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Bibliometric Analysis in the Context of Earthquake and Türkiye

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Abstract

Türkiye has experienced many earthquakes of different magnitudes throughout history. Since the destructive consequences of these earthquakes lead to disasters, they have an important place in terms of disaster management. Considering the seismicity of Türkiye, this study aims to present a bibliometric analysis of the studies on earthquakes and Türkiye from the Web of Science (WOS) database. In the study, filters were applied within the framework of various criteria, and analyses were made in the VOSviewer program. Within the scope of the study, it was determined that studies on Earthquake & Türkiye have increased in recent years, the journal with the most publications is Geophysical Journal International, and the most cited study is "Progressive failure on the North Anatolian fault since 1939 by earthquake stress triggering".It was determined that Barka, Aykut stand out among the authors regarding total link strength and citations, and Ergintav, Semih regarding number of documents and co-authorship. In terms of countries, the USA is the country with the most publications after Türkiye. In terms of keywords, earthquake, Türkiye and the North Anatolian Fault Zone came to the fore. It is thought that this study will be an important reference for researchers who want to study earthquakes in Türkiye.

Keywords
Earthquake, Türkiye, Bibliometric Analysis, Web of Science, VOSviewer

Deprem ve Türkiye Bağlamında Bibliyometrik Analiz

Özet

Türkiye tarih boyunca farklı büyüklüklerde birçok deprem yaşamıştır. Bu depremlerin yıkıcı sonuçları afetlere yol açtığı için afet yönetimi açısından önemli bir yere sahiptir. Bu çalışma, Türkiye'nin depremselliğini göz önünde bulundurarak, Web of Science (WOS) veri tabanından depremler ve Türkiye üzerine yapılan çalışmaların bibliyometrik bir analizini sunmayı amaçlamaktadır. Çalışmada çeşitli kriterler çerçevesinde filtreler uygulanmış ve analizler VOSviewer programında yapılmıştır. Çalışma kapsamında, deprem & Türkiye üzerine yapılan çalışmaların son yıllarda arttığı, en fazla yayın yapan derginin Geophysical Journal International olduğu, en fazla atıf alan çalışmanın ise "Progressive Failure on the North Anatolian fault since 1939 by earthquake stress triggering" olduğu belirlendi. Yazarlar arasında toplam bağlantı gücü ve atıf açısından Barka, Aykut, doküman sayısı ve ortak yazarlık açısından ise Ergintav, Semih öne çıkmıştır. Ülkelere göre bakıldığında Türkiye'den sonra en fazla yayın yapan ülkenin ABD olduğu tespit edilmiştir. Anahtar kelimeler açısından ise deprem, Türkiye ve Kuzey Anadolu Fay Zonu öne çıkmıştır. Bu çalışmanın, Türkiye'de deprem konusuyla ilgili çalışma yapmak isteyen araştırmacılar için önemli bir referans olacağı düşünülmektedir.

Anahtar Sözcükler
Deprem, Türkiye, Bibliyometrik Analiz, Web of Science, VOSviewer

1. Introduction

Earthquake is defined as the event in which the energy generated as a result of the fracture of the earth's crust due to the effect of tectonic forces spreads in the form of seismic waves and strongly shakes the environments and the earth (AFAD, 2024a). Earthquakes are natural events that have the potential to cause disasters, are included in the group of natural disasters, do not allow sufficient time for evacuation to the people of the region where they occur, and damage the infrastructure and superstructure. According to Kalafat (2023), although its source is a natural event, societies cause earthquakes to turn into disasters. The level of societies affected by earthquakes varies according to their level of socio-economic development (Özceylan & Coşkun, 2012; Şahin & Bilik, 2024), the importance they attach to risk mitigation activities (Kılıç, 2023), and their level of institutional and individual preparedness (Genç, 2007; Ünal et al., 2017). The integrated management approach in disaster management has not been fully realized in Türkiye (Parlak, 2023). In this respect, especially, earthquakes, cause devastating consequences for a large part of the country. In this framework, while an earthquake of similar magnitude can be overcome with minor damages in a region that prioritizes and implements disaster risk management, it can turn into a disaster with loss of life and property in another area where disaster risk culture has not yet been formed.

