THE REPUBLIC OF TURKEY MUGLA SITKI KOCMAN UNIVERSITY GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES

DEPARTMENT OF GEOLOGICAL ENGINEERING

IDENTIFICATION OF HOT AND COLD SPRINGS USING THERMAL INFRARED REMOTE SENSING AND IN-SITU MEASUREMENTS IN MEDITERRANEAN REGION

MASTER THESIS

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THESIS CONFIRMATION

The thesis, prepared by TUĞBA GÜRCAN, titled as "IDENTIFICATION OF HOT AND COLD SPRINGS USING THERMAL INFRARED REMOTE SENSING AND IN-SITU MEASUREMENTS IN MEDITERRANEAN REGION" has been accepted unanimously/majority by the jury listed below that fulfils the necessary conditions for master degree of Department of Geological Engineering at 21/09/2016.

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I declare all results and information in this document have been obtained and presented in accordance with scientific and academic ethic rules. I also declare that all original information and results belong to someone else that were not achieved within the study of this thesis were referenced by ethic rules of academy and science.

Tuğba GÜRCAN 21/09/2016

ÖZET

AKDENİZ BÖLGESİNDE SOĞUK VE SICAK SU KAYNAKLARININ TERMAL KIZILÖTESİ UZAKTAN ALGILAMA VE YERİNDE ÖLÇÜMLER İLE BELİRLENMESİ

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Yüksek Lisans Tezi Fen Bilimleri Enstitüsü Jeoloji Mühendisliği Anabilim Dalı Danışman: Yrd. Doç. Dr. Bedri KURTULUŞ Haziran 2017, 90 sayfa

Bu tezde, yerinde ölçümler ve termal kızılötesi görüntüleri kullanılarak sıcak ve soğuk su kaynaklarının Türkiye'de Akdeniz Bölgesinde haritalaması yapılmıştır. Yerinde yüzey, derinlik su sıcaklığı, iklim verileri ve derinlik ölçümleri veri kaydediciler kullanılarak toplanmıştır. Landsat 8 TIRS bant (Termal Kızılötesi Sensörleri) görüntüleri yerinde ölçümler ile karşılaştırılmıştır. Elektriksel iletkenlik, pH ve tuzluluk ölçümleri de toplanarak gölün dibindeki giriş yerlerinin daha iyi tanımlanması yapılmıştır. Yerinde ölçümler Ampirik Bayes Kriging (EBK) kullanılarak tahmin haritaları oluşturulmuştur. Yerinde ölçümler ve Landsat 8 görüntüleri hücre hücre karşılaştırılarak korelasyon katsayısı en iyi (R²) olana göre hesaplanmıştır ve en uygun regresyon denklemi oluşturulmuştur. Sonuçlar verinde şu sıcaklığın ölçümleri ile Landsat 8 TIR görüntülerinin iyi bir korelasyon katsayısına $(R2 \ge 0.86)$ ulaşabilirliğini göstermektedir. Yerinde ölçümlerinin haritalama sonuçları da Köyceğiz Gölü'nün kuzey doğu kısmında göl dibinde soğuk su girişlerinin olduğunu ortaya koymaktadır. Sıcak su kanıtları ise Sultaniye bölgesinin yakınında Köyceğiz Gölü'nün güney batı kesiminde bulunmaktadır. Köyceğiz gölünün derinliğe göre şekilleri de çizilerek gölün termal istifi de çıkarılmıştır. Göcek-Fethiye Körfezi'nde kıyı kesiminde soğuk su girişleri tespit edilmiştir. Bu bağlamda, bu tezin çıkmasında finansal olarak katkıları olan TÜBİTAK (112Y137) projesine, Sıtkı Koçman Vakfı'na ve Fransa Konsolosluğuna teşekkür ederim.

Anahtar Kelimeler: Sıcaklık, Uzaktan Algılama, Kaynak, Köyceğiz Gölü, Fethiye Göcek Körefezi

ABSTRCAT

IDENTIFICATION OF HOT AND COLD SPRINGS USING THERMAL INFRARED REMOTE SENSING AND IN-SITU MEASUREMENTS IN MEDITERRANEAN REGION

Tuğba GÜRCAN

Master of Science (M.Sc.) Graduate School of Natural and Applied Sciences Department of Geological Engineering Supervisor: Asst. Prof. Dr. Bedri KURTULUŞ Haziran 2017, 90 pages

In this thesis, in-situ measurement and thermal infrared imagery was used to map hot and cold springs of Mediterranean Region in Turkey. In-situ surface, depth water temperature, climatic data and bathymetry measurement were collected using data loggers. Landsat 8 TIRS Bands (Thermal Infrared Sensors) images were compared with in-situ measurements. Electrical conductivity, pH and salinity measurement were also collected at the bottom of the lake to better understand the groundwater discharge evidence in the lake. In-situ measurement was interpolated using Empirical Bayesian Kriging (EBK). In-Situ measurement and Landsat 8 Images were compared pixel by pixel and appropriate regression equation were calculated according to the best coefficient of correlation (R2). The results show that in-situ measurement of the temperature of the water surface can reach a good correlation (R2 \geq 0.86) with Landsat 8 TIR images. The mapping results of in-situ measurements also reveal that at the north east part of the Köyceğiz Lake there exist several evidence of cold spring at the bottom of the Lake. Hot spring evidence was located in the South-West part of the Köyceğiz Lake near the Sultaniye region. Thermal stratification of Köyceğiz Lake is also demonstrated using the depth vs. temperature graphs. There exist also some evidence of cold spring at Göcek-Fethiye Bay, which are located on the coastal line. In this regard, we would like also to thank TUBITAK project (112Y137), French Embassy in Turkey and Sıtkı Kocman Foundation for their financial support.

Keywords: Temperature, Remote sensing, Spring, Köyceğiz Lake, Göcek Bay

RESUME

IDENTIFICATION DE SOURCE CHAUD ET FROID EN UTILISANT TÉLÉDÉTECTION INFRAROUGE THERMIQUE ET MESURES IN SITU EN REGION DE LA MEDITERRANEE

Tugba GURCAN

Thèse du Master

Faculté des Sciences Fondamentales et Appliquées Superviseur: Asst. Prof. Dr. Bedri KURTULUŞ

Juin 2017, 90 pages

Dans cette thèse, Les mesure in-situ et l'imagerie infrarouge thermique a été utilisée pour cartographier les sources chaudes et froides de la région méditerranéenne en Turquie. In-situ surface, température de l'eau de profondeur, les données climatiques et la mesure de bathymétrie ont été recueillies à l'aide des enregistreurs de données. Landsat 8 TIRS Bands images (capteurs infrarouges thermiques) ont été comparés avec des mesures in-situ. La conductivité électrique, le pH et la mesure de la salinité ont également été recueillies au fond du lac afin de mieux comprendre les éléments de preuve à décharge des eaux souterraines dans le lac. Mesure in situ ont été interpolées à l'aide Empirique Bayésien Krigeage (EBK). In-Situ mesure et Landsat 8 images ont été comparés pixel par pixel et l'équation de régression appropriée ont été calculés selon le meilleur coefficient de corrélation (R²). Les résultats montrent que in situ mesure de la température à la surface de l'eau peut atteindre une bonne corrélation (R2 \geq 0,86) avec des images Landsat 8 TIR. Les résultats de la cartographie des mesures in-situ révèlent également que dans la partie nord-est du lac Köyceğiz il existe plusieurs preuves de la source froide au fond du lac. Les preuves de source chaude ont été situées dans la partie sud-ouest du lac Köyceğiz près de la région Sultaniye. Il existe également des preuves de la source froide à Göcek-Fethiye Baie qui sont situés sur la ligne côtière. Stratification thermique du Köyceğiz lac est également démontrée en utilisant la profondeur par rapport à des graphiques de température. À cet égard, nous aimerions également remercier projet TUBITAK (112Y137), Ambassade de la France en Turquie et Fondation Sıtkı Kocman pour leur soutien financier.

Mots Clés : Température, Télédétection, Source, Köyceğiz Lac, Fethiye-Göcek Baie

Dedicated to my family.

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SYMBOLS AND ABBREVIATIONS

$^{0}C/C$	Celsius Degree
%	Percent sign
σ	Sigma (Stefan-Boltzmann constant)
с	Speed of light
h	Planck's constant
Κ	Kelvin
\mathbb{R}^2	Coefficient of determination
Kg / m^2	Kilogram Per Square Meter
Km	Kilometer
μm	Micrometer
m	Meter
mm	Milimeter
km ²	Square Kilometer
m ²	Square Meters
m ³ /s	Cubic Meters Per Second
m/s	Metre Per second
EC	Electrical Conductivity
W	Watt
λ	Lambda
ρ	Rho
3	Reversed Ze (Epsilon)
min	Minimum
max	Maximum
μS/cm	Micro Siemens Centimeter
pН	Negative Logarithm Of [H ⁺]
Ppm	Parts per million
EBK	Empirical Bayesian Kriging
RS	Remote Sensing
GIS	Geographic Information System
Vs	Versus
ETM	Enhanced Thematic Mapper
	${}^{9}C/C$ ${}^{9}6$ ${}^{9}6$ ${}^{9}6$ ${}^{9}6$ ${}^{9}6$ ${}^{1}6$ ${}^{1}6$ ${}^{1}6$ ${}^{1}7$ ${}$

TIR	Thermal Infrared
TIRS	Thermal Infrared Sensors
OLI	Operational Land Imager
AVHRR	Advanced Very High Resolution Radiometer
NOAA	National Oceanic and Atmospheric Administration
MODIS	Moderate resolution Imaging Spectroradiometer
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
SLSTR	Sea and Land Surface Temperature Radiometer
NASA	National Aeronautics and Space Administration
VIS	Visible-Infrared
NIR	Near-Infrared
SWIR	Short-wavelength Infrared
LWIR	Long-wavelength Infrared
SGD	Submarine Groundwater Discharge
CDT	Conductivity Depth temperature
Т	Temperature
LST	Land Surface Temperature
ТОА	Top Atmospheric Radiance
TDS	Total Dissolved Solids
MGM	Turkish State Meteorological Service
MTA	General Directorate of Mineral Research and Exploration
USGS	United States Geological Survey
U.S	United States
NY	New York
YSI 6600	Multi-Parameter Water Quality Sonde
HOBO	Data Logger
DN	Digital Number
UTM	Universal Transverse Mercator
WGS	World Geodetic System
GMT	Greenwich Mean Time
Μ	Radiance Multiplier
В	Radiance Add
K1	Thermal conversion constant for the band (W/m ² x ster x $\mu m)$
K ₂	Thermal conversion constant for the band (Kelvin)

Na	Sodium
Ca	Calcium
Κ	Potassium
Ca	Calcium
Mg	Magnezyum
HCO ₃	Bicarbonete
Cl	Chloride
SO ₄	Sulfate
SiO ₂	Silica
NO ₃	Nitrate
В	Boron
Al	Aluminum
Fe	Iron
Br	Bromine

1. INTRODUCTION

1.1. Research Goal and Questions

Evaluating physicochemical parameter of surface and ground/water is a key tool in water management. A number of in-situ water samples can be collected in the field, which can be time consuming and costly. In addition, if there exist few samples, spatial variability of the study area cannot be mapped accurately. Water temperature is one the most important physicochemical parameter to understand the intrusion of hot and/or cold spring in the water environment. Water temperature can also be estimated from satellite images (Landsat thermal infrared data). The accuracy of temperature estimated from these satellite image data is comparable to in-situ monitoring. Other important physicochemical parameters such as specific electrical conductivity, salinity and pH are also useful to validate the spatial distribution of the water parameters. The research goal is to find an appropriate methodology to estimate the water temperature and other physicochemical parameter using in-situ measurement and compare with remote sensing data in the Mediterranean region.

The research questions, according to the defined goal above will basically try to answer the following questions:

- Estimation of surface temperature from Landsat satellite thermal infrared image can be used to identify hot and cold spring?

- What kind of information can give us a high resolution surface and depth insitu measurement? Can we find new discover of hot and cold spring in a large Lake and Bay in Mediterranean region?

- Can we determine the type of stratification of Lake Köyceğiz and Fethiye-Göcek Bay? Surfer 9. Data type transformations were implemented by Global Mapper v12. All other mapping and visualisation were done by ArcGIS 10.

1.2. Scope of the Study

This study is motivated by the physicochemical water parameter mapping and as well as to identify existing and new discover of hot and cold springs in the Mediterranean region (Köycegiz Lake and Fethiye-Göçek Bay) using in situmeasurement and remote sensing data. The study has three overall scopes:

1. To map surface and depth water physicochemical in-situ measurement using Empirical Bayesian Interpolation (EBK) method and identify hot and cold spring area;

2. To establish atmospheric/Geometric corrections of Landsat 8 Thermal images and transform the Digital Number to surface water temperature using RS and GIS software (ARCGIS 10.3.1);

3. To compare surface temperature with satellite images over different areas in the Mediterranean Region for an appropriate linear regression analysis.

4. Using the in-situ measurement the temperature stratification of Lake Köyceğiz and Fethiye-Göcek Bay was determined.

1.3. Thesis Outline

The general outline of the thesis is separated in the two main parts. The first part of the thesis covers three chapters which started with a general content describing the introduction, literature review the description of the study area. The second part of the thesis focus on the methodology applied and obtained results and conclusion.

Chapter 2 deals with the localization, general description of the geology and hydrogeology of the study area. Chapter 3, the first part deals with in-situ measurement and data mining. The second part mainly focused on the mathematical background of the interpolation technique and satellite thermal image analysis. The quality of the data is also discussed in this chapter.

Chapter 4 is dedicated to the result comparison based on the result derived from interpolation and LANDSAT 8 derived surface temperature. The depth vs temperature was plotted and evidence of thermal stratification for Lake Köyceğiz

was determined. Eventually, Chapter 5 ends up with conclusion, discussion, and recommendation and also suggests further areas of the study.

1.4. Literature Review

Water temperature in lakes, streams and coastal areas is an important indicator for several purposes (water quality, aquatic organism, land use, etc..) that is affected primarily by ground/surface water inputs (Brown and Krygier, 1970; Beschta et al., 1987; Poole and Berman, 2001; Hannah et al. 2008; Handcock 2012; Dörnhöfer and Oppelt, 2016). Water temperature change can be due to the anthropogenic effects and/or irrigation, energy production, transportation, fishery and also natural conditions. Table 1 show literature related to use for surface temperature products for monitoring purposes. Table 1 present also the literature for different types of temperature satellite sensors with coarse/fine resolutions on a daily basis. All authors agree that if there exist in-situ measurement, high accuracies can be achieved to predict the water temperature with different kind of instrumentations.

Authors	Sensor	Range	Study Area	Time	Process
Torgersen et al. (2001)	Airborne thermal infrared	5 to 27 °C	Western and Eastern Oregon, USA	1999	Evaluating the physical factors that influence the accuracy of thermal remote sensing
Handcock et al. (2006)	MODIS, ASTER, LANDSA T 7ETM+	Average temperature 17.2 ±5.2 °C	Washington State, USA	2001-2002	Stream temperature estimation for different scales
Alcantara et al., (2010)	MODIS	12 to 35 °C	Brazil	2003-2008	Analyses of heat fluxes and calculation surface energy budget
Tonollaa et al, (2010)	Thermal infrared Camera	7.4 to 30 °C	Alpine River floodplains Tagliamento, Italy	2004	TIR images to quantify surface temperature patterns at 12-15 minute interval over 24h cycles
Bresciani et al., (2011)	MODIS	0 to 30 °C	Lake Trasimeno Lake Garda, Italy	2005-2008 2004-2009	Temperature-Chla relationship

Table 1 1.Literature survey related to surface temperature estimation

Politi et al., (2012)	AVHRR	0 to 30 °C	Lake Geneva, Switzerland Balaton, Hungary	1993-1996 2001-2005	Spatial distribution of temperature for European Lakes
Simon et al., (2014)	Landsat ETM+	4 to 25 °C	Lake Bariousses, Lake Bimont, France	2009-2013	Historical prediction of temperature for different lakes
Tamborshi et al. (2015)	Airborne thermal infrared (TIR)	17 to 23 °C	Long Island, NY, USA	2013-2014	Investigate submarine groundwater discharge (SGD)
Liu et al, (2016)	Airborne thermal infrared (TIR)	9 to 20 °C	Heihe River, China	2012	Investigate surface groundwater interaction

Temperature and specific conductance are the two environmentally friendly used physicochemical parameters. Surface water temperature is a key physical parameter to monitor fundamentals of water. Specific conductance of water is also an essential chemical parameter that measure the ability of a water to conduct electricity at a specific temperature. Especially, these two parameters can be used to detect hot/cold water inputs in sea, lakes and rivers.

Williams (1976) stated that underwater thermal springs can be found far away from the coastal line and depth water. However, he told also that there could exist also some springs near the coastal areas.

The study of groundwater discharge (hot/cold springs) into sea/lake via coastal or submarine outflows began to come out in the literature at the begging of 1990s (Moore, 1996; Younger, 1996). The identification of the submarine groundwater discharge is also stated as very complicated and need specific techniques such as aerial thermal remote sensing or oceanographic surveying (Kazami, 2008).

Manga (1998), in his study record water temperature at springs in Oregon Cascades area. In this study, the surface water heat flux was compared with the regional groundwater heat flux. Anderson (2005) stated in his study that water temperature is an essential tracer to evaluate the groundwater system.

Torgersen et al. (2001) studies that the field of research about the remote sensing technology to predict the temperature is a very young and unexplored.

Baena (2008) has taken periodic in-situ measurement of water temperature and electrical conductivity values of a karstic springs located in Spain in order to evaluate the dynamics of the karstic system. He stated that the temperature and electrical conductivity had to be evaluated together.

Other studies about the groundwater temperature is done by Long (2009). He studies about groundwater modeling and calibrate the model with water temperature. Luhman (2011) show results that aquifer geometry can be predicted by using precipitation- temperature classification. He shows also that the temperature can be used as a tracer.

Mejias et al. (2012) stated that "The discharge of groundwater into the marine environment occurs when coastal aquifers possess a hydraulic connection with the sea and a great hydraulic head. Most discharges occur either on the coastline or the continental shelf and tend to concentrate few hundred meters from the coast."

There are over a hundred lakes in Turkey. Most of them locates in the area known as the Lake District in southwestern Turkey. The area includes saline and freshwater lakes. These lake systems can be formed during the Pleistocene period or can be the remnants of a central Anatolian lake (Kazancı et al. 2004). In Turkey, the most important studies about the study area is done by Bayarı (1995). In this study, they discover that Koycegiz Lake is a meromictic lake and has a two thermocline level. They also emphasis in their study the importance of water recharge at the bottom of the lake. Kazancı and Girgin (2001) work on thermal spring's hydrogeochemistry at Dalaman and Koycegiz. Another very important literature is done by Gökgöz and Tarcan (2006). They discover that the water temperature varies between 24 to 41 °C and enrich with Na, Ca. They also emphasize that lake water is influenced by thermal water inputs.

The latest work is done by Avsar et al. (2015) and Avsar et al. (2016). They collected 55 water samples from inland and coastal of Muğla. They found that 16 are geothermal and 10 are mineral water sources. The temperature of the water ranges between 18.3 and 39.2 °C. At the south west part of Koycegiz Lake (Sultaniye, Delibey, Kelgirme) the temperature of water is found hot. Near the Fethiye town, they also found a thermal spring called as Girmeler. The water properties in the region, according to laboratory analysis is given in Table 2.

Location	Sultaniye-1	Sultaniye-2	Sultaniye-3	Kelgirme	Delibey-1	Delibey-2
Х	642788	642853	642805	645593	644920	644921
Y	4082305	4082265	4082293	4078489	4080156	4080156
T (°C)	19.7	39.2	37	36.9	29.9	30.5
pН	7.29	6.45	6.54	6.39	6.81	6.3
TDS (ppm)	3419	25698	22965	29437	9885	27300
Na (ppm)	818	6904	6043	7808	2503	7344
K (ppm)	42	387	335	442	140	561
Ca (ppm)	255	1543	1436	1802	734	1465
Mg (ppm)	111	877	732	1031	363	907
HCO3 (ppm)	276	347	299	318	353	292
Cl (ppm)	1672	13584	12203	15697	4997	14549
SO4 (ppm)	228	1936	1811	2205	742	2088
SiO2 (ppm)	7	18	17	15	11	18
NO3 (ppm)	1	9	0	31	12	21
B (ppm)	0	4.6	3.6	0	1.4	4.4
Al (ppb)	124	886	0	487	234	5213
Fe (ppb)	230	1397	0	1269	460	7933
Br (ppb)	5	39	28	43	14	37
Water type	Na-Cl	Na-Cl	Na-Cl	Na-Cl	Na-Cl	Na-Cl

Table 1 2. Chemical analysis results of Köycegiz Bay waters according to Avsar et al. (2016)

There exist several studies about water quality monitoring using remote sensing. Remote sensing data are used to extract some information about water quality such as suspended soils, chlorophyll a (Chawira et al., 2013; Dube et al., 2014; Kibena et al., 2013; Verstraete et al., 1999).

Remote sensing give also special importance to the water management for different kind of application for water monitoring. Spatio-temporal information can be used using different electromagnetic band spectrum Landsat 8 satellite is recently launched in February 2013. It provides remote sensing data at high spatial resolution using the Operational Land Imager (OLI) and the thermal infrared sensors (TIRS). TIRS bands measure radiance at 100 m spatial resolution using two bands (10 and 12 μ m). They are resampled to 30 meters to match OLI multispectral bands (Lamaro et al. 2013). Landsat 7 ETM+ satellite providers also a remote sensing TIR image in the range 8 to 15 μ m. However Landsat 7 ETM+ has one band of TIR image. The TIR band has a spatial resolution of 60 m. The image was processed after 25 February 2010 and resampled to 30 meter/pixel. Landsat 7 ETM+ and Landsat 8 OLI TIR

bands has been newly applied in the last 10 year to predict Land Surface Temperature (LST) (Vlassova et al. 2014).

In this thesis, a new method of Kriging is used also to interpolate in-situ measurement (temperature, electrical conductivity, etc...) which named as Empirical Bayesian Kriging which was developed by Krivoruchko (2011). Empirical Bayesian Kriging method used a Bayesian rule to predict several variogram instead of single semi-variogram.

The present study focuses on determining possible hot/cold spring of Lake Koyceğiz and Fethiye-Göcek Bay by in-situ measurements and comparisons with Landsat 8 images (thermal bands). All the spatial interpolations maps were done using Empirical Bayesian Kriging (EBK) method and its results were correlated by in-situ measurements. By using spatial interpolation maps, remote sensing images result the evidence of the possible cold and hot areas were presented by EBK interpolation maps.

There exist several studies about water quality monitoring using remote sensing. Remote sensing data are used to extract some information about water quality such as suspended soils, chlorophyll a (Chawira et al., 2013; Dube et al., 2014; Kibena et al., 2013; Verstraete et al., 1999).

2. STUDY AREA

2.1 Localization of the Study Area

The Study area is located at the south and southwest part of Turkey in Muğla region. It is just the corner of the Aegean and Mediterranean Sea (Figure 2.1). The altitudes vary up to 2265 meters for Köyceğiz watershed and 1951 meters for Göcek watershed. According to 30 year temperature measurement of meteorological station in the region of Muğla, annual mean temperature observed as 15 °C. The long term summer mean temperature observed at 25 °C degrees and the winter mean temperature is observed at 6 °C degrees. The annual mean precipitation is as 1159.2 mm. Muğla region is also one of the areas that has the highest annual precipitation rate in Turkey. Mean annual meteorological values between 1950 and 2015 is given in Table 2.1 (Anonymous, MGM, 2015).

MUGLA	Jan.	Feb.	Mar	Apr	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec
Mean annual between (1950 - 2015)												
Mean Temperature (°C)	5.5	6.1	8.5	12.5	17.6	22.9	26.3	26.1	21.7	15.9	10.5	7
Mean Maximum Temperature (°C)	10	11	14.3	18.7	24.3	29.8	33.5	33.6	29.4	23	16.5	11.5
Mean Minimum Temperature (°C)	1.6	1.9	3.6	6.9	11.2	16.1	19.7	19.7	15.2	10.1	5.7	3.2
Average sun day (hour)	3.4	4.4	5.5	7.2	8.4	10.3	11.2	11	9.3	7	4.5	3.2
Average total day rainfall	14.9	13	11.1	9.5	8	3.7	1.7	1.3	2.7	6.6	9.9	14.6
Mean total rainfall (kg/m ²)	233.8	176.2	119.9	65.4	50.1	23.4	7.8	8	18.6	68.3	138.9	259
	The min	imum a	nd max	imum	tempe	erature	betwe	en 195	50 - 20	15		
Maximum Temperature (°C)	20.9	21.2	28.8	31.2	35.7	40.8	42.1	41.2	38.8	35	27.6	20.8
Minimum Temperature (°C)	-11	-9.9	-8.5	-3.6	1	6.7	10.5	10.9	5.6	0.2	-6.1	-8.4

Table 2 1.Mean annual meteorological values between 1950 and 2015 in Mugla Station.



Figure 2 1.Localization of the Study Area.

The first study area is located near the Köycegiz region. The name of the lake is taken as the village name. The total square area of Köycegiz Lake and of the lagoon is approximately 830 km2 and 130 km2. Köycegiz Lake is directly connected through surface water in the lagoon and further into the Mediterranean Sea by the lagoon and its various branches. There are total 3 main rivers across the lake who's recharging the lake. The highest flow rate river is named as Namnam River, located at the south west part of the river (Figure 2.1). The discharge of the Koycegiz Lake is 33 m3/s according to Bayari et al. (2001). Alagöl and Sülüngür lakes are also inside of the lagoon and it's a branch of Dalyan Channel. Köyceğiz Lake and Dalyan Lagoon, declared as a special protected area in 1988 with a diverse type of species. The Caretta Caretta turtles and the ruins of the Accient City of Caunos and Lycian rock tombs are found near the river (Gurel et al., 2005).

Göcek-Feyhiye Bay is located near the Göcek and Fethiye village. A Göcek-Fethiye watershed is about 450 km2. The main geological formations are: various kinds of limestones, green rocks, such as serpentine, and alluviums. The main tectonic and

morphological characteristics are the numerous faults, karsts and flood cones. The altitude varies up to 1951 m.



Figure 2 2.Digital Elevation Model and Batymetry Map of the Study Area.

A general view of Köyceğiz Lake and Fethiye- Göcek Bay is given in Figure 2.3 and Figure 2.4.



Figure 2 3.A general view of Köyceğiz Lake from Google Earth



Figure 2 4.A general view of Fethiye-Göcek Bay from Google Earth

2.2 Geology/Hydrogeology of the Study Area

Turkey has a complex geological evolution due to its geographical and geological position between Eurasian, Pan African and Arabian plates. There exist several literature and discussion about the geology/hydrogeology of the study area (Collins and Robertson 1997; 1998; 1999; 2003; Gessner et al., 2001a; 2001b; 2001c; Candan et al., 2001; Whitney and Bozkurt, 2002; Sözbilir et al, 2011; Tansug and Oztunalı, 1976; Gunay and Bayarı, 1989; Kazancı et al., 1992).

The geology in this region is mainly composed of allochthonous and autochthonous Flysch and karstic facies overlain by plio-quaternary sediments (Graciansky, 1968). Due to tectonic activities, several faults were formed in this area. Details about the geology and more maps can be found in Bayari et al. (1995). The Dalaman, Sarısu, Tersakan, Namnamcay and Yuvarlakcay rivers are the major surface waters in the study area. The Namnamcay River flows within the ophiolitic melange of the Marmaris nappe and its flow is negligible during summer. Most of the discharges of the Dalaman and Namnamcay rivers are supplied by karstic discharges from the allochthonous limestones of the Lycian nappes (Bayarı et al., 1995). The Namnamcay and Yuvarlakcay rivers, rain and alluvial groundwater (Bayarı et al., 1995) and discharged to the Mediterranean Sea by the Dalyan Channel.

Köycegiz Lake is composed of two water layers, with the boundary between the two layers being around 12 m from the surface. The bottom water chemistry is similar to thermal water in Sultaniye due to thermal groundwater discharges located at the lake bottom, whereas the upper layer water chemistry is similar to fresh water (Bayarı et al., 1995, 2000). According to the lake water balance equation Bayarı et al. (1995) stated that the amount of water must be supplied by the lake bottom springs.

The mountains of the Fethiye-Göcek watershed are mainly covered by karstic areas and groundwater is coming from the carbonate aquifers. The main rivers are Değirmendere, Karacasu, Cerci and Kargı and Eldirek rivers. Groundwater is used also for irrigation and drinking water purposes in the area. Major aquifers for cold groundwater in the study area are found in the brackish and locally karstic limestones of the Lycian nappes and Quaternary alluvium. The cold springs discharge from the contact between limestone and alluvium or ultramafic and alluvium (Yesertener, 1986). In this study, MTA (2002) maps are used and shown in figure 2.5.

We can divide the geological formations according to the hydrogeological point of view as fallow:

The permeable formations are mainly composed with limestones. The study area covered by Triassic, Cretaceous and Eocene limestone. The alluvium also is considered as permeable formation in the area. Semi- permeable formation are schistous sandstones, sandstone. The area is covered by Eocene Flysch. The impermeable formations are considered as peridotite and basalt.



Figure 2 5. The detailed geological map of Study Area

3. RESEARCH METHODOLOGY AND MATERIAL

3.1. In-Situ Measurement

Using Mugla Sıtkı Kocman University geological engineering floating platform (Fig3.1), specific conductance, temperature, pH and depth values were measured with the YSI 6600 and Horiba U2 devices in surface and depth of Lake Köyceğiz and Fethiye-Göcek Bay at specific grid (Fig 3.2). When the depth of the water and the coordinates were measured by GPS. The in-situ measurement details are given in Table 3.1.



