

COĞRAFİ TEMELLİ YAKLAŞIM TARTIŞMALI DENİZ ALANLARININ PAYLAŞIMINDA ÇÖZÜM OLABİLİR Mİ? YENİ BİR YÖNTEM: ANAKARALARIN TRANS-DENİZ BAĞLANTILARI

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CAN A GEOGRAPHICAL BASE APPROACH BE THE SOLUTION FOR DISPUTED MARITIME REGION PARTITION? A NEW METHOD: TRANS-SEA CONNECTIONS FOR CONTINENTS

ÖZ Deniz yetki alanlarının paylaşımı dünya ölçüğünde uluslararası ilişkilerde geriliyi tetikleyen anlaşmazlıkların biridir. Doğu Akdeniz’de bulunan Levant Denizi bu bağlamda son 30 sene içerisinde göz önünde bulunan alanlardan biri haline gelmiştir. Mevcut durumda deniz yetki alanı paylaşımı üzerine mevcut yaklaşımalar bulunmakla birlikte, bu yaklaşımalar bölge ülkeleri arasındaki tatsızlığın artmasına katkıda bulunmaktadır. Bu durum, uzmanları paylaşımında tartışmalı olan yarı kapalı ve kapalı deniz alanlarında daha müzakere edilebilir yaklaşımalar, öneriler oluşturmaları konusunda teşvik etmektedir. Bu çalışmada, dünyadaki yarı kapalı ve kapalı deniz alanlarında uygulanmak üzere ilgili ülkelerin denizden olan etkileşim sahaları ve kıyı coğrafyalarını temel alan deniz yetki alanlarının paylaşımına yönelik bir yöntem geliştirilmiştir. Bu yöntemde, taraf ülkelerin her bir ikili eşleştirmeleri ile bağlanabilen deniz aşan bağlanma uzaklıkları, bağlanma ile etkileşime girdikleri alanların büyüklükleri ve bağlanılan kıyı uzunlukları dikkate alınarak yapılan bir dizi hesaplama kullanılmaktadır. Durum çalışması olarak geliştirilen yöntem Levant Denizi’nde uygulanmış ve elde edilen sonuçlar sınırların belirlenmesinden öte deniz yetki alanlarının paylaşılması üzerine sunulmuştur. Sonuçlar üzerinde yapılan değerlendirmede, sınırların belirlenmesi üzerine mevcut olan yaklaşımın bölgelerdeki bazı ülkeler açısından coğrafik olarak adil olmayan dağılımlara sahip olduğu belirlenmiştir. Sonuç olarak, önerilen yöntem ülkeler arası anlaşmazlıklar süresince ilgili bölgede uluslararası kuruluşlarca belirlenen canlı deniz kaynakları kotaları/istatistikleri için tarafsız referans noktası olabilir. Ayrıca, yöntem sınır belirlemekten öte yetki alanlarının paylaşımına odaklandığı için ilerde gerçekleşebilecek müzakere ortamı için başlangıç koşullarını ortaya koymak açısından avantaj sağlayabileceğini belirtmiştir.

Anahtar Kelimeler: Deniz yetki alanı, coğrafi bilgi sistemleri, paylaşım, deniz kaynakları, uluslararası örgütler, doğu Akdeniz

ABSTRACT Sharing of marine resources and delimitation of maritime jurisdiction zones are the one of the main problems, which presents tense conflicts in an international scale. Past three decades, the Levantine Sea (in the eastern Mediterranean Sea) is the most popular marine region in this manner. Even though there have been available delimitation suggestions in the region, they add tension to conflict among regional countries. This fact tends specialists to find more negotiable methods, suggestions, or proposals to partition disputed marine regions under consensus rather than delimitation approaches. In this study, a method was developed to proportion maritime jurisdiction zones based on coastal geography and marine interactions of the countries that are in semi-enclosed and enclosed marine regions of the world. The method uses a series of calculations taking into account the length of connected coastline, size of interacted sea area and length of trans-sea connections of each coupled country. The method was applied in the Levantine Sea, and results were given for partition of maritime jurisdiction zones rather than delimitation. Results pointed out that current approaches defining boundaries for delimitations are geographically unfair for some countries in the region. It can be concluded that the method provides a new perspective by mean of focusing on proportion process than delimitation. Thus, the method can provide objective reference for international organization to determine objectively quota/statistics for living marine resources during period of conflict. Additionally, since the method aims proportion of maritime jurisdiction zones, it can provide initial conditions of negotiation environment in the future.

Keywords: Maritime jurisdiction, geographical information system, partition, marine resources, international organizations, the eastern Mediterranean Sea

1. INTRODUCTION

The Mediterranean Sea is a semi-enclosed sea connected with the Atlantic Ocean and other regional seas. It is surrounded by three continents along 3800 km from east to west; 900 km from north to south, and its occupation is in a basin around 2.6 million square-kilometer, and a coastline of 46000 km long (UNEP/MAP, 2012). Bathymetry of the Mediterranean Sea shows unique characteristics due to its sub-regions, reaching a maximum depth of 5267 m, with an average depth 1400 m (UNEP/MAP, 2012, Aksoy 2016). Since it has limited connection to other marine regions through narrow straits and Suez Channel, it can be considered as an enclosed sea with its almost isolated marine system (Robinson et. al., 2001). There are 19 continental countries, that have coastline on the Mediterranean Sea as well as islands countries.

The Mediterranean Sea has an important place in the maritime transportation of the world due to its geostrategic location. Though it has relatively small areal portion in the total marine areas of the world's oceans, it is among the world's busiest sea routes with contribution to 15% of the global marine transportation activity (Grida, 2013). The Levantine Basin of the eastern Mediterranean is also known with its rich marine energy resources, now becoming an important gas province (Karbuz, 2012). Additionally, the region has important place for valuable living marine resources, such including spawning and piscary fields of Atlantic bluefin tuna (Martin et al., 2006). These rich marine resources of the Levantine Sea trigger regional countries to take an action for maritime jurisdiction. The crisis is expanding regarding eight different continental countries in addition to states of island in Cyprus, which is another subject of dispute, including Sovereign British Bases with Brexit progress in the Levantine Sea.

Announced delimitation for maritime jurisdiction zones after 2003 became initial point of exacerbation of international crisis among countries in the region. Announcement of the delimitation, bilateral agreements based on maximal approaches of national interest in a country caused objection of third part countries parallel to their national interests (Aridemir and Allı, 2019). Maximal approaches of the relevant countries resulted, even, to take reference different legitimacy and legal principles for each agreement with its neighbor countries¹. Conflicting policies of the countries in order to have maximal share from the Levantine Sea make the issue more complicated to outline under common approaches of maritime law for negotiation on maritime boundary delimitation. There are a lot of examples² all over the world for such disputes of partition of maritime areas/regions. Moreover, as being in various part of the eastern Mediterranean, there are various cases that are suspended by the countries rather than bringing it to the court, since high spectrum of legal decision can be seen in previous cases. Even though they don't have any attribution as binding decision for other countries. It should be also noted that it is possible to propose a thesis based on geographical, strategical and political dynamics of a country under legal interpretation. Therefore, more concrete criteria definition for law enforcement are required for more precise partitioning of maritime areas in

¹ On 9 June 2020, Greece signed a treaty with Italy in the part of the Mediterranean between Italy and Greece, forming the delimitation line of the "exclusive economic zone" (EEZ). It has been announced that this treaty is similar to the treaty of May 24, 1977, which constituted the maritime boundary of the continental shelf of both countries in the same maritime area. It has been known that Greece cannot agree mainly on the impact of the islands in its limitation's disputes with Turkey in the Aegean Sea and the Eastern Mediterranean. Greece generally claims full jurisdiction of the islands over maritime areas, but it has been seen in related treaties that limited jurisdiction has been recognized to some Greek islands. Official Gazette of the Hellenic Republic N° 163 of 28 August 2020: "Agreement between the Hellenic Republic and the Italian Republic on the Delimitation of their Respective Maritime Zones" http://www.et.gr/idocs-nph/search/pdfViewerForm.html?args=5C7QrtC22wHUDWr4xouZundtvSoClrL8Tq6rbLkT5HR5MXD0LzQTLWPU9yLzB8V68knBzLCmTXKaO6fpVZ6Lx3UnKl3nP8NxdnJ5r9cmWyJWelDvWS_18kAEhATUkJb0x1LIdQ163nV9K--td6SiUrm1GbqsBjYQ2EWfbzwOCRdbs8wLOROnUpLKhYqYXEoH

² International Court of Justice, List of all cases for the Jurisdiction <https://www.icj-cij.org/en/list-of-all-cases>
ÇAKIROĞLU H. AND BENGİL F. AND AKYAR M.S. (2021). Can A Geographical Base Approach Be The Solution For Disputed Maritime Region Partition? A New Method: Trans-Sea Connections For Continents, DA&MS 1(1), 1-27.

order to reduce disputes in maritime regions that are under specific geographical conditions among countries.

Legal perspective for maritime jurisdiction cases had progress in application from consuetudo to Law of the Sea in last six decades (Açıkgonül, 2012). Legal procedure for delimitation of maritime jurisdiction underlies some basic principles of law as well as it is available for agreement of delimitation of maritime jurisdictions among countries based on their national interests. In the light of available cases in International Court of Justice, main principles can be grouped under equitable, proportionality, geographical consideration (Açıkgonül, 2012; Doğru, 2020). As pointed out, principles, geography is the key criteria for marine delimitation cases. Structure of coastlines belonging to a continent, the factor of islands, geographical properties and position amongst other countries play important role in determination of proportion/delimitation of maritime jurisdiction zones (Demir and Acar, 1992; Tanaka, 2001; Yayıçı, 2012; Doğru 2020). However, variety of legal interpretations of these principles in each case makes it not possible to inference clearly for available disagreements. In line with the principle of proportionality, which constitutes the first of the foundations of this study, calculations have been made in the context of proportionality in the division of sea areas in the Eastern Mediterranean, such as "there should be a ratio of acceptable proximity between the relevant coastal lengths of states and the sea area to be given to these states" It will be understood that the calculations made within the scope of the proportionality principle are quite logical, especially when the principles of the superiority of the mainland and coasts are taken into consideration in the delimitation process.

In this study, it is aimed to develop a method objectively based on geography to proportion maritime jurisdiction rather than delimitation. A series of criteria were defined under basic principles of the law for the semi-enclosed and enclosed seas. The method applied calculation steps, that took into account coastal and interacted sea area and coastal geography (coastline, sea area and distance of connection) by providing trans-sea connection in each couple of coastal countries. A case study was implemented in the Levantine Sea, denominated as "Trans-Mediterranean Connection of Continents". Partitioning of maritime areas were done by using scores acquired by each continental country in addition to using a specific ration for island based on their properties.