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Earthquakes, one of the most destructive natural disasters, have many negative effects. It causes socio-economic problems, epidemic diseases, theft, looting, social inequality, and short- and long-term psychological problems (acute stress disorder, post-traumatic stress disorder, anxiety), especially loss of life, physical and property in the disaster area (Avdar & Avdar, 2022; Aydınbaş, 2023; Akbıyık & Tekindal, 2023; Gülyol, 2024).

In the Alpine Himalayan earthquake belt, Türkiye is one of the most active earthquake-deformation countries in the world where destructive earthquakes have been experienced frequently throughout history. Due to active strike-slip, normal and reverse faulting in the country, many regions have unique structural features (Bozkurt, 2001). In Türkiye, a large part of which is located in the active earthquake zone, many large earthquakes have occurred due to the mobility of the North and East Anatolian fault lines (Karagöz, 2007). Türkiye, which is one of the leading countries in terms of loss of life in earthquakes occurring in the world, ranks first in terms of the annual recurrence rate of earthquakes resulting in loss of life (Özel & Solmaz, 2012). In Türkiye, which is located in one of the most risky regions of the world in terms of earthquakes, destructive earthquakes that can cause loss of life and property are experienced every five years. On average, Türkiye experiences at least one earthquake between magnitude 5.0 and 6.0 every year. Among disasters, earthquakes caused 60 percent of the loss of life and the highest loss of property (AFAD, 2018).

EM-DAT (2024), which records disaster data from around the world, requires at least one of the following criteria to be met for a natural or man-made event to be registered as a disaster. These criteria are; at least 10 people have lost their lives (including missing persons), at least 100 people have been affected by this event (injury, homelessness, evacuation, etc.) and an emergency situation has been declared with international assistance. AFAD's (2024a) definition of disaster emphasizes the impact on the whole or a certain part of the society, physical and socio-economic losses, interruption of daily life, and exceeding the coping capacity of the community experiencing the event. In terms of both EM-DAT criteria and AFAD's definition, moderate earthquakes in Türkiye occasionally result in disasters.

In Türkiye, a large part of the country's territory is under earthquake risk, and approximately 98% of industrial organizations are also under earthquake risk (Altun, 2018). The rapid increase in the number of multi-storey buildings in the cities due to immigration to the cities in the last 70 years in Türkiye and the deficiencies and negligence in the inspection of these buildings are among the factors that cause loss of life and property in earthquakes that occur (Akdemir & Günaydın, 2024). Some prominent earthquakes in Türkiye in terms of magnitude are as follows: the 2023 Kahramanmaraş earthquakes (Mw 7.7 and Mw 7.6), the 1999 Marmara earthquakes (Mw 7.6 and Mw 7.1), and the 1939 Erzincan earthquake (MS 7.9), as well as 1926 Datça offshore (MS 7.7), 1942 Erbaa-Tokat (MS 7.0), 1943 Ilgaz-Çankırı (MS 7. 2), 1944 Gerede-Bolu (MS 7.3), 1953 Çanakkale (MS 7.2), 1957 Düzce-Bolu (MS 7.1), 1964 Karacabey-Bursa (MS 7.0), 1970 Kütahya (MS 7.2), 1976 Çaldıran-Van (Mw 7.0), and 2011 Van (Mw 7.1) (AFAD, 2024b). Considering the seismicity of Türkiye, it offers a wide field of study for scientists (Bozkurt, 2001).

There are various bibliometric studies on earthquakes in Türkiye in the literature. Okutkan and Gün (2023) conducted a bibliometric study of postgraduate theses in the field of earthquake-related education in Türkiye. Balbay et al. (2024) conducted a study on earthquake-related lung diseases. Kaçmaz and Kaçmaz (2023) discussed post-earthquake rehabilitation studies in children. In addition, in the international literature, earthquake has been addressed in bibliometric studies from various aspects (Liu et al., 2012; Ho, 2013; Arık et al., 2023; Wang et al., 2019; Morante-Carballo et al., 2023).

Although bibliometric studies, which have recently come to the forefront as visual mapping of studies, have been included in the literature on earthquakes, bibliometric analysis of studies on Türkiye & earthquakes has not been included. In this respect, this bibliometric study on earthquake & Türkiye has a unique structure. The study aims to reveal the academic research on earthquake & Türkiye obtained from the WOS database from a bibliometric perspective. In this context, answers to the following questions were sought:

- What is the number of articles on Earthquake & Türkiye, their distribution by years, and what are the prominent journals?
- What are the most cited studies on Earthquake & Türkiye?
- Which researchers are prominent in terms of co-authorship in studies on Earthquake & Türkiye?
- What is the level of the number of documents, citations, and total link strength of the authors on Earthquake & Türkiye?
- What is the number of countries' documents, citations, and links in studies on Earthquake & Türkiye?
- What are the prominent keywords in studies on Earthquake & Türkiye?