Figure 3 1.Muğla Sıtkı Kocman University floating platform (Avsar et al., 2015)



Figure 3 2.Specified in-situ measurement grid

	Parameters			In-Situ Measurement time interval		
Date	Surface Temperature	Depth CDT	Satellite Availability (Landsat 8)	Start	End	
19.07.2013	+	+	-	08:45	13:28	
20.07.2013	+	+	-	07:34	15:34	
22.07.2013	+	+	-	10:29	18:23	
23.07.2013	+	+	+	08:32	17:43	
24.07.2013	+	+	-	09:39	12:23	
25.07.2013	+	+	-	11:55	14:19	
26.07.2013	+	+	+	09:27	10:27	
18.08.2013	+	+	-	11:16	18:22	
19.08.2013	+	+	-	11:33	14:28	
20.08.2013	+	+	-	11:05	14:26	
23.08.2013	+	+	- /	12:42	16:09	
24.08.2013	+	+	+	13:51	18:02	
25.08.2013	+	+	- /	12:37	18:07	
26.08.2013	+	+		11:33	18:07	
27.08.2013	+	+	-	10:30	19:14	
28.08.2013	+	+	-	11:03	17:04	
29.08.2013	+	+	-	13:18	17:26	
30.08.2013	+	+	-	09:31	16:32	
31.08.2013	+	+	-	09:43	15:17	
2.06.2014	+	+	-	12:27	19:31	
3.06.2014	+	+	-	09:19	19:12	
5.06.2014	+	+	-	08:50	19:18	
6.06.2014	+	+	-	09:10	19:45	
7.06.2014	+	+	+	08:46	19:17	
27.08.2014	+	+	+	09:59	19:53	
28.08.2014	+	+	-	10:53	17:59	
29.08.2014	+	+	-	10:00	16:55	
30.08.2014	+	+	-	09:26	19:07	
31.08.2014	+	+	-	10:20	15:22	

Table 3 1.In-Situ measurement information (Avsar et al., 2015)

CDT : Conductivity, Depth, Temperature

3.2 Interpolation Methodology: Empirical Bayesian Kriging

Empirical Bayesian Kriging is a geostatistical interpolation method that automates the difficult aspects of building a valid kriging model. Other kriging methods require to manually adjust parameters, but EBK automatically calculates these parameters through a process of subsetting and simulations (Chiles and Delfiner, 1999). EBK method can handle moderately nonstationary input data estimates and then uses many semivariogram models rather than a single semivariogram. EBK accounts for the error introduced by estimating the underlying semivariogram through repeated simulations (Finzgar et al., 2014).

EBK method is based on 3 main steps: Firstly, a semivariogram model is estimated from the observed data set. Secondly, a new value is simulated at each of the observed data locations by using the semivariogram estimated on the previous step. Thirdly, a new semivariogram model is estimated from the newly simulated data at the second step. By using Bayes' rule, a weight for this semivariogram model is calculated which shows how likely the observed data can be generated from the semivariogram. Second and third steps are repeated. This process creates a spectrum of semivariograms (Pilz and Spöck, 2007). New parameters are needed also for EBK such as subset size which defines the number of points in each subset, overlap factor which specifies the degree of overlap between subsets and number of simulation which specifies the number of semivariogram that will be simulated for each subset.

3.2.1. EBK Process

For the creation of semi-variogram cloud in EBK; subset size, overlap factor, the number of simulations, maximum neighbors, minimum neighbors and radius (m) are determined by order: 100, 1, 100, 50, 25 and 100. The solid line semi-variogram cloud shows the best performance for the obtained results. Cross validation results also derived for each interpolation and used to select for best fit (Fig 3.3).
Geostatistical wizard - Empirical Bayesian Kriging step	1 of 2 - Method Pr	– 🗆 X
	General Prop	erties
	Subset Size	100
	Overlap Factor	1
	Number of Simu	lations 100
	Output Surface	Type Prediction
	Transformation	Empirical
	E Search Neigh	borhood
	Neighborhood	ype Smooth Circular
	Smoothing fact	or 1
	Radius	100
	Predicted Va	lue
	x	645125.9
	Y	4082067
	Value	11874.63
· · · · · · · · · · · · · · · · · · ·	Neighbors (7)
\		
Simulations at (645125.9, 4082067)		
y -10 ¹		
6.209		
4.967		
3.725		
2.483		
1.242		
0 0.742 1.484 2.226 2.969 3.711 4.453 5.195 5.937 6.679 7 Distance (7.421 8.163 Meter), h ·10 ⁻²	
Semivanograms A Nugget A Partial Sill A Range A Transformation		

a.

Semi variogram cloud according to bayesing kriking (solid line show the best fit semi-



b. cross validation and best fit results

Figure 3 3.An example of EBK interporpolation for a. semi variogram cloud b. cross validation results and best fit

3.3. Thermal Infrared (TIR) Remote Sensing

Understanding the temperature of ocean, sea, lakes, and rivers are crucial for understanding the hydrosystem (Flipo et al. 2014, Vilmin et al. 2016). The temperature data coming from ships buoys and other type instruments can be very expensive and were very insufficient to characterize the area. The spatial resolution (pixel size) of remote sensing technology has recently developed and have the possibility to fill the gap to collect the spatial data. Table 3.1 shows the currently available TIR imaging satellites with their pixel size.

TIR Satellites	Pixel size [m]	Source
Landsat 7 and 8	100, 60 (30)	NASA (2013a)
ASTER	90	Satellite İmaging Corporation
		(2013a,b)
MODIS	250,500,1000	NASA (2013b)
AVHRR-NOAA	1100	NOAA (1997)
Sentinel-3A SLSTR	1000	COPERNICUS (2016)

Table 3 2.TIR imaging for different type of satellites

Landsat-8 was successfully launched on 11 February 2013 and deployed into orbit with two instruments on-board: (1) the Operational Land Imager (OLI) with nine spectral bands in the visual (VIS), near infrared (NIR), and the shortwave infrared (SWIR) spectral regions; and (2) the Thermal Infrared Sensor (TIRS) with two spectral bands in the LWIR. The relative spectral response of the TIRS bands is presented in Figure 3.4 The spatial resolution of TIRS data is 100 m with a revisit time of 16 days, and as a result, applications are different than those of other sensors with coarser spatial resolutions and shorter revisiting times. Landsat-8 images are already freely distributed through the U.S. Geological Survey (USGS) (Figure 3.5).



Figure 3 4.Landsat 8 Spectral response function

The satellite instrument measures the emitted thermal and/or reflected solar energy of/by the earth and expresses the intensity measured in each part of the spectrum (the 'bands' of the instrument) as a Digital Number (DN). This DN of each image pixel is the characteristic output of the satellite instrument. High DN values represent high intensities, while low DN values represent low intensities (USGS, 2016).



Figure 3 5.An example view of Landsat 8 download web page (http://earthexplorer.usgs.gov/)

The dataset used in this study included images is presented in Table 3.2. The metadata used for Landsat 8 TIR for Band10 is given in Table 3.3. For Landsat 8, bands 10 are used to estimate the temperature data value of each pixel in the image.

All Landsat images were further rectified to a common Universal Transverse Mercator (UTM) WGS 84 coordinate system. Table 3.4 give the temperature values at the time of accruing the images.

Landsat 8 Name	Acquisition date	Cloud	Sun	Sun Azimuth
		Cover (%)	Elevation	
LC81790352013204LGN00	23.07.2013	1.10	65.00	123.46
	10:42:46 GMT+2, K			
LC81800342013211LGN00	30.07.2013	0.06	63.23	128.85
	10:48:35 GMT+2, K			
LC81790342013236LGN00	24.08.2013	1.16	57.80	139.42
	10:42:27 GMT+2, G			
LC81790352014159LGN00	08.06.2014	14.20	67.80	120.22
	10:40:28 GMT +2, G			
LC81790352014239LGN00	27.08.2014	0.08	57.75	137.96
	10:40:53 GMT+2, G			

Table 3 3.Details describing selected LANDSAT 8 scenes

G: Göcek-Fethiye; K: Köyceğiz Study area

Table 3 4. Metadata for Landsat 8 TIR for Band 10

	Band 10
Radiance Multiplier (M)	0.0003342
Radiance Add (B)	0.1
K1 (watts/meter ² x ster x μ m)	774.89
K2 (Kelvin)	1321.08

Table 3 5.Tem	perature value	s at the capture	e time (hourly	temperature aver	age of 10:00-11:00)

of	the	LA	ND	SA	Т	8	images
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Landsat 8 Name	Acquisition	Mugla	Köyceğiz	Fethiye
	date	Meteorological	Meteorological	Meteorological
		Station	Station	Station
		(°C)	(°C)	(°C)
	23.07.2013			
LC81790352013204LGN00	10:42:46	32.00	35.40	35.35
	GMT+2, K			
	30.07.2013	24.70	26.00	27.00
LC81800342013211LGN00	10:48:35	54.70	30.90	37.00
	GMT+2, K			
	24.08.2013	20.05	24.45	24.25
LC81790342013236LGN00	10:42:27	50.95	54.45	54.25
	GMT+2, G			
	08.06.2014			
LC81790352014159LGN00	10:40:28	28.00	28.40	28.50
	GMT +2, G			
	27.08.2014			
LC81790352014239LGN00	10:40:53	34.90	36.00	32.50
	GMT+2, G			

G: Göcek-Fetihye; K: Köyceğiz Study area, all meteorological station are located in the city center.

3.3.1. Mathematical Background For TIR Remote Sensing of Surface Water

In Figure 3.6 a flowchart with a recommended processing procedure for TIR images is presented (Handcock, et al., 2012).

The methodology to convert Digital Number (DN) of the TIRS to temperature value can be done first by converting DN to Top Atmospheric Radiance (TOA) and then using TOA values, brightness temperature can be calculated as shown in Eq. (1) and Eq. (2). Table 2 shows the parameters that are needed for brightness temperature calculations.

$$TOA = M \times DN + B \tag{1}$$

Where; M: is the Radiance Multiplier

B: is the Radiance Add

TOA is the spectral radiance in W/(m2 x ster x um)

TB (Kelvin) = K2/(Ln(K1/TOA+1))

(2)

Where K1 and K2 are parameters of band specific thermal conversion constant. TB is brightness temperature in Kelvin.



Figure 3 6.Suggested flowchart for Landsat 8 image processing (Handcock et al., 2012)

The temperature values obtained by TB are for black body. Therefore, the emissivity (ϵ) become necessary according to the nature of land cover. Land Surface Temperature can be calculated using Eq. (3) by using an average emissivity values for water (ϵ water = 0.98) as stated in Du et al. (2015).

$$T = TB/(1 + (\lambda + TB/\rho) \times \ln \varepsilon)$$
(3)

 λ =wavelength of emitted radiance (λ = 11.5 um for Landsat 7, λ = 10.8 for Landsat 8 Band 10, λ = 12 for Landsat 8 Band 11) (Markham and Barker, 1985)

 $\rho=h*c/\sigma$ (1.438x10-2 m K), $\sigma=$ Boltzmann constant (1.38x10-23 J/K), h=Planck's constant (6.626 x 10-34 J s), and c= velocity of light (2.998 x 108 m/s).

The brightness temperature is calculated in degree Kelvin. Then, the temperature values can be convert in degree Celsius by subtracting 273.15° from degrees Kelvin. All these calculation are done using ArcGIS platform (ESRI, 2013).

Except minimum and maximum values, Geo-ANFIS provided more accurate results than Kriging for ⁶⁵Cu and ⁷⁵As.

3.4 Advantages, Disadvantages and Limitations of TIR Remote Sensing Methods

The potential of remote sensing for water management is generally well known. However, there are also some studies indicate a number of disadvantages. In order to better understand the potential of remote sensing, the advantages and disadvantages are summarized in Table 3.5.

	Advantages	Disadvantages
Data Collection	Data can be collected from local to regional scale	The temporal image is limited
	The image are generally continuous and repeatedly, The image can be free of use and low cost	The image can be cloudy.
Image processing	If there exist no measurement of temperature in the field, the temperature pattern can be obtained from the data	Expert knowledge is required to interpret the data, Corrections of temperature can be time consuming and expensive due to commercial programs
Applications	The study area can be measured repeatedly	The surface temperature may not be representative. The Land body can influence the water body.
	The images are consistent and it can be used for calibration of models	The spatial resolution of image can be not sufficient to interpret for different scales. TIR measurement can only measure at the top layer of the surface.

Table 3 6.Advantages and disadvantages of TIR remote sensing

The limitation of the airborne technology also is a discussion subject in the literature. The spatial resolution of the image determine the delineation of water body to the coastal site. Temporal resolution of satellite is limited and revisit time of a satellite depend on the orbit. Another limitation is the pixel size. The pixel size have an influence of the data and cause a heterogeneity of land and water. There is also effect of other surface, object which can be found at the study area. Atmospheric absorption and scattering limits the accuracy of measure of the temperature.

3.5 Sensitivity Analysis

A sensitivity analysis also is needed to understand the uncertainty contribution of external and internal factors to approximate the water temperature distribution. The sensitivity analysis show that external and internal factor which influence on uncertainty could be reasonable and the results is not change extremely for this study. Unfortunately, all factors could not be analyzed due to time limitation of the thesis however the factor which can be influences the uncertainty by the literature is given in Table 3.6.

 Table 3 7.An overview of the uncertainty analysis for internal and external factor to calculate temperature prediction

Influence factor	Type of factor	Estimated Bias for temperature (°C)
Atmospheric Correction	External	$\pm 0.5 (1.5^{\circ}C \text{ at coastal part})$
Emissivity	External	± 0.5 °C
Surface effects	External	± 2-3 °C
Measurement error of Satellite	Internal	± 0.6 °C
Measurement error of data	Internal	± 0.22 °C
logger		
Undetected Cloud Cover	Internal	- 10 °C

4. RESULTS

4.1 EBK Interpolation Results for in-situ Measurement

Fig. 4.1, Fig. 4.2, Fig. 4.3 and Fig. 4.4 show the EBK prediction of temperature at surface and depth for Köyceğiz and Fethiye-Göcek Bay. Salinity, specific conductance at depth EBK maps of Köyceiz Lake are given in Appendix I. Specific conductance, pH, salinity at depth maps of the Fethiye-Göcek Bay are given in Appendix II. All Errors maps, statistics and semi-variograms for surface and depth temperature interpolations are given in Appendix III and Appendix IV

In order to better compare and analyze the interpolation results for each maps a number is given as shown in Table 4.1

Date	Numbering	Date	Numbering	Date	Numbering
19/07/2013	STK 1	20/07/2013	STK 2	22/07/2013	STK 3
23/07/2013	STK 4	24/07/2013	STK 5	25/07/2013	STK 6
26/07/2013	STK 7	18/08/2013	STK 8	19/08/2013	STK 9
20/06/2013	STK 10	21/08/2013	STK 11	STK: Surface	Temperature
				Measurement	of Köycegiz
				Lake	
Date	Numbering	Date	Numbering	Date	Numbering
19/07/2013	DTK 1	20/07/2013	DTK 2	22/07/2013	DTK 3
23/07/2013	DTK 4	24/07/2013	DTK 5	25/07/2013	DTK 6
26/07/2013	DTK 7	18/08/2013	DTK 8	19/08/2013	DTK 9
20/06/2013	DTK 10	21/08/2013	DTK 11	DTK: Depth	Temperature
				Measurement	of Köycegiz
				Lake	
Date	Numbering	Date	Numbering	Date	Numbering
19/07/2013	DSK 1	20/07/2013	DSK 2	22/07/2013	DSK 3
23/07/2013	DSK 4	24/07/2013	DSK 5	25/07/2013	DSK 6
26/07/2013	DSK 7	18/08/2013	DSK 8	19/08/2013	DSK 9
20/06/2013	DSK 10	21/08/2013	DSK 11	DSK Dent	th Salinity
		21/00/2013	DSK II	DSR. Dep	in Samily
		21/00/2015	DSK II	Measurement	of Köycegiz
		21/00/2015	DSK II	Measurement Lake	of Köycegiz
Date	Numbering	Date	Numbering	Measurement Lake Date	of K öycegiz
Date 19/07/2013	Numbering DScK 1	Date 20/07/2013	Numbering DScK 2	Measurement Lake Date 22/07/2013	of Köycegiz Numbering DScK 3
Date 19/07/2013 23/07/2013	Numbering DScK 1 DScK 4	Date 20/07/2013 24/07/2013	Numbering DScK 2 DScK 5	Disk. Dep Measurement Lake Date 22/07/2013 25/07/2013	of Köycegiz Numbering DScK 3 DScK 6
Date 19/07/2013 23/07/2013 26/07/2013	Numbering DScK 1 DScK 4 DScK 7	Date 20/07/2013 24/07/2013 18/08/2013	Numbering DScK 2 DScK 5 DScK 8	Disk. Dep Measurement Lake Date 22/07/2013 25/07/2013 19/08/2013	of Köycegiz Numbering DScK 3 DScK 6 DScK
Date 19/07/2013 23/07/2013 26/07/2013	Numbering DScK 1 DScK 4 DScK 7	Date 20/07/2013 24/07/2013 18/08/2013	Numbering DScK 2 DScK 5 DScK 8	Disk. Dep Measurement Lake Date 22/07/2013 25/07/2013 19/08/2013	of Köycegiz Numbering DScK 3 DScK 6 DScK

Table 4 1.The Numbering the interpolation maps

20/06/2013	DScK 10	21/08/2013	DScK 11	DScK:	Depth	Spec	ific
				Condun	Measure	ement	of
				Köycegiz	Lake		

Table 4 2. The numbering the interpolation maps (cont...)

Date	Numbering	Date	Numbering	Date	Numbering
23-24-	STG 1	26/27/30/31/08/2013	STG 2	02/03/05/	STG 3
25/08/2013				06/07/06/2014	
27/08/2014	STG 4	28/08/2014	STG 5	29/08/2014	STG 6
30/08/2014	STG 7a,	31/08/2014	STG 8	STG: Surface	Temperature
	7b, 7c			Measurement	of Göcek-
				Fethiye Bay	
Date	Numbering	Date	Numbering	Date	Numbering
23-24-	DTG 1	26/27/30/31/08/2013	DTG 2	02/03/05/	DTG 3
25/08/2013				06/07/06/2014	
27/08/2014	DTG 4	28/08/2014	DTG 5	29/08/2014	DTG 6
30/08/2014	DTG 7a,	31/08/2014	DTG 8	26/08/2014	DTG 9
	7b, 7c				

STG: Depth Temperature Measurement of Göcek-Fethiye Bay

Date	Numbering	Date	Numbering	Date	Numbering
23-24-	DScG 1	26/27/30/31/08/2013	DScG 2	02/03/05/	DScG 3
25/08/2013				06/07/06/2014	
27/08/2014	DScG 4	28/08/2014	DScG 5	29/08/2014	DScG 6
30/08/2014	DScG 7a,	31/08/2014	DScG 8	26/08/2014	DScG 9
	7b, 7c				

STG: Depth Specific Conductivity Measurement of Göcek-Fethiye Bay

Date	Numbering	Date	Numbering	Date	Numbering
23-24-	DpHG 1	26/27/30/31/08/2013	DpHG 2	02/03/05/	DpHG 3
25/08/2013				06/07/06/2014	
27/08/2014	DpHG 4	28/08/2014	DpHG 5	29/08/2014	DpHG 6
30/08/2014	DpHG 7a,	31/08/2014	DpHG 8	26/08/2014	DpHG 9
	7b, 7c				

STG: Depth pH Measurement of Göcek-Fethiye Bay

Date	Numbering	Date	Numbering	Date	Numbering
23-24-	DSG 1	26/27/30/31/08/2013	DSG 2	02/03/05/	DSG 3
25/08/2013				06/07/06/2014	
27/08/2014	DSG 4	28/08/2014	DSG 5	29/08/2014	DSG 6
30/08/2014	DSG 7a,	31/08/2014	DSG 8	26/08/2014	DSG 9
	7b, 7c				

STG: Depth Salinity Measurement of Göcek-Fethiye Bay



Figure 4 1.EBK interpolation for temperature at surface of Köyceğiz Lake



Figure 4 2.EBK interpolation for temperature at depth of Köyceğiz Lake



Figure 4 3.EBK interpolation for temperature at surface of Fethiye-Göcek Bay



Figure 4 4.EBK interpolation for temperature at depth of Fethiye-Göcek Bay

4.2 Comparison of Landsat 8 OLI with in-situ temperature measurement

Landsat 8 TIR band10 images were compared with in-situ measurements (see table 3.3 above). Figure 4.5 and Fig 4.6 give correct Landsat thermal images according to the appropriate regression equation for Köyceğiz Lake. Fig. 4.7, Fig. 4.8 and Fig.4.9 give correct Landsat 8 thermal images according to the calculated regression equation for Fethiye-Göcek Bay.

Table 4.2 present geostatistical summary to compare in-situ measurement and Landsat 8 TIR images.

 Table 4.2 Geo-statistical evaluation of in-situ measurement, Landsat TIR images and corrected

 Landsat TIR images

	Date				
In-Situ Measurement	23.07.2013	30.07.2013	27.08.2014	7.06.2014	24.08.2013
Mean	28.68	29.91	28.63	22.22	28.30
Standard Deviation	0.39	0.37	0.25	0.29	0.20
Minimum	27.90	29.10	28.30	21.70	27.87
Maximum	29.30	30.50	29.20	22.97	28.75
Coefficient of Variation	0.01	0.01	0.01	0.01	0.01
	Date				
Landsat 8	23.07.2013	30.07.2013	27.08.2014	7.06.2014	24.08.2013
Mean	26.41	27.44	27.24	22.19	25.49
Standard Deviation	0.19	0.15	0.26	0.18	0.15
Minimum	26.15	27.10	26.84	21.85	25.25
Maximum	26.89	27.76	28.17	22.86	25.97
Coefficient of Variation	0.01	0.01	0.01	0.01	0.01
	Date				
Landsat 8 corrected	23.07.2013	30.07.2013	27.08.2014	7.06.2014	24.08.2013
Mean	28.68	26.34	28.63	22.22	28.30
Standard Deviation	0.47	0.07	0.35	0.39	0.24
Minimum	28.07	26.19	28.09	21.48	27.92
Maximum	29.88	26.48	29.90	23.68	29.07
Coefficient of Variation	0.02	0.00	0.01	0.02	0.01
R ² (coefficient of					
determination)	0.68	0.86	0.53	0.55	0.71



Figure 4 5.Corrected Landsat 8 TIR image according to regression equaiton for Koycegiz Lake (23/07/2013)



Figure 4 6.Corrected Landsat 8 TIR image according to regression equaiton for Koycegiz Lake (30/07/2013)



Figure 4 7.Corrected Landsat 8 TIR image according to regression equaiton for Göcek-Fethiye Bay (27/08/2014)



Figure 4 8.Corrected Landsat 8 TIR image according to regression equaiton for Göcek-Fethiye Bay (08/06/2014)



Figure 4 9.Corrected Landsat 8 TIR image according to regression equaiton for Göcek-Fethiye Bay (24/08/2013)

The south-west part of the lake can be seen hotter than the northeast part (Fig. 4.10, Fig. 4.11,). As well-known, there exist thermal springs at the south west part of the Köyceğiz lake ("Sultaniye Kaplıcaları"). This thermal source has significant effects on the south part of the lake. A thermal plume can be easily seen in Fig. 4.10 and Fig.4.11.

Near the coastal part of the Fethiye-Göcek Bay the water is hotter than the south part of the bay (Fig. 4.12, Fig. 4.13 and Fig. 4.14). There are also significant inputs of lakes which influence the thermal pattern.

4.3 Evidence of cold and hot spring results for Köycegiz Lake and Fethiye-Göcek Bay

A detailed analysis is done also to determine the local cold and hot springs at Köyceğiz and Fethiye-Göcek Bay. Fig. 4.10 and Fig. 4.11 present the general temperature distribution for all grid patterns in Köyceğiz Lake and Fethiye-Göcek Bay. The maps show us that at the north east part of Köyceğiz lake surface temperature is significantly higher than south part of the lake. Namnamcay and Yuvarlakcay River is feeding the Köyceğiz Lake at the middle part. The bathymetry and weather conditions also have an effect on the surface temperature of the Lake. At the corner of the lake the temperature is relatively higher than the other part because of the slightly lower thickness of the water mass body.



Figure 4 10.Surface Water Temperature interpolations for Köyceğiz Lake (July and August 2013).

For Fethiye-Göcek Bay, it is very difficult to assess the data due to the different several factors such as climatic conditions, different types of dry river inputs, wave effect etc... Especially at the south west part and southeast part of the bay, near the Göcek and Fethiye city center the surface water temperature is rising. After the Değirmenboğazı River to the Fethiye city due to the recharge of the several rivers the temperature is decreasing at the coastal site of the bay.



Figure 4 11.Surface Water Temperature interpolations for Fethiye-Göcek Bay (August 2013 and June 2014).

In order to find the local cold and hot spring each in-situ measurement at the depth of the Köycegiz Lake and Fethiye Göcek Bay are also analyzed one by one. According to a detailed analysis of depth temperature (DTK1 to DTK10 and DTG1 to DTG 9), local cold and hot springs are detected in Fig. 4.12 and Fig. 4.13. In order to better understand if there is an evidence of cold/hot springs or to find an anomaly the temperature data is divided by the bathymetry to normalize the data. The other validation method of the cold and hot springs at that region can be also seen with Specific conductivity, salinity and pH maps in Appendix I. The normalized temperature is defined as (2 * (X-Xmin) / (Xmax-Xmin)-1, where the X is the temperature values, and (Xmax-Xmin) is the amplitude of the temperature. The values will be a range between [-1 1].



Figure 4 12.Normilize Depth Water Temperature Interpolation maps for Köyceğiz Lake (July and August 2013)



Figure 4 13.Normalize Depth water temperature Interpolations maps for Fethiye-Göcek Bay (August 2013 and June 2014)

4.4 Thermal Stratification (thermocline) of Köycegiz Lake

The thermal stratification of Köyceğiz lakes could also present the change in the temperature at different depths in the lake. This change is due to the change in water's density with temperature. The atmosphere force a temperature signal at the surface of the surface water body. As a consequence, thermal stratification can be observed during the warm season if a lake is sufficiently deep. In-situ measurement of temperature and specific electrical conductivity are plotted vs depth in Figure 4.14 for Köyceğiz Lake. Fig. 4.14 show clearly that there is a shift of thermal stratification at 7 m. The temperature vs depth plots for Fethiye-Göcek Bay are given in Appendix V. Fethiye-Göcek Bay temperature-depth profile give generally a decrease the temperature with increasing the depth. At the first 10m depth of the Fethiye Göcek Bay. There exist mixing water and the temperature has a mixing temperature level with depth (1m, 5m and 8m).



Figure 4 14. Temperature and Specific Conductivity vs Depth plots for Köyceğiz Lake



Figure 4 15. Temperature and Specific Conductivity vs Depth plots for Köyceğiz Lake (cont...)



Figure 4 16. Temperature and Specific Conductivity vs Depth plots for Köyceğiz Lake (cont...)



Figure 4 17. Temperature and Specific Conductivity vs Depth plots for Köyceğiz Lake (cont...)



Figure 4 18. Temperature and Specific Conductivity vs Depth plots for Köyceğiz Lake (cont...)



Figure 4 19. Temperature and Specific Conductivity vs Depth plots for Köyceğiz Lake (cont...)

5. CONCLUSION

In this study, thermal water (cold/hot) inputs were investigated for Köycegiz Lake and Fethiye-Göcek Bay. In order to find the evidence of springs in-situ measurement and satellite images was used. In situ measurement were done by data loggers. Landsat 8 thermal band was used for satellite measurement. At the depth of the Köyceğiz Lake and Fethiye-Göcek Bay, not only the temperature measurement are collected but also the electrical conductivity, pH and salinity measurement were made to validate the evidence of inputs. All maps were interpolated using a new methodology called as Empirical Bayesian Kriking (EBK). Vertical temperature profile of Köyceğiz Lake and Fethiye-Göcek Bay is also investigated to understand vertical stratification characteristics of the study areas. The following conclusions can be made according to obtained results:

- The combination of the different techniques such as in-situ measurements interpolation using EBK and Satellite estimation of temperature with Landsat 8 described in this study has proved very useful for the locating and quantifying the cold/hot spring at the Mediterranean Sea (Köyceğiz Lake, Fethiye-Göcek Bay).
- The comparison of Landsat 8 thermal image show a good correlation (R2>0.68) with in-situ measurement. Hot thermal plume at Köyceğiz Lake was shown in Fig. 4.5 and Fig 4.6. For Fethiye-Göcek Bay, thermal satellite images also show a good correlation up to R2=0. 71. The thermal significance at the surface of the Fethihe-Göcek bay is more difficult to comment due to the several influence factor of the open sea (Fig 4.7, Fig 4.8 and Fig.4.9). However, it was also concluded that, using surface in-situ measurement near the Fethiye and Göcek village the temperature profile is rising to the surface. The inputs of the rivers decrease the temperature of the Sea between Fethiye and Göcek village (Fig 4.11). However, it must be also

mentioned that there is a significance difference of temperature up to 2°C between in-situ measurement and thermal image calculations.

- At the South West part of the Köceğiz Lake there a significant influence of Sultaniye hot spring, which were presented in the surface temperature interpolations maps (STK2, STK3, STK4, STK7, STK8, STK11). The cold spring and the influence of the rivers were located at the north part of the Lake. Fig. 10 present all temperatures in-situ measurement on the surface, it can be also seen that at the middle part of the lake (low depth) the water body has low temperature the other part of the lake.
- The normalization data of depth temperature (Fig.4.12) show also clear hot and cold inputs of the lake. There exist more than 5 evidence input at the bottom of the Lake Köyceğiz. Electrical conductivity, salinity and pH maps also validate the inputs of the Lake. The normalization temperature data at the bottom of the Fethiye-Göcek Bay show also some evidence of cold spring at the bottom near the coastal part of the Bay (Fig 4.13).
- The thermocline stratification of the lake was found using vertical temperature measurement. At 7m of the Lake there is a significant evidence of thermal stratifications. The temperature and electrical conductivity above 7m is approximately 29 °C and 4000 μ S/cm respectively. Above 7m, the temperature is decreasing up to 15 °C and electrical conductivity can reach up to 15000 μ S/cm.
- The stratification of the Fethiye Göcek bay is not as clear as the Köyceğiz Lake. There exist mixing water at the surface water and the temperature at 1m, 5m and 8m depth varies between [28 °C 31 °C], [27.5 °C 29.5 °C], [25.5 °C 27.5 °C]. At 100m of depth the temperature can decrease up to 17 °C. The prediction of temperature at a depth of 200m according to observation at 23/08/2013 can be estimated 10 °C (Appendix V).