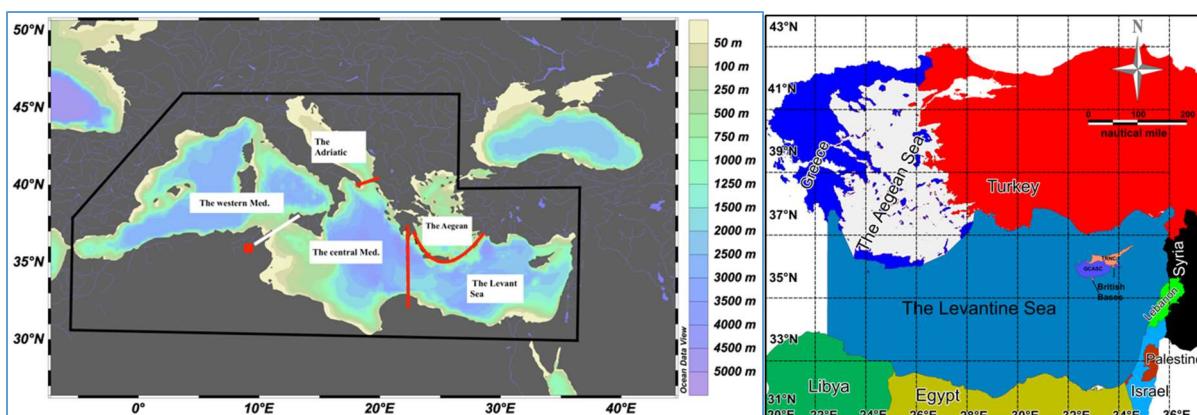
2. MATERIAL and METHODS

A method, called Trans-Sea Connections of Continents, was developed in order to determine a series of criteria for sharing of maritime jurisdiction in semi-enclosed and enclosed seas. All criteria of the method revealed by principles of maritime law, that take into account for delimitation of maritime boundaries in available cases. Relevant main principles of maritime law were explained in the introduction section, however details and examples on these principles were explained in the content of this study. A list of relevant references and list of examples cases in International Court of Justice were provided in Supplemental Table (S.Table 1). This method was not developed for the resolution of the conflicts in the eastern Mediterranean, on the contrary, it was applied after the development with the idea that it could solve the existing conflicts such as in the Eastern Mediterranean area. In this sense, it is true that many legal and political arguments can be claimed regarding the sharing of maritime jurisdictions in the mentioned geographical area specifically, but in this study, it was showed that this method can be a solution within the framework of all legal and political arguments. Therefore, the method was implemented in the Levantine Sea (Figure 1), with case specific adaptation based on international agreements, that are valid. Therefore, a specific name was denoted as "Trans-Mediterranean Connections of Continents". Principles of each criterion were explained below based on implementation in the Levantine Sea. A generalization can be done for other semi-enclosed and enclosed sea by following criteria.

2.1. Determination of The Disputed Marine Region

Boundaries of disputed marine region was defined for subsection of the Aegean-Levantine sub-regions based on Pisano et al. (2020). On the other hand, it is assumed that the Aegean Sea is not part of the study area since it is another disputed marine area between Turkey and Greece. However, since there is no concrete (continental) boundary between both seas (hypothetical arch of the island Kithira, Antikithira, Kriti, Kasos, Karpathos, and Rodhos from the continent of Greece to of Turkey), the Aegean Sea provided no contribution during the calculation step of the method. Coastline and sea area in the Aegean Sea were not included into calculations of portioning of maritime jurisdiction zones in the Levantine Sea. Additionally, land area of the islands in the Levantine Sea were also excluded from sea area (Figure 1) to estimate the net size of the maritime region. Distance and areal units were chosen in nautical mile (nm) and square nautical mile (nm^2) for further calculation.

Figure 1. The Mediterranean Sea and its sub-regions (on left), white line separates the western and eastern basins, red lines separate sub-regions defined by Pisano et al. (2020); Study area in Levantine region (on right), blue area indicates marine region used in this study.



TRNC: Turkish Republic of Northern Cyprus; GCASC: Greek Cypriot Administration of Southern Cyprus³; British Bases: Sovereign Base of United Kingdom in Cyprus.

2.2. Maximal Trans-Mediterranean Connections Between Countries

Each country's shore is connected to other relevant countries based on their maximal benefits. Main limitation factor for this connection is another continent between two trans-connection points. It is assumed that islands are not a limitation factor for connecting continents, as they were accepted as limited elements opposed to continents in previous precedent and legal decisions of maritime law. In conditions of conflict in benefit of coupled countries, connection was done in favor of the county with shorter coastline. An example connection was given in Figure 2.

Since special geographic position of the Aegean Sea, it affected partly each connection. Diagonal connections between countries (here, connections of Turkey and Greece with other countries) were determined by using its shore in the Aegean Sea, since the islands do not have effect on trans-

³ Turkey does not recognize the Republic of Cyprus. Turkey uses the term Greek Cypriot Administration of Southern Cyprus (GCASC) to designate administration existing the Southern part of Cyprus island. For additional info and example to this use you can access the link Republic of Turkey MFA. https://www.mfa.gov.tr/gkry_ye-seyahat-edecik-vatandaslarimiza-uyari.tr.mfa

Mediterranean connections. However, the areal size and length of coastline within connection were not counted in for further calculations. This assumption provided advantageous to Greece and Turkey for determining wider areal size in the Levantine Sea with the connections, while areal size and length in coastline of the Aegean Sea had no contribution. Additionally, distances in connections of abovementioned countries increased because of availability of farther locations, thus provided disadvantage for the connections, either.

While these connections do not establish a precedent in law for a maritime boundary, they can be used to define interaction zone of coupled countries with maximal benefit. It is also advantageous approach to apply objectively for all countries. This step provides only numerical data for further calculations. Areal size, length of coastline in the Levantine Sea and length of diagonal connection distances were recorded for further calculations. It should be also noted that if coastal systems such as estuary, lagoon, tombolo and any other unshaped indentations (bay, cove, etc.) have entrance narrower than 2 nm, they have to be discarded from calculation of coastline by assuming straight line to be parallel with equitable principles of law.

2.3. Normalization of Connections Based on Distance

In order to be parallel with the principles of law, a normalization factor based on distance of connection was applied in each data set obtained from coupled countries. Lengths of trans-Mediterranean connections were used by calculating average value of length of the connections in both boundaries. After estimating this average value, value of longest distance was taken for dividing each value in order to derive normalization indices, hereafter called proportional effect. Then, each derived value was used to contribute multiplier effect to the areal size. Therefore, countries that have shorter connection distance ensured advantages.

2.4. Contribution of Islands of Continental Countries

This issue is the one of main challenges for ensuring a criterion in this regard. In case of the study area, there are two different groups of the islands: The first group is the islands on the Aegean arch (Kithira, Antikithira, Kriti, Kasos, Karpathos and Rodhos) and the island belonging to a continental country, the second group is the island States in Cyprus Island. “Depending on the circumstances, the island may be given full or partial effect, in certain cases, it may even be ignored. In others, it may be enclaved.” Due to there are interpretation (wrong side of the median line) that the island has no contribution in maritime jurisdictions zones except territorial waters, enclave definition (OPIL, 2020) was accepted as criteria for Kastellorizo island. In regard to the islands on the Aegean arch, islands have no contribution in maritime jurisdictions zones except their territorial waters. Since, the International Court of Justice and some state practices apply the theory of “special geographical features” to the islands. If the island appears to be an aberrant geographic feature or an insignificant feature in relation to the overall configuration, partial impact is given or ignored. However, while defining the geographical boundaries of the Levantine sea, an arch based on the coasts of the Aegean arch islands was determined as the apparent continuation of the coasts of mainland Greece and contributed as the sea area contribution by including in the length of the coastline (but sea area contribution not connected with the relevant islands' territorial waters) (Nugzar, 2005).

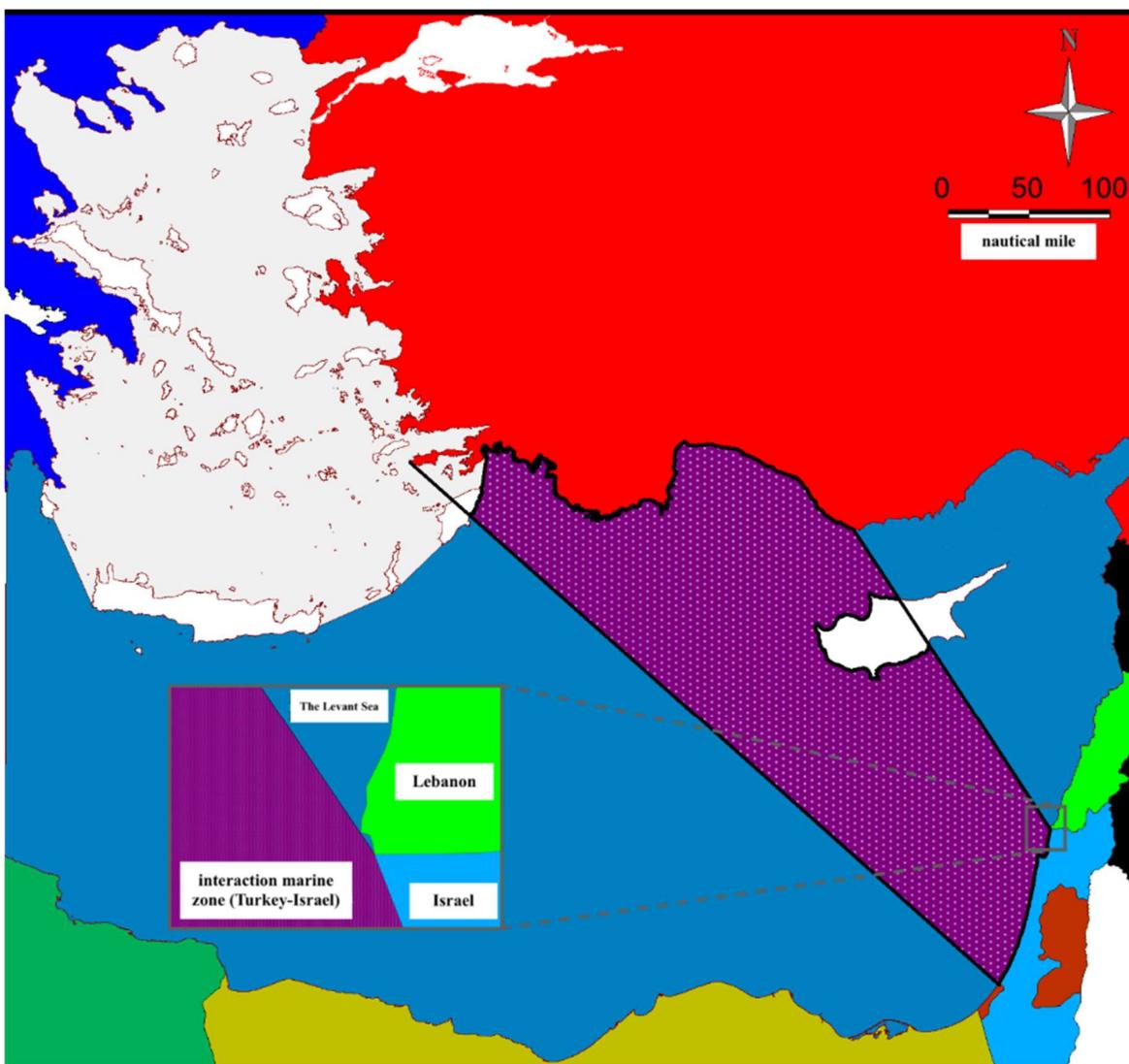
2.5. Share of Island Countries

Previous cases on delimitation of maritime jurisdiction zones (e.g. continental shelf case of Malta and Libya), island countries are considered as special cases, and privileges are provided contrary to the

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other islands. Parallel to this, calculation for maritime partition of island countries were designed differently. To correspond to geographical principles, not only coastline was used, but also areal size of island's coverage was considered for further calculation. Since indented configuration of coastlines can be revealed advantageous as infringement to equitable principle of law, average proportion of coastline and areal size on the islands to marine were used to determine proportion of islands.

Figure 2. An example for implementation of Trans-Sea Connections for Continents Method. The figure pointed out connection limitation (Turkey-Israel) by Lebanese continent for maximal connection of Israel as country with shorter coastline.



2.6. Sharing Principles of Maritime Jurisdiction for Countries

Score of each connection of coupled countries were calculated based on proportional areal size by applying rate of coastline and distance normalization. Cumulative scores of a country were found by getting sum of gaining from each connection with relevant countries. Then, cumulative score of each country were divided to sum of scores of cumulative countries. Therefore, proportion of each continental country were calculated. Separately, the size of marine region obtained from calculation for islands (in both statement four and five) were found and subtracted from total size of sea area. The remaining size of sea area allocated to relevant continental countries based on their proportion.