2. Materials and Methods

Web of Science (WOS) database was used as the data source in the study. The WOS database, which academics see as the main data source with the highest quality standards, contains many important journals and articles with high impact factors (Merigó et al., 2015). In addition, studies in WOS can be transferred to bibliometric programs such as VOSviewer (Yu et al., 2020). The WOS database provides some metadata for bibliometric analysis. These are data such as abstracts, references, citations, authors, organizations, countries, and impact factors of journals (Carvalho et al., 2013). VOSviewer, one of the tools used for bibliometric analysis, has powerful functionalities such as relationship networks in the literature, discovering new concepts, visualizing and mapping data, and providing different analyses of data (Dirik et al., 2023).

VOSviewer, a free computer program, facilitates the interpretation of large bibliometric maps and emphasizes graphical representation (Van Eck & Waltman, 2010). Bibliometric analysis facilitates researchers in exploring and analyzing large datasets. It also provides researchers with an overview of their topic, identifying knowledge gaps in the field, deriving new ideas, and positioning intended contributions (Donthu et al., 2021).
The study process started on 01.05.2024 by selecting TOPIC on the WOS database and typing the keywords "Earthquake" and "Turkey" or "Earthquake" and "Türkiye" in the search button. The study was limited from 1980 to 2023 in terms of publication year, articles as publication type, English as publication language, SCI-EXPANDED, and SSCI in terms of WOS indexes. The data exported from WOS were transferred to the VOSviewer 1.6.20 program for data analysis and visualization.

Regarding the ethical permissions of the study, the WOS database is an open source. Therefore, there was no need to obtain ethics committee approval. The data in the WOS database is considered valid and reliable.

3. Results

3.1. Findings Related to WOS

First of all, the keywords "Earthquake" and "Turkey" or "Earthquake" and "Türkiye" were typed into the search button by selecting topic on the Web of Science Core Collection database. 4,257 publications were found. According to the type of publication on Earthquake & Türkiye in the WOS, it is understood that most studies are Articles (3,757 documents). Other studies are Proceeding Papers (424 documents), Early Access (78 documents), Review Articles (71 documents), Editorial Materials (60 documents), Book Chapters (57 documents), and Letters (24 documents). Then, when it is examined in which indexes the studies were scanned, it is understood that Science Citation Index Expanded (3,360 documents) has the highest number of indexes.

The other indexes are Conference Proceedings Citation Index - Science (397 documents), Social Sciences Citation Index (372 documents), Emerging Sources Citation Index (315 documents), Conference Proceedings Citation Index - Social Science & Humanities (54 documents), Book Citation Index - Science (48 documents), Arts & Humanities Citation Index (48 documents), and Book Citation Index - Social Sciences & Humanities (14 documents).

When the languages used in the studies are analyzed; it is understood that most of the publications are in English (4,134 documents). Then Turkish (100 documents), Chinese (7 documents), Croatian (6 documents), German (4 documents), Russian (2 documents), Italian, Dutch, Spanish, and Ukrainian are listed with 1 study each.

Various filters were applied in the study. First, filters were applied in terms of publication years. It was understood that the publications on the subject were between 1980 and 2024. In this study, the year 2024 was excluded since WOS data was obtained as of 01.05.2024 and the calendar for 2024 is still in progress. The distribution of studies according to years is given in Figure 1.