6. DISCUSSSION AND RECOMMENDATION

It was very clear that the surface temperature can be estimated using Landsat 8 TIR images with a relatively medium uncertainty ($\pm 2^{\circ}$ C). In order to have more accurate monitoring of temperature ($\pm 0.1 \,^{\circ}$ C), the resolution of the satellite images have to be increased or airborne thermal images must be done in the field. There exist also several atmospheric correction algorithm can be tested such as "split window algorithm" to reduce the uncertainty. If the weather conditions are also well known and measurement stations are close to the observation points, some error causing parameters (the flow condition, air temperature, wind velocity effects etc..) can be estimated and the errors could be reduced. We recommend also that the water temperature estimation can be used in calibration and validation of models in a coarse scale. Another recommendation is that water temperature can be used also in ecological works, hydrological studies for water quality monitoring and climate change.

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APPENDICES

Appendix A. EBK Interpolation For Salinity and Specific Conductance For Köyceğiz Lake



Figure A 1.EBK interpolation for salinity at depth of Köyceğiz Lake



Figure A 2.EBK interpolation for Specific Conductivy at depth of Köyceğiz Lake





Figure B 1.EBK interpolation for Specific Conductivy at depth of Fethiye-Göcek Bay



Figure B 2.EBK interpolation for pH at depth of Fethiye-Göcek Bay



Figure B 3.EBK interpolation for salinity at depth of Fethiye- Göcek Bay



Appendix C. EBK Eror Maps and Variograms for Köyceğiz Lake

Figure C 1. The surface temperature eror map of Köyceğiz Lake

Geostatistical wizard - Empirical Bayesian Kriging st	ep 2 of 3 - Method F	Properties – 🗆 🗙			Geosta	atistical w	rizard - Em	pirical Ba	vesian Kric	aina s	tep 3 of 3 - Cross Validation –
(A ▼) 0, 0, 2° (A) 4 + (A) 1 (A ▼) 1 ∧ ▼	General Properties								,		
	Subset Size	100	Source ID	Included	Measured	Predicted	Fron	Standar	Standa	^	Predicted -10-1
	Overlap Factor	1									
	Number of Simulations	100	0	Yes	27.9	27.90	0.00839	0.0165	0.5057		2.95
1	Output Surface Type	Prediction Standard Error	1	Yes	27.9	27.90	0.00507	0.0111	0.4540		2014
//////////////////////////////////////	Transformation	Empirical	2	Yes	27.9	27.90	0.00373	0.0104	0.3567		2314
	Search Neighborho	od	3	Yes	27.9	27.90	0.00239	0.0106	0.2259		1070
	Neighborhood type	Smooth Circular		Vac	27.0	27.00	0.00909	0.0106	0.9427		2.0/3
	Smoothing factor	1	1	ies .	27.3	27.30	0.00050	0.0200	0.0427		1942
	Radius	100	2	res	2/.9	2/.90	0.00123	0.0094	0.1301		2043
	Predicted Value		6	Yes	27.9	27.89	-0.00232	0.0095	-0.243		2 807
	x	647823.1	7	Yes	27.9	27.89	-0.00234	0.0092	-0.253		
	Y	4085511	8	Yes	27.9	27.89	-0.00159	0.0087	-0.183		2771
	Value	0.158109	9	Yes	27.9	27.89	-0.00119	0.0086	-0.138		
	E Neighbors (64)		10	Var	27.0	27.99	-0.00064	0.0074	-0.086		2.736
				163	27.3	27.02	0.00001	0.0071	0.000		1 2*
				tes	27.9	27.89	-0.00042	0.006/	-0.063		M
			12	Yes	27.899	27.89	-0.00032	0.0075	-0.042		2.7 2.742 2.783 2.825 2.867 2.908 2.95
· · · · · · · · · · · · · · · · · · ·			15	Yes	27.9	27.90	0.00065	0.0075	0.0861		Measured 10 ⁻¹
Simulations at (647823.1, 4085511)			17	Yes	27.9	27.90	6.62571	0.0067	0.0098		Predicted (Error) Standardized Error /
v-10 ¹			18	Yes	27.9	27.90	0.00024	0.0076	0.0322		
7.101			20	Yes	27.9	27.90	0.00037	0.0072	0.0515		Regression function 0.998795283971511 * x A
E 330			21	Yes	27.9	27.89	-0.00058	0.0069	-0.083		Prediction Errors
5.326			77	Yes	77.9	27.90	0.00123	0.0072	0.1706		Samples 7693 of 7693
3.55			23	Yes	27.9	27.90	0.00049	0.0069	0.0709		Mean -0.001207733
1.775			25	Var	27.0	27.00	0.00035	0.0070	n n400		Root-Mean-Square 0.05863104
			2	Vee	27.000	27.00	0.000000	0.0070	0.0410		Mean Standardized NaN
0 0.861 1.722 2.583 3.443 4.304 5.165 6.026 6.887			20	Vee	27.033	27.30	0.00023	0.0070	0.0710		Root-Mean-Square Standa NaN
Distance (Meter), h ·10 ⁻¹			32	Tes	21.099	27.90	0.00023	0.00/0	0.0334	~	Average Standard Error 0.07415007
Semivariograms Nugget Partial Sill Range Transformation			<u></u>	Tes	77.899	77.90	0.00014	0.0070	0.0203		
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	HEAT >										

Figure C 2. The surface temperature variogram of Köyceğiz Lake in 19.07.2013

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Pro	operties – 🗆 🗙			Geos	tatistical	wizard -	Empirical Bay	esian Kriging ste	ep 3 of 3 - Cross Validation 🛛 – 🗖 🌄
	General Properties		Source ID	Included	Measured	Predicted	Error	Standard Error	Standardized Er ^	Predicted -10 ⁻¹
	Subset Size	100	0	Yes	28.3	28.30	0.0085	0.03995102	0.21455952826	3.02
	Overlap Factor	1	1	Yes	28.3	28.30	0.0006	0.03023530	0.02238205841	I.I.I.I.I.I.I.I.I.I.I.I.I.I.I.I.I.I.I.
	Number of Simulations	100	2	Yes	28.3	28.30	0.0003	0.03240463	0.00960366350	2381
	Output Surface Type	Prediction Standard Error	3	Yes	28.3	28.30	0.0003	0.03107209	0.00991842771	2943
	Transformation	Empirical	4	Yes	28.3	28.30	0.0003	0.03025247	0.01090316540	: 1 1'
	Search Neighborhood	bd	5	Yes	28.3	28.30	0.0002	0.03191516	0.00798649177	2.904
	Neighborhood type	Smooth Circular	6	Yes	28.3	28.30	0.0002	0.03158540	0.00849698175	1000 × 1
Ĺ	Smoothing factor	1	7	Yes	28.3	28.30	0.0001	0.03098252	0.00570569048	2000
	Radius	100	8	Yes	28.3	28.30	0.0002	0.03067520	0.00883198002	2.827
	Predicted Value		9	Yes	28.3	28.30	0.0001	0.02948564	0.00641627367	je se se se se se se se se se se se se se
	x	645679.7	10	Yes	28.3	28.30	0.0001	0.03040420	0.00502544847	2.788
	Y	4082365	11	Yes	28.3	28.30	0.0001	0.03003008	0.00560775986	4 ⁴
	Value	0.01333166	12	Yes	28.3	28.30	0.0001	0.02854332	0.00444361301	2.75 2.804 2.858 2.912 2.966 3.0
	 Neighbors (64) 		13	Yes	28.3	28.30	0.0001	0.02822795	0.00376982288	Measured -10
Simulations at (645679.7. 4082365)			14	Yes	28.3	28.30	8.6978	0.02791657	0.00311564037	Predicted (Error) Standardized Error /
1			15	Yes	28.3	28.30	6.7563	0.02760375	0.00244762351	
γ-10 ¹			16	Yes	28.3	28.30	4.9163	0.02728988	0.00180153986	Regression function 0.9996/10.96886116 * x
6.705			17	Yes	28.3	28.30	4.4705	0.02784049	0.00160577798	Prediction Errors
5.029			18	Yes	28.3	28.29	-1.615	0.02744531	-0.0005885862	Samples 9669 of 9669
3.303			19	Yes	28.3	28.29	-7.984	0.02710401	-0.0002945972	Mean 0.0001006441
1.070			20	Yes	28.3	28.29	-5.652	0.02670067	-0.0021168746	Root-Mean-Square 0.03831097
0 1.047 2.094 3.14 4.187 5.234 6.281 7.328 8.375			21	Yes	28.3	28.29	-6.131	0.02553632	-0.0024010849	Mean Standardized NaN
Distance (Meter), h 10 ⁻¹			77	Yes	28.3	78.79	-9.357	0.02622048	-0.0035688876 *	Root-Mean-Square Stand NaN
Semivariograms Nugget Partial Sill Range Transformation			۲.						>	Average Standard Error 0.05474951
	< Back Next >	Finish Cancel								<back next=""> Finish Cancel</back>

Figure C 3.The surface temperature variogram of Köyceğiz Lake in 20.07.2013

Geostatistical wizard - Empirical Bayesian Kriging ste	2 of 3 - Method Prope	erties – 🗆 🗙			Geos	tatistical w	vizard - Empiric	I Bayesian Kriging	ng step 3 of 3 - Cross Validation	- • ×
Geostatistical wizard - Empirical Bayesian Kriging ste ○・	2 of 3 - Method Properties Subset Size 1 Overlap Factor 1 Number of Simulations 1 Output Surface Type T Transformation E Search Itelighborhood Neighborhood type S smoothing factor 1 Radius 1 Predicted Value X 4 Y 4	erties – C X 100 100 100 100 100 100 100 10	Source ID 0 1 2 3 4 5 6 7 8 9 9 10 11	Induded Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	Geos Measured 29.8 29.8 29.8 29.8 29.8 29.8 29.8 29.8	tatistical w Predicted 1 29.79 2 20.79 2 20.70 2 20.	Aizard Empirical Error Standard Error -0 0.00837788 -0 0.00531276 -0 0.00531376 -0 0.00531376 -0 0.00531376 -0 0.00531385 -0 0.00531386 -0 0.00531386 -0 0.00531386 -0 0.00531386 -0 0.00531386 -0 0.00531386 -0 0.00531387 -0 0.00531387 -0 0.00531387	Bayesian Kriging 5tandardzed Error 0.2106376714434 0.17833289451206 0.1785166893946 0.1795150817319391 0.17949494832104 0.17949946352104 0.17949946352194 0.179499446055279441 0.1794994531989 0.1794994532104 0.1794994532194 0.1794994532194 0.1794994532194 0.1794994532194 0.1794994532194 0.1794994532194 0.1794994532194 0.17949915151 0.1794991511 0.1794911413111	g step 3 of 3 - Cross Validation A Pedded 10 ⁻¹ 302 - 6 295 7 227 12 227 12 227 12 227 12 227 12 227 12 227 12 227 12 223 12 224	X
Smilations at (\$453932.450811) y 10 ¹ 903 453 207 0 0.891 1.781 2.672 3.583 4.454 5.344 6.225 7.125 8.016 Distance (Mee), h.70 ⁻¹ Semivatogram. (Neget.) Pantal Sk.) Range.\ Transformation./	Alace A	Restl	11 12 13 14 15 16 17 18 19 20 21 27 €	Yes Yes Yes Yes Yes Yes Yes Yes Yes	29.8 29.8 29.8 29.8 29.8 29.8 29.8 29.8	29,79	-0 0.00531383. -0 0.00481378. -0 0.00481378. -0 0.00481378. -0 0.00481388. -0 0.00481388. -0 0.00481388. -0 0.00481388. -0 0.00481388. -0 0.00531232. -0 0.00531538. -0 0.00531538. -0 0.00531538. -0 0.00531538. -0 0.00531538. -0 0.00531539. -0 0.00531514. -0 0.00531402.	0.175996075118 0.1701297471703. 0.1701297471703. 0.17012974717033987 0.15652305055980. 0.166333709490420. 0.156533709490420. 0.1755387839505980. 0.175538745950651494 0.17553514945905. 0.17553814445007. 0.17557544501811. 2	1 225 2284 218 292 2 225 2284 218 292 Peddael Firm Standardized Enry Standardized Enry Regression function 0.99955228 Standardized Enry Standardized Enry Regression function 0.99955228 Standardized Enry Standardized Enry Regression function 0.9995528 Standardized Enry Standardized Enry Regression function 0.9995528 Standardized Enry Non Standardized Enry Regression function Non Standardized Enry Non Standardized Enry Non Standardized Enry Standard Enry Standard Enry Standard Enry Standardized Enry Standard Enry Standard Enry Standard Enry Standardized Enry	2.986 3.02 Measured :10 ⁻¹ 8849932 * x ^ 8 7 7

Figure C 4. The surface temperature variogram of Köyceğiz Lake in 22.07.2013

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties – 🗆 🗙	Geostatistical wizard - Empirical Bayesian Kriging step 3 of 3 - Cross Validation – 🗆 💌
	Example Properties 500 Sheart Six 500 Unreter Frotor 1 Number of Simulations 500 Ought Sirks Sires Frediction Standard Error Transformation Expract Heightborood Second Heightborood Coldard Second Tegetorhood 1 Second Tegetorhood 00 Predicted Value 00 X 644037.4 Value 0.05003/961 Bil Regibles (4) 0.05003/961	Source 2D Indexide Meeticel Enror Standard Frur Standard Frur Standard Frur Fred coded Total 6 res 35 34.9. 0.005996. 0.0199695. 0.129892 0.3198 0.3198 0.3198 0.3198 0.3198 0.1198 0.3198
Sindarova et (845574.4081250) Y 101 5375 2439 0 953 0 953 1966 2459 0 953 1966 2459 Semivariograme Naget Partial SB Parge Tourismotory Naget	Radius The length of the results of the search circle.	27 Yee 35 28.5 0.000586. 0.0019967. 0.0019967. 28 Yee 35 28.5 0.000781. 0.0019169.

Figure C 5. The surface temperature variogram of Köyceğiz Lake in 23.07.2013

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Prope	erties – 🗆 🗙			Geos	tatistical w	izard - Empirica	l Bayesian Krigi	ng step 3 of 3 - Cross Validation – 🗖	×
	General Properties		Source ID	Included	Measured	Predicted B	error Standard Erro	Standardized ^	Predicted 10 ⁻¹	
	Subset Size	100	0	Vec	28.3	78.31	0.01346973	0.947479571	3	
	Overlap Factor	1	1	Vec	28.3	28.31	0.01255555	0.945366449		2
	Number of Simulations	100	25	Vec	28,200	28.32	0.01225754	2 012208923	2.976	
	Output Surface Type	Prediction Standard Error	44	Vec	28 371	78.34	0.01249334	1.676771075	2061	•
	Transformation	Empirical	45	Vec	78.4	28.35	0 0.01303023	-3.837338565	2351	
	Search Neighborhood	d	45	Var	78.4	28.38	0 0.01210214	-1 318976575	2.927	
	Neighborhood type	Smooth Circular	47	Var	78.4	78 30	0 0.01168395	0 503605745		
	Smoothing factor	1	48	Yes	28.4	78.39	00.01186431	-0.276278485	2.903	
F F	Radus	100	40	Var	78.4	78 30	0 0.01195734	-0 145132653	2.879	
	Predicted Value		50	Yes	28.4	78.39	0.01194199	-0.106225907	····· V.	
	x	645512.2	51	Yes	28.4	28.39	0.01193346	-0.089819775	2.854	
	Y	4085760	52	Yes	28.4	28.39	0.01176034	-0.086226674		
7	Value	0.0513988	53	Yes	28.4	28.39	0 0.01144269	-0.085654150	2.83 2.858 2.887 2.915 2.943 2.972	3
	 Neighbors (64) 		54	Yes	28.4	28.39	0 0.01143506	-0.081225258	Measure	.d -10 ⁻¹
Simulations at (645512.2, 4085760)			55	Yes	28.4	28.39	0 0.01187009	-0.095434805	Predicted (Error) Standardized Error /	
			56	Yes	28.4	28.39	0 0.01189632	-0.083870241		-
¥-10 ¹			57	Yes	28.4	28.39	0 0.01177338	-0.086808687	Regression function 0.999859829491781 * x +	*0 ^
3.254			58	Yes	28.4	28.39	0 0.01168730	-0.090932093	Prediction Errors	_
2441			59	Yes	28.4	28.39	0 0.01134567	-0.083112325	Samples 4059 of 4059	
0.914			60	Yes	28.4	28.39	0 0.01136310	-0.085390344	Mean -0.0001170993	
0.014			61	Yes	28.4	28.39	0 0.01154788	-0.083358694	Root-Mean-Square 0.01464168	
0 0.342 0.685 1.027 1.369 1.712 2.054 2.396 2.739 3.081	Radius		62	Yes	28.4	28.39	0 0.01177827	-0.083601686	Mean Standardized NaN	
Distance (Meter), h ·10 *2	The length of the radius of	the search circle.	63	Yes	28.4	28.39	0 0.01180929	-0.084060205 *	Koot-Mean-Square Standard NaN	
Semivariograms Nugget Partial Sill Range Transformation			<					>	Average Standard Error 0.01639418	۷
										_
	< Back Next >	Finish Cancel							<back next=""> Finish Ca</back>	encel
				_						

Figure C 6.The surface temperature variogram of Köyceğiz Lake in 24.07.2013

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties 🛛 – 🗖 🗙	x Geostatistical wizard - Empirical Bayesian Kriging step 3 of 3 - Cross Validation –	×
0- 4400 (**) EE- %-	Ceneral Properties Subset Sam 100 Overlap Factor 1 Number of Sinulations 100 Output Surface Type Prediction Standard Bror Transformation Empirical	Source ID Indukel Nearest Predicted Pr	
	E Secart Regiblechead Peoplement of years	8 Yes 32 23.2m. 1 0.0031944.m. 0.0594195 9 Yes 32 23.2m. 0.m. 0.0031947.m. 0.0594195 10 Yes 32 23.2m. 0.m. 0.003942.m. 0.05915644 11 Yes 32.2 23.2m. 0.m. 0.003942.m. 0.057156444 12 Yes 32.2 23.0m. 0.0033945.m. 0.09254277 13 Yes 32.2 23.0m. 0.0044057m. 0.09254927 14 Yes 32.2 23.0m. 0.0044057m. 0.095549549 15 Yes 32.2 23.0m. 0.0044057m. 0.095549549 15 Yes 32.2 23.0m. 0.0044057m. 0.095549549 15 Yes 32.2 23.0m. 0.0044057m. 0.09554957477 15 Yes 32.2 23.0m. 0.0044057m. 0.05554957477	2.99 red :10 ⁻¹
Smillton 4 (54553) 459552) Y 10 ¹ 5115 105 0 0 0.733 1565 0 0.733 1565 0 0.733 1565 0 0.733 1565 0 0.733 1565 0 0.733 1565 0 0.733 1565 0 0.733 1565 0 0.733 1565 0 0.733 1565 0 0.734 12 0 0.735 1567 0 0.734 1567 0 0.735 1567 0 0.734 157 0 0.735 1567 0 0.734 157 0 0.735 1567 0 0.735 1567 0 0.735 157 0.735 0.736 157 0.736 0.737 157		17 Yes 32 23.0 0.00493851 0.00493851 Peddadf Text detable Terry 18 Yes 32.2 20.0 0.0034987 0.05977351 Regression function 0.99995511254512.*% 19 Yes 32.2 20.0 0.0034987 0.05971551 Peddadf 0.9995511254512.*% 20 Yes 32.2 20.0 0.0034987 0.0521465 Peddadf 0.9995511254512.*% 21 Yes 32.2 20.0 0.00414554 0.055035212 Mesh 0.00329865 Root Hern Guare 0.00329865 Root Hern Guare 0.00329865 Root Hern Guare 0.00329865 Net Net Not Start Guare Net <t< th=""><th>+0 ^</th></t<>	+0 ^
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Figure C 7.The surface temperature variogram of Köyceğiz Lake in 25.07.2013

Geostatistical wizard - Empirical Bayesian Kriging step 2	of 3 - Method Prop	oerties – 🗆 🗙			Geos	tatistical	wizaro	d - Empirical	Bayesian Krigir	ng step 3 of 3 - Cross Validation 🦳 🗖 🗙
	General Properties		a â m			D		0	Charles La A	
	Subset Size	100	Source ID	Included	Measured	Predicted	Error	Standard Error	Standardized	Predicted -10 ⁻¹
	Overlap Factor	1	0	Yes	28.2	29.70	1	0.29558500	5.096594217	3.05
	Number of Simulations	100	1	Yes	28.2	29.56	1	0.30990320	4.3898332791	2.017
	Output Surface Type	Prediction Standard Error	2	Yes	28.2	29.47	1	0.32493921	3.932474978(
	Transformation	Empirical	3	Yes	28.2	29.25	1	0.34930278	3.015673732	2.984
	E Search Neighborho	et al.	4	Yes	28.2	28.91	0	0.38230371	1.880913544	
	Neichhorhood type	Smooth Circular	5	Yes	28.2	28.61	0	0.39501441	1.0598086028	2.951
	Smoothing factor	1	6	Yes	28.2	28.46	0	0.39858613	0.659174748	2919
	Radius	100	7	Yes	28.2	28.33	0	0.40188243	0.3315318590	
	Predicted Value		8	Yes	28.2	28.33	0	0.41299600	0.318484537	2.886
	Y	646973.2	9	Yes	28.2	28.30	0	0.42864306	0.250178384	
	Y	4085540	10	Yes	28.2	28.25	0	0.39682239	0.135316707!	2.803
	Value	0.01600917	11	Yes	28.2	28.24	0	0.36926410	0.110465706	
	F Neighbors (58)		12	Yes	28.2	28.24	0	0.36147793	0.113334555	2.82 2.858 2.897 2.935 2.973 3.012 3.05
			13	Yes	28.2	28.25	0	0.36996074	0.147328624	Measured 10*1
Simulations at (646973.2, 4085549)			14	Yes	28.2	28.25	0	0.38580624	0.142700781	Predicted (Error) Standardized Error
v.m1			15	Yes	28.2	28.28	0	0.38424642	0.222098769:	Permanence 6 meters 0.00066 7000050 1002 * x ± 0
1 10			16	Yes	28.2	28.28	0	0.36527108	0.239888558	Regission function 0.330070333332032 X + 0 P
3806			17	Yes	28.2	28.32	0	0.34486783	0.348696654	Sampler 10554 of 10554
2 538			18	Yes	28.2	28.35	0	0.34130116	0.467197065!	Maan J 0017012039
1269			19	Yes	28.2	28.38	0	0.34454356	0.537945214	Post-Mass-Science 0.06042144
			20	Yes	28.2	28.51	0	0.33917223	0.920703460(Man Standard Nak
u u.izo u.zoo u.oor u.oid 0.940 0.774 0.503 1.032 1.161 Distance (Mater) k. 10-2			21	Yes	28.7	28.36	-0	0.33042457	-1.015195871	Dont Mean Share Standard Naki
Uistance (Meter), n · IU =			77	Yes	28.2	78.51	n	0.33421621	0.9560347081	Average Standard Error 0 0015804
IN servarograms / rugget / ranai sii / range / Iransformation /			<						>	V 000000000000000000000000000000000000
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		-								

Figure C 8. The surface temperature variogram of Köyceğiz Lake in 26.07.2013



Figure C 9. The surface temperature variogram of Köyceğiz Lake in 18.08.2013

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties 🛛 🗖 🗙	Geostatistical wizard - Empirical Bayesian Kriging step 3 of 3 - Cross Validation – 🗖 🗖
0-8820 ++ ==-\5-	□ Statet Sm 00 Derlap Factor 1 Number of Smuletors 10 Output Srinker Jippe Perketon Standard Error 1 Transformation Enjicital Search ReighteeMood Exact ReighteeMood Badar 50 Perketor Statis 50 ■ Predicted Value K 455530 Y 498671 Inder 0.0952554 Breghbors (6) Engibbors (6)	Source D Included Heasure Predicate Predint Predint Predin
Smalation as (5053) 409670) Y 101 235 128 0 0.49 0 0.48 0 0.49 0 0.49 0 0.48 0 0.49 0 0.49 0 0.49 0 0.49 0 0.49 0 0.49 0.49	<bak nect=""> Find Canal</bak>	14 Yes 25.8 26.8 0 0.1553914 0.0145397 Yes 26.9 26.8 0.0145397 Yes 26.9 26.8 0.0145397 Yes 26.9 26.8 0.0145397 Yes 26.9 26.8 0.0145397 Yes 26.9 <th< th=""></th<>

Figure C 10.The surface temperature variogram of Köyceğiz Lake in 19.08.2013

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Pro	perties – 🗆 🗙			Geos	tatistical	wizard	- Empirical	Bayesian Krigi	ng step 3 of 3 - Cross Validation 🛛 🗧
	∃ General Properties	5	Source ID	Included	Measured	Predicted	Error S	Standard Error	Standardized ^	Predicted -10:1
	Subset Size	100		Vee	20.6	20.50		0.00719707	0.003656011	202
1	Overlap Factor	1		Yes	25.0	20.00	0	0.00/10/0/	0.053636011	3.02
	Number of Simulations	5 100		Vec	25.0	20.00	0	0.00462096	0.041678272	3.01
	Output Surface Type	Prediction Standard Error	2	Vec	29.0	20.00	0	0.00407000	0.041270615	
	Transformation	Empirical	4	Vec	29.0	20.00.00	-0	0.00402402	0.042107614	3
1	E Search Neighborho	ood		TES	23.0	29.39	-0 0	0.00402322	0.045197014	299
. 1	Neighborhood type	Smooth Circular	5	TES Ver	23.0	29.39	-0	0.00402510	0.047110222	
	Smoothing factor	1	0	TES Vez	23.0	20.00	0	0.00402515	0.040119367	2.98
	Radius	50		Vee	23.0	27.29	-v U	0.001020//	0.047020022	297
	E Predicted Value			Yes	25.0	20.00	0 0	0.00402110	0.040622215	231
	X	648878.3	10	Vec	25.0	20.00	0	0.00405292	0.04609667	2.96
	Y	4088075	10	Vec	29.0	20.00	0	0.00490302	0.045691197	
	Value	0.02737852		Vee	23.0	20.00	0 0	0.00450555	0.04000110-	295 2962 2973 2985 2997 30
N.	Ineighbors (53) ■		12	TES	23.0	29.39	-0 0	0.00405045	0.042749035	Los concentro con the
			10	TES Vez	23.0	29.39	-0	0.00490040	0.0308/4100	Predicted (Emr.) Standardized Emr. /
bons & (6405/6.3, 40630/b)			17	TES Vez	23.0	20.00	0	0.00490340	0.040103301	
-10 ¹			15	Vec	23.0	20.00	0	0.00320992	0.04631/332	Regression function 0.99918691749274 *
			10	Yes	25.0	20.00	0	0.004903467	0.040765306	Prediction Errors
			10	Vec	25.0	20.00	0	0.00463001	0.041752416	Samples 3731 of 3731
4			10	Vec	29.0	20.00	0	0.00407501	0.04212040/	Mean -0.0002368189
			20	Vec	23.0	20.09	-0	0.00-03080	0.040000165	Root-Mean-Square 0.01232388
0 0.761 1.523 2.284 3.046 3.807 4.568 5.33 6.091 6.852			20	Ver	23.0	20.00	-0	0.00001-0000	-0.049039105	Mean Standardized NaN
Distance (Meter) h -10 ⁻¹			22	Vee	20.6	20.00	0	0.003204/8	0.040044151	Root-Mean-Square Standard NaN
ivariograms (Nugget) Patial SII) Range) Transformation /			< Contraction of the second se	1996		and a			>	Average Standard Error 0.0108493
	cBack Next >	Firish Cancel								<back next=""> Finish</back>

Figure C 11.The surface temperature variogram of Köyceğiz Lake in 20.08.2013

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties 💦 🗖 🗙			Geost	atistical wi	izard - Empirica	l Bayesian Krigir	ng step 3 of 3 - (Cross Valid	ation	
	General Properties Subset Size Subset Size Subset Size Subset Size Subset Size Subset Size Subset Size Subset Size Subset Size Subset Size Subset	Source ID 0 1 2 3 4 5 6 7 7 8 9 10 11	Included 1 Yes 2 Yes 3 Y	Measured 23.55 23.55 23.55 23.54 23.47 23.47 23.47 23.47 23.47 23.47 23.47 23.47 23.47	Predicted B 29.55 4 29.55 4 29.55 0 29.47 0 29.47 0 29.47 0 29.47 0 29.47 0 29.47 0 29.47 0 29.47 0	rror Standard Error 0. 0.01178978 0. 0.00421933 0. 0.0112894 0. 0.1128852 0. 0.1128853 0. 0.1128894 0. 0.1128894 0. 0.1096109 0. 0.11096109 0. 0.11096109 0. 0.1106438 0. 0.1105438 0. 0.1251890	Standardized O.041579512 O.041579512 O.134318556 O.554200075 I.428308185: O.079692778: O.0629279648: O.055739648: O.055739648: O.055739648: O.055739648: O.055759648: O.019495540:	Predicted 10 ⁻¹ 3.002 2.978 2.953 2.955 2.955 2.855 2.881 2.881 2.885 2.886	.48 ⁻⁵		
Smidelova et 665813.9.4081141) v. 10 ¹ 242 0 0523 1.045 1568 2.09 2.613 3.155 3.658 4.181 4.703 Delance (Meler), h. 10 ⁻² Servicelogana, /Naget, / Pand SP, Range, / Tandonador,	© Registers (5)	12 13 14 15 16 17 18 19 20 21 22 4	Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	28.47 28.47 29.47 29.47 29.47 29.47 29.43 29.43 29.43 29.43 29.43 29.41 29.41 29.41	29.461 29.461 29.461 29.461 29.461 29.451 29.43 0 29.421 29.411 29.41 0 29.411	0.01746419 0.02184538 0.02184538 0.02184538 0.02184538 0.02432319 0.04381195	-0.70056845 -0.190690036 -0.203904947 -0.223904947 -0.223904945 -0.372202522 -0.64145497× -0.194985545 -0.194985545 -0.1959533 0.078606447? -0.239196975 ♥ -0.239196975 ♥	2832 28 Predicted Entr Regression funct Prediction Entr Samples Mean Root-Mean-Squa Neon Standarda Root-Mean-Squa Average Standard	s 2.889 <u>Standardize</u> ton oes re ed re Standard rd Eiror	2 91/ 2 946 6 Ertor Normal Q/ 0.840711768438: 960 of 963 0.002276032 0.1263013 -0.009047429 0.8066957 0.12237008	29/4 3.00 Measured 10 <u>2Plot</u> / 308 * x + 4
	<back next=""> Finish Cancel</back>							< Back	Next >	Finish	Cancel