Calculation of approaches in six statement above were conduct by using formulations given below:

$$i_pc_{ij} = \frac{cl_{ji}}{\sum cl_{ij}} \text{ and } j_pc_{ij} = \frac{cl_{ij}}{\sum cl_{ij}}; \quad (1)$$

pc: ratio of coastlines in case of coupled countries i ve j; cl: length of coastline in case of coupled countries i ve j

$$\Delta l_{ij} = \frac{l_{1ij} + l_{2ij}}{2} \quad (2)$$

Δl_{ij} : average lenght of distance connected coupled countries i and j

$$i_SA_{ij} = \int_{x=l_{1ij}}^{x=l_{2ij}} (i_{pc_{ij}}(x) - j_{pc_{ij}}(x)) dx * i_pc_{ij} * \frac{Max(\Delta l_{ij})}{\Delta l_{ij}} \quad (3)$$

and

$$j_SA_{ij} = \int_{x=l_{1ij}}^{x=l_{2ij}} (i_{pc_{ij}}(x) - j_{pc_{ij}}(x)) dx * j_pc_{ij} * \frac{Max(\Delta l_{ij})}{\Delta l_{ij}} \quad (4)$$

SA_{ij} : areal size of interaction zone between two boundaries connected to coupled countries i and j.

$$SC = \sum_{i=1}^n SA_i \quad (5)$$

SC: Cumulative score of country i from each coupled country

$$\%PS_i = \frac{SC_i}{\sum_{i=1}^n SC_i} * 100 \quad (6)$$

PS_i : Score ratio of country i to total score from all countries

$$Ic_i = (\frac{L_i}{L_a} + \frac{A_i}{A_a}) * Aa \quad (7)$$

Ic_i : size of marine region for country island; L_i : i length of coastline (nm); L_a : length of coastline of interested marine region (nm); A_i : i size of land in country island (nm^2); A_a : size of interested marine region (nm^2);

$$I_i = L_i * 12 \quad (8)$$

I_i : size of marine region for island belongs to continental country.

2.7. Implementation

In order to implement the method for the Levantine Sea, each criterion was applied by using geographic information system. Maps of countries used in spatial analysis were obtained from GADM (2020). All layers and objects used in calculation were prepared in latitude-longitude coordinate system with World Geodetic System (WGS 84). Digital layer of marine area of this study were created by using merged layer from vector boundary field of countries and limit coordinates of maritime boundaries of the study region. Each layer for obtaining the required data was derived by using relevant country layers and sea area. After spatial analysis was completed, obtained data set were extracted to common file format (csv) for applying relevant formulas.

3. RESULTS

Sea area of Levantine Sea (study area) was found to be 172900 nm², and a total of 4450.7 nm coastline was calculated for the area. Among the coupled connections of countries, Turkey has 935.0 nm coastline, which is the longest in connection with Libya and Egypt. The shortest coastline was found in Israel in connection with Syria. Additionally, there were no connections between Syria - Greece, and Palestine – Lebanon since limitation of third countries' continent (supplemental figures from S.Figure 1 to S.Figure 8). Lengths of coastline in each connection were presented n Table 1.

Table 1. Lengths of coastline in each coupled country (nm). Values corresponding to starting with countries in row

	Turkey	Greece	Libya	Egypt	Palestine	Israel	Lebanon	Syria
Turkey		190.0	935.0	935.0	919.0	593.0	621.0	745.0
Greece	110.1		110.1	110.5	110.1	110.1	110.1	0.0
Libya	351.3	351.3		351.3	117.5	351.3	351.3	351.3
Egypt	758.5	743.5	758.5		758.5	758.5	748.5	668.5
Palestine	20.5	20.5	20.5	20.5		20.5	0.0	20.5
Israel	148.4	148.4	148.4	148.4	120.6		38.6	10.0
Lebanon	175.8	175.8	175.8	175.8		73.6		175.7
Syria	151.7		151.4	151.4	32.6	22.8	108.0	

Lengths of the connection distance had a range from 34.5 nm (Israel-Lebanon) to 715.2 nm (Palestine-Greece). As the same couples of countries with connection distance, normalization index values were found to be between 0.05 and 1.00 (Table 2). Size of connection area of each coupled countries was in a range between 168.5 nm² (Israel-Lebanon) to 140500.0 nm² (Egypt – Turkey). Cumulative scores of countries dispersed from 25499.4 nm² (Palestine) to 531603.9 nm² (Egypt). Normalized areal score and cumulative score of each country were given in Table 3.

Table 2. Size of interacted marine region in each coupled country (upper triangle matrix, nm²) and their proportional effect (italic triangle matrix).

	Turkey	Greece	Libya	Egypt	Palestine	Israel	Lebanon	Syria
Turkey		2065.0	92000.0	140500.0	53890.0	34210.0	27730.0	19280.0
Greece	2.58		28130.0	93379.0	30610.0	45190.0	35880.0	0.0
Libya	1.30	1.88		24430.0	15650.0	47590.0	55570.0	53510.0
Egypt	1.69	1.22	2.23		11470.0	33600.0	54950.0	66060.0
Palestine	1.98	1.00	1.21	3.00		5471.0	0.0	2688.0
Israel	2.29	1.12	1.28	2.69	14.78		168.5	789.6
Lebanon	2.66	1.11	1.20	2.05		20.71		1911.0
Syria	4.46		1.13	1.65	2.83	4.26	9.37	

In respect of islands in the Levantine Sea, it is found to be that size of sea area gained from Islands belong to Greece is 7824.3 nm^2 , while sea area that calculated for Cyprus Island is 10332.5 nm^2 (Table 4).

A total of 154725.3 nm^2 sea area were found after subtraction of shares from the island. This value was apportioned based on proportion of cumulative score in each country. Additionally, share from islands of Greece were added into its continental share. Results showed that percentages of proportion are from 1.3 % (Palestine) to 27.7 % (Egypt) for the continental countries. Percentages of proportion and their corresponding scales in nautical mile were presented in Table 4.

Table 3. Cumulative scores in each coupled country (nm). Values corresponding to starting with countries in row

	Turkey	Greece	Libya	Egypt	Palestine	Israel	Lebanon	Syria	Total
Turkey		3377.8	87001.9	130992.5	104563.9	62548.4	57552.5	71462.8	517499.7
Greece	1956.5		12633.2	14655.5	25813.3	21478.2	15352.8		91889.4
Libya	32688.5	40327.6		17271.6	16163.0	42975.5	44358.4	42324.1	236108.7
Egypt	106265.0	99012.6	37291.5		33469.2	75507.5	91406.5	88651.6	531603.9
Palestine	2326.8	4796.7	2813.1	902.4		11724.5		2936.0	25499.4
Israel	15652.9	28962.9	18154.2	14773.0	69114.1		1200.4	1022.9	148880.4
Lebanon	16292.6	24525.4	22198.1	21468.6		2288.9		11092.9	97866.6
Syria	14551.5		18240.4	20077.6	4681.7	2339.3	6818.6		66709.2

4. DISCUSSION

Partition process of maritime areas including proportion and delimitation of maritime jurisdiction zones highly depends on the frame of maritime law, which has precisely defined sources, principles and rules. However, unique geographical conditions of each cases cause unpredictable legal interpretation. This fact provides uncertainty for estimation of legal decision and concerns many countries in terms of unexpected results against their national interests. Thus, most of the marine regions subjected to disagreement long periods of time. According to Doğru (2020), approximately more than 200 disagreements are currently known on delimitation of maritime jurisdiction. High number of disagreements without applying court, highlights requirement of less uncertain decision mechanism to find solution based on well predictable interpretation and decision. The method developed in this study provides a concrete series of criteria for enclosed and semi-enclosed seas regarding proportion of maritime jurisdiction zones among many countries. The methods compiled principles of maritime law and physical geography elements. This versatile method is also available for further developments to make possible to used various properties such as anthropogeography, maritime and marine usage etc. in his purpose.

Disagreements on maritime jurisdiction zones for long periods also gives a reason other than disagreement on organization or performing of activities on marine resources. It is a known fact that there are problems on research operations and utilization of marine sources in the Mediterranean (e.g. El Darazy, 2014; Sami 2019). On the other hand, international organization must be party of one side rather than being unbiased to determine or serving statistics of the countries. As an example, website of The Food and Agriculture Organization (FAO) of the United Nations (see <http://www.fao.org/fishery/facp/GRC/en> for disputed EEZ of Greece as European Union country)

serves exclusive economic zone (EEZ) statistics based on delimitation suggestion of Suarez de Vivero et al. (1990), that was suggested informally to European Union, though there is not neither a formal announcement nor international acceptance according to international law about EEZ map of European Union countries in the eastern Mediterranean. On the other hand, delimitation of Suarez de Vivero et al. (1999) was also used for Turkey (see FAO, 2019) by ignoring official maritime boundary of Turkey. Official document of Turkey in UN declared almost three times wider marine area for continental shelf (UN, 2020) than its hypothetical marine delimitation of EEZ by Suarez de Vivero et al. (1999). Such cases are reason for international organizations to questioned, eventually, might be a reason for reliability in terms of objectivity as well as sustainability of international organization. From this point of view, an objective geographical base standard operating approach will also contribute to international organizations for getting objective position against countries under disagreement conditions.

Table 4. Percentages of shares and their corresponding areal scales in nautical mile

Country	Component	Percentage (%)	Areal scale (nm ²)
Turkey		27	46683.0
Greece	Continent	4.8	8299.2
	Islands	4.5	7780.5
	Total	9.3	16079.7
Libya		12.3	21266.7
Egypt		27.7	47893.3
Palestine		1.3	2247.7
Israel		7.8	13486.2
Lebanon		5.1	8817.9
Syria		3.5	6051.5
Cyprus Island	British Bases ⁴	0.3	518.7
	GCASC ⁵	3.1	5359.9
	TRNC ⁶	2.6	4595.4
	Total	6.0	10374.0
	Grand Total	100	172900

It should be also noted that output of the method can be also effective on determination of unbiased quota and utilization of marine resources by international organizations without de jure boundary of maritime jurisdiction. In addition to this, such a standard and objective baseline might be also motivation for the countries to make agreements.

⁴ Sovereign Base of United Kingdom in Cyprus. <https://www.legislation.gov.uk/ukpga/1981/61>. In Annex A of the Founding Treaty of the Republic of Cyprus signed in 1960, it was accepted that the Akrotiri and Dhekelia bases were determined as the sovereign territory of Britain and the sea area determined in the regions where the two bases were located, not to be claimed as the territorial waters of the Republic of Cyprus.

⁵ Greek Cypriot Administration of Southern Cyprus.

⁶ Turkish Republic of Northern Cyprus

As another advantage, the method proposes a partition model for maritime jurisdiction zones beyond political problems. Political issues in the Middle East and Cyprus Island are known for last eight decades. The method has capability of produce outputs under properties of physical geography for communities, states or bases before sitting down at the negotiation table. Instead, output of the method can provide preliminary conditions before negotiation as well as baseline for de facto application. For instance, possible partition in case of Cyprus island can be also simulated as presented in Table 4. Results of this study can be also useful in case any requirement on maritime jurisdiction of Sovereign Base of United Kingdom in Cyprus after Brexit period.

Table 5. Areal comparison of available approaches on maritime jurisdiction.

Ülke	Suarez de Vivero (1999) (nm ²)	Trans-Sea Connections for Continents (nm ²)	Notes
Turkey	17472	46683	Announced continental shelf area by Turkey is 47360 nm ² , which is calculated by using UN (2020); areal size of Blue Homeland approach of Yaycı doctrine ⁷ is 51820 nm ² .
Greece	44830	16080	-
Libya	15550	21267	-
Egypt	49960	47893	Continental shelf of Egypt is 53312 nm ² based on Approach of Turkey ⁸
Palestine	357	2248	-
Israel	7143	13486	-
Lebanon	5884	8818	-
Syria	2994	6052	-
Cyprus Island	28710	10374	Please see Table 4 for proportions of Communities and bases in Cyprus Island
Total	172900	172900	

Comparison sizes of areal distribution of scientific studies and available announcement of maritime jurisdiction by countries in the same scale of study area (Table 5) highlighted that Suarez de Vivero (1999) imparted maritime jurisdiction three times more in size for EU's regional countries as parallel to its preparation goal that providing baseline for southern waters of Europe.