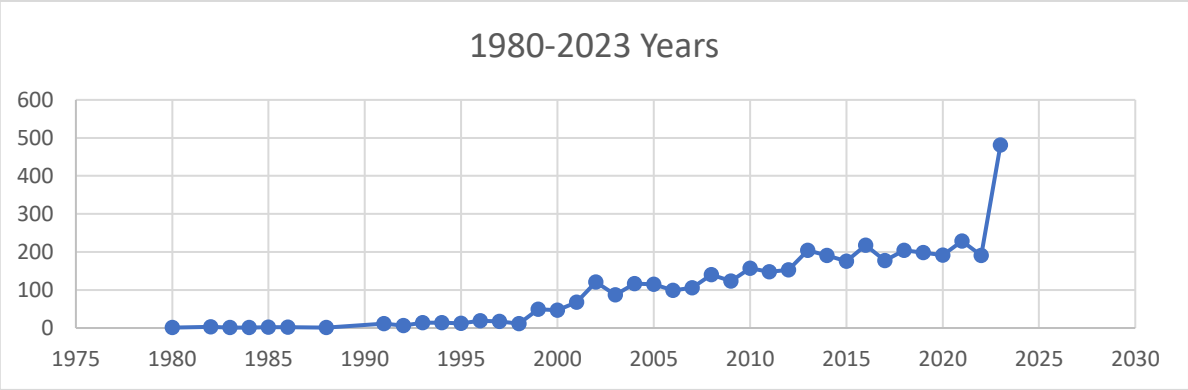

Figure 1: Distribution of studies by years (1980-2023)

When the distribution of the studies on Türkiye and earthquakes by years is analyzed; in the detailed examination of the visuals in Figure 1 prepared in Excel program environment, the highest number of publications was made in 2023 with 481 documents. It was determined that there were no documents in 1990, 1989, 1987, and 1981. Marmara earthquakes in 1999, Van earthquake in 2011, Elazığ and İzmir earthquakes in 2020, and finally Kahramanmaraş earthquakes in 2023, which are important dates in terms of Türkiye's earthquake experience, come to the fore. In Figure 1, it is observed that studies have increased especially after these dates.

As the second filtering, only articles were included in the study in terms of document types. As the third filtering, SCI-EXPANDED (3127 documents) and SSCI (323 documents) were filtered in terms of WOS indexes and included in the study. As the last filtering, only English language was filtered in terms of the languages used in the studies and the analysis continued. As a result of these filters in the WOS database, 3,243 articles were included in the analysis.

In the examination of the WOS database, it is understood that Türkiye ranks first with 2202 studies in the order of the countries with the highest number of publications. Then, USA (456 documents), England (201 documents), Germany (200 documents), France (198 documents), Italy (188 documents), China (148 documents), Japan (142 documents), Greece (128 documents), and Iran (97 documents).

Academic journals are important tools for communicating scientific studies and disseminating academic achievements. By analyzing journals, the prominent journals in any field can be identified (Liu et al., 2020). As a result of the restrictions applied in the study, the top 10 journals with the most publications on earthquake & Türkiye in the WOS database are shown in Figure 2 in different colors.

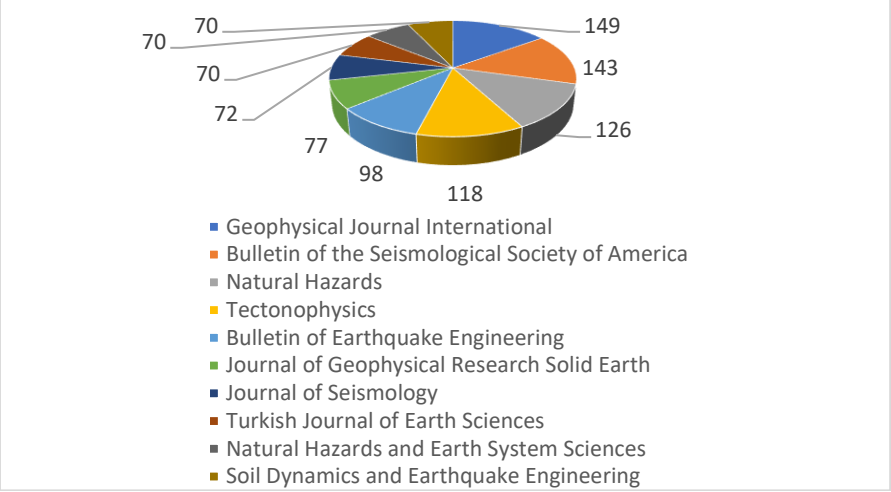

Figure 2: Prominent journals

Figure 2 shows that the journals with the highest number of publications are Geophysical Journal International, Bulletin of the Seismological Society of America, Natural Hazards, Tectonophysics, Bulletin of Earthquake Engineering, Journal of Geophysical Research Solid Earth, Journal of Seismology, Turkish Journal of Earth Sciences, Natural Hazards and Earth System Sciences, and Soil Dynamics and Earthquake Engineering.