Figure C 12. The surface temperature variogram of Köyceğiz Lake in 21.08.2013



Figure C 13. The depth temperature eror map of Köyceğiz Lake

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties – 🗖 🗙			Geos	tatistical	wizaro	d - Empirical	Bayesian Krigir	ng step 3 of	3 - Cross V	alidation	-	. 🗆 🛛
Smulatore at 6402215.4056470 9	General Properties 300 Schert Sim 300 Dire leif Fatzr 1 Nurder of Smakuffors 500 Dugut Sinfex Type Petchert Sanderd Brow Insuffors 600 Search Single Strike Search Single Strike Single Strike Xipe Petchert Sanderd Brow Single Strike Xipe Search Circler Single Strike Xipe Search Single Strike Single Strike Xipe Search Single Strike Image Strike Xipe Search Single Strike Image Strike Xipe Search Single Strike Image Strike Xipe Search Single Strike Image Strike Xipe Search Single Strike Image Strike Xipe Search Single Strike Image Strike Xipe Search Single Strike Image Strike Xipe Search Single Strike Image Strike Xipe Search Single Strike Xipe	Source ID 0 1 2 3 4 5 6 7 8 9 10 11 12 15 17 18 20 21 17 18 20 21 22 23 24 25 25 25 27 27 27 27 28 29 20 20 20 20 20 20 20 20 20 20	Induded Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	Measured 28.85 28.85 28.85 28.85 28.86 28.86 28.86 28.86 28.86 28.86 28.86 28.86 28.86 28.86 28.86 28.86 28.86 28.86 28.85 28.72 28.75 28.	Predicted 28.84 28.84 28.85 28.85 28.85 28.85 28.85 28.86 28.86 28.86 28.86 28.86 28.85 28.85 28.85 28.85 28.83 28.73 28.73 28.73 28.73	Error 0	Standard Error 0.0%13054 0.0%120540 0.0%120540 0.0%4756127 0.0%4756127 0.0%4643564 0.0%125234 0.0%125234 0.0%125254 0.0%125254 0.0%125254 0.0%125254 0.0%125254 0.0%125254 0.0%12554 0.0%12554 0.0%12554 0.0%12554 0.0%25445 0.0%254 0.0%25445 0.0%254 0.0%25450 0.0%2540 0.0%25450 0.0%25450 0.0%2	Standardaed 4 0.02539535 0.025395555 0.0203305395 0.0203305395 0.0203305395 0.0203305395 0.0203305395 0.0203305 0.1205645952 0.1556459522 0.1556459522 0.1556459512 0.0559592 0.0559592 0.0559592 0.0259592 0.0259592 0.0259592 0.0259294 0.0259294 0.0259295 0.025925 0.025925 0.025925 0.025925 0.0259255 0.025925 0.02595 0.025955 0.025955 0.02595	Predicted 10 3 (25 2 858 2 691 2 524 2 19 2 (23 2 19 2 (23 2 19 2 (23) 1 856 Predicted Regression Predicted Mean Root Mean Root 2.051 2.24 Sanda Sand	6 2.441 mized Emer 0.9993 0.010 0.057 0.014 mized Emer 0.057 0.087 0.087	2.535 2 2.535 2 3. Normal (2017) 2.57599 40591 2.4579 2.4579 2.4579 2.4579 2.4539 2.45	10 ⁻ Ret / 2 * x + 0 /	
[<back next=""> Finish Cancel</back>								< Ba	dk Next	>	Finish	Cancel

Figure C 14. The depht temperature variogram of Köyceğiz Lake in 19.07.2013

■ ● ● ● ● ▲ ▲ ■ ■ ■ • *. •	General Properties	Source ID	Included	Measured	Predicted	Error	Standard Error	Standardia *	Predicted 10-1
	Subset Size 100	0	Yes	28.9	28.90	0	0.01264612	0.3715386	3 307
	Overlap Factor 1	1	Yes	28.9	28.89	-0	0.00954927	-0.048741	
	Number of Simulations 100	2	Yes	28.9	28.89	-0	0.01045081	-0.475995	3.075
	Output Surface Type Prediction Standard Error	3	Yes	28.89	28.89	0	0.01000590	0.4134362	2 842
	Transformation Empirical	4	Yes	28.89	28.89	0	0.00972234	0.0200237	
	E Search Neighborhood	5	Yes	28.89	28.88	-0	0.01025970	-0.015967	2.609
	Neighborhood type Smooth Circular	6	Yes	28.89	28.88	-0	0.01014811	-0.020123	
4	Smoothing factor 1	7	Yes	28.89	28.88	-0	0.00995162	-0.021073!	2.311
A 8	Radus 100	8	Yes	28.89	28.88	-0	0.00984892	-0.023988!	2144
	Predicted Value	9	Yes	28.89	28.88	-0	0.00945868	-0.062533	
	X 646437	10	Yes	28.89	28.88	-0	0.00972606	-0.510288	1912
	Y 4087667	11	Yes	28.88	28.88	0	0.00959257	0.4230774	
	Failer 0.03770732	12	Yes	28.88	28.88	0	0.00908459	0.0176501	1.679 1.95 2.222 2.493 2.764 3.036
Second Se	Iteighbors (64)	13	Yes	28.88	28.87	-0	0.00897776	-0.016373:	Measured
m lations at (646437-4087667)		14	Yes	28.88	28.87	-0	0.00887207	-0.019455	Predicted (Error) Standardized Error) Normal QQPlot
		15	Yes	28.88	28.87	-0	0.00876540	-0.019560X	0.000000000000000000000000000000000000
A-101		16	Yes	28.88	28.87	-0	0.00865853	-0.019403!	Regression function 0.99922920+909457 * X + 0.
1.866	-	17	Yes	28.88	28.87	-0	0.00882879	-0.017706	Prediction Errors
5.149		18	Yes	28.88	28.87	-0	0.00869513	-0.019776!	Samples 9009 01 9009
1433		19	Yes	28.88	28.87	-0	0.00857887	-0.016559-	Presin 0.000368253
		20	Yes	28.88	28.87	-0	0.00844307	-0.015389:	Man President 0.0002000
0 1.016 2.033 3.049 4.065 5.081 6.098 7.114 8.13	147	21	Yes	28.88	28.88	0	0.00806395	0.0231384	Root Man Source Standardized 0.6130527
Distance (Meter), H	10-1	77 €	Yes	78.88	78.88	0	0.00831685	0.4746593 *	Average Standard Error 0.1229764



Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Prop	oerties – 🗆 🗙			Geos	tatistical	wizar	d - Empirical	Bayesian K	Kriging step 3 of 3 - Cross Validation – 🗖
	General Properties		Cource TD	Included	Mana rad	Deadstad	Error	Chandred Error	Chandlery A	Designed 10-1
	Subset Size	100	Jource and	D RODUCO	PRESENT CO	Freuktes	-		Junior	Fiedicied IIU
	Overlap Factor	1	0	Yes	27.83	27.83	0	0.00595214	1.52478	3.131
	Number of Simulations	100	1	Yes	27.84	27.83	-0	0.00449363	-0.1238	3001
	Output Surface Type	Prediction Standard Error	2	Yes	27.85	27.84	-0	0.00449717	-1.0869	
	Transformation	Empirical	3	Yes	27.85	27.84	-0	0.00433619	-1.1468	2.871
	Search Neighborho	bd	4	Yes	27.84	27.84	0	0.00449249	1.25356	270
	Neighborhood type	Smooth Circular	5	Yes	27.84	27.84	0	0.00449073	0.12281	2141
	Smoothing factor	1	6	Tes	27.84	27.84	0	0.00449201	0.05892	2.611
	Radus	100	/	Tes	27.84	27.84	0	0.00449276	0.06236	
	Predicted Value		8	Tes	27.84	27.84	0	0.00449296	0.05922	2.481
	x	647451.7	9	Tes	27.84	27.84	0	0.00449354	0.05989	2351
	Y	4086832	10	Yes	27.84	27.84	0	0.00449403	0.05875	
	Value	0.08809905	11	Yes	27.84	27.83	-5	0.00449842	-0.0122	2 221 2 351 2 481 2 611 2 741 2 871 3 001 3 1
	Iteighbors (64)		12	tes	27.84	27.83	-0	0.00434062	-1.15//	Manual II
			13	res	27.83	27.83	5	0.00434048	0.00115	Productor (Developing Developing Cons.) Named CORet
Smulations at (64/451./, 4086832)			19	res	27.82	27.82	0	0.00449660	0.22996	(rieucieu / bio / standauzeu bio / nollia durne /
y-10 ¹			10	Tes	27.01	27.00	-Q	0.00422968	-0.5252	Regression function 0.999565618910942 * x + 0.0
7.892			10	Tes	27.0	27.00	0	0.00423027	1.33/0/	Prediction Errors
5.919			1/	Tes	27.0	27.00	0	0.00449595	0.07355	Samples 3108 of 3108
3.946			10	Vee	27.0	27.79	0	0.00445724	1 10024	Mean 0.0000687003
1.9/3			20	Vee	27.79	27.79	0	0.00405511	1.17529	Root-Mean-Square 0.03627377
0 0.88 1.761 2.641 3.522 4.402 5.283 6.163 7.044 7.924			21	Vee	27.79	27.79	0	0.00440632	0.1065	Mean Standardized -0.008050243
Distance (Meter), h · 10 ⁻¹			20	Vea	27.0	27.75	0	0.00449079	1.02165	Root-Mean-Square Standardized 0.6299276
Semivatograms (Nugget) Partial SII Range Transformation			ć		((2)	er.ell		1.111-1-1-1-1 ID	>	Average Standard Error 0.05170989
	< Back Next >	Finish Cancel								<back next=""> Finish Cancel</back>

Figure C 16. The depht temperature variogram of Köyceğiz Lake in 22.07.2013

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties -	Geostatistical wizard - Empirical Bayesian Kriging step 3 of 3 - Cross Validation -
[문] 역 역 전 🕲 🕸 🍽 🗉 🌆 🖌 🐉 T	Cherch Properties	Source ID Included Measured Predicted Error Standard Error Standard * Predicted 10 ⁻¹
1.	Subset Size 100	6 Yes 29.370 29.43 0 0.00963133 7.13250 1524
	Number of First James 100	14 Yes 29.44 29.390 0.009109664.4634
	Number of Simulations 100	15 Yes 29.44 29.43 0 0.00831099 0.7642
	Supplementation of the standard error	16 Yes 29.44 29.43 0 0.00900635 0.2232 3205
	Construction Empirical	17 Yes 29.44 29.430 0.000613950.1430:
	Search Neighborhood	18 Yes 29.44 29.44 6 0.00872564 0.00779 3.047
	Neighborhood type Smooth Circular	19 Yes 29.44 29.43 0 0.00871284 0.0297 3 000
~	Smoothing factor 1	20 Yes 29.44 29.44 3 0.00877976 0.00036
	Radus 100	Z1 Yes 29.44 29.44 1 0.00880240 0.00182 2.73
	Predicted Value	22 Yes 29.44 29.43 0 0.00933812 0.0266
	X 644192.7	23 Yes 29.44 29.430 0.009784320.0440- 2.5/1
• • • • • • • • • • • • • • • • • • •	1002197	24 Yes 29.44 29.433 0.008704730.0041
D D	Value 0.03254514	25 Yes 29.44 29.44 6 0.00920618 0.00075 2.412 2.571 2.73 2.889 3.047 3.206 3.365 3.5
	It Reighbors (64)	26 Yes 29.44 29.430 0.008783970.0713 Measured T
Simulations at (644192.7, 4082197)		27 Yes 29.44 29.430 0.008745010.0153 Predicted Error Standardzed Error Normal GQPtst
		28 Yes 29.44 29.43 0 0.0093/242 0.0345 Descention Environment of 901000/300710441 F + 0.1
¥-10+		29 Yes 29.44 29.43 0 0.00069632 0.0801: Repetition Encode
6.484		30 Yes 29.44 29.43 0 0.008007730.21061 Convolution Provide
4,003		31 Yes 29.44 29.43 0 0.00806322 0.5709 Man 0.008053905
1.621		32 Yes 29.43 29.43 0 0.00824236 0.61528 Dark Mann Co.mer 0 160084
		33 Yes 29.43 29.43 0 0.00785332 0.27995 Maan Standardand .0.00227831
0 0.897 1.794 2.692 3.589 4.486 5.383 6.281 7.178 8.075		34 Yes 29.43 29.43 0 0.00806669 0.42885 Details Standardined 0.601953
Distance (Meter), h ·10 ⁻¹		16 Yes 29,416 29,41 d. 0.00261015 d.7742 V August Standard Standard Status
Semivariograms (Nugget) Partial SII) Range) Transformation /		K 3 House Prove a research and the second se
	<back next=""> Finish Cancel</back>	<bok net=""> Preh //Carol</bok>

Figure C 17. The depht temperature variogram of Köyceğiz Lake in 23.07.2013

Geostatistical wizard - Empirical Bayesian Kriging	tep 2 of 3 - Method Properties -			Geos	tatistical	wizar	d - Empirical	Bayesian k	Kriging step 3 of 3 - Cross Validation -
수 - 역, 역, 환 🥥 🦛 🎐 🗄 💁 - 🍾 -	General Properties	Source ID	Induded	Measured	Predicted	Error	Standard Error	Standarc ^	Predicted 10*1
	Subset Size 100	0	Yes	30.91	29.51	-1	0.31865905	-4.3702	3.091
	Overlap Factor 1	1	Yes	29.75	29.97	0	0.30357725	0.72777	
	Number of Simulations 100	25	Yes	29.045	29.49	0	0.27957050	1.59376	2.887
	Output Surface Type Prediction Standard Error	44	Yes	28.879	29.12	0	0.28472084	0.86011	2682
	Transformation Empirical	45	Yes	28.84	28.95	0	0.30327082	0.37225	
	Search Neighborhood	46	Yes	28.85	28.90	0	0.30138285	0.18347	2.478
	Neighborhood type Smooth Circular	47	Yes	28.86	28.89	0	0.29803632	0.10818	2 274
	Smoothing factor 1	48	Yes	28.86	28.85	-0	0.31488453	-0.0179!	······································
	Kadus 100	49	Yes	28.86	28.85	-0	0.32089794	-0.0253k	2.07
	Predicted value	50	Yes	28.86	28.88	0	0.32124102	0.07127	1 2
*	X 646090.5	51	Yes	28.86	28.84	-0	0.31924126	-0.0562t	1.865
	T 400000	52	Yes	28.84	28.84	0	0.31173645	0.02087	7
7	Valle 0.00/1422	53	Yes	28.82	28.83	0	0.29502297	0.03443	1.661 1.865 2.07 2.274 2.478 2.682 2.8
•	E heighbors (64)	54	Yes	28.8	28.80	0	0.29339200	0.00423	Mea
imulations at (648090.5, 4088543)		55	Yes	28.79	28.83	0	0.31639359	0.15242	Predicted (Error) Standardized Error) Normal QQPlot /
		56	Yes	28.79	28.79	0	0.31453543	0.01170	Respective Exercises 0.000766560322365 # v
γ.ω.		57	Yes	28.8	28.79	-0	0.30766431	-0.0171	Prediction Emper
7 081		58	Yes	28.8	28.74	-0	0.30241492	-0.1672	Samples 4059 of 4059
4.721		59	Yes	28.72	28.59	-0	0.28091310	-0.4623!	Mean -0.0119372
2.36		60	Yes	28.46	28.50	0	0.27865882	0.17553	Root-Mean-Square 0.392848
		61	Yes	28.24	28.28	0	0.28099049	0.17174	Mean Standardzed +0.005397834
u u.so/ 1./33 2.55 3.36/ 4.483 5.38 5.2/6 /.1/3 8	n-2	62	Yes	28.09	28.06	-0	0.28517037	-0.0905(Root-Mean-Square Standardized 0.4864474
Cambraicannes (Numeri) Datiel Cil) Danse) Transformation /	-	63	Yes	27.85	27.79	-0	0.27905465	-0.1841-	Average Standard Error 0.4085455
Jointany and Vinange Vinang		•						,	*
	<back next=""> Finish Cancel</back>								< Badk Next > Finish



	G General Properties	Source ID	Induded	Measured	Predicted	Error	Standard Error	Standars ^	Predicted 10-1
	Subset Size 100	3	Yes	30.8	29.53	-1	0.26860115	-4.7040	3.105
	Overlap Factor 1	20	Yes	29.3	30.11	0	0.24930112	3.27804	
	Number of Simulations 100	40	Yes	29.111	30.11	1	0.25362426	3.94514	2.961
	Output Surface Type Prediction Standard Error	61	Yes	30	29.87	-0	0.27341804	-0.4672	2817
	Transformation Empirical	62	Yes	30	29.90	-0	0.26710905	-0.3668	1
	Search Neighborhood	63	Yes	30	29.88	-0	0.25849100	-0.4547	2.674
	Neighborhood type Smooth Circular	64	Yes	30	29.83	-0	0.25526920	-0.6510	252
	Smoothing factor 1	65	Yes	30	29.74	-0	0.25859604	-0.9672	233
	Radius 50	66	Yes	30	29.49	-0	0.26559702	-1.8834	2.387
	Predicted Value	67	Yes	29	29.47	0	0.26343791	1.78429	
	x 000578	68	Yes	29	29.27	0	0.25841010	1.06145	2.243
	1 4000370	69	Yes	29	29.14	0	0.25659348	0.55982	· ·
	E Heinkhors (48)	70	Yes	29	29.07	0	0.25159283	0.30386	2.099 2.243 2.387 2.53 2.674 2.817 2.9
	a mahanara (43)	71	Yes	29	29.03	0	0.25246793	0.14080	Mea
dations at (651399.8, 4088576)		72	Yes	29	29.01	0	0.25032503	0.07815	Predicted (Error) Standardized Error /
v 101		73	Yes	29	29.00	0	0.24866913	0.03443	Recreasion function 0.999590173426684 * v
91		74	Yes	29	29.00	0	0.24650759	0.00988	Prediction Errors
43		75	Yes	29	28.99	-0	0.24407235	-0.0034	Samples 3977 of 3977
6		76	Yes	29	28.99	-0	0.24157061	-0.0095!	Mean -0.001394086
48		77	Yes	29	29.00	0	0.23993911	0.00458	Root-Mean-Square 0, 1542865
0 0.139 0.278 0.417 0.556 0.695 0.834 0.973 1.112 1.251		78	Yes	29	28.99	-0	0.23925651	-0.04068	Mean Standardized NaN
Distance (Meter), h 10 ⁻²		79	Yes	29	28.99	-0	0.23704764	-0.0189:	Root-Mean-Square Standardized NaN
envatorame (Nuccet) Partial SII) Rance) Transformation /		80	Yes	29	78.99	-0	0.73252862	-0.01851	Average Standard Error 0.1643304
the second s	0							-	

Figure C 19. The depht temperature variogram of Köyceğiz Lake in 25.07.2013

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Prop	erties – 🗆 🗙			Geos	tatistical	wizaro	d - Empirical	Bayesian K	riging step 3 of 3 - Cross Validation 🛛 – 🗖 🗙
	General Properties		Source ID	Included	Measured	Predicted	Error	Standard Error	Standars ^	President -10:1
	Subset Size	100	7	Vee	20.166	20.12		0.00493639	0.0467	2955
	Overlap Factor	1		Vec	29.100	20.12	0	0.00403038	1 71095	200
	Number of Simulations	100	47	Yer	29.127	29.13	0	0.00679095	0.51264	2.904
	Output Surface Type	Prediction Standard Error	155	Yee	20 110	20.13	0	0.00578107	1 73366	1001
	Transformation	Empirical	107	Ver	20 110	20.12	0	0.00552994	1 20727	2.001
	E Search Neighborhoo	d	207	Ver	20 110	29.12	0	0.00522262	0.64749	2.799
	Neighborhood type	Smooth Circular	216	Vec	29.120	29.12	0	0.00512577	0.67031	1 .
	Smoothing factor	1	267	Yes	29.127	29.12	-0	0.00516087	-0.8060	2.746
	Radius	50	287	Vac	20.127	29.12	-0	0.00582353	.0 1972	2694
	Predicted Value		307	Yes	29.123	29.12	0	0.00607541	1 11758	
	x	650876.4	327	Yes	29.130	29.12	-0	0.00568116	-0.4119	2.641
	Y	4090344	347	Yes	29.131	29.13	0	0.00741733	0.13240	
	Value	0.09005873	365	Yes	29.138	29.14	0	0.01129084	0.84331	2 589 2 641 2 694 2 746 2 799 2 851 2 904 2 956
	Image: Neighbors (53)		366	Yes	29.17	29.15	-0	0.01128808	-0.9901	Measured 10*1
Sem Jations at (ES007E & 4090244)			367	Yes	29.17	29.17	0	0.01145394	0.08412	Predicted (Error) Standardized Error) Normal QQPlot /
Simalations de (650070-9, 1650514)			368	Yes	29.18	29.17	-0	0.01163907	-0.3435	
y-10 ¹			369	Yes	29.18	29.18	0	0.01130076	0.22024	Regression function 1.00096539475827 * x + -0.02 ^
5.938			370	Yes	29.19	29.18	-0	0.01134829	-0.6762	Prediction Errors
4.453			371	Yes	29.19	29.18	-0	0.01122456	-0.6799(Samples 1451 of 1451
2 969			372	Yes	29.18	29.18	0	0.01088386	0.17652	Mean -0.0002885613
1.404			373	Yes	29.18	29.17	-0	0.01093672	-0.2329	Root-Mean-Square 0.04260006
0 0.837 1.674 2.512 3.349 4.186 5.023 5.86 6.698 7.535			374	Yes	29.17	29.17	0	0.01139589	0.39515	Mean Standardized -0.02771207
Distance (Meter), h ·10 ⁻¹			375	Yes	29.17	29.17	n	0.01130520	0.01754 ¥	Root-Mean-Square Standardized 0.6955725
Semivarlograms Nugget A Partial SII Range Transformation /			<						>	Average Standard Error 0.05248506
	< Back Next >	Finish Cancel								<back next=""> Finish Cancel</back>

Figure C 20.The depht temperature variogram of Köyceğiz Lake in 26.07.2013

9 C C 2 G 4 + 5 3 - 5 -	General Properties		Source ID	Included	Measured	Predicted 8	Error Standard En	or Standars A	Predicted 10 ⁻¹
	Subset Size	100		Ver	21.07	20.76	0 0 50577799	-0 5977	2 120
7	Overlap Factor	1		Yer	20.24	20.95	0.40107050	1 34395	5.100
	Number of Simulations	100		Yer	20.07	20.69	0.470920203	1 29222	2.904
	Output Surface Type	Prediction Standard Error	1	Yes	30.02	30.63	0.47721629	1 28439	2009
	Transformation	Empirical	4	Yes	30.515	30.37	0 0.45734153	-0.3109	2.000
	Search Neighborho	od	5	Yes	29.99	30.59	0.47119217	1 28776	2.435
	Neighborhood type	Smooth Circular	6	Yes	29.96	30.54	0.47249413	1 22906	Section 2 Section 2
	Smoothing factor	1	7	Yes	29.91	30.37	0.45337677	1.03031	22
	Radius	100	8	Yes	29.87	30.49	0.45018053	1.37982	1955
	Predicted Value		9	Yes	29.85	30.36	0.43660639	1.16976	
	х	649279.5	10	Yes	29.82	30.22 (0 0.40917725	0.99843	1.731
	Y	4087908	11	Yes	29.78	30.20 (0 0.39551470	1.06323	
	Kabe	0.06589081	12	Yes	29.77	30.15 (0 0.37121740	1.02441	1.497 1.731 1.966 2.2 2.435 2.669 2.9
· ·	E Neighbors (64)		13	Yes	29.76	30.02 (0 0.32300224	0.82295	Mea
ulations at (649279 5 4087908)			14	Yes	29.77	30.02 (0 0.31432261	0.81791	Predicted (Error) Standardized Error) Normal QQPlot /
			15	Yes	29.77	30.03 (0.31526858	0.85334	
Y-101			16	Yes	29.77	30.00 (0 0.29888914	0.78370	Regression function 0.997033518996212 *1
326			17	Yes	29.77	30.07 (0 0.32931457	0.91650	Energian 0124 of 0124
244			18	Yes	29.77	30.06 (0.33222194	0.89201	Mana
IBS INCOMENTATION OF THE OWNER			19	Yes	30.395	29.87	0 0.21583554	2.4043	Prost Mean Scillare 0.9573477
			20	Yes	29.76	30.04	0.32287918	0.88331	Mean Standardzed 40 009366844
0 0.925 1.849 2.774 3.698 4.623 5.548 6.472 7.397 8.322			21	Yes	29.76	30.00 (0.29463183	0.82156	Post-Mean-Square Standardized 0 7514733
Distance (Meter), h ·10 ·1 enivariograms / Nugget / Partial Sil / Range / Transformation /			22 K	Yes	29.76	30.05	n n.31824348		Average Standard Error 1.016254



Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties 🛛 – 🗖 🗙			Geos	tatistical	wizaro	d - Empirical	Bayesian H	riging step 3 of 3 - Cross Validation -
	General Properties	a north an		Managed	Desident of		Charles d Carro	Churchen A	• • • • • • • • •
	Subset Size 100	Source II	Incuded	Measured	Predicted	Crior	Standard Error	Standart	Predicted 10"
~ 2	Overlap Factor 1	0	Yes	30.43	28.93	-1	2.50487444	-0.5953	3.129
	Number of Simulations 100	1	Yes	29.94	27.76	-2	5.57110376	-0.39000	2.897
	Output Surface Type Prediction Standard Error	2	Yes	29.83	29.01	-0	2.22265065	-0.36770	
X	Transformation Empirical	3	Yes	29.83	29.08	-0	2.13174405	-0.3510	2.665
	Search Neighborhood	4	Yes	29.83	29.11	-0	2.07819334	-0.3445(202
	Neighborhood type Smooth Circular	5	Yes	29.83	29.13	-0	2.05234355	-0.3404K	2-55
	Smoothing factor 1	6	Yes	29.83	29.14	-0	2.04323305	-0.3365	2.201
	Radius 50	/	Tes	29.83	29.14	-0	2.04412220	-0.3357-	11 2 2 2
	Predicted Value	8	Yes	29.83	29.14	-0	2.05050981	-0.3363	1.969
	X 651114.4	9	Yes	29.83	29.13	-0	2.06319098	-0.3383	1777
	Y 4088237	10	Yes	29.83	29.07	-0	2.11167362	-0.3576	A A A A A A A A A A A A A A A A A A A
	Value 0.5937153	11	Tes	29.84	28.87	-0	2.18323575	-0.44090	1505 1727 1000 2001 2422 2005 2007 2120
	Neighbors (6)	12	Yes	29.84	28.90	-0	2.37728262	-0.39254	1.000 1.737 1.000 2.201 2.400 2.000 2.007 3.120 Mercured 10-7
		13	Yes	29.84	28.80	-1	2.43345813	-0.4253	Pedated / Enry Development Enry Mercel 0001at /
Simulations at (651114.4, 4088237)		14	Yes	29.86	27.77	-2	3.21847519	-0.6476	I Prediced / Erfor / Standardzed Erfor / Noma GUHot /
y-10 ¹		15	Yes	30.29	29.29	-0	1.93852168	-0.5110	Regression function 0.887579213664866 * x + 2.6 /
2149		16	Yes	30.29	29.73	-0	1.46963528	-0.3748	Prediction Errors
1.612		17	Yes	30.28	29.73	-0	1.45084605	-0.3774k	Samples 406 of 407
1.075		18	Tes	30.32	29.71	-0	1.4/551550	-0.4084.	Mean -0.2727019
0.537		19	Yes	30.31	29.60	-0	1.82766468	-0.3867	Root-Mean-Square 3.25442
0 0.435 0.871 1.306 1.742 2.177 2.612 3.048 3.483 3.919		20	Yes	29.02	26.62	-2	4.78026467	-0.5001	Mean Standardized -0.1360978
Distance (Meter), h ·10 ⁻²		21	Tes	29.01	25.74	-2	4.75413137	-0.4/89	Root-Mean-Square Standardized 1.477176
Semivariograms (Nugget) Partial Sill) Range) Transformation /		7) <	Tes	78.86	76.44	-7	4,874%666	-0.4959	Average Standard Error 3.123927
	<badk next=""> Finish Cance</badk>								<back next=""> Finish Cancel</back>