Within this context the practical applications and advantages of this study can be described below:

- While enabling the diagonal connection of two mutual/neighboring countries via the sea, it gives the parties the chance of maximal ratio in the related sea area.
- It brings an alternative dimension to the solution of previous conflicts by placing it on an objective basis.
- Due to the variables of the length of the coastline, the proximity of the countries to the sea area and the configurations of the coastline it can provide normalized calculations and provide a distinct advantage in equity.

⁷ <https://harita.mavivatan.net> website include an explanation “ Blue Homeland Map by Assoc. Dr. Cihat Yaycı. Values correspond to section in the study area..”

⁸ <https://www.aa.com.tr/en/politics/turkey-slams-so-called-maritime-deal-by-greece-egypt/1933938>

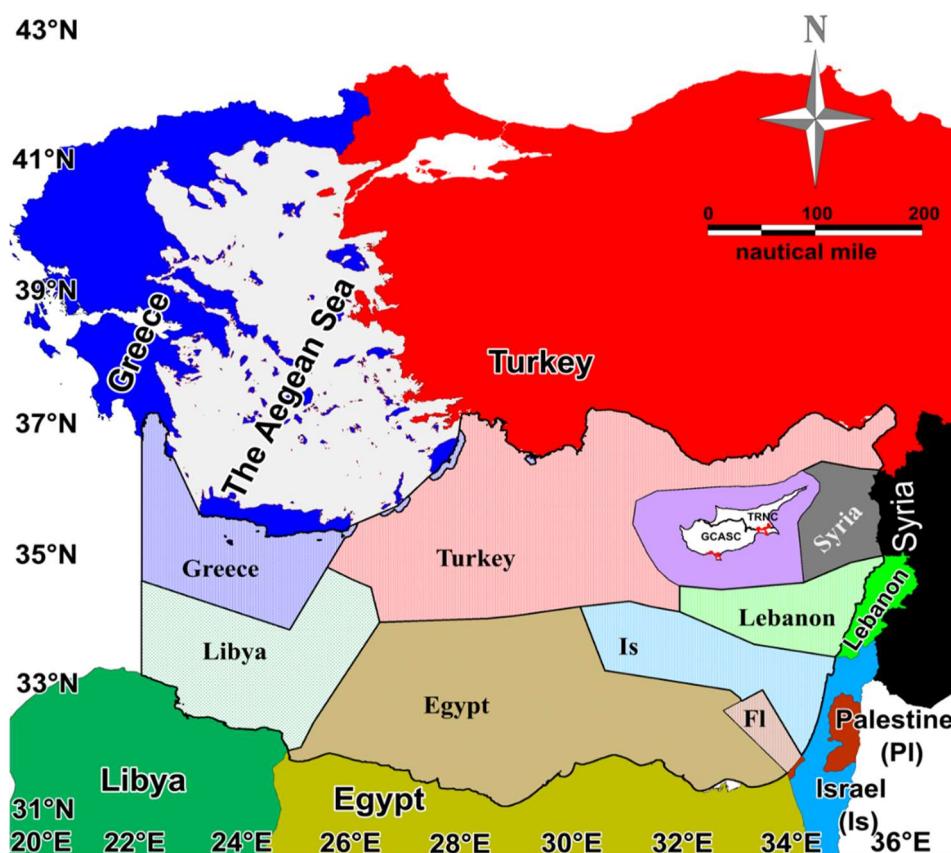
- d. Considering the testable transparency of the method, it will be able to provide a new principle for establishing minimums or initial scenarios for negotiations between states.
- e. Considering the current valid agreements, it can allow sufficient flexibility in existing border agreements between the related countries, since the agreements are made primarily on the ratios of the areas to be divided, not on the delimitation lines.
- f. Sketched map by the maximal approach of the dominant powers contrary to the rights provided by the geography to Israel, Syria, Lebanon, Libya, Palestine and Turkey, can redraw quite fair and equitable by this method.

Despite it is not aimed to provide delimitation in this study, output of the study can be used for this purpose based on proportions of the countries' sea area under various scenarios. It is a known fact that there are bilateral agreements on delimitation of maritime jurisdiction zones between certain countries as well as utilization of marine resources. The study has flexibility in delimitation with compilation of available agreements. Within the scope of this study, one of the maritime boundary delimitation scenarios was generated based on statements above (Figure 3). In this scenario, a temporary boundary was first set on the basis of geographical factors. For this purpose, a median line was drawn in parallel with the coasts, and this temporary boundary determined in the second stage was amended in accordance with the area proportions in a way to allow the delimitation to be just and fair. While performing these procedures, it was checked whether there are islands in the area where the delimitation was made, the coastal lengths / area ratios, and whether there were factors that would require the correction or shifting of this line. In the third stage, the temporary boundary or the corrected boundary has been adapted, if any, in line with the applicable agreements between the coastal countries.

5. CONCLUSION

As conclusion, the study proposes a method based on coastal and marine geography to focus determining proportion of maritime jurisdiction rather than delimitation for a certain marine region in case of disagreement among many countries. Since the study has a series of concrete criteria based on principle of maritime law, it is possible to apply it in any semi-closed and enclosed marine area. This method will prevent disagreements on disputed waters among countries by providing a notional map for maritime jurisdiction instead providing precise delimitation to dictate countries. Additionally, it will also provide an opportunity to remain impartial for international organization without accepting any so-called delimitation for determining quota or utilization of marine resources of seabeds or pelagic zones. As an additional benefit, the method can be also used for determining assessment of marine living resources by extrapolation of statistics in each country owing to provided areal size for them. Since the method underlies objective criteria, which makes it applicable for every country to test/validate, it provides less uncertainty than legal decisions under various geographical interpretation. Therefore, countries might be motivated to solve problems and the method also might trigger countries to sit to the negotiation table in case where it becomes common practice amongst international organizations.

Figure 3. A notional map for distribution scenario representing the size of the area proportions resulting from the study.



TRNC: Turkish Republic of Northern Cyprus; GCASC: Greek Cypriot Administration of Southern Cyprus; Red lines in Cyprus Island: Sovereign Base of United Kingdom in Cyprus.

REFERENCES

- AÇIKGÖNÜL, Y.E. (2012). Deniz Yetki Alanlarının Hakça İlkeler Çerçeveşinde Sınırlandırılması, [in Turkish], Master Thesis, Ankara Üniversitesi Sosyal Bilimler Enstitüsü, Ankara.
- AKSOY, M. (2016). “Doğu Akdeniz Enerji Rekabeti” [in Turkish]. İnsani Ve Sosyal Araştırmalar Merkezi, İnsamer, Araştırma 23, S.1.

ARIDEMİR, H., ALLİ Ç. (2019). “Doğu Akdeniz Bölgesindeki Münhasır Ekonomik Bölge Tartışmalarının Analizi” [in Turkish], İktisadi İdari Ve Siyasal Araştırmalar Dergisi, 4(10): 188-202.

CHARNEY, J.I., ALEXANDER, L.M. (1993). International Maritime Boundaries, Vol. II, Martinus Nijhoff Publishers, Doderecht.

DARAZY, G.A. (2014). The Impact Of Levantine Basin Oil And Natural Gas Discoveries On Lebanese-Israeli Relations. Master Thesis In Military Art And Science, Faculty Of The U.S. Army Command And General Staff College. 93 Pp

DEMİR, Ö., ACAR, M. (1992). Sosyal Bilimler Sözlüğü [in Turkish]. Ağaç Yayıncılık, İstanbul.

DOĞRU, S. (2020). Deniz Alanlarının Sınırlandırılması Hukuku Ve Doğu Akdeniz [in Turkish]. Tasam Yeni Deniz Güvenliği Ekosistemi Ve Doğu Akdeniz E-Kitabı. S.261

NUGZAR, D. (2005). Delimitation of Maritime Boundaries between Adjacent States. The United Nations Nippon Foundation.

MARTTIN, F., BARONE, M., BIZSEL, C., FAYED, S., HADJISTEPHANOU, N., KROUMA, I., MAJDALANI, S., ÖZDEMİR, A., SALEM, A., VASSILIADES, L. (2006). Brief Introduction To The Eastern Mediterranean Fisheries Sector. Tcp/Int/2904/Td-6. Medfisis Technical Document No. 6.FAO (2007). Fishery And Aquaculture Country Profiles. Greece (2007). Country Profile Fact Sheets. In: Fao Fisheries Division [Online]. Rome. Updated 20 September 2016. Retrieved in 10/09/2020 from <http://www.fao.org/fishery/>

FAO (2019). Fishery And Aquaculture Country Profiles. Turkey (2019). Country Profile Fact Sheets. In: Fao Fisheries Division [Online]. Rome. Updated 1 March 2008. Retrieved in 10/09/2020 from <http://www.fao.org/fishery/>

GADM (2020). Global Administrative Areas (GADM), Global Spatial Database Of Administrative Boundaries. University Of California, Berkeley, Museum Of Vertebrate Zoology, And The International Rice Research Institute . Retrieved in 03/07/2020 from <https://www.gadm.org/about.html>

GRIDA (2013). Maritime Transportation Routes In The Mediterranean. Internet Resource. Retrieved in 10/09/2020 from <https://www.grida.no/resources/5920>

KARBUZ, S. (2012). Natural Gas Resources In The Eastern Mediterranean: Challenges And Opportunities. IEMED Mediterranean Yearbook 2012. European Institute Of The Mediterranean, Barcelona. Retrieved in 10/09/2020 from

ÇAKIROĞLU H. AND BENGİL F. AND AKYAR M.S. (2021). Can A Geographical Base Approach Be The Solution For Disputed Maritime Region Partition? A New Method: Trans-Sea Connections For Continents, DA&MS 1(1),1-27.

<https://www.google.com/search?client=safari&rls=en&q=natural+gas+resources+in+the+eastern+mediterranean:+challenges+and+opportunities.&ie=utf-8&oe=utf-8>

OPIL, (2020). Oxford Public International Law (OPIL), Definition Of Enclave. Retrieved in 10/09/2020 from <https://opil.ouplaw.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e1037?rskey=hoyabi&result=2&prd=opil>

PISANO, A., MARULLO, S., ARTALE, V., FALCINI, F., YANG, C., LEONELLI, F.E., SANTOLERI, R., BUONGIORNO NARDELLI, B. (2020). “New Evidence Of Mediterranean Climate Change and Variability From Sea Surface Temperature Observations”. *Remote Sensing*, 12(1). <https://doi.org/10.3390/rs12010132>.

ROBINSON, A.R., LESLIE, W.G., THEOCHARIS, A., LASCARATOS, A. (2001). Mediterranean Sea Circulation. In *Encyclopedia Of Ocean Sciences* (Pp. 1689–1705). Elsevier. <Https://Doi.Org/10.1006/Rwos.2001.0376>

SAMI, M. (2019). Cyprus Gas Dispute: Turkish Obstinacy And European Passivity. Middle East Report Of Brussels International Center For Research And Human Rights. Brussels. 7 Pp. Retrieved in 10/09/2020 from <https://www.bic-rhr.com/sites/default/files/inline-files/cyprus%20gas%20dispute.official.pdf>

SUÁREZ DE VIVERO, J.L., RODRÍGUEZ MATEOS, J.C. (2002). “The Mediterranean And Black Sea: Regional Integration And Maritime Nationalism”. *Marine Policy*, 26(5), 383–401.

SUAREZ DE VIVERO, J.L., ROMERO, G.G., RODRIGUEZ, J.C., FRIEYRO, M. (1999), The Mediterranean: Regional Politics And Fishing Politicies, Pp. 113-128, In D. Symes (Ed), Europe's Southern Waters: Management Issues And Practice, Oxford, Fishing News Books.