Figure C 22. The depht temperature variogram of Köyceğiz Lake in 19.08.2013

Oracle R Constrained formation Decided form Standament formation Percent formation	Geostatistical wizard - Empirical Bayesian Kriging ste	p 2 of 3 - Method Pro	perties – 🗆 🗙			Geos	tatistical	wizar	d - Empirical	Bayesian H	Kriging step 3 of 3 - Cross Validation – 🗖 🗙
Subdisting of STSS 5, 60858() 90 V 11 Y 11 Subdisting of STSS 5, 60858() 90 V 11 Y 11 Subdisting of STSS 5, 60858() 90 V 11 Y 11 Subdisting of STSS 5, 60858() 90 V 11 Y 11 Subdisting of STS 5, 60858() 90 V 11 Y 11 Subdisting of STS 5, 60858() 90 V 11 Y 11 Subdisting of STS 5, 60858() 90 V 11 Y 11 Subdisting of STS 5, 60858() 90 V 11 Y 11 Subdisting of STS 5, 60858() 90 V 11 Y 11 Subdisting of STS 5, 60858() 90 V 11 Y 11 Subdisting of STS 5, 60858() 90 V 11 Y 11 Subject (Mather Math	😔 • Q Q 🖑 🌒 🛊 🕸 🗄 📓 • 🍾 •	General Propertie	5	Source ID	Induded	Measured	Predicted	Error	Standard Error	Standare ^	Predicted -10 ⁻¹
Ovelop Factor 1 1 Ter 20.96 20.950 0.0.02251240.0386 Ovelop Factor 1 1 Ter 20.96 20.950 0.0.02251240.0386 Outduis factor 20 register 1 Ter 20.96 20.960 0.0.02251240 0.0386 Outduis factor 20 register 1 Ter 20.96 20.960 0.02251240 0.03815 Sector 10 register 1 Ter 20.96 20.960 0.0225270 0.0418 Sector 10 register 1 Ter 20.97 20.970 0.02251780 0.03815 Ter 20.97 20.970 0.02251780 0.02251780 0.0418 Ter 20.97 20.970 0.02251780 0.02217780 0.0127 Ter 20.97 20.970 0.02251780 0.02251780 0.02251780 0.0127 Ter 20.97 20.970 0.02251780 0.02251780 0.02251780 0.02251780 0.02251780 Ter 20.97 20.980 0.02251780 0.02251780 0.02251780 0.02251780 0.02251780 0		Subset Size	100	0	Yes	29.96	29.95	-0	0.03496641	-0.0437	3.119
Indexe of Subdays 100 Press 29.8% 0.0.029823.4.0.0891 20.00 Indexe of Subdays 100 Press 29.9% 29.6% 0.0.0.029823.4.0.0891 20.00 Indexe of Subdays 100 Press 29.9% 29.6% 0.0.0.022822.4.0.0491 20.00 Indexe of Subdays 100 Press 29.9% 29.6% 0.0.0.022825.7.0.0.022865.6.0.0287 0.0227287.0.0.022865.0.0.0287 Indexe of Subdays 100 Indexe		Overlap Factor	1	1	Yes	29.96	29.95	-0	0.02521745	-0.1886-	· · · · · · · · · · · · · · · · · · ·
Dub, Lishing the Problem 3 tre 20,46 <th></th> <th>Number of Simulation</th> <th>s 100</th> <th>2</th> <th>Yes</th> <th>29.95</th> <th>29.96</th> <th>0</th> <th>0.02495624</th> <th>0.45901</th> <th>2.888</th>		Number of Simulation	s 100	2	Yes	29.95	29.96	0	0.02495624	0.45901	2.888
Building and problem Product of karge bond on the problem 4 1 4		Output Surface Type	Prediction Standard Error	3	Yes	29.96	29.96	0	0.02617628	0.36115	2.657
2. Match insignmented 2. Match insignmented 5 (mm = 2.9, mm =		Transformation	Emprical	4	Yes	29.99	29.97	-0	0.02648656	-0.5656:	
Implementative factor 1 Radar 50 President Video 7 Radar 50 Pres 2.57 Radare df U7531.6 10782.4 Pres 2.57 Radare df U7531.6 10782.4 Pres 2.58 2.58 Radare df U7531.6 10782.4 Pres 2.58 2.58 Radare df U7531.6 10782.4 Pres 2.58 2.58 Radare df U7531.6 2.58		Search Neighborh	boo	5	Yes	29.99	29.98	-0	0.02702367	-0.0418(2.426
Sindation al (5/75).6.4005X(a) 7 Ye 20.98 20.98 0.0.00377380.0420 Sindation al (5/75).6.4005X(a) 9 Ye 20.97 20.97 0.0.0249370.02495310.02496 1.00 Sindation al (5/75).6.4005X(a) 1.770276 1.770276 1.770276 1.770276 1.770276 1.170276 1.170276 1.10 Ye 2.0.0249476 0.0249476 0.0249476 0.0249476 0.0249476 0.0249476 0.0249476 0.0249476 0.0124976	N 5	Neignborhood type	smooth Circular	6	Yes	29.99	29.98	-0	0.02686355	-0.2363(2 195
Sinuatione at 64/20316, 400850) P (res 23,97 2,97, 0 0.0351940, 0.03071 154 Y 10 ¹ *** *** 2.97 2,97, 0 0.0251940, 0.03071 1502 Sinuatione at 64/20316, 400850) *** *** 2.97 2,97, 0 0.0251940, 0.02071 1.02120 Y 10 ¹ *** 2.98 2,98, 0 0.0271747, 0.02120 1.0227 1.0217 1.0217 Y 10 ¹ *** 3.0 2,98, 0 0.0271747, 0.02120 1.0228147, 0.022814 1.172814		smoothing factor	1	7	Yes	29.98	29.98	0	0.02677359	0.04020	. 🦋 🚦
Predactor weig 6470.14 9 Prez 2.67 2.68 0.028981 0.22898 0.028981 0.22898 Sinulation al (6470516.4005X2) Prez 2.99 2.98 -0.0299787 -0.0513 1502 1.30 1.50 1.30 1.50		Radus	50	8	Yes	29.97	29.97	0	0.02651408	0.19071	1.964
Image: Statistic statis statistic statistic statistic statistic statistic		Predicted value	647252.6	9	Yes	29.97	29.97	0	0.02657881	0.22686	1 722
Sindama (6/705/5, 40053) Control (4) Control (×	(000020	10	Yes	29.98	29.98	0	0.02741378	0.01220	
Image: Second control (March 1: 10) Image: Se		Value	1 775934	11	Yes	29.99	29.98	-0	0.02773675	-0.0153	
Sindarina (\$47/5515.400551) 13 Yes 35 25.9%. 0. 0.0228217. 0.0214 Y 10 ¹ Yes 35 25.9%. 0. 0.0228627. 0.0214 314 Yes 35 25.9%. 0. 0.0228627. 0.0214 315 Yes 35 25.9%. 0. 0.0228627. 0.0214 315 Yes 35 178 35.9%. 0. 0.0228627. 0.0214 315 Yes 25.9%. 0. 0.0228647. 0.4928 0.0298674. 0.4928 316 Yes 25.9%. 0. 0.0228647. 0.4928 0.0228647. 0.01297855. 0.0228647. 0.03998 0.00258667. 317 158 2.33 317 321 475 5.48 0.0129856. 0.0202867. 0.00258667. 0.00258678 316 Yes 2.84 2.84 0.0129856. 0.0129856. 0.00218785 Database due due due due due due due due due du		E Neighbors (64)		12	Yes	30	29.99	-0	0.02654074	-0.1735(1.502 1.733 1.964 2.130 2.426 2.657 2.888 3.119
Sinulational (SI/2015, 6408558) 14 19re 30 29.9%, -0., 0.0286455, -0.0451 15 1re 30 29.9%, -0., 0.0286457, -0.0451 15 1re 29.9%, -0., 0.0286457, -0.0470 16 0.714 156 253 3107 1271 4705 545 6274 7268 Detance (Meer, 1.10 ⁻⁷) 21 19re 29.4 29.3 2.04., -0.01210356, -0.0297 21 19re 29.4 29.3 .0.0 0.0121036, -0.0297 21 19re 29.4 29.3 .0.0 0.0121036, -0.0297 21 19re 29.4 29.3 .0.0 0.0121036, -0.0297 21 19re 29.4 29.3 .0.0 0.0121036, -0.0297 21 19re 29.4 29.3 .0.0 0.0121036, -0.0297 21 19re 29.4 29.3 .0.0 0.0121036, -0.0297 21 19re 29.4 29.3 .0.0 0.0121036, -0.0297 21 19re 29.4 29.3 .0.0 0.0121036, -0.0297 21 19re 29.4 29.3 29.4 .0.0 0.00297 21 19re 29.4 29.3 29.4 .0.00497 21 19re 29.4 29.3 29.4 .0.00497 21 19re 29.4 29.3 29.4 .0.00497 21 19re 29.4 29.3 29.4 .0.00497 21 19re 29.4 29.3 29.4 .0.00497 21 19re 29.4 29.3 29.4 .0.00497 21 19re 29.4 29.3 29.4 .0.00497 21 19re 29.4 29.3 29.4 .0.00497 21 19re 29.4 29.3 29.4 .0.00497 21 19re 29.4 29.3 29.4 .0.00497 21 19re 29.4 29.3 29.4 .0.00497 21 19re 29.4 29.3 29.4 .0.00497 21 19re 29.4 29.3 29.4 .0.00497 21 19re 29.4 29.3 29.4 .0.00497 21 19re 29.4 29.3 29.4 .0.00497 21 19re 29.4 29.3 29.4 .0.00497 21 19re 29.4		- neighbors (or)		13	Yes	30	29.99	-0	0.02538217	-0.0214	Measured TU -
y 101 15 17e 23.98 .0	Simulations at (647353.6, 4088363)			14	Yes	30	29.99	-0	0.02769825	-0.0161	Predicted / Erfor / Standardized Erfor / Normal Gluenot /
334 156 176 25.38 25.88 .0.0269577 -0.070 3235 177 176 25.34 25.48 .0.0209514 -0.0209514 -0.0209514 -0.0209514 -0.0201587 -0.071 157 197 176 25.34 25.88 .0.0.0209514 -0.0209514 -0.0201587 -0.0124036 -0.0201587 Hain -0.00205891 -0.00205891 -0.00205891 -0.0020187 Hain -	v.101			15	Yes	30	29.98	-0	0.02886045	-0.4453	Regression function 0.999981068621894 * x + 0.0 A
17 Tre 25.94 25.93 0.02035% 0.2724 1557 1557 19 Yes 25.85 0.02135% 0.2724 0 0.714 1562 25.85 0.021235% 0.0217 0 0.714 1562 25.85 0.021235% 0.0217 10 Yes 25.87 25.85 0.021235% 0.0217 10 Yes 25.87 25.85 0.021226% 0.020216% 12 Yes 25.85 25.82 0.00216% 0.00216% 21 Yes 25.85 25.82 0.00216% Man Standardsed 0.000216% 21 Yes 25.85 25.82 0.00216% Man Standardsed 0.000218% 21 Yes 25.85 25.82 0.00216% Man Standardsed 0.000218% 21 Yes 25.87 25.81 0.0024%	2914			16	Yes	29.98	29.96	-0	0.02669577	-0.47070	Prediction Errors
1557 156 157 158 258 0.012038 0.0129 0.0129 0.0129 0.012038 0.0202187 0.002187 0.002187 Nonconceptone 0.0002187 Nonconceptone Nonconceptone 0.0002187 Nonconceptone Nonconceptone Nonconceptone Nonconceptone Nonconceptone Nonconceptone Nonconceptone Nonconceptone Nonconceptone Nonconceptone Nonconceptone Nonconceptone Nonconceptone Nonconceptone	2936			17	Yes	29.94	29.93	-0	0.02309514	-0.2924	Samples 3731 of 3731
1979 20 197 24 24.87 24.98 0.001228 0.0012 0.0012 0.001214 198 23.98 0.001214 0.001225 0.001214 198 24.82 24.84 0.001225 0.001225 0.001214 198 23.92 24.82 24.82 0.001225 0.00125 Mean Standarded 0.0002146 198 24.92 0.00125 0.00125 0.001214 198 24.92 0.001214 198 24.92 0.001214 198 24.92 0.001214 198 24.92 0.001214 198 24.92 0.001214 198 24.92 0.001214 198 24.92 198 24.92 198 </td <td>1.957</td> <td></td> <td></td> <td>18</td> <td>res</td> <td>29.9</td> <td>29.89</td> <td>-0</td> <td>0.01/38345</td> <td>-0.0347.</td> <td>Mean -0.002969091</td>	1.957			18	res	29.9	29.89	-0	0.01/38345	-0.0347.	Mean -0.002969091
0 0.714 156 2.55 1377 3521 4.75 5.49 6.274 7.553 Datase (Meet) 1: 0' 1' 1' 1' 1' 1' 1' 1' 1' 1' 1' 1' 1' 1'	0.979			19	res	29.87	29.86	-0	0.01243036	-0.201/4	Root-Mean-Square 0.2001287
Diance (Mein; h: 10 ⁻¹) 21 185 23.8.2 -0 0.000/Ver/dis -0.0185 ⁻¹ 2 Vie 29.87 29.81 -0 0.000/Ver/dis -0.0185 ⁻¹ 3 Vie 29.87 29.81 -0 0.000/Ver/dis -0.0185 ⁻¹ 4 Vie 29.87 29.81 -0 0.000/Ver/dis -0.0185 ⁻¹ 5 Vie 29.87 29.81 -0 0.000/Ver/dis -0.0185 ⁻¹ 4 Vie 29.87 29.81 -0 0.000/Ver/dis -0.0185 ⁻¹ 5 Vie 29.87 29.81 -0 0.000/Ver/dis -0.0185 ⁻¹	0 0.784 1.568 2.353 3.137 3.921 4.705 5.49 6.274 7.05			20	Tes	29.09	29.04	0	0.01021206	0.09025	Mean Standardized -0.0003114616
Servisopers (Hugget / Patal SI / Range, Transformator / 0.2841389	Distance (Meter) h 10	1		21	Yes	29.03	27.02	0	0.00749786	0.05301 A	Root-Mean-Square Standardized 0.6867179
	Semivalograms (Nugget) Patial SII) Range) Transformation /			< Contraction of the second se		19.00	and the		0.000-0208	>	Average Standard Error 0.2841389
<beck next=""> Finish Cancel <beck next=""> Finish</beck></beck>		<back next=""></back>	Finish Cancel								< Back Next > Finish Cancel

Figure C 23.The depht temperature variogram of Köyceğiz Lake in 20.08.2013

o - 0, 0, 2° () (≠ ⇒) E (- % -	General Properties		Source ID	Induded	Measured	Predicted	Error St	tandard Error	Standare ^	Predicted -10-1
	Subset Size	100	0	Ver	20.25	20.22	.0 0	13629027	0.2109	2 108
	Overlap Factor	1		Vee	30.20	30.22	0 0	10000327	0.2012	3.100
	Number of Simulations	100		Vee	30.20	30.22	-0 0.	12052203	0.2312	2.904
	Output Surface Type	Prediction Standard Error	2	Yee	30-23	30.22	-0 0.	14050600	0.1/90	
	Transformation	Empirical	-	Vee	30.23	30.20	-0 0.	147130000	0.2052	2./01
	B Search Neighborho	od	1	Yee	30.23	30.19	0 0.	19/13030	0.0002	2.497
	Neighborhood type	Smooth Circular	-	Vee	30.22	30.20	-0 0.	120103/4	0.0302	
	Smoothing factor	1	7	Vee	30-23	20.25	0 0	12/17/092	0.1640	2.294
	Radius	100		Yes	20.23	20.20	-00	12427479	-0.2049	209 •
	Predicted Value		0	Yee	30-23	30.20	0 0.	1293/922	0.3741	203 .
1	X	646272.3	10	Vee	30.24	30.25	-0 0.	12301030	0.1476	1.886
2	Y	4083395	10	Yee	30-22	30.20	0 0.	12933083	0.1090	
	Value	0.06764527	12	Yer	20.12	20.19	0 0	1202324201	0.10500	1,683 1,886 2,09 2,294 2,497 2,701 2
	B Neighbors (8)		12	Yes	30.15	30.19	0 0.	13903913	0.10390	Me
- (afree at (\$45272.2, 4092265)			14	Yer	30.13	20.10	0 0	11300457	0.07799	Predicted (Emr.), Standardized Emr.), Nomal COPInt /
inuduuris at (946272.3, 4003333)			15	Yee	20.22	20.21	0 0	13603560	0.1266	
Y-10 ¹			16	Yer	30.25	20.24	-0 0	14673365	-0.1300	Regression function 0.993813287485049 *:
9.8			17	Yee	30.20	30.25	-0 0	16061667	J0 1066	Prediction Errors
7.35			19	Yer	20.22	20.25	0 0	10710700	0 19747	Samples 960 of 963
49			19	Yee	30.22	30.26	0 0	15157208	0 22883	Mean 0.008998863
240			20	Yes	30.25	30.25	0 0	14397439	0.04483	Root-Mean-Square 0.2881215
0 1.09 2.18 3.271 4.361 5.451 6.541 7.632 8.722 9.812			21	Yee	30.26	30.23	-0 0	12587100	J1 1789	Mean Standardized 0.002521125
Distance (Meter), h ·10 ⁻²			22	Yes	30.2	30.21	0 0	10274902	0.10556	Root-Mean-Square Standardized 0.9255469
Semivariograms (Nugget) Partial SII) Range) Transformation /			<						>	Average Standard Error 0.3591955
	(Bark Navt)	Enith Carral								(Rack Next) Erich

Figure C 24.The depht temperature variogram of Köyceğiz Lake in 21.08.2013



Appendix D. EBK error maps and variograms for Fethiye-Göcek Bay

Figure D 1.The surface temperature eror map of Fethiye-Göcek Bay

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Pro	perties – 🗆 🗙			Geos	statistical	wiza	rd - Empirical	l Bayesian I	Kriging step 3 of 3 - Cross Validation -
⊕ - 0, 0, 8 0) (a a) = a - % -	General Propertie	5	Source ID	Induded	Measured	Predicted	Firm	Standard From	Standar A	Rendicted .10-1
	Subset Size	100					-	-		
	Overlap Factor	1		TES	20.4	20.7	0	0	Nan	2.33
7	Number of Simulations	s 100	1	res	28.9	28.9	0	0	Nan	2.913
	Output Surface Type	Prediction Standard Error	2	res	28.4	28.4	0	0	NaN	
	Transformation	Empirical	3	res	20.4	28.4	U	0	Nan	2.896
	Search Neighborh	bod	4	res	28.4	28.9	0	0	NaN	2,879
	Neighborhood type	Smooth Circular	3	TES	20.4	28.4	U	0	nan	
	Smoothing factor	1	-	Tes	20.4	20.4	0	0	nen	2.861
11	Radius	100		Tes	20.4	20.4	0	0	NeN	2041 : 1
	Predicted Value		0	105	20.4	20.4	0	0	ngn .	2.014
77	x	676306.9	9	TES	20.4	20.4	0	0	nen	2.827
	Y	4066214	10	TES	20.4	20.4	0	0	NaN	
67	Value	0.01614019	12	Ves	20.4	20.9	0	0	NeN	281 2827 2844 2861 2879 2896 28
 	Neighbors (64)		12	Tes	20.4	20.7	0	0	NeN	Lon Eddi Lon Lon Lon Long Long
See (stings at /CTC216 0, //CCC21/)			10	TES .	20.4	20.4	0	0	nan	Pradetad / Emr. Qandardinad Emr. /
indaturis & (070300.3, 40002.14)			14	Tes	20.4	20.4	0	0	NeN	
Y-10 ¹			13	Vez	20.4	20.4	0	0	Net	Regression function 0.999848402012853 * x
6.584			17	Ves	20.1	20.4	0	0	Net	Prediction Errors
4.938			19	Vec	20.1	20.1	0	0	NeN	Samples 4550 of 4550
3.292			10	Voc	20.1	20.1	0	0	NeM	Mean -0.0001974208
1.546			19	Ver	20.1	20.4	0	0	NeN	Root-Mean-Square 0.00921192
0 0.713 1.426 2.139 2.852 3.565 4.278 4.992 5.705 6.418			20	Vec	20.1	20.1	0	0	NeN	Mean Standardized NaN
Distance (Meter), h ·10 ⁻¹			22	Ves	20.1	20.4	0	0	NoN Y	Root-Mean-Square Standardized NaN
Senivariograms / Nugget / Partial Sill / Range / Transformation /			č		and t	10.1			>	Average Standard Error 0.009539851
										1
	<back next=""></back>	Finish Cancel								<back next=""> Finish</back>

Figure D 2. The surface temperature variogram of Fethiye-Göcek Lake in 23.08.2013

5 - 0, 0, 2 () (+ +) 🗄 🖥 - 1, -	General Propertie	5	Source ID	Included	Measured	Predicted	Error	Standard Error	Standarc ^	Predicted 10 ⁻¹
	Subset Size	100	0	Yes	29.22	29.27	0	0.33011187	0.17358	2993
//	Overlap Factor	1	1	Yes	29.193	29.24	0	0.25402309	0.18405	·····
	Number of Simulation	s 100	4	Vec	29.18	29.18	0	0 23477136	0.03363	2.694
	Output Surface Type	Prediction Standard Error	5	Yes	29.17	29.09	-0	0.30546375	-0.2322	2.296
	Transformation	Empirical	6	Yes	29.15	29.05	-0	0.28635242	-0.3198	2.300
	Search Neighborh	bod	7	Yes	29.12	28.87	-0	0.21122691	-1.1815	2.097
	Neighborhood type	Smooth Circular	8	Yes	29.13	28.71	-0	0.09617135	-4.7998	
1	Smoothing factor	1	9	Yes	29.13	28.95	-0	0.15977376	-1.1114	1./36
3 /	Radus	100	10	Yes	29.1	29.08	-0	0.17486428	-0.1043x	1.499
	Predicted Value		11	Yes	29.9	29.13	-0	0.25847588	-2.9525	
17	x	672933.2	12	Yes	29.5	29.44	-0	0.26773388	-0.1898	1.201
I I	Y	4063990	13	Yes	29.3	29.18	-0	0.28322885	-0.4003	
	Value	0.008379226	14	Yes	29.1	28.92	-0	0.20846870	-0.8217	0.902 1.201 1.499 1.798 2.097 2.396 2.69
V	 Neighbors (58) 		15	Yes	28.98	28.93	-0	0.20684781	-0.2341	Meas
m (ations at (677933.2 4063990)			16	Yes	28.98	28.62	-0	0.06586402	-5.3554	Predicted (Error) Standardized Error) Normal QQPlot /
-			17	Yes	28.94	28.59	-0	0.03602855	-9.6370	
Y-101			18	Yes	28.91	28.71	-0	0.12337410	-1.5428	Regression function 0.9363/66365412/9 " X
.626			19	Yes	28.85	28.68	-0	0.10199579	-1.5938-	Prediction Errors
122			20	Yes	28.84	28.57	-0	0.02671730	-9.8315	Samples 1914 07 1914
A07			21	Yes	28.82	28.69	-0	0.13946220	-0.8923	Mean 0.01524014
1.107			22	Yes	28.8	28.70	-0	0.17191301	-0.5497	KOOLHEATI-SQUARE 0.0973225
0 0.157 0.315 0.472 0.63 0.787 0.945 1.102 1.26 1.417			23	Yes	28.77	28.85	0	0.28601790	0.29242	Deet Mane Course Streetweetand 2, 216179
Distance (Meter), h -10 *			74	Yes	28.73	28.77	n	0.17617867	0.23653 ¥	Autorean Standard Error 0.1155000
Semivariograms (Nuppet) Partial Sil) Range Transformation /			<						>	0.1185000

Figure D 3. The surface temperature variogram of Fethiye-Göcek Lake in 24.08.2013

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Prop	perties – 🗆 🗙			Geos	statistical w	vizard -	Empirical B	ayesian K	Kriging step 3 of 3 - Cross Validation 🛛 – 🗖 🗙
Cectatistical ward - Empirical Bayesian Kriging step	2 of 3 - Method Prop General Properties Subset Size Overlap Factor Number of Smulatons Output Surface Type Transformation E Search Heighborhoo Neighborhood type Smoothing Factor Radius	100 1 100 Prediction Standard Error Empirical od Smooth Circular 1 100	Source ID 0 1 2 3 4 5 6 7 8	Included Yes Yes Yes Yes Yes Yes Yes Yes Yes	Geos Messured 28.21 28.2 28.2 28.2 28.2 28.2 28.2 28.	Predicted I 28.22 I 28.21 I 28.20 I 28.20 I 28.20 I 28.20 I 28.20 I 28.20 I 28.20 I 28.20 I 28.20 I 28.20 I 28.20 I 28.20 I	vizard - Error Sta 0 0.1	Empirical B tandard Error S 16061954 0 0.09450787 0 0.05227118 0 0.65227118 0 0.66178545 0 0.66801449 0 0.706012151 0 0.7147810 0 0.6530147 0	ayesian K 5tandar: ^ 1.09224 1.17261 1.0037 1.003	Origing step 3 of 3 - Cross Validation -
Smidtors # (5/15)24.4657178 y 10 ¹ 2354 7.75	 Predicted Value X Y Y Value Bille Billeighbors (38) 	671932.4 4967179 0.81050228	8 9 10 11 12 13 14 15 16 17	Yes Yes Yes Yes Yes Yes Yes Yes Yes	28.2 28.2 28.2 28.2 28.2 28.2 28.21 28.21 28.21 28.22 28.22 28.22 28.22	28.21 28.20 28.20 28.21 28.21 28.22 28.22 28.22 28.22 28.22 28.22	0 0.1 0 0.1 0 0.1 0 0.1 0 0.1 0 0.1 0 0.1 0 0.1 0 0.1	U0630447 0 08254533 0 08311098 0 07210964 0 06927645 0 08358499 0 09020413 0 07902913 0 06950096 0 06663928 0	0. 11/15 0. 11369 0. 11329 0. 10399 0. 17204 0. 04276 0. 21454 0. 06637 0. 12775 0. 12771	2431 2559 2457 2559 2631 2703 2775 2847 2519 2591 Measured 10 ⁻¹ Pedicide <u>Enry Standards Enry Normal 02781</u> <u>Regression Fundon</u> <u>0.577195305711*+1.0.</u> A <u>Predicide Enror</u> <u>Sandard 250 of 255</u>
1157 0 0.133 0.367 0.55 0.73 0.917 1.1 1.205 1.467 1.65 Detroce (Mear), h 10 ² Serientograms (Nagget, Patril St), Rangel, Tendomator	< Back Next >	Frish Cancel	18 19 20 21 77 K	Yes Yes Yes Yes	28.22 28.22 28.22 28.23 78.77	28.22 (28.22 (28.23 (28.22) 28.22)	0 0.1 0 0.1 0 0.1 -0 0.1 0 0.1	.06791213 0 .06882293 0 .07180855 0 .06658832 4 .06341077 0	0.12860 0.13256 0.20136 0.02328 1.20021 ¥	Amper Dovid 200 Mean Country (Country) Rom-Mean-Source 0085139 Hean Standards 009594862 Rom-Mean-Source Standard 009594814 Amerge Standard Error 006594814 V

Figure D 4. The surface temperature variogram of Fethiye-Göcek Lake in 25.08.2013

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties -	• ×		Geos	tatistical v	vizard - Emp	iirical Bayesian	Kriging step 3 of 3 - Cross Validation – 🗆 🗙
€. QQC0(++ ==\%·	General Properties Subset Size 100 Overlap Factor 1 Number of Smulations 100 Output Surface Type Prediction Standard 8 Transformation Empirical	Source II 0 1 2 3	D Included Yes Yes Yes Yes	Measured 27.95 27.94 27.96 27.96 27.96	Predicted 27.93 27.95 27.95 27.96	Error Standan -0 0.04170 0 0.03484 -0 0.04029 0 0.04224	d Error Standar(^ 2990.2698: 344 0.35500 6250.2036(276 0.01620 023 0.14032	Pedicted 10 ⁻¹ 2506 2.803 2.571
Same	Electrical Metghborhood Neghborhood type Smooth Cirular Smoothing factur 1 Radus 100 Predicted Value X 668719.4 Y 405303 Palace Bibliophors(5)	4 5 6 9 10 11 12 13 14 15	Yes Yes Yes Yes Yes Yes Yes Yes Yes	27.96 27.98 27.98 27.996 28.02 28.02 28.01 27.98 27.98 27.98	27.96 27.97 28.02 28.04 28.29 28.24 27.97 27.97 27.97	0 0.04885 -0 0.03010 -0 0.03147 0 0.03933 0 0.04242 0 0.11826 0 0.12406 -0 0.08697 -0 0.05702 -0 0.07489	022 0.14023 1140.0976- 1300.0471 163 0.61782 637 0.53696 191 2.32376 687 1.89080 1110.0389! 9340.0437! 2850.0594	2.538 2.456 2.141 2.008 2.141 2.273 2.406 2.538 2.671 2.803 2.536 Meanweil 10 ⁻¹
Smulators at 660719.4.4053033 y 10 ¹ 2552 7755 0 0549 1.089 1.646 2.105 2.744 3.229 3.841 4.39 4.539 Distance (Meter). h 10 ² Seminatograms / Rugget / Patal SII, Range / Teardomatory		16 17 18 19 20 21 22 23 24 <	Yes Yes Yes Yes Yes Yes Yes Yes	27.97 27.96 27.96 27.96 27.96 27.96 27.97 27.96 28.13 28.13 28.17	27.94 27.95 27.95 27.94 27.94 27.92 28.06 28.10	-0 0.21348 -0 0.10941 -0 0.12841 -0 0.21096 -0 0.21095 -0 0.29655 -0 0.35493 -0 0.30998 -0 0.24141	936 0.1173: 201 0.0500: 821 0.0681: 788 0.0894; 414 0.0814: 688 0.1448- 101 0.0598: 511 0.2129- 168 0.77714 >	Nedactad (Emr.) Sandardad Emr. Nome (JQPer./ Regression Enction 0.57786554032381* x + 0.6) Prediction Encros Samples 1035 of 1235 Mean Root Mean Square 0.30020461 Root Mean Square 0.30020461 Root Mean Square 0.30020461 Root Mean Square 0.30020461 Root Mean Square 0.30020461 Root Mean Square 0.30020461 Root Mean Square 0.30020461 Root Mean Square 0.30020461 Root Mean Square 0.30020461 Root Mean Square 0.30020461 Root Mean Square 0.30020461 Root Mean Square 0.30020461 Root Mean Square 0.30020461 Root Mean Square 0.30020461 Root Mean Square 0.30020461 Root Mean Square 0.30020461 Root Mean Square 0.30020461 Root Mean Square 0.30020461 Root Mean Root Root Mean Root
	< Back Next > Finish	Cancel						< Back Next > Finish Cancel

Figure D 5.The surface temperature variogram of Fethiye-Göcek Lake in 26.08.2013

	Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Prop	perties – 🗆 🗙			Geos	tatistical v	wizard - Emp	rical Bayesian	Kriging step 3 of 3 - Cross Validation 🛛 – 🗖 🗙
- 1	⊜ - € € 8 @ # # = 3 - % -	General Properties		Source ID	Included	Measured	Predicted	Error Standard	Error Standars ^	Predicted -10 ⁻¹
_		Subset Size	100	ç	Yes	27 547	27.59	0 0.003504	43 15 0065	299
	2	Overlap Factor	1	18	Yes	27.6	27.60	0.00381	83 0.63284	
		Number of Simulations	100	19	Yec	27.6	27.50	-0 0.00304	43 _0 2274	2,956
- 1	***CA8	Output Surface Type	Prediction Standard Error	20	Yes	27.6	27.59	-0 0.003034	00 -0.8803	1000
_		Transformation	Empirical	21	Yes	27.6	27.59	-0. 0.00305	85 -1 3268	2325
_		Search Neighborho	od	24	Yes	27.600	27.59	-0 0.00285	980.6808	2.889
_		Neighborhood type	Smooth Circular	27	Yes	27,600	27.59	-0 0.002730	29 -1 0458	× .
_		Smoothing factor	1	31	Yes	27.6	27.59	-0 0.002719	47 -1 5584	2856
_		Radius	100	41	Yes	27.600	27.59	-0 0.002803	912.2892	2 822
_	1	Predicted Value		52	Yes	27.6	27.59	-0 0.003008	84	
		X	687439.6	53	Yes	27.6	27.59	-0 0.002764	79 -1.6387	2.788
		Y	4060550	54	Yes	27.6	27.59	-0.002806	32 -0.6587	J.r.
_	14	Value	0.01744114	55	Yes	27.6	27.59	-0 0.002838	50	2,755 2,788 2,822 2,856 2,889 2,923 2,956 2,99
_		Neighbors (57)		56	Yes	27.6	27.59	-0 0.002934	271.6148	Measured -10*1
_	Care distance of IC97/20 C (ACCEER)			57	Yes	27.6	27.59	-0 0.002967	630.0885	Predicted (Error) Standardized Error /
_	Sendalions at (007433/6, 4000330)			58	Yes	27.6	27.59	-0 0.002895	870.3603	
_	Y-10 ¹			59	Yes	27.6	27.59	-0 0.00300-	690.5680	Regression function 1.000140244708 * x + -0.0041 ^
_	1.601			60	Yes	27.6	27.59	-0 0.003242	190.3834	Prediction Errors
_	1.201			61	Yes	27.6	27.59	-0 0.003258	440.1173	Samples 6816 of 6816
_	0.8			62	Yes	27.6	27.59	-0 0.003183	570.1333	Mean -0.0004241086
_	0.4			63	Yes	27.6	27.59	-0 0.003278	560.1654	Root-Mean-Square 0.01231128
_	0 0.228 0.455 0.683 0.91 1.138 1.365 1.593 1.82 2.048			64	Yes	27.6	27.59	-0 0.003293	910.0824	Mean Standardized NaN
_	Distance (Meter), h -10 ⁻²			65	Yes	27.6	27.59	-0 0.003304	320.13921 [×]	Root-Mean-Square Standardized NaN
_	Semivariograms / Nugget / Partial Sill / Range / Transformation /			<					>	Average Standard Error 0.0157974 v
		< Back Next >	Finish Cancel							<back next=""> Finish Cancel</back>

Figure D 6. The surface temperature variogram of Fethiye-Göcek Lake in 27.08.2013

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Prop	ierties – 🗆 🗙			Geos	statistical wiz	ard - Empirica	Bayesian H	Kriging step 3 of 3 - Cross Validation 🛛 – 🗖 🗙
○ • • • • ○ • • • • • • • • • • • • • • • • • • •	General Properties		Source ID	Included	Measured	Predicted Fm	standard Error	Standarr ^	Predicted .:10:1
	Subset Size	100		Yee	27.1	27.10 7	0.00026514	0.21927	2.02
(1)	Overlap Factor	1	1	Yee	27.1	27.10 2	0.00036324	0.12026	
	Number of Simulations	100		Vee	27.1	27.10 2	0.00020004	0.13920	2.899
P	Output Surface Type	Prediction Standard Error	2	165 Vee	27.1	27.10	0.00027631	0.13963	
345	Transformation	Empirical	3	Yes	27.1	27.10 3	0.00027604	0.12/94	2.867
	Search Neighborhoo	d	-	Yes	27.1	27.10 3	0.0002/303	0.13090	2.836
M 1 3 3 1	Neighborhood type	Smooth Circular	-	Vee	27.1	27.10 3	. 0.00030313	0.12303	·····
9 1 1 1	Smoothing factor	1	2	Tes	27.1	27.10	. 0.00032768	0.19915	2.804
	Radius	100		165	27.1	27.10	0.00029498	0.13390	1777
	Predicted Value			165 Vez	27.1	27.10	0.00029389	0.13492	2//3
	х	674540.9	3	105 Vee	27.1	27.10	0.00023280	0.13020	2.741
	Y	4067141	10	Yes	27.1	27.10 3	0.0002/5/4	0.12371	X
	Value	0.01181371		tes	27.1	27.10 3	. 0.00028120	0.13328	271 2741 2773 2804 2836 2867 2899 293
	Neighbors (64)		12	Tes	27.1	27.10	. 0.00028001	0.13077	Measured 10-1
			10	Tes	27.1	27.10 3	0.00029298	0.13132	Padetad (Emr.) Sandarinad Emr. (
Simulations at (6/4540.9, 406/141)			17	165	27.1	27.10	0.00029514	0.130/1	
v-10 ¹			10	165	27.1	27.10 3	. 0.0002/998	0.13093	Regression function 0.999593671783903 * x + 0.0 A
2964			10	tes	27.1	27.10 3	. 0.00028063	0.13612	Prediction Errors
2 223			10	tes	27.1	27.10 4	. 0.0003204/	0.130/0	Samples 9549 of 9549
1.482			10	tes	27.1	27.10	. 0.00032050	0.13238	Mean -0.0003648296
0.741			19	165	27.1	27.10 3	. 0.0002/704	0.15300	Root-Mean-Square 0.0291618
0 0.191 0.262 0.544 0.725 0.907 1.099 1.269 1.451 1.622			20	165	27.1	27.20 3	. 0.00029164	0.13300	Mean Standardized NaN
Distance (Mater) h 10-2	Radius		21	165	27.1	27.20 5	. 0.00029164	0.13361	Root-Mean-Square Standardized NaN
Semivariograms / Nugget / Partial Sil / Range / Transformation /	The length of the radius of	t the search circle.	ć	100	77.1	77. m S.	. 0.001/8100	>	Average Standard Error 0.0326553 v
	< Back Next >	Finish Cancel							<back next=""> Finish Cancel</back>

Figure D 7. The surface temperature variogram of Fethiye-Göcek Lake in 30.08.2013

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Prop	perties – 🗆 🗙			Geos	tatistical v	wizard - Er	impirical Bay	yesian K	Kriging step 3 of 3 - Cross Validation 🛛 – 🗖 🗙
♦ • 0, 0, 20 (0) (* *) [] [] • % •	General Properties		Source ID	Included	Measured	Predicted	Error Stan	ndard Error Sta	ndarr ^	Predicted ·10° ¹
	Subset Size	100	259	Yes	27.198	27.20	0 0.00	090630 1.6	60310	2.89
	Overlap Factor	1	380	Yes	27, 199	27.19	-0 0.00	0921540.	1435	· · · · · · · · · · · · · · · · · · ·
	Number of Simulations	100	419	Yes	27.199	27.19	-0 0.00	0935050./	6243	2.866
	Output Surface Type	Prediction Standard Error	560	Yes	27.199	27.19	-0 0.00	0815530.	4288	28/1
	Transformation	Empirical	637	Yes	27.2	27.19	-0 0.00	0892900.4	4263	
	Search Neighborho	od	638	Yes	27.2	27.19	-6 0.00	0864410.	0704	2.817
	Neighborhood type	Smooth Circular	640	Yes	27.2	27.19	-1 0.00	0876530.	0195	
	Smoothing factor	1	641	Yes	27.2	27.19	-1 0.00	0879320.	0170	2./93
	Radius	100	642	Yes	27.2	27.19	-1 0.00	087984	0202	2.768
	Predicted Value		643	Yes	27.2	27.19	-1 0.00	087992	02266	
	х	676608.4	646	Yes	27.2	27.19	-2 0.00	087992	0242	2.744
	Y	4065641	647	Yes	27.2	27.19	-20.00	087989 -0	0252	
N 100 100 100 100 100 100 100 100 100 10	Value	0.05946597	648	Yes	27.2	27.19	-2. 0.00	087985 -0	0256	272 2744 2768 2793 2817 2841 2866 289
F	Image: Beighbors (64)		649	Yes	27.2	27.19	-2 0.00	087979 -0	0259	Measured · 10 ⁻¹
Smildions at (676608.4.4065641)			652	Yes	27.2	27.19	-2 0.00	0879560.	0264	Predicted (Error) Standardized Error /
			653	Vec	27.2	77 19	-2 0.00	087868 -0	0273	
y-10 ¹			654	Yes	27.2	27.19	-2 0.00	087395	0290-	Regression function 0.99976274107026 * x + 0.00 A
2.24			655	Yes	27.2	27.19	-2 0.00	084823	0334	Prediction Errors
1.68			657	Yes	27.2	27.19	-2 0.00	082863	0348	Samples 8130 of 8130
1.12			658	Yes	27.2	27.20	6	0899570.0	0727	Mean -0.0001086046
0.30			659	Yes	27,199	27.20	5 0.00	104589 0.0	4976	Root-Mean-Square 0.01200391
0 0.807 1.614 2.421 3.227 4.034 4.841 5.648 6.455 7.262			672	Yes	27.2	27.19	-3. 0.00	1092432 -0.	0384	Mean Standardized NaN
Distance (Meter), h ·10 ⁻¹			673	Yes	27.2	77.19	-3 0.00	107190 -0	03614	Root-Mean-Square Standardized NaN
Semivariograms Nugget Partial Sil Range Transformation /			<						>	Average Standard Error 0.0146464 v
	<back next=""></back>	Finish Cancel								<back next=""> Finish Cancel</back>

Figure D 8. The surface temperature variogram of Fethiye-Göcek Lake in 31.08.2013

O Constraint Sector is produced from produced Geostatistical wizard - Empirical Bayesian Kriging step 2	of 3 - Method Prop	perties – 🗆 🗙			Geos	tatistical	wizard	- Empirical	Bayesian I	Kriging step 3 of 3 - Cross Validation –	
B Reglators (3) B Reglator		General Properties Subort See Overlap Factor Number of Smulations Output Surface Type Transformation Neighborhood type Smoothing factor Radus Predicted Value X Y Jalae	200 1 200 Empiral Smooth Circular 1 200 56+425.6 4257885 60 4257895	Source ID 0 1 2 3 4 5 6 6 7 8 9 10 11	Included Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	Measured 23.04 23.04 23.06 23.08 23.08 23.05 23.05 23.05 23.05 23.04 23.01 22.92 22.87 22.87	Predicted 23.01 23.05 23.05 23.05 23.06 23.04 23.04 23.02 22.98 22.98 22.90	Error : -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0	Standard Error 0. 178 10296 0. 12304018 0. 12540289 0. 15633640 0. 16671801 0. 16788322 0. 16788325 0. 1508325 0. 19813805 0. 19813805 0. 19614636 0. 19972211 0. 1669488 0. 1092385	Stander: * -0.1164 0.09247 -0.0965 -0.1232 0.09996 -0.0144 -0.1419 -0.2837 0.01348 -0.0738 -0.0738	Paskas 10 ⁻¹ 228 227 228 228 228 228 228 228 228 229 229 229
	Sinulations at (554255, 45788) v 10 ¹ 1779 1384 0 455 0 0153 0.307 0.46 0.613 0.766 0.52 1.073 1.226 1.379 Delatore (Meyr), h 10 ³ Semiantogram (Nuget), Partia SI), Parge, Transformation	• Neighbors (3)		12 13 14 15 16 17 18 19 20 21 21 22 < <	Yes Yes Yes Yes Yes Yes Yes Yes Yes	22.82 22.66 22.54 22.47 22.43 22.23 22.21 22.21 22.2 22.15 27.17	22.81 22.63 22.47 22.44 22.48 22.29 22.29 22.20 22.21 22.21 22.25	-0 -0 0 0 0 0 0 0 0 0	0. 19327852 0. 20806928 0. 17008489 0. 12226877 0. 14702783 0. 14702783 0. 14608447 0. 05164378 0. 05534292 0. 18 118344 0. 0. 16 157749	-0.0079(-0.1205; 0.10231 0.02802 0.11398 0.26171 0.42225 -0.0630; 0.31719 0.55222 0.0435 * *	2.14 2.21 2.26 2.26 2.26 Hearre Hearre Meaning Hearre Hearre Hearre Regression function 0.899330810570**x+0. Prediction Environ Hearre Sterples FX4F778 Hearre 0.0059074 Row NeuroSpace 0.055904 New NeuroSpace 0.055904 -0.0029074 Row NeuroSpace 0.055914 New NeuroSpace D.055914 -0.0029514 Row NeuroSpace 0.002591 Arenge Sandrald Enry 0.400271

Figure D 9. The surface temperature variogram of Fethiye-Göcek Lake in 03.06.2014

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties – 🗆 🗙	Ceostatistical wizard - Empirical Bayesian Kriging step 3 of 3 - Cross Validation –	х
Smidlors # 603417.8. 4057/539 y 10 ¹ 223 0 0.55 0.233 0.459 0.55 0.231 1.457 Distance (Rest, 1): 10 ²	B General Properties Statest Size 300 Overlap Factor 1 Number of Simulators 300 Output Safest Dip Prediction Standard Brar Transformation B Beach Relightedhood Neeblechood Beach Relightedhood Predicted X4 400 X 4057263 Tale 0.0590/597 B Reighbors (10)	Source D Included Hearnel Predicted Field	23 \$10-1
Semvarograms / Nugget / Patial Sil / Hange / Iranstomation /	<back next=""> Finish Cancel</back>	<pre></pre>	ncel

Figure D 10. The surface temperature variogram of Fethiye-Göcek Lake in 04.06.2014

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Prop	perties – 🗆 🗙			Geos	tatistical w	vizard	- Empirical E	Bayesian K	Kriging step 3 of 3 - Cross Validation 🛛 – 🗖 🗙
	General Properties		Source ID	Included	Measured	Predicted E	Error S	Standard Error	Standars ^	Predicted :10:1
	Subset Size	100		Van	20.26	20.24		0.45504044	0 17247	2.269
	Overlap Factor	1		Yes	20.20	20.34		0.49021172	0.1/24/	2.200
and the second sec	Number of Simulations	100		Vee	20.30	20.24	0	0.40005727	0.0226	2.23
	Output Surface Type	Prediction Standard Error	2	Yes	20.41	20.30	0 0	0.75003737	0.0320.	
A CONTRACT OF A	Transformation	Empirical		Vee	20.44	20.35	0 0	0.35300105	0.1700	2.192
	Search Neighborho	od	-	Vee	20.99	20.30	0 0	0.41913000	0.1/03	2 154
The second second second second second second second second second second second second second second second se	Neighborhood type	Smooth Circular		Vee	20.30	20.34	0 0	0.420900007	0.0751	
	Smoothing factor	1	7	Vee	20.32	20.33 0	o u	0.42090035	0.02371	2.115
	Radius	100	· ·	Vee	20.3	20.30 0	0 0	0.42345552	0.03/00	2.077
	Predicted Value			Tes	20.35	20.36 0	0 0	0.9335/49/	0.02409	2.0//
	x	673083.6	3	Vee	20.40	20.73 0	o u	0.3/230403	0.73390	2.039
	Y	4061751	10	Vee	20.03	21.30 0	0 0	0.23046001	2.53013	
	Value	0.01584324		Vee	20.02	20.04 0	o u	0.23990101	0.09972	2001 2039 2077 2115 2154 2192 223 2268
\sim	Neighbors (3)		12	Vee	20.00	21.05	0 0	0.233/1190	1.00554	Measured 10-1
			10	Vee	20.99	21.25 0	0	0.1/992901	2,5121	Predicted (Emr.) Standardized Emr.) Normal OOPInt /
Simulations at (673083.6, 4061751)			19	Yes	20.01	20.9/ 1	0 0	0.20790100	-2-3121 [*]	
v-10 ¹				Vee	20.01	21.00	0	0.17720315	0.40207	Regression function 0.998260594089255 * x + 0.0 A
4 977			10	Vee	21.00	20.95 •	0 0	0.2003/330	0.9039.	Prediction Errors
3.729			10	Vee	21-1	21.10 0	0	0.21/0/304	0.01525	Samples 1322 of 1334
2,486			10	Vee	21.14	21.11	0 0	0.2303/409	0.1167	Mean -0.001279247
1.243			19	Vee	21-21	21.10 *	0 0	0.21122307	0.1107.	Root-Mean-Square 0.04761043
0 0.171 0.241 0.512 0.692 0.952 1.024 1.194 1.265 1.526			20	Vee	21.22	21.21	0 0	0.191/2/24	0.0202	Mean Standardized -0.03414581
Distance (Mater) 1: 1013			21	Vee	21.20	21.23 *	0	0.20002313	0.0557 V	Root-Mean-Square Standardized 0.7610668
Serivarograms / Nugget / Partial Sil / Range / Transformation /			<	100				0.19021003	>	Average Standard Error 0.0612197 v
	< Back Next >	Finish Cancel								<back next=""> Finish Cancel</back>

Figure D 11. The surface temperature variogram of Fethiye-Göcek Lake in 05.06.2014



Figure D 12. The surface temperature variogram of Fethiye-Göcek Lake in 06.06.2014

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties	- • ×			Geosta	atistical w	vizard	- Empirical	Bayesian K	riging step 3 of 3 - Cross Validation 🛛 – 🗖 🗙
Sinulators at (\$72143, 455670) y v01 5.04 0 6.62 1.25 1.57 2.04 1.55 0 6.62 1.25 1.57 2.04 1.57 2.04 1.57 2.04 1.57 2.04 1.57 2.04 1.57 2.04 1.57 2.04 1.57 2.04 1.57 2.04 1.57 2.04 1.57 2.04 1.57 3.04 1.172	General Properties Salest Size 100 Direligo Patto Nuther of Sinukators 10 Nuther of Sinukators 10 Output Sinth City Per Persident Standa Transformation Bengcheter Sanothing fact X GENERAL X GENERAL X GENERAL Sinuth S	ed Error 2 2 3 4 5 5 6 7 7 8 8 9 9 9 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Source ID Inc. 0 Yes 1 Yes 2 Yes 4 Yes 5 Yes 6 Yes 6 Yes 7 Noto 8 Yes 9 Yes 9 Yes 9 Yes 10 Yes 11 Yes 13 Yes 14 Yes 15 Yes 15 Yes 15 Yes 15 Yes 15 Yes 16 Yes 17 Yes 18 Yes 19 Yes 19 Yes 19 Yes 19 Yes 19 Yes 19 Yes 19 Yes 19 Yes 19 Yes 19 Yes 10 Yes 10 Yes 10 Yes 10 Yes 10 Yes 10 Yes 10 Yes 11 Yes 11 Yes 11 Yes 12 Yes 1	cluded Me s 21 F 11.55 2 1.55	Predicted # 1 21.56 21.54 21.54 21.54 21.44 21.41 21.41 21.41 21.42 21.43 21.43 21.43 21.44 21.43 21.44 21.43 21.44 21.43 21.44 21.43 21.44 21.42	Error S -0 0	tandard Error 1.078130-43 0.086274106 1.05718310 1.05718310 1.05718310 1.05718310 1.05718310 1.079195753 1.04945272 1.048229540 1.03822945 1.03822945 1.03822945 1.03822945 1.03822945 1.03822945 1.049505260 1.049505261 1.049505261 1.049505261 1.049505261 1.049505261 1.049505261 1.049505261 1.049505261 1.049505261 1.049505261 1.049505261 1.049505263 1.049505263 1.049505263 1.049505263 1.049505263 1.049505263 1.049505263 1.049505263	Standar: ▲ -0.3605(-0.0478) 0.02788 0.02148 0.02108 0.0207 -0.4013 1.13865 NaN 0.35341 -0.05010 -0.1520 0.36010 -0.1520 0.36050 -0.3907 -	Predicted 10 ⁻¹ 227 227 228 229 229 229 239 239 239 239 239 239 239	
	<badk next=""> Finish</badk>	Cancel								<back next=""> Finish Cance</back>

Figure D 13. The surface temperature variogram of Fethiye-Göcek Lake in 07.06.2014

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties – 🗉 🗙			Geos	tatistical w	izard - Er	mpirical Bayesia	n Kriging step 3 of 3 - Cross Validation 🛛 – 🗖 🗙
Original Control Control	E General Properties Sober Sin 200 DerelopPactor 1 Nuther of Smidters 200 Duptu/Suffice 7) metection Standard Brow Transformation English Search Heighborod Heighborod The Smooth Chalar Smoothing Gard 1 Radias 20 Predictor Value X 65755.2 Predictor Value X 65755.2 Part 0.001503588 El Reighboro (10)	Source D 0 10 30 50 56 96 1136 136 136 136 136 136 236 236 236 236 236 336 336 336 336 3	Induded Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	Measured 29 29 29 29 29 29 29 29 29 29 29 29 29	Predicted E 29.02 0 29.00 0 29.00 0 29.01 0 29.02 0 29.03 0 29.03 0 29.03 0 29.09 4 29.09 4 29.09 4 29.09 4 29.09 4 29.09 4 29.09 4 29.09 4 29.09 4 29.09 4 29.09 4 29.09 4 29.09 4 29.09 4 29.09 4 29.09 4 29.09 4 29.09 4 29.09 4	Error Standard 	dard Error Standarn 14957	Predicted 10 ⁻¹ 235 236 237 238 239 230 230
[<back next=""> Finish Cancel</back>							<back next=""> Finish Cancel</back>

Figure D 14. The surface temperature variogram of Fethiye-Göcek Lake in 26.08.2014

Geostatistical wizard - Empirical Bayesian Kriging ste	o 2 of 3 - Method Properties 🛛 – 🗖 🗙			Geos	tatistical wiza	ard - Empirical	Bayesian k	Kriging step 3 of 3 - Cross Validation – 🗖 🗙
	General Properties	Source ID	Included	Measured	Predicted Erro	r Standard Error	Standar: ^	Predicted -10-1
	Subset Size 100	0	Yes	28.5	28.49 -0	0.01676726	-0.1591-	293
	Overlap Factor 1	4	Vac	28.5	28.40 .0	0.01610678	.0.0127	
	Number of Simulations 100	6	Vec	28.5	28.53 0	0.07895455	1 24708	2.912
	Output Surface Type Prediction Standard Error	7	Yes	28.566	28.54 -0	0.02776084	-0.7873	3.002
	Transformation Empirical	10	Vac	28.6	28.50 .0	0.01235104	.0 1364	2000
	Search Neighborhood	12	Vec	28.6	28.60 0	0.01045513	0.01295	2.874
	Neighborhood type Smooth Circular	13	Ver	28.6	28.60 0	0.01275848	0.001200	a 1. M 1
	Smoothing factor 1	14	Vec	28.6	28.50 .0	0.01130057	.0.1785	2.856
	Radius 40	15	Ver	79.6	20.00 .0	0.01050016	.0.0797	2 827
	Predicted Value	16	Ver	28.6	28.50 .0	0.01252852	-0.0757	2007
	X 686109.3	17	Vec	28.6	28.50 .0	0.01411845	J0 1060	2.819
	Y 4057672	10	Ver	79.6	20.00 .0	0.01796077	.0.02061	
	Value 0.03144791	10	Ver	28.6	28.50 .0	0.01158877	.0 1434	2.8 2.819 2.837 2.856 2.874 2.893 2.912 2.92
	Iteighbors (28)	20	Vec	20.0	20.00	0.01036126	0.0047	Measured 10
C 12 1200100 5 1059295	1	20	Ver	20.0	20.050	0.01277361	0.004/-	Predicted (Emr.) Standardized Emr./
Simulations at (686109.3, 4057672)		21	Vec	20.0	20.00 0	0.01377301	0.05200	
v-10 ¹		22	Vee	20.0	20.35 10	0.01430133	0.0013	Regression function 0.988494721255626 * x + 0.3
9224		20	1es Vez	20.0	20.390	0.01999094	-0.0407	Prediction Errors
6.918		29	Vec	20.0	20.33 12	0.01251942	0.0021	Samples 6261 of 6261
4.612		20	Tes	28.0	20.390	0.01351843	-0.02505	Mean 0.001194436
2.306		20	165	20.0	20.390	0.01288109	-0.0441	Root-Mean-Square 0.03446952
0 0946 1893 2839 3786 4732 5679 6625 7572 8518		2/	100	20.0	20.00 0	0.01109000	0.01339	Mean Standardized NaN
Distance (Meter) h 10"		20	1Cb	20.0	20.350	0.0111/0/0	-0.0/10:	Root-Mean-Square Standardized NaN
Semivationame (Numet) Partial Sil) Ranne) Transformation /	-	ĉ	194	/0.0	70.79 40.		-0.0455	Average Standard Error 0.04391015
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								and have not not
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Figure D 15. The surface temperature variogram of Fethiye-Göcek Lake in 27.08.2014

Geostatistical wizard - Empirical Bayesian Kriging step 2	of 3 - Method Properties 🛛 – 🗖 🗙	Geostatistical wizard - Empirical Bayesian Kriging step 3 of 3 - Cross Validation – 🗖 💌
Section al (65403.7.46128) y 10 ¹ 0 0391 0.782 1172 1544 1955 2346 2727 3129 352 Detroce (Meer), h 10 ⁻¹ Servindigams, Nagel, Pand SI), Range, Trendmation	General Properties Subart Size Donator Text Subart Size Donator Text Danafter of Shudaros Donator Size Donator Size Donator Size Donator Donator Danafter Donator Don	Source ID Indukted Measured Reduced Three Standard Brur Stand
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Figure D 16. The surface temperature variogram of Fethiye-Göcek Lake in 28.08.2014

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties 🛛 – 🗖 🗙	Geostatistical wizard - Empirical Bayesian Kriging step 3 of 3 - Cross Validation – 🗖 🗙
	B General Properties Silect Ear 200 Overlage Factor 1 Nutrie of Smuktors 10 Output Schnick Type Prediction Standard Error Transformation Expression Search Heightformood Frankstone Nether factor 1 Radue 20 Predicted Value 60811.9 Y 605812 Belgehong State 6.02.99432	Source D Podded Headned Free Sourder Gim Sourder Gim Freedold 101 0 Yes 32.2 32.3 0 0.014555 0.0249 101 1 Yes 32.2 32.3 0 0.014555 0.0249 102 1 Yes 32.2 32.3 0.0149655 0.0259 102 3 Yes 32.2 32.3 0.0125958 0.0358 102 </th
Simulators at (500113, 406418.) v 10 ¹ 245 0.523 0 0.32 0.641 0.951 1.281 1.502 1.202 2.243 2.253 2.883 0 0.32 0.641 0.951 1.281 1.502 1.202 2.243 2.853 2.883 Distance (Meer, h. 10. ⁻¹ Serivatograms (Nagget) Partal Sil, Range), Tandomation	<bot next=""> Findh Cancel</bot>	14 Yes 23:2 33:3.0. 0.0. 0.021244-0. 0.034er 15 Yes 32:2 23:3.0. 0.0. 0.01964155. 0.0255 17 Yes 32:2 23:3.0. 0.0. 0.01964156. 0.0259 17 Yes 32:2 23:3.0. 0.0. 0.01964156. 0.0259 17 Yes 32:2 23:3.0. 0.0. 0.02124110. 0.0246 18 Yes 32:2 23:3.0. 0.01214110. 0.0246 Sarplas 900065539 19 Yes 32:2 23:3.0. 0.0. 0.02121210. 0.0566 20 Yes 32:2 32:3.0. 0.0. 0.0212421. 0.0566 21 Yes 32:2 32:3.0. 0.0. 0.0212421. 0.0356 21 Yes 32:2 32:3.0. 0.0. 0.0216220 0.0324 21 Yes 32:2 32:3.0. 0.0. 0.0216220 0.0324

Figure D 17. The surface temperature variogram of Fethiye-Göcek Lake in 29.08.2014