TANAKA, Y. (2001). “Reflections On The Concept Of Proportionality In The Law Of Maritime Delimitation”, *The International Journal Of Marine And Coastal Law*, Vol. 16, No. 3, 2001.

UN (2019). United Nations 19-19844 (E), Letter Dated 13 November 2019 From The Permanent Representative Of Turkey To The United Nations Addressed To The Secretary-General. Retrieved in 10/09/2020 from <https://undocs.org/en/a/74/550>.

UN (2020). United Nations 20-04258 (E), Letter Dated 18 March 2020 From The Permanent Representative Of Turkey To The United Nations Addressed To The Secretary-General. Retrieved in 10/09/2020 from <https://undocs.org/en/a/74/757>

UNEP/MAP (2012). UNEP/Map: State Of The Mediterranean Marine And Coastal Environment, UNEP/Map – Barcelona Convention, Athens.

YAYCI, C. (2012). “Doğu Akdeniz'de Yetki Alanlarının Paylaşılması Sorunu Ve Türkiye” [in Turkish]. Bilge Strateji, Cilt 4, Sayı 6, Ss. 1-70, S. 2.

YAYCI, C. (2011). “Doğu Akdeniz'de Deniz Yetki Alanlarının Sınırlandırılmasında Libya'nın Rolü Ve Etkisi” [in Turkish]. Güvenlik Stratejileri Dergisi, 7 (14). Retrieved in 10/07/2020 from <https://dergipark.org.tr/tr/pub/guvenlikstrj/issue/7529/99176>

SCHLITZER, R. (2020) Ocean Data View, download from <https://odv.awi.de>.

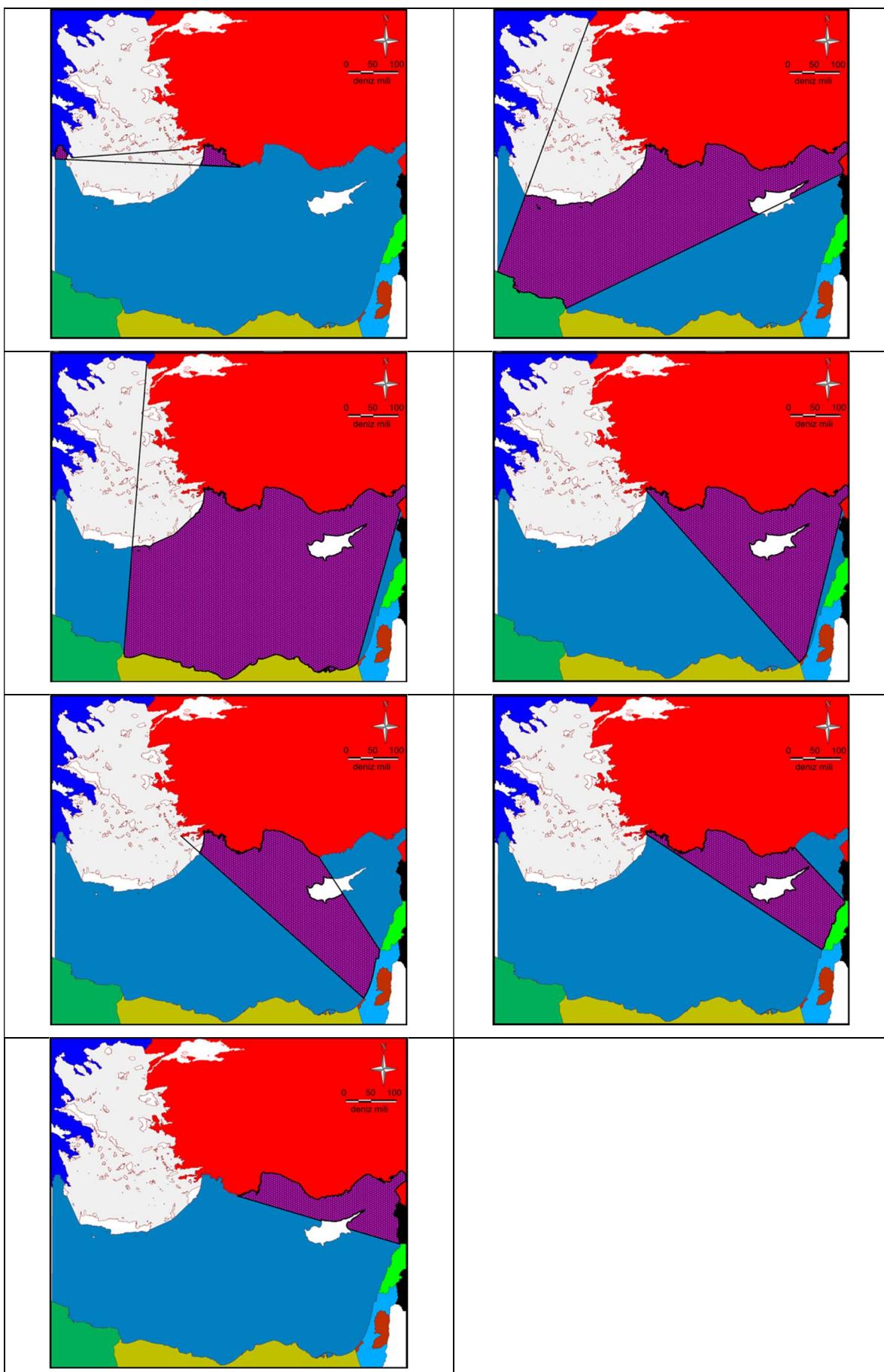
APPENDIX A. Supplementary File:

Supplementary File to this article was added below.

S.Table 1. List of example cases International Court of Justice

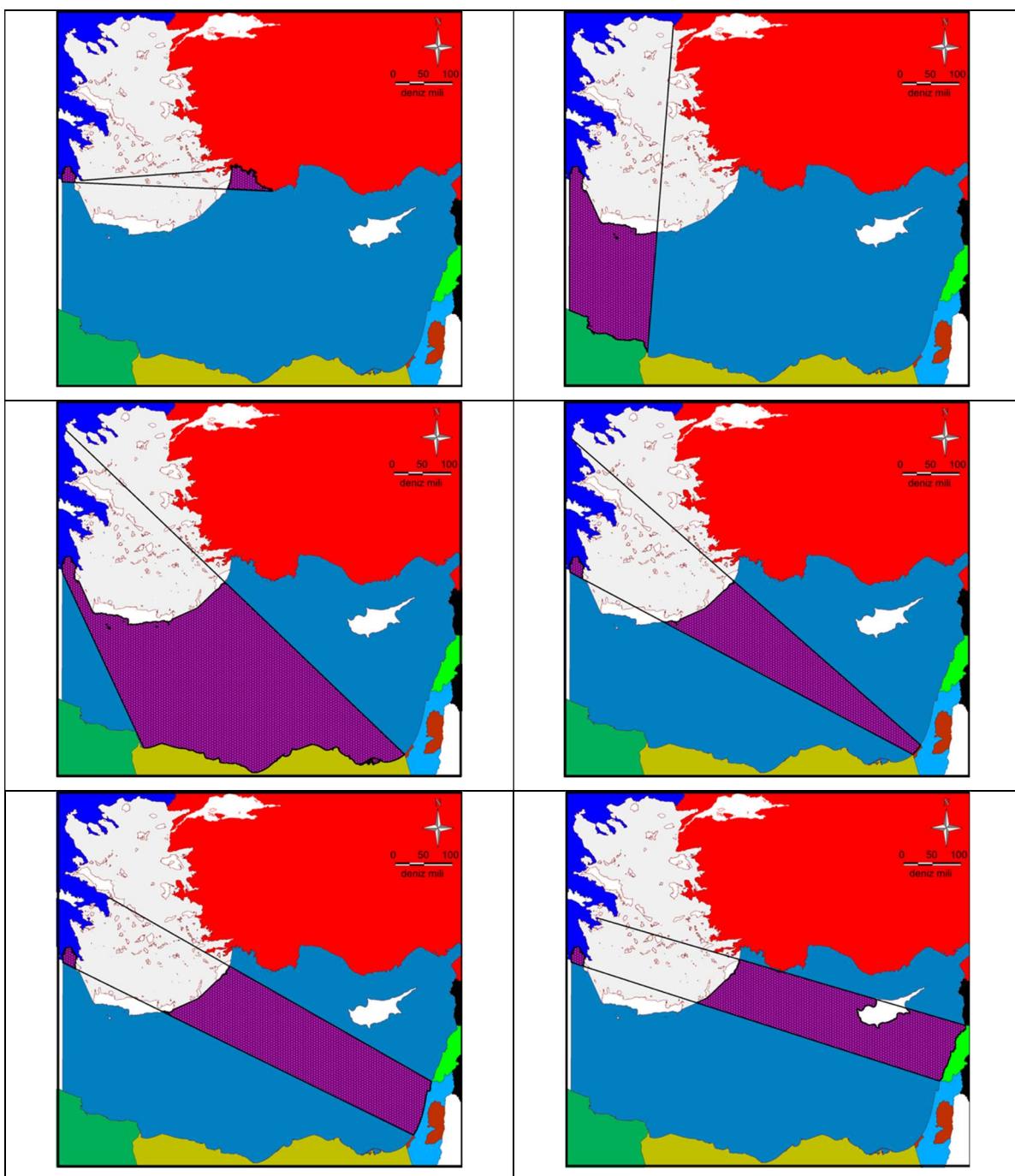
1) 2014 Maritime Delimitation in the Caribbean Sea and the Pacific Ocean (Costa Rica v. Nicaragua).
2) 2008 Maritime Dispute (Peru v. Chile).
3) 2001 Territorial and Maritime Dispute (Nicaragua v. Colombia).
4) 2004 Maritime Delimitation in the Black Sea (Romania v. Ukraine).
5) 1994 Land and Maritime Boundary between Cameroon and Nigeria (Cameroon v. Nigeria: Equatorial Guinea intervening).
6) 1991 Maritime Delimitation and Territorial Questions between Qatar and Bahrain (Qatar v. Bahrain).
7) 1991 Maritime Delimitation between Guinea-Bissau and Senegal (Guinea-Bissau v. Senegal).
8) 1998 Maritime Delimitation in the Area between Greenland and Jan Mayen (Denmark v. Norway).
9) 1986 Land, Island and Maritime Frontier Dispute (El Salvador/Honduras: Nicaragua intervening).
10) 1982 Continental Shelf (Libyan Arab Jamahiriya/Malta).
11) 1981 Delimitation of the Maritime Boundary in the Gulf of Maine Area (Canada/United States of America).
12) 1978 Continental Shelf (Tunisia/Libyan Arab Jamahiriya).