🗖 0, 0, 11 🕼 (d) (de 🔿) 🗐 📓 📲 🖏 🕶	General Properties		Source ID	Included	Measured	Predicted En	or Standard Er	or Standarr	Predicted ·10 ⁻¹
	Subset Size	100	0	Yes	29.6	29.60 0.	0.02200223	0.43150	3
	Overlap Factor	1	1	Yes	29.6	29.60 0.	0.01651763	0.08620	
YAA	Number of Simulations	100	2	Yes	29.6	29.60 0.	0.01651284	0.08337	2.993
	Output Surface Type	Prediction Standard Error	3	Yes	29.6	29.60 0.		0.08308	2 996
(NBA	Transformation	Empirical	4	Yes	29.6	29.60 0	0.0164978	0.07637	
	E Search Neighborho	od	5	Yes	29.6	29.60 0	0.01604416	0.07996	2.979
1 HHH 1	Neighborhood type	Smooth Circular	6	Yes	29.6	29.60 0	0.0164978	0.07637	
	Smoothing factor	1	7	Yes	29.6	29.60 0	0.01651177	0.08308	2971
	Radius	5	8	Yes	29.6	29.60 0	0.01651284	0.08337	2964
	Predicted Value		9	Yec	29.6	29.60 0	0.0164988	0.07565	
	X	676753.8	10	Vec	29.6	29.60 0	0.01604066	0.07695	2.957
	Y	4065720	11	Ver	20.6	20.60 0	0.01501700	0.05500	
	Value	0.0255056	12	Vec	20.6	20.60 0	0.01251200	0.000000	295 2957 2964 2971 2979 2986 29
	Neighbors (8)		12	Vec	20.6	20.60 0	0.01557212	0.06712	Mez
			14	Vec	25.0	20.60 0	0.0155221	0.06712	Predicted (Emr.) Standardzed Emr.) Nomal COPInt /
ations at (6/6/53.8, 4065/20)			17	Vez	23.0	25.00 0.	0.01002012	0.00715	
v-10 ¹				1C5	23.0	25.00 0.	0.0103000	0.07430	Regression function 0.998645426591724 * >
1			10	1es	23.0	29.00 0.	0.01392203	0.0/1/1	Prediction Errors
5			1/	165	23.0	29.60 0.	0.01630676	0.07951	Samples 1678 of 1678
19			10	100	23.0	25.00 0.		0.0/233	Mean -0.00007591755
5			19	165	20.0	29.80 0.	0.015091/5	0.06128	Root-Mean-Square 0.01054736
0 0.238 0.476 0.713 0.951 1.189 1.427 1.664 1.902 2.14			20	165	25.0	29.80 0.	0.0155148	0.06199	Mean Standardized 0.003219705
Distance (Mater) h.10-1.			21	165	25.5	29.60 0.	0.01650491	0.0/812	Root-Mean-Square Standardized 0.8868519
Distance (Hear), in to			5	Yes	79.6	79.60 0.			Average Standard Error 0.01489078
inangana / ingger / rana aii / naige / litaraomaton /			-					,	

Figure D 18. The surface temperature variogram of Fethiye-Göcek Lake in 30.08.2014

Geostatistical wizard - Empirical Bayesian Kriging ste	2 of 3 - Method Properties – 🗖 🗙	Geostatistical wizard - Empirical Bayesian Kriging step 3 of 3 - Cross Validation – 🗖 💌
	E Cencel Properties SubsetSize 800 Ornelige Factor 1 Nurber of Smilators 800 Output Srifter Type Rediction Standard Error Transformation & Empirical E Search Rispiblombood Neighborhood Smith Smoth Chailer Smothing factor 1 Radua 5 E Predicted Value X 684287.5 Y 645120 Nation 0.0275575 B Respiblos (20)	Surez D Included Hessured First Standard/Standard Predicted 10 ⁻¹ 0 Yes 28.3 28.31 0 0.0528223 0.3394 1 Yes 28.3 28.31 0 0.0528232 0.3394 2 Yes 28.3 28.31 0 0.0455852 0.1246 2 Yes 28.3 28.31 0 0.0455852 0.1246 4 Yes 28.3 28.31 0 0.0459158 0.1256 5 Yes 28.3 28.30 0 0.0459158 0.1256 5 Yes 28.3 28.30 0 0.0459158 0.0156 7 Yes 28.3 28.30 0 0.0459158 0.0156 7 Yes 28.3 28.30 0 0.0459158 0.01591547 1921 9 Yes 28.3 28.3 0 0.01591547 1931 <
Sinulations at (\$42975,4061120) V :10 ¹ 8.224 6.168 4.112 0 0.146 0.231 0.437 0 0.146 0.211 0.437 0 0.146 0 0.146 0 0.146 0 0.147 0 0.148 0 0.147 Datance (Meter), h :10 ⁻¹ Datance (Meter), h :10 ⁻¹	<back cancel<="" net="" th="" trinh=""><th>13 Yes 23.3 23.5. 0 0.00114072. 1.8374 14 Yes 23.3 23.4. 0 0.0020550.2. 24.96 15 Yes 23.3 23.4. 0 0.0020550.7. 1.1354 17 Yes 23.3 23.3. 0 0.002050.7. 1.1354 18 Yes 23.3 23.3. 0 0.0000508.0. 6404 19 Yes 23.3 23.3. 0 0.0000508.0. 6404 19 Yes 23.3 23.3. 0 0.0000508.0. 6404 19 Yes 23.3 23.3. 0 0.0000508.0. 6404 Ves 23.3 23.3. 0 0.0000508.0. 64967 20 Yes 23.3 23.3. 0 0.0000508.0. 63967 21 Yes 23.3 23.3. 0 0.000070750.0. 63967 21 Yes 23.3 3</th></back>	13 Yes 23.3 23.5. 0 0.00114072. 1.8374 14 Yes 23.3 23.4. 0 0.0020550.2. 24.96 15 Yes 23.3 23.4. 0 0.0020550.7. 1.1354 17 Yes 23.3 23.3. 0 0.002050.7. 1.1354 18 Yes 23.3 23.3. 0 0.0000508.0. 6404 19 Yes 23.3 23.3. 0 0.0000508.0. 6404 19 Yes 23.3 23.3. 0 0.0000508.0. 6404 19 Yes 23.3 23.3. 0 0.0000508.0. 6404 Ves 23.3 23.3. 0 0.0000508.0. 64967 20 Yes 23.3 23.3. 0 0.0000508.0. 63967 21 Yes 23.3 23.3. 0 0.000070750.0. 63967 21 Yes 23.3 3

Figure D 19. The surface temperature variogram of Fethiye-Göcek Lake in 30.08.2014

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Prop	perties – 🗆 🗙			Geos	tatistical	wizar	d - Empirical	Bayesian K	(riging step 3 of 3 - Cross Validation 🛛 – 🗖 🗙
	General Properties		Source ID	Included	Measured	Predicted	Error	Standard Error	Standars ^	Preficted 10-1
	Subset Size	100		Ver	79.7	29.20	0	0.01362971	0.25323	294
	Overlap Factor	1	i i	Yes	29.2	29.20	0	0.01340044	0.24733	/•
	Number of Simulations	100	2	Yes	29.2	29.20	0	0.01324932	0.24354	2937
	Output Surface Type	Prediction Standard Error	5	Yes	29.2	29.20	0	0.01313242	0.24097	2024
	Transformation	Emprical	6	Yes	29.2	29.20	0	0.01308259	0.23991	2334
	Search Neighborho	od	7	Yes	29.2	29.20	0	0.01319696	0.24214	2.931
	Neighborhood type	Smooth Circular	8	Yes	29.2	29.70	0	0.01343961	0.24768	
	Smoothing factor	1	9	Yes	29.2	29.20	0	0.01389746	0.25819	2929
	Radius	5	10	Yes	29.2	29.2	0	0	NaN	2.925
	Predicted Value		11	Yes	29.2	29.2	0	0	NaN	
	X	687279.3	12	Yes	29.2	29.2	0	0	NaN	2.923
	Y	4059679	13	Yes	29.2	29.2	0	0	NaN	
	Vabe	0.03459764	14	Yes	29.2	29.2	0	0	NaN	2.92 2.923 2.926 2.929 2.931 2.934 2.937 2.94
	Neighbors (20)		15	Yes	29.2	29.2	0	0	NaN	Measured -10 ⁻¹
Sm Jations at (687779.3, 4059679)			15	Yes	29.2	29.2	0	0	NaN	Predicted Error Standardized Error
			17	Yes	29.2	29-2	0	0	NaN	
¥-10 ¹			18	Yes	29.2	29.2	0	0	NaN	Regression function U.559193368310705 * X + 12 A
9.63			19	Yes	29.2	29.2	0	0	NaN	Prediction Errors
7.222			20	Yes	29.2	29.2	0	0	NaN	Sampes 28/107 28/1
4815			21	Yes	29.2	29.2	0	0	NaN	Pedri -0.002576362
2.80			22	Yes	29.2	29.2	0	0	NaN	K00(-Medi-Square 0.03532531
0 0.13 0.261 0.391 0.521 0.651 0.782 0.912 1.042 1.172			23	Yes	29.2	29.2	0	0	NaN	Picel Status General Standard Matt
Distance (Meter), h -10 ⁻¹			24	Yes	29.2	79.7	0	0	NaN Y	Nuclimean Standard Crass 0.02/22007
Serviariograms (Nugget) Partial SII) Range Transformation			<						>	1 Nice age 312100 0101 0103/03/
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Figure D 20.The surface temperature variogram of Fethiye-Göcek Lake in 30.08.2014



Figure D 21. The surface temperature variogram of Fethiye-Göcek Lake in 31.08.2014



Figure D 22. The depth temperature eror map of Fethiye-Göcek Bay

Geostatistical wizard - Empirical Bayesian Kriging st	ep 2 of 3 - Method Pro	perties – 🗆 🗙			Geos	tatistical	wizaro	d - Empirical	Bayesian K	Griging step 3 of 3 - Cross Validation 🛛 – 🗖
○ · · · · · · · · · · · · · · · · · · ·	General Propertie	s	Source ID	Included	Measured	Predicted	Error	Standard Error	Standars ^	Predicted -10 ⁻¹
	Subset Size	100	0	Yes	18.92	18.97	0	0.08434459	0.06898	3.019
	Overlap Factor	1	1	Vac	18.02	18.07	0	0.05544050	0.15050	···· /
7	Number of Simulation	s 100	2	Yes	18.93	18.93	0	0.05348873	0.13858	2.84
	Output Surface Type	Prediction Standard Error	3	Yes	18.95	18.94	-0	0.05069547	-0.0095	2002
	Transformation	Empirical	4	Yes	18.96	18.96	0	0.05175818	0.00447	2002
	Search Neighborh	boo	5	Vac	18.08	18 07	-0	0.05277100	.0 1300	2.483
	Neighborhood type	Smooth Circular	6	Ver	19.09	19.09	0	0.05405075	0.03522	
	Smoothing factor	1	7	Vac	18.08	18.08	0	0.05907077	0.04754	2.304
11	Radus	100	8	Yes	18.98	18.98	0	0.05900475	0.04736	2175
	Predicted Value		0	Vac	18.08	18.08	0	0.05004302	0.04555	
11	x	675675.1	10	Ver	19.09	19.07	-0	0.05036660	0.0706	1.947
	Y	4064676	11	Vac	18.07	18.08	0	0.05020005	0.21578	
	Value	0.03177995	12	Ver	19.09	19.07	-0	0.06136356	0.0704	1,768 1,947 2,125 2,304 2,483 2,662 2,84 3,0
4	Heighbors (64)		13	Vac	18.08	18.08	0	0.05542822	0.0321	Measured 1
Conclusion of (C25/25-1-49/4/27)			14	Ver	19.09	19.09	0	0.000010000	0.11912	Predicted (Fmr.) Standardized Fmr.) Nomal OOPlet /
3muatoris at (0/30/3.1, 40040/0)	-		15	Vac	18.00	18.08	-0	0.06075450	0.0326	
y-10 ¹			16	Ver	19.00	19.00	0	0.06150607	0.04709	Regression function 0.99991336185306 * x + 0.00
25			17	Vac	18.00	18 00	0	0.06140158	0.04730	Prediction Errors
1.875			10	Ver	19.00	19.09	-0	0.05567363	-0.0602	Samples 4550 of 4550
125			10	Vac	18.08	18.08	0	0.05586457	0.14520	Mean -0.0006159956
0.625			20	Ver	19.09	19.07	-0	0.05479060	-0.0640	Root-Mean-Square 0.06279819
0 0.784 1.568 2.352 3.136 3.92 4.704 5.488 6.272 7.05	6		21	Vac	18.07	18 07	0	0.05383530	0.04577	Mean Standardized -0.01556119
Distance (Meter), h -10	1		72	Yes	18.96	18.95	-0	0.05345139	-0.0564 Y	Root-Mean-Square Standardized 0.5810536
Semivariograms (Nugget) Patial SII) Range) Transformation /			<						>	Average Standard Error 0.08982639
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Figure D 23. The depth temperature variogram of Fethiye-Göcek Lake in 23.08.2013

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties 🛛 – 🗖 🗙	Geostatistical wizard - Empirical Bayesian Kriging step 3 of 3 - Cross Validation – 🗖
<u>○•</u>	General Properties Subset Size 100 Overlap Factor 1	Source D Induded Measured Predicted Error Standard/Error Standard/Error Standard/Error Predicted 10 ⁻¹ 0 Yes 25.55 .7.0 0.00039942 .000039742 2555
	Number of Simulations Site Output Surface Type Peekdion Standard Error Interdomation Expandi B search Heighborhood Heighborhood Heighborhood Train Sinoch Circler Sadus 500 B Peekdeted Value K K 672123.7 Y 495.72	1 195 2.5.2 2.5.1. 0 (JUMPH757. J. 3.81) 2 195 2.5.4 2.5.4. 0 0.0099957. J. 5764 3 195 2.5.4 2.5.4. 0 0.00795590. J. 5764 4 196 2.5.3 2.5.4. 0 0.0072594 2.55 5 196 2.5.4 2.5.4. 0 0.0072594 2.55 5 196 2.5.5 2.5.4. 0 0.0055957 2.5.51 6 196 2.5.5 2.5.4. 0 0.0055957 2.5.51 7 196 2.5.7 2.5.4. 0 0.0055957 2.5.444 10 196 2.5.4 2.5.4 0 0.0055957 2.5.444 10 196 2.5.4 0.0055957 2.5.444 10 196 2.5.4 2.5.4 0.0055957 2.5.444 10 196 2.5.4 2.5.4 0.0055957 2.5.444 10 196 2.5.4 2.5.4 0.0055957 2.5.4 0.0055957 2.5.444 10 196 2.5.4 2.5.4 0.0055957 2.5.407 10 196 2.5.4 2.5.4 0.0055957 2.5.4 0.0055957 2.5.444 10 196 2.5.4 0.0055957 2.5.4 0.0055957 2.5.444 10 196 2.5.4 0.0055957 2.5.445 10 196 2.5.4 0.0055957 2.5.455 10 196 2.5.4 0.0055957 2.5.455 10 196 2.5.455 10 196 2.5.455 10 196 2.5.455 10 196 2.5.455 10 196 2.5.455 10 196 2.5.455 10 196
V	Value 0.04001042 Meighbors (40)	12 Yes 28.31 27.85 -1 1.4554085 -1.0279; 1854 2.017 2.18 2.343 2.606 2.669 2.832 2.91 13 Yes 28.51 28.76 -0 0.69573370 0.7041 Herson of the Messard -10 4 Yes 20.31 28.64 0.7041 Herson of the Messard -10 Herson of the Messard -10
Sindefine at (5/1723), 4/06/122) y + 10 ¹ 5/28 7/37 4/374 2/457		In Test 23.32 23.94 0. 0.5321237 0.7328 15 Yes 23.77 20.00. 0.4422232 0.7328 1.100000 Vert Wardward W. (New Wardward
0 0.246 0.491 0.737 0.902 1.228 1.473 1.719 1.954 2.21 Distance (Meter), h 10 ⁻² Servivatograms / Nagget / Partial SII / Range / Transformation /		21 Yes 28.47 28.43. 0
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Figure D 24. The depth temperature variogram of Fethiye-Göcek Lake in 24.08.2013

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties 💦 – 🗖 🗙	Geostatistical wizard - Empirical Bayesian Kriging step 3 of	3 - Cross Validation 🛛 – 🗖 🗙
Smillor at 674105.405748 V 101 0	B Centeral Properties State Size 00 Derlige Facture 1 Nurber of Smalators 10 Output Sinder The Periodical Standard Draw Transformation Experial State Size Size Size Size Size Size Size Siz	Surve D Inducted Neasured Freedoted Start of the Start of	9 2552 2716 278 244 2907 2511 Mesourel 10 ⁻¹ 9 2552 2716 278 244 2907 2511 Mesourel 10 ⁻¹ 9 androstated Enr. Nomel OxParl 9 2500 of 538 0 0000532 9 0 02903648 9 0 25003648 9 00 9 0 25000 9 0 2500 9 0
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Figure D 25. The depth temperature variogram of Fethiye-Göcek Lake in 25.08.2013

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties -	Geostatistical wizard - Empirical Bayesian Kriging step 3 of 3 - Cross Validation – 🗖
Genetational wizard - Empirical Bayesian Kriging step ○ •	2 of 3 - Method Properties - C X General Properties Statet Site 00 Orela Pictor 1 Nucleor of Smatch Staded Error of Coupt Sarface Tipe - Peckton Staded Error of Terroformation Durical Second Registerioted International Second Registerioted State 0 Pecktod Value X 660554.2 X 7 X 660554.2 X 660554.2 X 7 X 660554.2 X 7 X 660554.2 X 7 X 660554.2 X 7 X 660554.2 X 7 X 660554.2 X 7 X 660554.2 X 7 X 660554.2 X 7 X 660554.2 X 7 X 660554.2 X 7 X 660554.2 X 7 X 660554.2 X 7 X 660554.2 X 7 X 660554.2 X 7 X 7 X 7 X 7 X 7 X 7 X 7 X 7	Geostatistical wazard - Empirical Bayesian Kriging step 3 of 3 - Cross Validation C Survice 3D Incided Measure Prediced for Sandard Funz Sandard, Tur San
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Figure D 26. The depth temperature variogram of Fethiye-Göcek Lake in 26.08.2013

	General Properties		Source ID	Induded	Measured	Predicted	Error	Standard Error	Standars ^	Predicted -10°1
•	Subset Size	100		Vec	29 720	29.61	.0	0.02620671	4 4707	21
•	Overlap Factor	1	4	Vec	20.725	20.01	0	0.02023071	0.24405	3.1
	Number of Simulations	100	-	Vec	20.02	20.02	0	0.012031020	1 20002	3.057
**CM	Output Surface Type	Prediction Standard Error	6	Vec	20.30	20.00	0	0.01701350	0.7550	
	Transformation	Empirical	7	Vee	20.37	20.33		0.01410221	0.06067	3.014
	Search Neighborho	od		Vee	20.34	20.33	-v	0.01710331	0.0000	2 971
<u>~~</u>	Neighborhood type	Smooth Circular		165 Vee	20.0	20.31	0	0.01105410	0.32303	· · /
~	Smoothing factor	1	10	Vec	20.19	10.40	0	0.01153410	0.0030/	2.927
	Radius	100	11	Vec	20.70	20.10	0	0.01545005	0.33776	2.994
1	Predicted Value		12	Ver	20.70	20.47	0	0.01540878	0.4350	2004
	X	687390.9	12	Ver	20.17	20.47	-0	0.013796/0	J0 33011	2.841
1	Y	4060604	14	Ver	20.10	20.17	.0	0.01100011	-0.0144	
C 1	Value	0.01287194	10	Vec	20.40	20.47	.2	0.01550300	-0.0007	2,798 2,841 2,884 2,927 2,971 3,014 3,0
<i>V</i> ~	E Neighbors (64)		16	Vec	28.48	28.47	.5	0.01550501	-0.0002	Mea
tions at (202200.0, 402000.0)			17	Vec	28.48	28.48	5	0.01686103	0.00351	Predicted (Error) Standardized Error) Normal OQPlot /
alonis at (60/330.3, 4060604)			18	Yes	28.48	28.48	0	0.01686479	0.01492	
y-10 ¹			19	Yes	28.48	78.48	0	0.01679368	0.29159	Regression function 0.999680019067905 * x
8			20	Yes	28.49	28.48	-0	0.01673966	-0.5944	Prediction Errors
1			21	Yes	28.48	28.48	0	0.01691503	0.28527	Samples 6807 of 6807
4			22	Yes	28.48	28.48	0	0.01686424	0.00949	Mean 0.000003128809
3/			23	Yes	28.48	28.48	2	0.01673949	0.00146	Root-Mean-Square 0.01319748
0 0.223 0.445 0.668 0.891 1.113 1.336 1.558 1.781 2.004			24	Yes	28.48	28.48	4	0.01673002	0.00284	Mean Standardized -0.006912488
Distance (Meter), h ·10 ⁻⁷			25	Yes	28.48	78.48	1	0.01510241	0.00070 *	Root-Mean-Square Standardized 0.67547
rivariograms (Nuccet) Partial SII) Range) Transformation /			<						>	Average Standard Error 0.02207682

Figure D 27. The depth temperature variogram of Fethiye-Göcek Lake in 27.08.2013

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties – 🗖 🗙			Geos	statistical w	izard - Em	npirical Bayesian H	(riging step 3 of 3 - Cross Validation 🛛 – 🗖 🗙
Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties - C X G Central Properties 5 Statet Size 20 Oreing Fattr 1 Number of Smulations 200 Ouguts Sarface Type - Redictal Standard Brar Transformation Dupurical B Search Registerioted Smooth Circular Search Registerioted Smooth Circular Search Registerioted Smooth Circular Search Registerioted Smooth Circular Redict 200 C Predicted Value X 677780.4 Tr 695566 Table 200409613 B Registeriot (s4)	Source ID 0 1 2 3 4 4 5 6 6 7 7 8 9 9 10 11 12 13 14 15 15 15 15 15 17 18 19 20 21 27 27 €	Included Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	Geos Measured 28.06 28.07 28.07 28.07 28.07 28.17 28.11 28.11 28.11 28.11 28.11 28.11 28.11 28.11 28.11 28.11 28.11 28.11 28.11 28.11 28.12 28.12 28.12 28.12 28.12 28.12 28.12	tatistical w Predicted E 28.07 (28.06 2 28.08 2 28.08 2 28.08 2 28.10 2 28.10 2 28.10 2 28.10 2 28.10 2 28.10 2 28.10 2 28.10 2 28.11 2 28.12 2 28.	iizard Emr Standa 500 0.0079 0 0.0059 0 0.0059 0 0.0050 0 0.0050 0 0.0050 0 0.0050 0 0.0050 0 0.0054 0 0.0054 0 0.0055 0 0.0055 0 0.0055 0 0.0055 0 0.0055 0 0.0055 0 0.0055 0 0.0055 0 0.0055 0 0.0055 0 0.0055 0 0.0055 0 0.0055 0 0.0055 0 0.0055 0 0.0055 0 0.0055 0 0.0055 0 0.0055	Printic Bayesian ardime Sandar Å Market 1.322 9931.4 0.399 0.83.4 0.399 0.83.4 0.399 0.83.4 0.399 0.83.4 0.399 0.83.4 0.399 0.83.4 0.399 0.83.4 0.329 0.84.4 0.0225 5577.4 0.5124 0.9202 9.5124 94902 9.5124 94902 9.5124 94903 0.7122 9557.4 0.1935 9179.9 0.7142 9557.4 0.1935 9179.4 0.1945 9494.5 0.1945 9495.4 0.1925 9195.4 0.1925 9195.4 0.1925 9195.4 0.1926 9195.4 0.1926 9195.4 0.1926 9195.4 0.1926 9195.4 0.1926 9195.4 0.1926	Diging step 3 of 3 - Cross Validation -
	<back next=""> Finish Cancel</back>							<back next=""> Finish Cancel</back>

Figure D 28. The depth temperature variogram of Fethiye-Göcek Lake in 30.08.2013

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties 🛛 – 🗖 🗙	Geostatistical wizard - Empirical Bayesian Kriging step 3 of 3 - Cross Validation – 🗖 🗴
	General Properties Subet Six Su	Source D Dubled Meanuel Predicts Standard Free <thstandard free<="" th=""> Standard Free <thst< th=""></thst<></thstandard>
Sendators at (\$2251.48178) y -10 ¹ 7067 5301 334 0 0.833 1565 2.5 3.333 4.766 4.399 5.82 6.655 7.489 Datacce (Mean). h -10 ⁻¹ Sentiance (Mean). h -10 ⁻¹	Predicted Value Cick the UserIfy Value con to see the prediction at a location. (Sack Next > Frink Cancel	11 Yer 24.15 0. 0.0098295 1.0517 14 Yer 24.17 28.18 0. 0.0098295 1.0517 15 Yer 28.17 28.18 0. 0.0098494 1.4657 17 Yer 28.15 3.22 0. 0.0098494 1.4657 18 Yer 28.25 3.23 0. 0.0098494 1.4657 19 Yer 28.25 3.23 0. 0.00985128 0.009 19 Yer 28.25 3.23 0. 0.00985128 0.0098 10 Yer 28.25 3.23 0. 0.0098121 0.0399 11 Yer 28.27 3.8 0. 0.0098121 0.0399 12 Yer 32.39 28.27 0. 0.0098120 0.0399 14 Yer 28.28 28.27 0. 0.0098120 0.0099 14 Yer 2

Figure D 29. The depth temperature variogram of Fethiye-Göcek Lake in 31.08.2013

ວ - 0, 0, ୬ 0) é sè	General Properties		Source ID	Included	Measured	Predicted	Error 9	Standard Error	Standars ^	Predicted 10-1
	Subset Size	100		Yer	73.76	77.69		1 10647767	.0.6312	2475
1.	Overlap Factor	1	1	Yec	23.70	23.05	0 0	1.05389900	0.00012	2410
	Number of Simulations	100	2	Var	23.60	23.68	-n r	1 04612050	-0.1330	2.41
	Output Surface Type	Prediction Standard Error	1	Yer	22.67	22.66		0.04645770	.0.0307	2015
	Transformation	Empirical	4	Yee	22.07	22.000	0 0	0.02540040	0.10597	2.340
	🗄 Search Neighborho	od		Var	23.65	73.64	J. 1	1 03337587	-0.1101	2.28
	Neighborhood type	Smooth Circular	4	Yee	22.00	22.64	0 0	1 04902509	0 10142	
1 2-	Smoothing factor	1	7	Yer	23.61	23.60		1 08830361	0.13145	2.214
A	Radius	100		Yer	73.61	22.60		1 04202425	0.0307.	21/9
/	Predicted Value			Yee	22.61	22.000	.0 0	04260622	0.0426	
·	x	674740	10	Yer	23.61	23.60	-0	1.04665173	-0.0430	2.084
And and a support of the local data and the local d	Y	4057285	11	Yer	22.61	22.60		0.04410071	0.0450	× ×
1	Value	0.02921137	12	Yee	22.61	22.000		0.02059055	0.0255	2019 2084 2149 2214 228 2345 241
	E Neighbors (3)		12	Vee	22.61	22.00		0.00200000	0.0300	Measur
Car July and (C2/240, 4057085)			14	Yee	22.61	22.60		1 02075092	0.0303	Predicted (Emr.) Standardized Emr.) Nomal QQPInt /
Singerons et (5/4/40, 400/200)			10	Yee	22.61	22.00	0 0	1.02900530	0.0297	
y-10 ¹			10	Vee	23.01	23.00		0.0000000000000000000000000000000000000	0.0345	Regression function 0.994731914249341 * x +
8712			10	Vee	23.01	23.00	0	0.04305505	0.0343	Prediction Errors
6.534			10	165 Vec	22.39	22.92	0	1.09/90000	1.2795	Samples 588 of 601
4.356			10	Vee	22.4	23.35	0	0.00009120	-1.2/03.	Mean -0.001636733
2178			20	Vec	22.4	22.92	0 0	1.04923000	0.140409	Root-Mean-Square 0.1360411
0 0.235 0.469 0.704 0.938 1.173 1.408 1.642 1.877 2.112			20	185 Vee	22.4	23.38	-0 0	0.0000000000000000000000000000000000000	-0.2990:	Mean Standardized -0.01803462
Distance (Meter), h -10 -3			21	100	23.37	23.30	-U U	0.00200000	0.3300 ¥	Root-Mean-Square Standardized 0.930482
Senivatograms (Nuccet) Partial SII) Rance) Transformation /			i i	195	25.56	73.34	-		>	Average Standard Error 0.1480643

Figure D 30.The depth temperature variogram of Fethiye-Göcek Lake in 02.06.2014

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Proj	perties – 🗆 🗙			Geos	tatistical w	vizard ·	- Empirical E	Bayesian K	riging step 3 of 3 - Cross Validation 🛛 – 🗖 🗙
	General Properties		Source ID	Included	Measured	Predicted	Error S	Standard Error	Standars ^	Predicted -10-1
	Subset Size	100		Vec	22.02	72.10		12220041	2 22544	1 269
	Overlap Factor	1	1	Ver	73.11	77.86	J. 0	1 17774750	2 0140	2 X
	Number of Simulations	100	2	Vec	22.00	77.00	0 0	14000017	0.03668	2.35
	Output Surface Type	Prediction Standard Error	3	Vec	22.04	77.04	0 0	1 06717010	0.04873	
	Transformation	Empirical	4	Vec	22.04	22.04	0 0	06571160	0.00850	2332
	Search Neighborho	od	5	Vec	22.07	72.40	J. 0	1 23887508	1 7816	2313
	Neighborhood type	Smooth Circular	5	Vec	22.38	22.45	0 0	1 00800550	0.25287	
	Smoothing factor	1	7	Yes	22.38	22.38	0	08475361	0.09954	2.294
	Radius	100	8	Vec	22.4	22.44	0 0	1 08038450	0.53886	2275
	Predicted Value		0	Vec	22.52	22.41	.0 0	10288392	1.0619	
	X	680400.9	10	Vec	22.44	22.51	0 0	11163892	0.67276	2257
	Y	4061894	11	Vec	22.52	22.50	-0 0	10708546	-0.1675	/
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Value	0.0182541	12	Vec	22.57	22.53	-0 0	11072908	-0.2850	2238 2257 2275 2294 2313 2332 235 2369
N	E Neighbors (7)		13	Vec	22.57	22.85	0 0	17161620	2 33415	Measured 10 ⁻¹
Des Julies et (200400.0. 400500.0			14	Yes	23.03	23.55	0 0	1 09941177	5 23600	Predicted (Error) Standardized Error) Normal QQPlot /
amulatoris at (600400.3, 4061034)			15	Yes	23.09	23.22	0 0	10543178	1 29263	
y-10 ¹			16	Yes	23.03	23.09	0 0	109799136	0.69455	Regression function 0.965045676579781 * x + 0.8 /
8,255			17	Yes	23.04	23.04	4 0	08779702	0.00048	Prediction Errors
6.191			18	Yes	23.03	23.04	0 0	10373164	0.17712	Samples 658 of 692
4.127			19	Yes	23.11	23.05	-00	0.05999026	-0.9177	Mean -0.001473475
2.064			20	Yes	23.06	23.07	0.0	1.04927716	0.23293	Root-Mean-Square 0.0520216
0 0.115 0.23 0.345 0.46 0.575 0.69 0.805 0.92 1.035			21	Yes	23.01	23.08	0.0	06047115	1.27759	Mean Standardized -0.02793795
Distance (Meter), h ·10 ⁻³			22	Yes	23.12	23.20	0	05566704	1.55537 ¥	Root-Mean-Square Standardized 0.8617673
Servivariograms (Nugget) Partial Sill) Range) Transformation /			۲.						>	Average Standard Error 0.04863399
[<back next=""></back>	Finish Cancel								<badt next=""> Finish Cancel</badt>