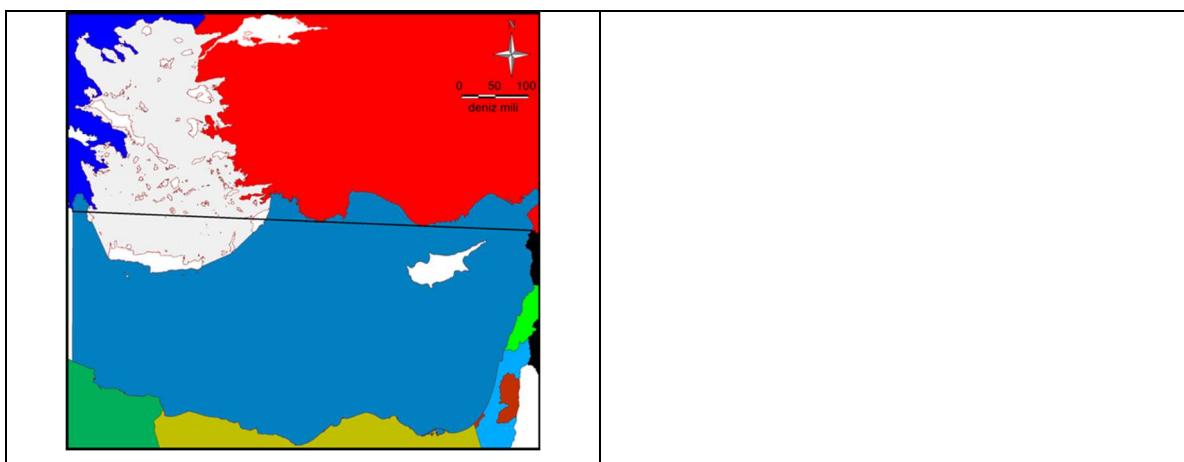
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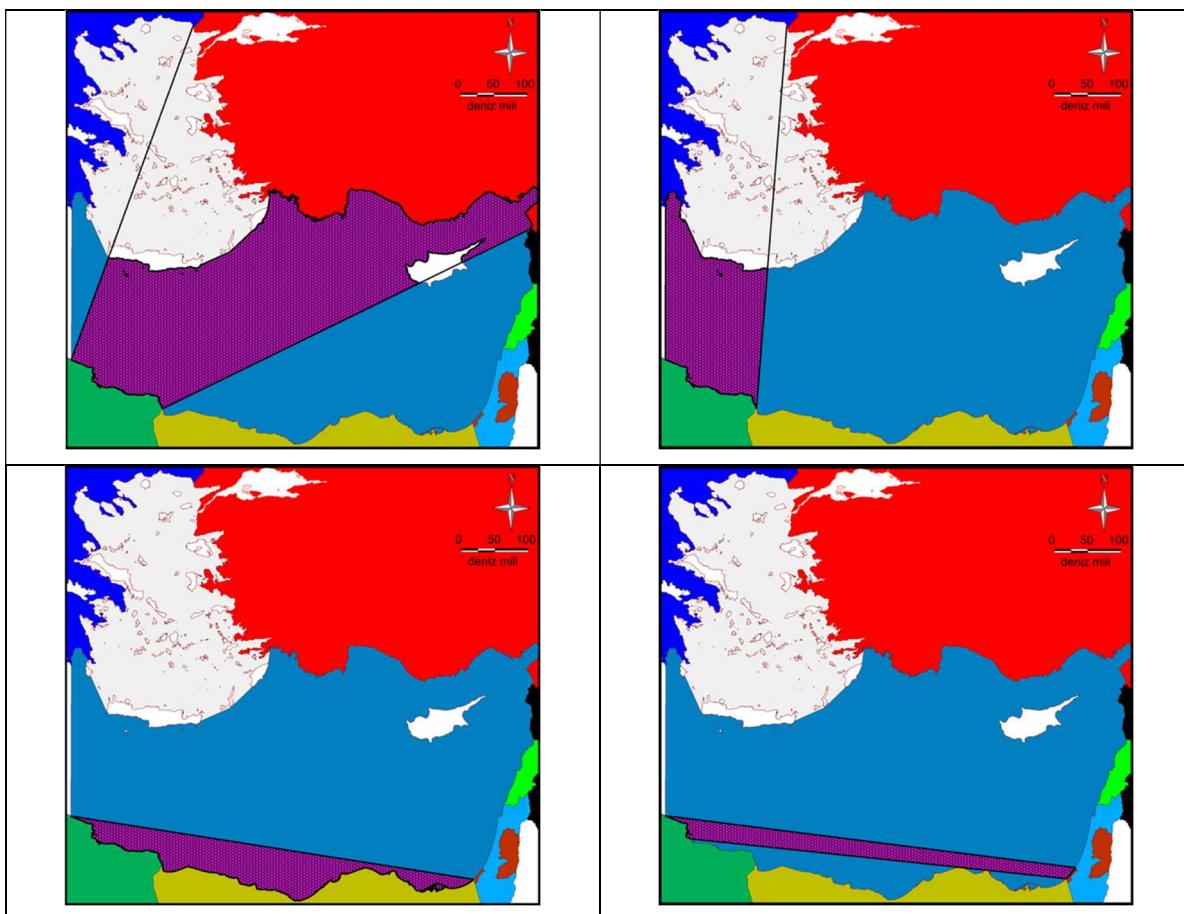
ÇAKIROĞLU H. AND BENGİL F. AND AKYAR M.S. (2021). Can A Geographical Base Approach Be The Solution For Disputed Maritime Region Partition? A New Method: Trans-Sea Connections For Continents, DA&MS 1(1),1-27.