Figure D 31. The depth temperature variogram of Fethiye-Göcek Lake in 03.06.2014

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Prop	perties – 🗆 🗙			Geos	tatistical	wizaro	d - Empirical	Bayesian R	Griging step 3 of 3 - Cross Validation 🛛 🗖 🗖
	General Properties		Course ID	Induded	Mana and	Developed	Error	Chandred Error	Chandray A	0-(
	Subset Size	100	300 (2 12	a couco	Measureu	FIGULIEU	Citor	313110310 0110	Jailai	Predicted IU
	Overlap Factor	1	0	Yes	22.46	22.45	-0	0.10656136	-0.03650	2.84
and the second sec	Number of Simulations	100	1	Yes	22.46	22.46	0	0.08446456	0.03269	2344
And the second s	Output Surface Type	Prediction Standard Error	2	Yes	22.48	22.41	-0	0.09371368	-0.6504	
	Transformation	Empirical	3	Yes	22.39	22.45	0	0.08869361	0.79475	2.305
	Search Neighborho	bd	4	Yes	22.45	22.43	-0	0.10557282	-0.1729	195
The state of the s	Neighborhood type	Smooth Circular	5	Yes	22.57	22.47	-0	0.10422168	-0.9068	2.200
	Smoothing factor	1	6	Yes	22.49	22.46	-0	0.10044642	-0.2341/	2 226
	Radius	100	7	Yes	22.26	22.52	0	0.10514040	2.54507	
	Predicted Value		8	Yes	22.56	22.48	-0	0.06953765	-1.0269(2 185
	x	672400.3	9	Yes	22.55	22.53	-0	0.04950015	-0.2364	2147
	Y	4062007	10	Yes	22.53	22.54	0	0.05106904	0.27714	· /.
	Value	0.03754346	11	Yes	22.54	22.53	-0	0.07059104	-0.0821/	
\sim	Neighbors (3)		12	Yes	22.55	22.55	0	0.08404400	0.07603	210/ 214/ 2186 2226 2260 2305 2344 238
			13	Yes	22.58	22.56	-0	0.05895968	-0.3165	Measured 10
Simulations at (672400.3, 4062007)			14	Yes	22.57	22.56	-0	0.05558883	-0.1538	Predicted / Error / Standardized Error / Normal QQPlot /
v:101			15	Yes	22.54	22.52	-0	0.06273765	-0.2528·	Regression function 0.995570070868201 * x + 0.0
1772			16	Yes	22.5	22.45	-0	0.05864005	-0.72330	Prediction Errors
583			17	Yes	22.39	22.49	0	0.05966942	1.72912	Samples 1303 of 1315
3.887			18	Yes	22.49	22.42	-0	0.07923430	-0.7917	Mean -0.001098729
1943			19	Yes	22.51	22.45	-0	0.09747049	-0.5837!	Root-Mean-Square 0.05043328
0 0102 0226 0499 0461 0912 0976 1120 1201 1464			20	Yes	22.43	22.53	0	0.08745555	1.16284	Mean Standardized -0.01047382
U U.103 U.323 U.408 U.031 U.813 U.376 I.133 I.3UI 1.464			21	Yes	22.55	22.53	-0	0.07569634	-0.1610	Root-Mean-Square Standardized 0.9976068
Semivarlograms (Nugget) Partial Sill) Range) Transformation /			77 K	Yes	77.67	77.56	-0	0.08180421	-0.6715! *	Average Standard Error 0.04401181
	< Back Next >	Finish Cancel								<back next=""> Finish Cancel</back>

Figure D 32. The depth temperature variogram of Fethiye-Göcek Lake in 05.06.2014



Figure D 33. The depth temperature variogram of Fethiye-Göcek Lake in 06.06.2014

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties -			Geos	tatistical wiz	zard - Empirica	l Bayesian H	Criging step 3 of 3 - Cross Validation 🛛 – 🗖 🗙
Generalizational warad - Empirical Regesian Kriging Step ●	2 d3 - Method Properties ■ General Properties Subject Same 100 Oracle Arabitation 1 Durber of Stankins 000 Durber Stankins 000 Durber Stankins 000 Endomation Exprical ■ Search Registerioned Interformation 2 sound Oracle Registration together 1 Registration together 1 Registration together 2 ■ Predicted Value X 679407.3 Y 455581 Take 607025922 ■ Registrations (14)	7 7 7 8 9 10 3 4 5 6 6 7 7 8 9 10 11 2 9 10 11 2 9 10 11 2 12 13 14 15 15 12 12 12 12 12 12 12 12 12 12 12 12 12	D Induded Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	Geos Neasured 22.47 22.4 22.4 22.3 22.42 22.52 21.95 2	Latistical With Predicted En 22.42 0 22.33 0 22.25 0 22.32 0 22.33 0 21.167 0 22.47 0 22.48 0 22.48 0 22.49 0 23.10 0 23.10 0 23.10 0 23.11 0 23.12 0 23.33 0 NeW Ne 23.33 0	Zard – Empirica 2 Sandard Error 0. 18275156. 0. 14900144. 0. 17294521. 0. 12596551. 0. 12596551. 0. 13597454. 0. 13597454. 0. 13597454. 0. 13597454. 0. 03594934. 0. 03594934. 0. 03594934. 0. 03594934. 0. 03594934. 0. 03594934. 0. 04515758. 0. 04515788. 0. 0451578	Bayesian Standar: ^ 4. 2523 4.3670; 0.22134 0.23355 0.86153 4.2513 4.4696; NaN 0.99710 1.19782 -1.2031 2.34200 0.15064 4.7901; 0.3534 -1.4600; 4.3534 -1.4600; 0.3534 -1.4600; 0.3534 -1.4600; 0.3534 -1.4600; 0.3534 -1.4600; 0.3534 -1.4600; 0.3534 -1.4600; 0.3534 -1.4600; 0.3534 -1.4600; 0.3534 -1.4600; 0.5364; 0.	Origing step 3 of 3 - Cross Validation -
[< Back Next > Finish	Cancel						<back next=""> Finish Cancel</back>

Figure D 34. The depth temperature variogram of Fethiye-Göcek Lake in 07.06.2014

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties 🛛 – 🗖 🗙	Geostatistical wizard - Empirical Bayesian Kriging step 3 of 3 - Cross Validation 🦳 🗖 🔜
	General Properties Subet Size Subet Size 10 Overlap Fact 1 Number of Simulations 10 Output Surface Type Prediction Standard Error Transformation Experia Search ResployMented Number Search ResployMented Search Size Y 646965 Y 646965 Y 646965	Source D Induided Measurel Preduced firm Standard Preduced film Standard Preduced film Standard Preduced film Standard Preduced film Standard Standard Standard Standard Standard Preduced film Standard Preduced film Standard
Sinulations at (585555, 455540) y 10 ¹ 531 232 0 0 452 0355 1357 131 2252 2715 3167 3519 4072 0 0 452 0355 1357 131 2252 2715 3167 3519 4072 Distance (Rein), h 10 ⁻¹ Seminatograms (Nagget, Patal St), Parge, Terriformation	E Reghters (17)	11 ref 2402 8.99 4. 0.11444911 4.06/ 13 ref 26.02 8.99 4. 0.1244491 4.06/ 14 ref 26.01 28.99 4. 0.1244491 4.06/ 15 ref 28 38.99 4. 0.124491 4.0124 15 ref 28 38.99 4. 0.121492 4.0124 16 ref 28.98 4.0. 0.121429 0.01494278 1.0147 17 ref 28.98 38.7 4. 0.0194928 0.020 18 ref 28.98 38.7 4. 0.0399497 1.04744 0.0202878 20 ref 28.98 38.7 4. 0.0399497 1.04744 0.0202878 1.04949 1.04989-1 1.049897-1 1.04949 1.0289713 1.04744 1.019871 1.04149 1.049871-1 1.04494 1.049871 1.04484 1.049871 1.04484 1.049871-1 1.04484 1.04947-1 1.04484 1.04484 1.04987

Figure D 35. The depth temperature variogram of Fethiye-Göcek Lake in 27.08.2014

Geostatistical wizard - Empirical Bayesian Kriging step 2	2 of 3 - Method Properties 🛛 🗖 🗙		Geos	statistical wizard -	- Empirical Bayesian K	riging step 3 of 3 - Cross Validation 🛛 – 🗖 💌
	E General Paperties Sobert See 100 Order Fairr 10 Under of Enklands 100 Order See 100 Order See 100 Sector Keylowick 100 Partformation See 000 Partformation See 000 Partformation See 000 Partformation See 000 X 664:083 X 664:083 X 664:083 X 664:083 Defender See 00 See 0000 See 000 See 0000 See 0000 See 000 See 000 See 0000 See 0	Source ID Ind 0 Yes 1 Yes 2 Yes 3 Yes 4 Yes 5 Yes 6 Yes 8 Yes 9 Yes 10 Yes 12 Yes 13 Yes	Juded Measured a 30.38 a 29.84 b 29.75 c 29.74 b 29.75 c 29.64 b 29.41 c 29.42 c 29.41 c 29.41 c 29.41 c 29.41 c 29.41 c 29.41	Predicted Error S1 29.80 40 0. 30.11 0 0. 29.70 0 0. 29.70 0 0. 29.70 0 0. 29.57 0 0. 29.59 4 0 0. 29.41 0 0. 29.41 29.41 0 0. 29.41 29.41 0 0. 29.41 29.40 0 0. 29.41	ander/Error Standor 18/41/464	Predicted 10 ⁻¹ 358 3261 3153 3154 2539 2832 274 274 2832 259 3045 3151 3261 336 Messared 10
Sindarova (\$845103, 45104) v 10 ¹ 2055 1022 0 6468 0.815 1.223 1.53 2.038 2.446 2.853 3.251 3.668 Distance (Nary, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	districtions/according/	14 Yes 15 Yes 16 Yes 17 Yes 18 Yes 20 Yes 21 Yes 22 Yes 4	s 29.4 s 29.4 s 29.4 s 29.4 s 29.4 s 29.41 s 29.41 s 29.41 s 29.41 s 29.41 s 29.42	23.40 0 0. 23.40 0 0. 23.40 0 0. 23.41 0 0. 23.41 0 0. 23.41 0 0. 23.41 0 0. 23.41 0 0. 24.11 0 0.	142395540.01440 142394540.01334 14237387001478 143637500.00478 153595740.01478 153801390.01038 14365215001451 14359139001451 15380736140.0707 * >	Produced (Emp.) Sandardased Emp.) Normal G2Det/ Regression function 0.9891718.53391272 ** + 0.3. Production Enversion Sangheis 9242 of 9242 Mean 0.00088305 Normal Sangheis Root Mean Squarked 0.312497 Normal Sangheis Nean Standordsed 0.31118933 Normal Sangheis Average Standardsed 0.7994633 Northern Square Average Standardsed 0.3400304 Northern Square V Cancel Northern Square Cancel

Figure D 36. The depth temperature variogram of Fethiye-Göcek Lake in 28.08.2014

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties 💦 – 🗖 🗙	Geostatistical wizard - Empirical Bayesian Kriging step 3 of 3 - Cross Validation –
	Col 3 - Mellinou Properties Seteral Properties Seteral State: 100 Overlap Ractor 1 Number of Similators 10 Overlap Ractor 1 Transformation Empirical Search Neighborhood Heighborhood E- Sinout Circular	Orderational macanity chipming serves of
Smlatere at (80055.1,404542) y.10 ¹	Snooting factor 1 Sadus 10 Predicted Value X X 660355.3 Y 466452 Fielder 0.01515389 B Reighbors (16)	7 16 25.2 35.2 4.0 00115208 4.068 8 17 18 35.2 35.2 4.0 00115208 0.408 9 19 55.2 35.2 5.0 000011520 0.271 10 16 35.2 35.2 5.0 00001150 0.0751 10 17 25.2 25.1 4.0 00003146 0.00124 11 17 25.2 25.1 4.0 00003146 0.00124 12 16 35.2 35.1 4.0 0.0003146 0.00124 13 16 35.2 35.1 4.0 0.0003146 0.00124 14 17 35.2 35.1 4.0 0.0003146 0.00124 14 16 35.2 35.1 4.0 0.001352 0.044 14 16 35.2 35.1 4.0 0.001458 0.0425 15 16 35.2
7.155 356 0 0.179 0.357 0.556 0.715 0.853 1.072 1.25 1.429 1.638 Datarce (Hear), h. 10 ² Serivatograms (Nuggel, Partie SI), Range, Transformation		17 free 25.51 25.81. 0. 0.0135111. 0.4467 38 free 25.51 25.83. 0. 0.0135112. 0.01237 36 free 25.51 25.83. 0. 0.0123658. 0.0237 37 free 25.51 25.83. 4 0.0123658. 0.0237 20 free 25.51 25.83. 4 0.0122058. 0.0237 21 free 25.51 25.83. 4 0.0120367 RootNem-Gaure 0.012232 7 free 25.51 25.83. 4 0.0120367 RootNem-Gaure 0.012232 7 free 25.51 25.83. 4 0.012037 RootNem-Gaure 0.0125357 7 free 25.51 25.81. 4 0.01017 2.01237 RootNem-Gaure 0.0125357 7 free 25.51 25.81. 4 0.01017 2.01237 7 free 25.1 <td< td=""></td<>
	<back next=""> Finish Cancel</back>	<back next=""> Frish Car</back>

Figure D 37. The depth temperature variogram of Fethiye-Göcek Lake in 29.08.2014

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties 💦 – 🗖 🗙			Geos	tatistical v	wizard	- Empirical	Bayesian H	Kriging step 3 of 3 - Cross Validation – 🗆 🗙
	General Properties Subset Size 100 Overlap Factor 1 Number of Simulators 100 Output Surface Type Prediction Standard Error	Source ID 0 1 2	Induded Yes Yes Yes	Measured 33.32 33.32 33.32	Predicted 33.31 33.31 33.32	Error S -0 0 -9 0 0 0	Standard Error 0.02144926 0.01610840 0.01610598	Standar: ^ -0.2011 -0.0060k 0.33233	Predicted 10 ⁻¹
	Transformation Engrite Basenh Heightohood Heightohood Heightohood type Snooth Citolar Smoothing factor 1 Radus 5 ■ Predictad Value X X \$75855.6 Y ≪00278373	3 4 5 6 7 8 9 10 11	Yes Yes Yes Yes Yes Yes Yes Yes	33.35 33.34 33.35 33.36 33.37 33.38 33.38 33.38 33.38 33.39	33.34 33.34 33.35 33.37 33.38 33.38 33.38 33.38	-0 0 -0 0 -0 0 -0 0 -0 0 1 0 0 0 -0 0	0.01610466 0.01563685 0.01563685 0.01610481 0.01610481 0.01610601 0.01610860 0.01563717 0.01550107	-0.05/6 0.05668 -0.0107 -0.0676 0.03938 -0.3511 0.00094 0.30786 -0.32448	3.22 1.12 1.25 2.26 2.261
Simulations at (\$78500, 4405500) y 10 ¹ 1842 1842 1842 0.027 0.455 0.027 0.455, 0.877 1089 1342 1342 0.572 1345 0.577 1089 1342 1342 0.5 1342 1342 0.5 1342 1	≘ Neighbors (7)	12 13 14 15 16 17 18 19 20	Yes Yes Yes Yes Yes Yes Yes Yes	33.39 33.4 33.4 33.41 33.41 33.41 33.41 33.41 33.41 33.42 33.41	33.39 33.40 33.40 33.40 33.40 33.41 33.41 33.40 33.41	0 0 -0 0 -0 0 -0 0 -0 0 -0 0 0 0 -0 0 0 0	0.01610354 0.01509239 0.01509239 0.01509239 0.01610354 0.01550530 0.01550530 0.01610047 0.01610047 0.0165075 0.01509032	0.26950 -0.2526: 0.25026 -0.29238 -0.01158 -0.00769 0.31380 -0.68818 0.38310	2.68 2.51 2.50 3.05 5.12 3.21 5.41 <td< th=""></td<>
Serivatorysmic / Nugget \ Petal SII \ Pange \ Transformation /	<bad. next=""> Frish Cancel</bad.>	21 27 6	Tës Yes	33.41 33.41	33.40 33.40	-1 0	0.01610406 0.01610694	+0.00068 +0.0151: **	Root Mean-Square Standardized 0.4922015 Average Standard Error 0.2121207 v <back next=""> Finish Cancel</back>

Figure D 38. The depth temperature variogram of Fethiye-Göcek Lake in 30.08.2014

- 0, 0, 2° (a) (e =) 🗏 📓 - 🗞 -	General Properties		Source TD	Included	Manu rad	Deadlated	Error	Chandard Error	Chandler, A	Parking 10:1
	Subset Size	100	30010212	5100000	Headurea	FICULIEU	CIU		301001	Fredicied 10
(Aller and a second se	Overlap Factor	1	0	Yes	33.13	30.77	-2	3.07475680	-0.7668	3.464
	Number of Simulations	100	1	Yes	33.11	32.35	-0	2.96101697	-0.2534	3 346
Colling attended	Output Surface Type	Prediction Standard Error	2	Yes	33.11	32.23	-0	3.03468325	-0.2870
	Transformation	Empirical	3	Yes	33.11	32.29	-0	2.97935283	-0.2724	3.228
	Search Neighborho	od	4	Yes	33.13	32.45	-0	2.90779155	-0.2334	3 100
	Neighborhood type	Smooth Circular	5	Yes	33.15	32.33	-0	3.02082998	-0.2712	3.105
A CONTRACTOR OF A CONTRACTOR OFTA CONTRACTOR O	Smoothing factor	1	6	Yes	33.16	32.46	-0	2.90955592	-0.2375:	2.99
	Radus	5	7	Yes	33.16	32.12	-1	2.85734257	-0.3636/	95 g//
	Predicted Value		8	Yes	33.16	31.48	-1	2.84625109	-0.5902	2.8/2
	x	684282	9	Yes	33.17	30.70	-2	2.55520408	-0.9538	2754
An or setting	Y	4061198	10	Yes	33.18	27.95	-5	1.21862048	-4.2915	
	Value	0.2821824	11	Yes	33.18	27.78	-5	1.01397711	-5.3224	2,025, 2,754, 2,072, 2,00, 2,400, 2,220
2	Neighbors (20)		12	Yes	33.19	27.56	-5	0.98456695	-5.7088	2,033 2,734 2,072 2,33 3,103 3,220
			13	res	33.2	28.34	- 1	1.39004/04	-3.4934	Producted (Error) Development Error) Neural 000Rs
Jabons at (684,282, 406 136)			14	Yes	33.2	32.32	-0	2.58/86389	-0.3362	I (riediced / Bior / Standardzed Bior / Norma durid
v-10 ¹			15	res	33.21	31.54	-l	3.24290151	-0.5/48	Regression function 0.90487395526852
67			16	Yes	33.23	31./6	-1	3.600234/8	-0.4082	Prediction Errors
52			1/	res	33.29	31./5	-1	3.5255/400	-0.4107.	Samples 7572 of 7572
135			18	res	33.2b	30.07	-3	3.1406/354	-1.015Z	Mean -0.02875937
17			19	res	33.29	29.13	-	2.99/32/1/	-1.6015.	Root-Mean-Square 0.6927836
0 0.15 0.3 0.45 0.601 0.751 0.901 1.051 1.201 1.351			20	res	33.31	28.55	4	2.13121922	-2.231.9	Mean Standardized -0.01967399
Distance (Meter), h -10 ⁻¹			21	TES	33-32	20.54		2.29333991	-1.9001	Root-Mean-Square Standardized 0.9256688
mivariograms (Nugget) Patial SII) Range) Transformation /			<	TPS	35.35	A.m	-5	7.4594.854	>1.5475	Average Standard Error 0.6834699

Figure D 39. The depth temperature variogram of Fethiye-Göcek Lake in 30.08.2014

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties 💦 – 📮 🗙			Geos	tatistical v	wizard - Em	pirical Bayesian	Kriging step 3 of 3 - Cross Validation 🛛 – 🗖 🗙
Sectors at \$512187.455573 Y 1 300 100 101 202 101 202 101 202 101 202 101 202 101 202 101 202 101 202 102 202 102 202 102 202 102 202 102 203 103 104 105 202 105 202 105 202 203 204 205 202 203 204 205 205 205 205 205 205 2	General Properties Subst State 100 Orelige Factor 10 Nurble of Sinulators 10 Nurble of Sinulators 10 Nurble of Sinulators 10 Nurble of Sinulators Sinulator Sinulator Sinulator Sinulator Sinulator Sinulator S Predicted Value X 4055075 Nu Sinulat S Registers Sinulator S Registers Sinulator S S	Source II 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 15 15 15 19 20 21 22 21 22 21 22 21 22 21 22 21 22 22	Induded Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	Measured 23.41 23.81 23.87 23.89 23.89 23.89 23.89 23.89 23.88 23.89 24.89 24.	Predicted 28.39 28.22 28.14 28.41 28.75 28.24 28.24 28.39 28.39 28.39 28.24 28.43 29.43 29.43 29.52 29.52 29.52 29.52 29.52 29.52 29.52 29.52 29.52 29.52 29.52 29.52 29.52 29.52 29.52 29.52 29.52 29.52	Error Standa -1 0.6016 -1 0.4513 -1 0.3264 -1 0.5191 -1 0.8452 -1 0.8452 -1 0.8452 -1 0.8452 -1 0.8452 -1 0.8402 -1 0.8402 -1 0.8402 -1 0.8402 -1 0.4303 -1 0.4303 -1 0.4303 -1 0.4303 -1 0.7504 0 0.7564 0 0.7564 0 0.7541 0 0.7541 0 0.7541	d Bro Standar & 9498 1.6787 1990 3.033 9498 5.840 1199 2.785 1199 2.785 1199 2.785 1199 2.785 1199 1.9405 1197 1.9405 1197 1.9405 1197 4.940 1197 4.955 1197 4.585 1197 4.585 1197 4.585 1198 4.777 1084 4.777 1084 4.777 1085 4.777 1095 4.777	Predicted 10 ⁻¹ 135 265 227 287 288 289 281 283 284 285 286 287 288 289 281 283 284 285 286 287 288 289 289 280 281 283 284 285 286 287 288 289 280 281 281 281 281 281 281 281 281 281 281 281 281 281 281 281 281 281
[<back next=""> Finish Cancel</back>							<badk next=""> Finish Cancel</badk>

Figure D 40. The depth temperature variogram of Fethiye-Göcek Lake in 30.08.2014

Geostatistical wizard - Empirical Bayesian Kriging step	2 of 3 - Method Properties 🛛 – 🗖 🗙	🗙 Geostatistical wizard - Empirical Bayesian Kriging step 3 of 3 - Cross Validation 🛛 – 💷 🗙
	B State: Six 300 State: Six 300 Oreign Patz 1 Nucher of Smaket Six 300 Ough Sarfacs Type Pediction Sixande Dror Transformation Beginical Bissek Similary Sarkacs Type Section Sixande Dror Impediction Optime Social Transformation Bissek Sixander Time Social Transformation Sackar 30 E Pedictical Value X 655561 Inde 0.51277703	Surica D Inductif Barrier D Surica D Inductif Surica D Inductif Surica D Inductif Surica D
Sindlard all (5515), 465401) y 101 2114 155 0 0.451 0.351 1.472 1563 2.454 2.543 3.255 4.417 Distance (Mear), h 10 ⁻¹ Servivalogram, (Nugget,) Partid Sill, Partye, \ Tandomidor /	<back next=""> Finds Canad</back>	14 Ves 23.9 23.33 -0. 0.04799564 -1.6153 15 Ves 23.33 3.00 -0.0279564 -0.14755 15 Ves 23.33 23.00 -0.0278554 -0.14755 17 Ves 23.43 -0.0238574 -0.021857 -0.021974 18 Ves 23.12 23.44 -0.02385746 -0.02197 18 Ves 23.12 23.44 -0.02325746 -0.02197 20 Yes 23.12 23.14 -0.02325746 -0.02197 20 Yes 23.12 23.10 -0.02325746 -0.02197 21 Yes 23.12 23.10 -0.02325746 0.02197 21 Yes 23.12 23.10 -0.02325742 0.02197 21 Yes 23.12 23.10 -0.02325728 0.02197 21 Yes 23.12 23.10 -0.02325728 0.02197 21 Yes 23.12 23.10

Figure D 41. The depth temperature variogram of Fethiye-Göcek Lake in 31.08.2014





Appendix E. Temperature vs. Depth Graphs for Fethiye-Göcek Bay

Figure E 1. Temperature and Specific Conductivity vs Depth plots for Fethiye-Göcek Bay



Figure E 2. Temperature and Specific Conductivity vs Depth plots for Fethiye-Göcek Bay (cont...)



Figure E 3.Temperature and Specific Conductivity vs Depth plots for Fethiye-Göcek Bay (cont...)

CURRICULUM VITAE

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EDUCATION

2015-2016	: Joint M2 (Master 2) Student Hydrogeology and Associated Transfers, University of Poitiers, Poitiers/France & Geological Engineering (Hydrogeology Laboratory), Mugla Sitki Kocman University, Mugla/Turkey (CGPA 3.71/4).
2015 (Sum)	: St.Giles International English School Brighton- UK
2014-2015	: M1 (Master 1) Geological Engineering (Hydrogeology Laboratory), Mugla Sitki Kocman University, Mugla, Turkey
2013-2014	: Sıtkı Koçman School of Foreign Languages, Mugla Sitki Kocman University/Turkey
2008-2012	: Bachelor of Science in Geological Engineering, University of Firat, Elazig, Turkey
2003-2007	: Yalova Foreign Language Intensive High School/ Yalova/ Turkey

SKILLS

OS:	Windows Operating System (Windows 8, 7, Vista), Mac OS X, Linux
Software:	Groundwater Vistas, Groundwater Modeling Software (GMS), Suffer, Rockworks 14, ARCGIS 10.2-10.3, Jchess, MODFLOW, MT3D, SPSS, Global Mapper, MS Office (Word, Excel, Power Point)
Languages:	Matlab 2014b
SCHOLARSHIPS

French Government Master Fellowship (2015-2016)

Sıtkı Koçman Foundation Master Fellowship (2015-2016)

PUBLICATIONS

Gürcan T., Kurtulus B., Avsar U., and Avsar Ö., Evaluating the thermal stratification of Köyceğiz Lake (SW Turkey) using in-situ and remote sensing observation. (Under review in Limnology and Oceanograp)

Gürcan T., Kurtulus B., Amphibious Unmanned Air Vehicle Based Remote Sensing Using Multispectral Camera, April 06-10, 2015, 68. Turkey Geology Congress, Ankara, Turkey.

CONFERENCES AND COURSES ATTENDED

American Geophysical Union (AGU), Fall Meeting in San Francisco, U.S on December 12-16, 2016 as a poster presenter. http://fallmeeting.agu.org/2016/

European Geosciences Union (EGU) in Vienna, Austria on April 23-28, 2017 as a poster presenter. http://www.egu2017.eu/

8th International Congress on Environmental Modelling and Software (iEMSs) in Toulouse, France, on July 10-14, 2016, as a participant. http://www.iemss.org/sites/iemss2016/

8th International Symposium on Eastern Mediterranean Geology (ISEM) in Muğla, Turkey on October 13-17, 2014, as a staff member. http://isemg.org/

LANGUAGES AND CERTIFICATES

English (Upper Intermediated- B2), French (Beginner), Turkish (Mother tongue)

- 2015 : St. Giles English School, Intermediated general English program in Brighton, UK
- 2015 : British Street Course, English Language Training Program, B2 Levels in Muğla, Turkey
- 2014 : 8th International Symposium on Eastern Mediterranean Geology (ISEMG), 13-17 October, Mugla Sitki Kocman University, Turkey
- 2012 : The European Language Portfolio, American Cultural Association Language Schools Elazıg, Turkey
- 2012 : ArcGIS 10.2 training certificate, Esri, Ankara, Turkey

WORK EXPERIENCE

- 2014-2015 : Research Assistant, Geographic Information System and Remote Sensing Center (CBS-UZAL) Mugla Sitki Kocman University, Mugla, Turkey. www.cbs.mu.edu.tr
- 2013-2014 : GIS Expert, Infomab Geographic Information, Technologies Inc. Ankara, Turkey. http://www.infomab.com/en/
- 2008-2012 : Bachelor of Science in Geological Engineering, University of Firat, Elazig, Turkey
- 2010 : Internship Field Geologist, General Directorate of Mineral Research and Exploration- MTA Ankara/Turkey Feasibility studies in Elbistan Coal mine Project, http://www.mta.gov.tr/en/