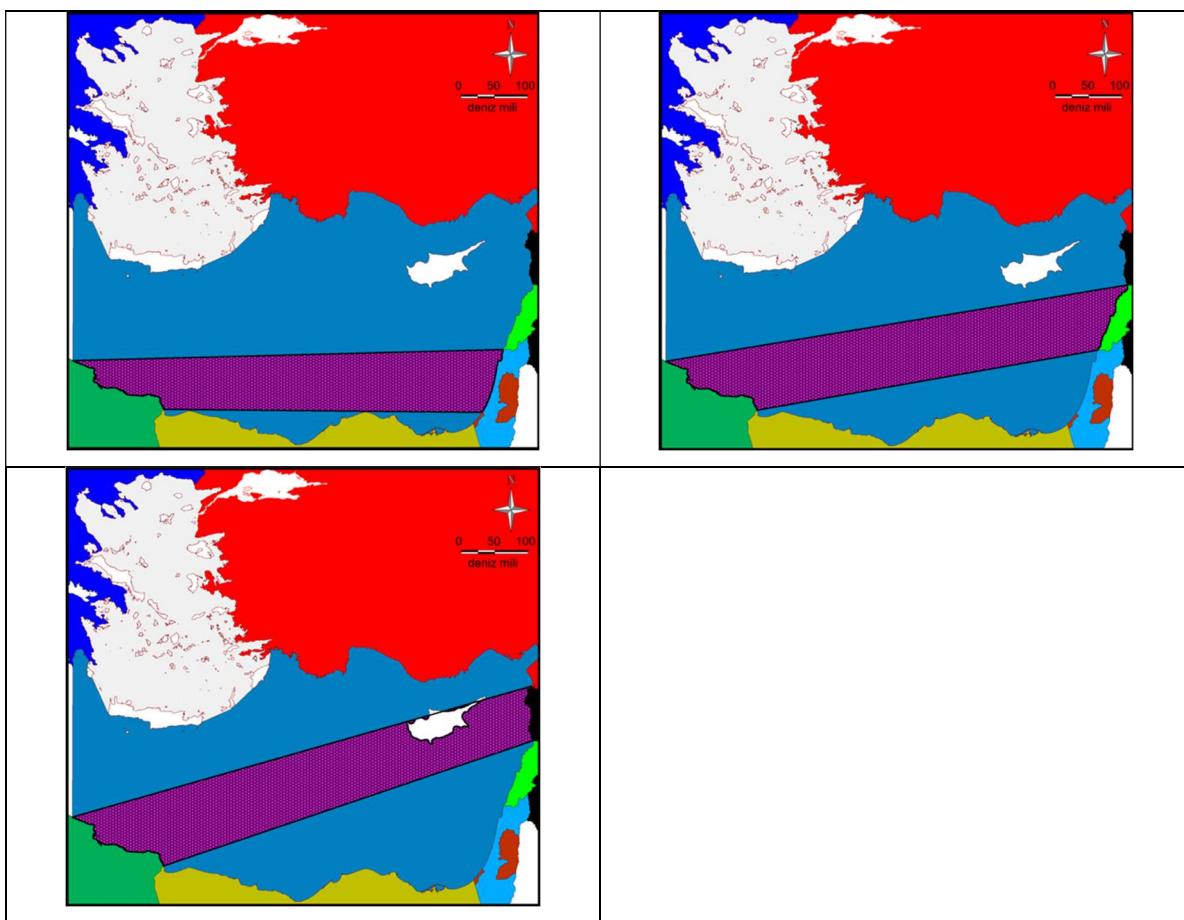
S.Figure 1. Connections for Turkey



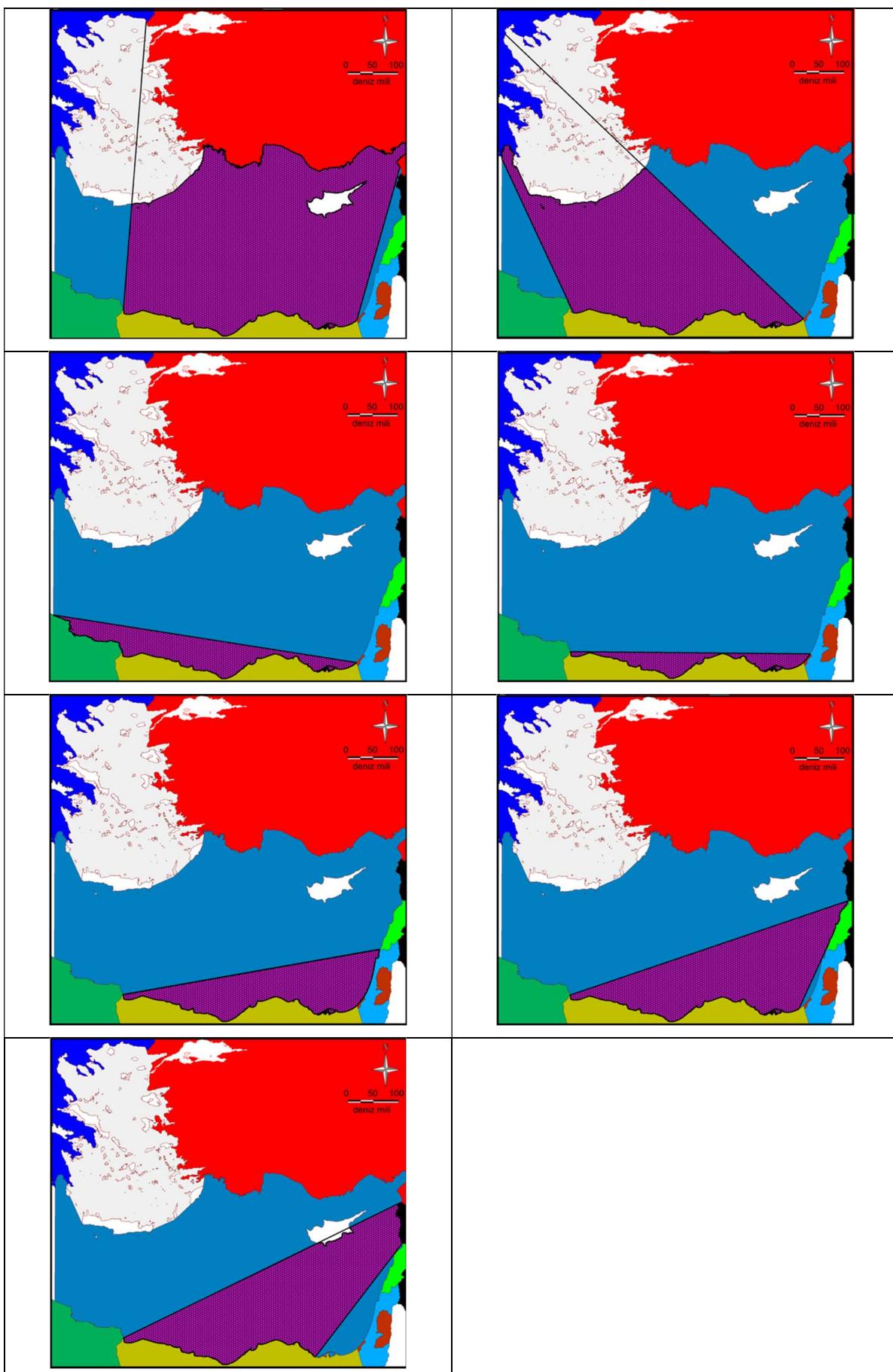


S.Figure 2. Connections for Greece

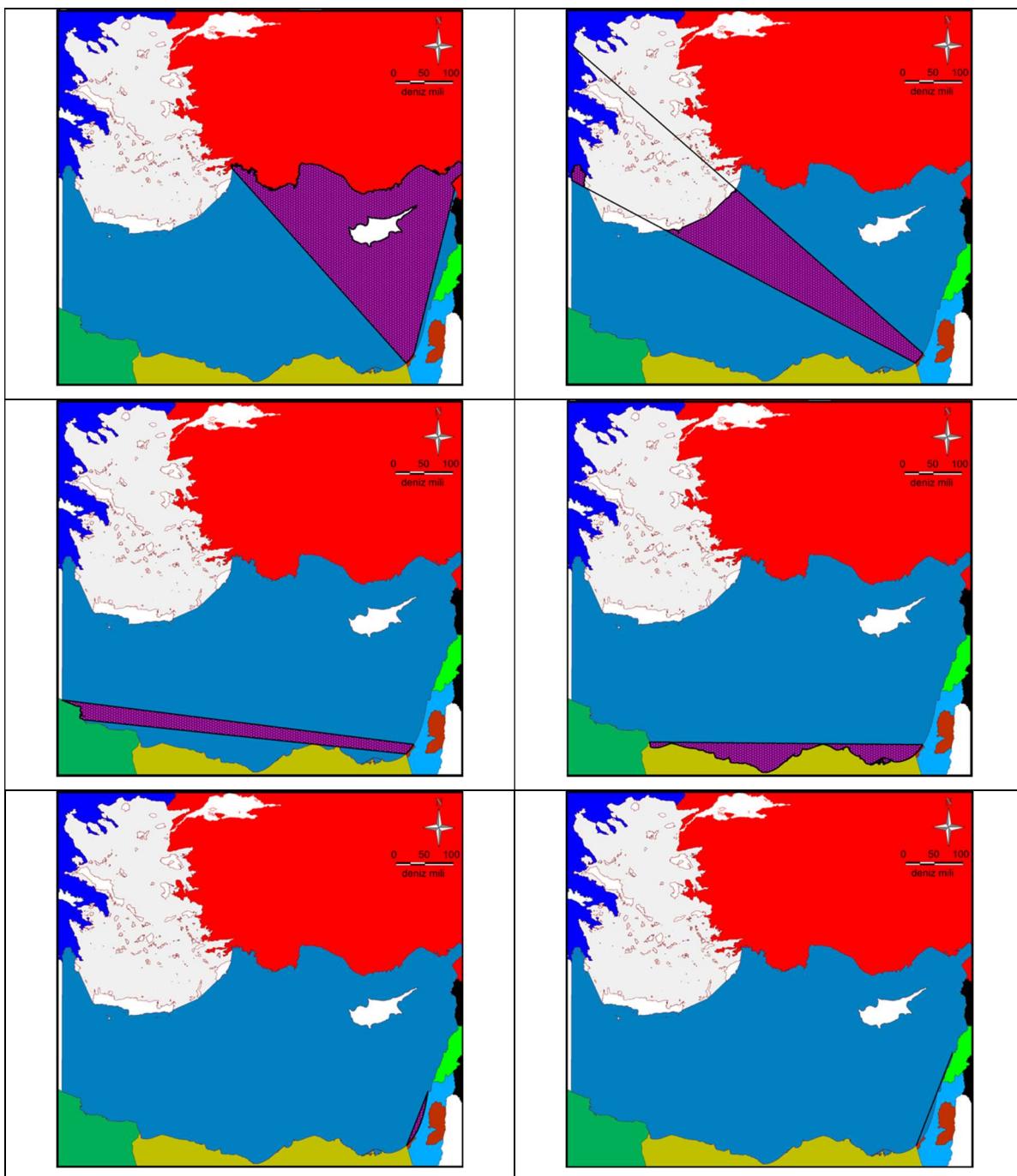


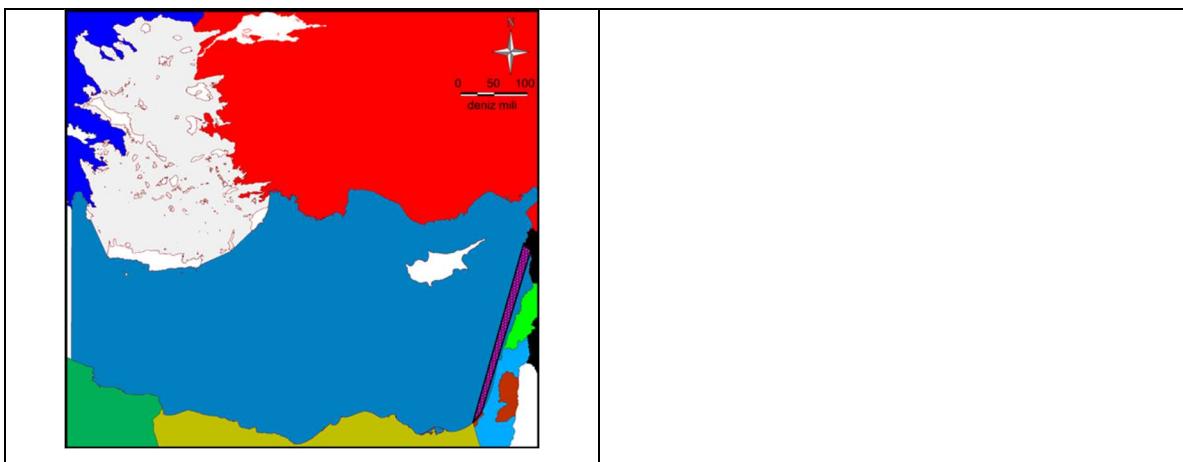


S.Figure 3. Connections for Libya

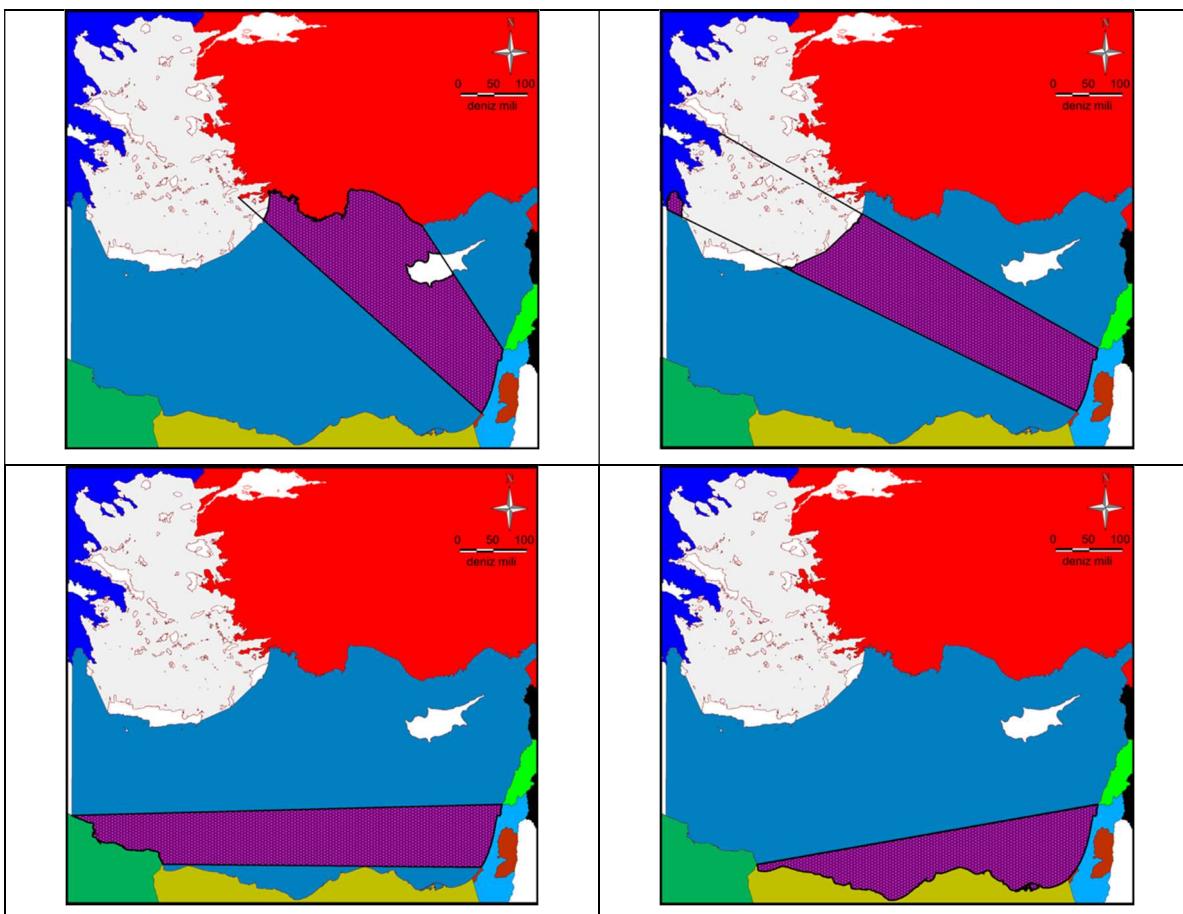


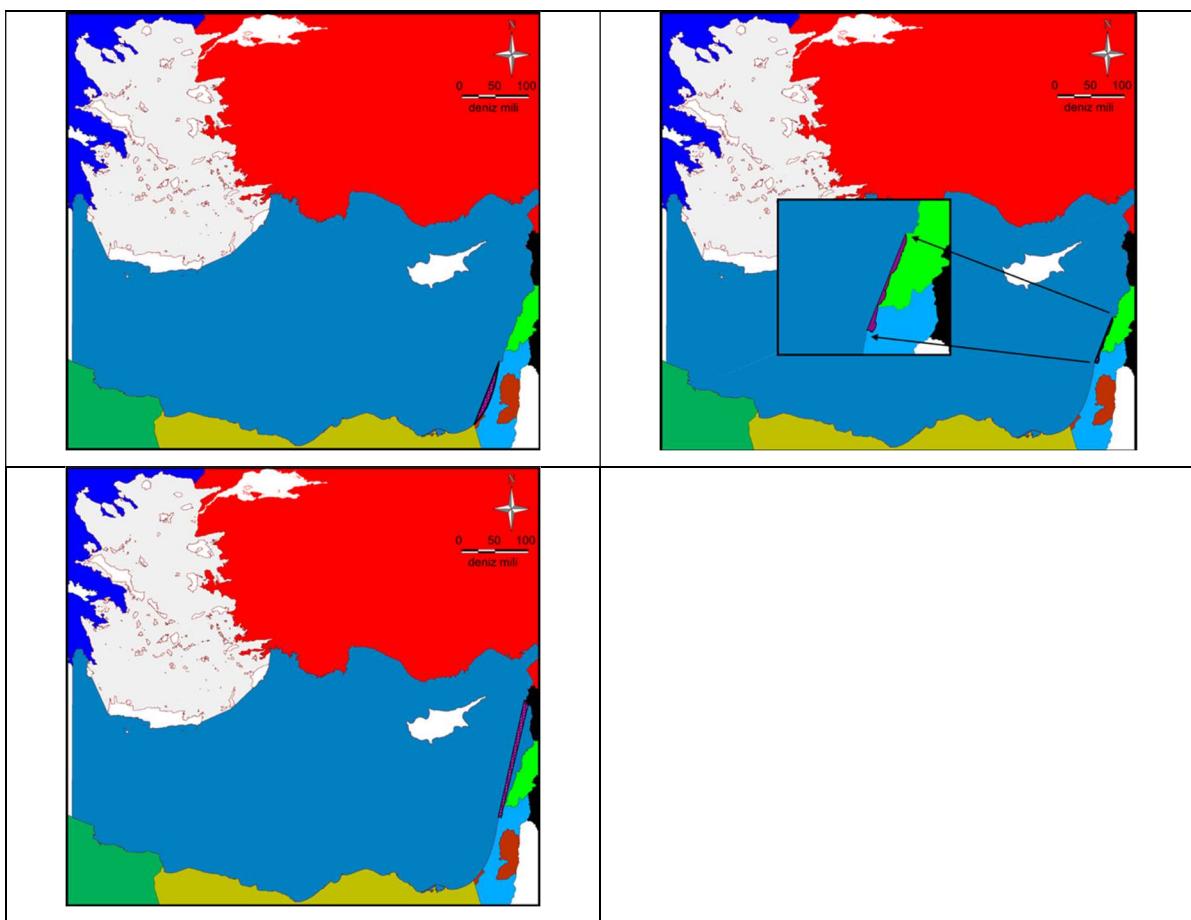
S.Figure 4. Connections for Egypt



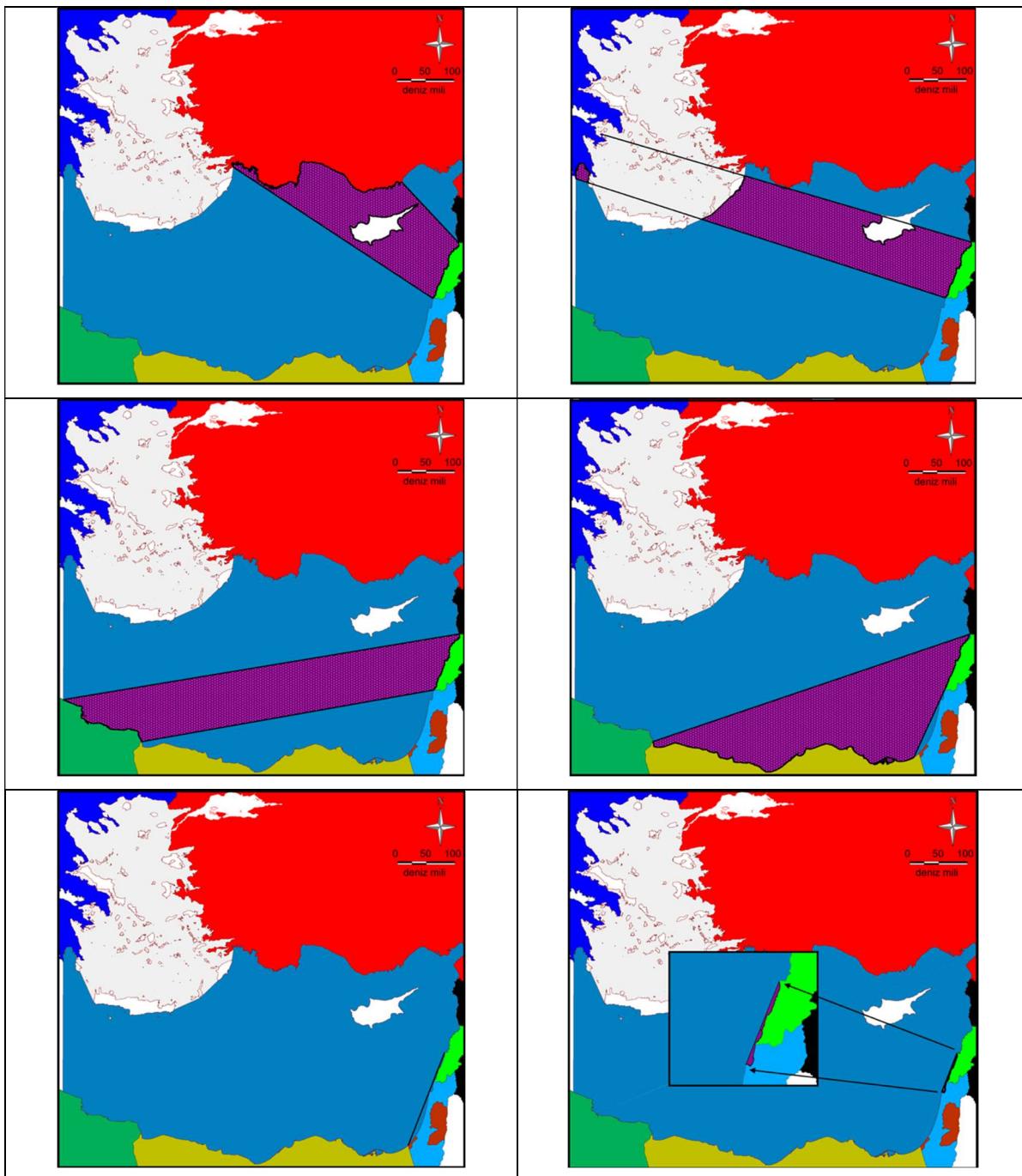


S.Figure 5. Connections for Palestine



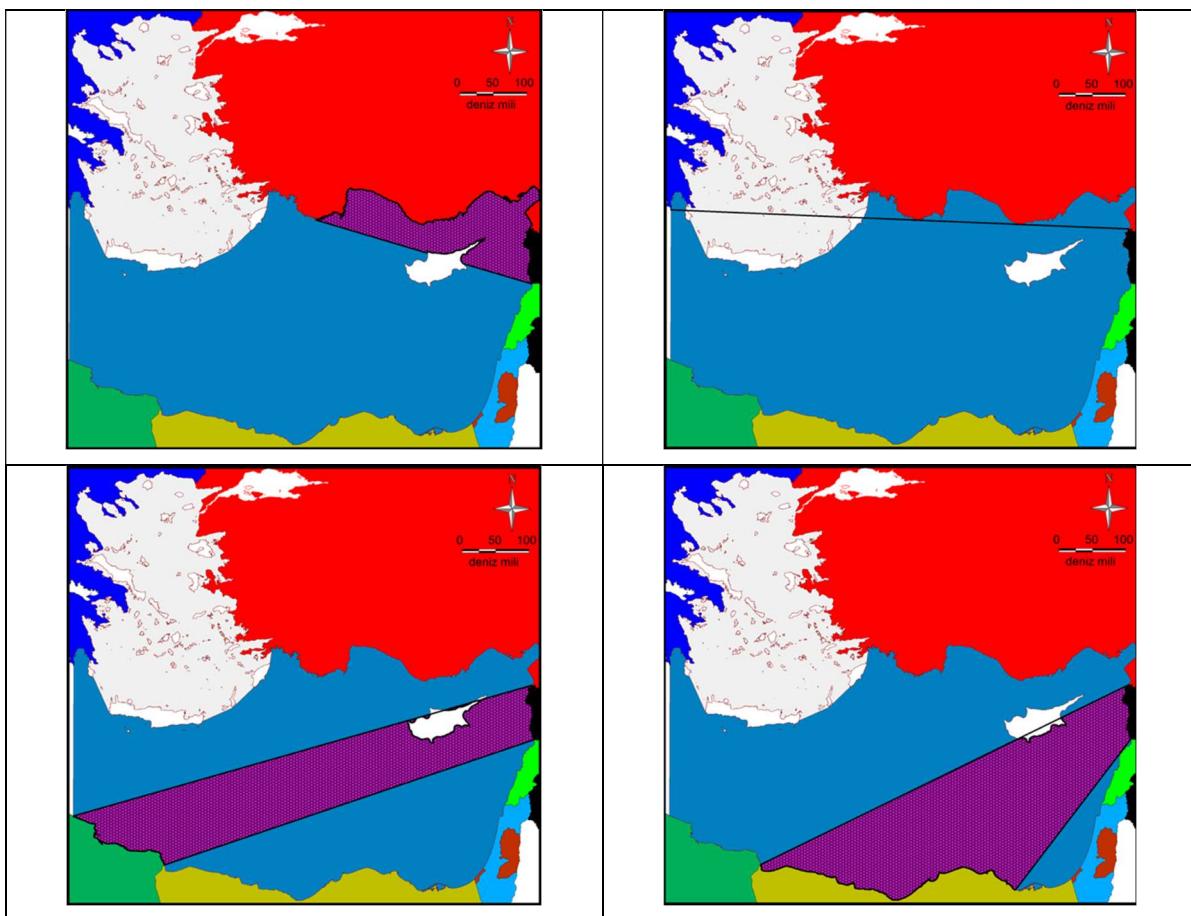


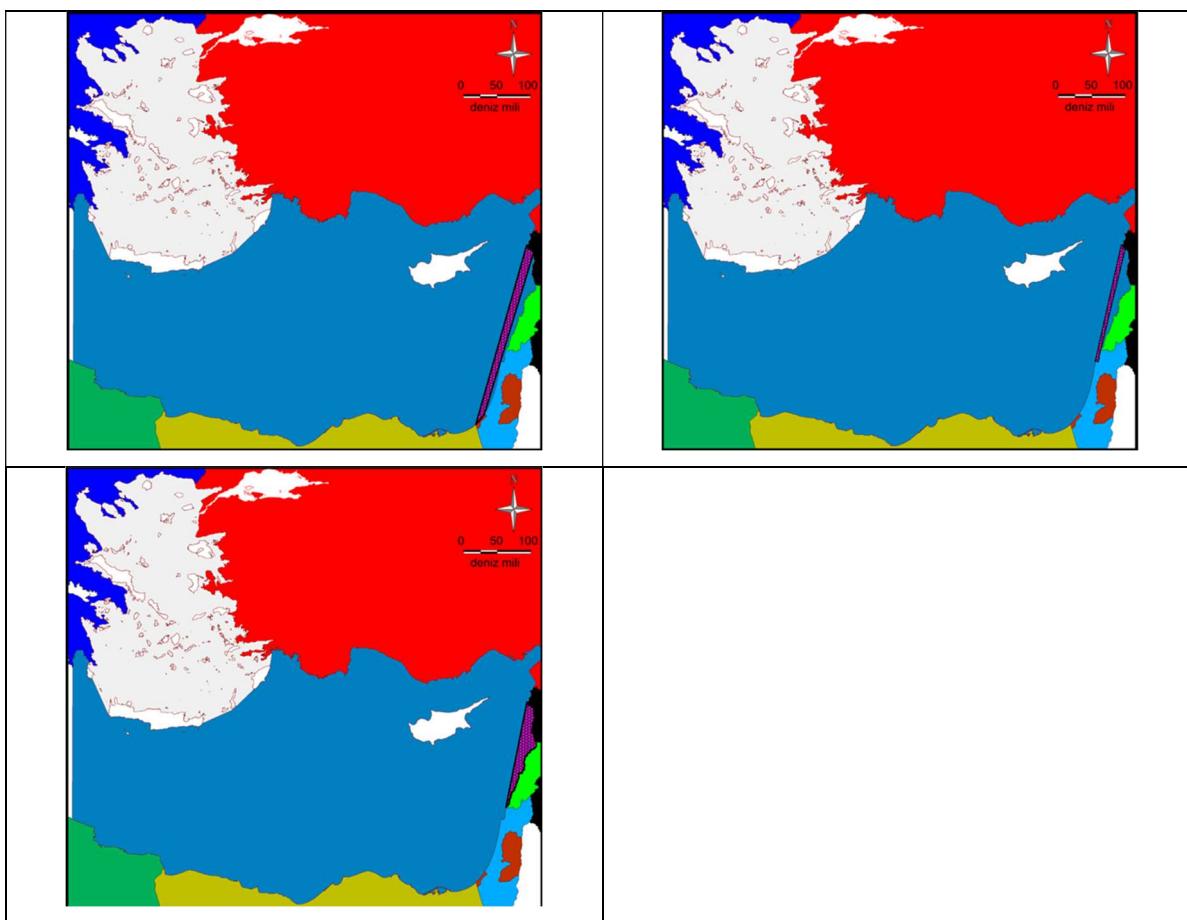
S.Figure 6. Connections for Israel





S.Figure 7. Connections for Lebanon





S.Figure 8. Connections for Syria