3.2. Bibliometric Analysis

3.2.1. Citation & Documents

In the bibliometric analysis, the minimum number of citations for a document was set as 50. The 5 most cited documents (Stein et al., 1997; Bozkurt, 2001; Taymaz et al., 1991; Barka & Kadinsky-Cade, 1988; Berberian, 1995) were identified through VOSviewer program and created by the author and shown in Table 1.

Table 1: Most cited studies (Source: Web of Science)

Title	Journal	Year	Author(s)	Average Per Year	Citations
"Progressive failure on the North Anatolian fault since 1939 by earthquake stress triggering"	Geophysical Journal International	1997	Stein, R.S.; Barka, A; Dieterich, J.H.	33.50	939
"Neotectonics of Turkey–a synthesis"	Geodinamica Acta	2001	Bozkurt, E.	35.29	847
"Active tectonics of the North and Central Aegean Sea"	Geophysical Journal International	1991	Taymaz, T; Jackson, J ; Mckenzie, D.	24.26	825
"Strike-slip-fault geometry in Turkey and its influence on earthquake activity"	Tectonics	1988	Barka, A., & Kadinsky-Cade, K.	21.19	784
"Master blind thrust faults hidden under the Zagros folds-active basement tectonics and surface morphotectonics"	Tectonophysics	1995	Berberian, M.	24	720

In the visual analysis, items: 297, clusters: 18, and Links: 1153. In terms of links, Barka & Kadinsky-Cade (1988) study (links=197) ranks first. In addition, bibliometric visuals within the framework of citations are given in Figure 3.

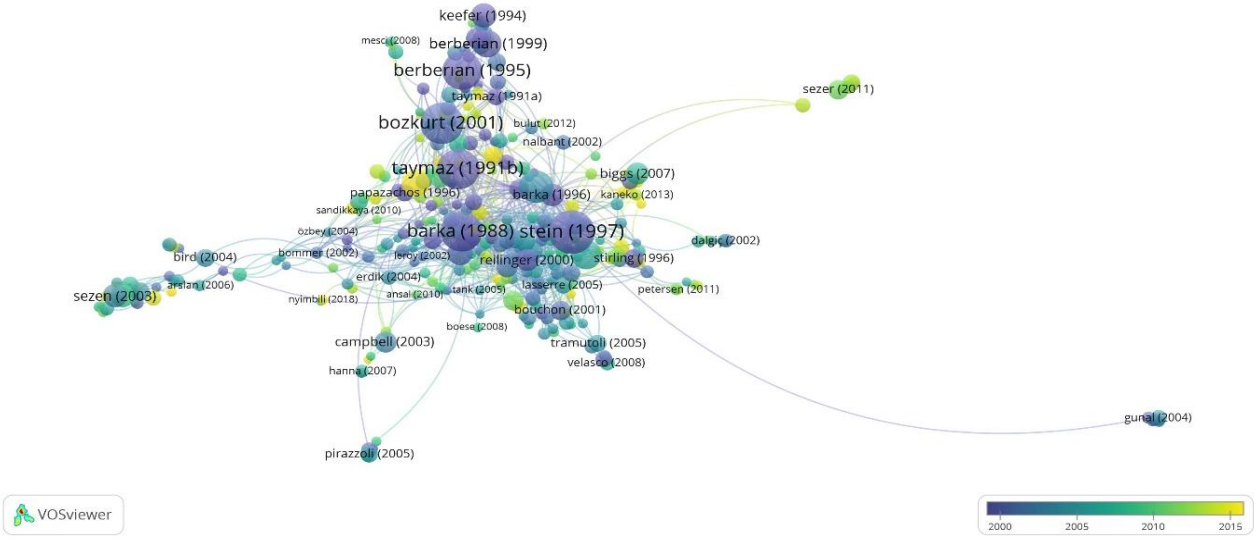

Figure 3: Citation & documents - overlay visualisation

3.2.2. Analysis of Co-Authorship & Authors

Co-authorship analysis examines the collaboration and interaction of researchers in any field of science. This analysis allows authors' collaborations to be mapped over different periods. Thanks to the information in this analysis, enables scientists who want to conduct research in their field of expertise to contact and collaborate with pioneering scientists (Donthu et al., 2021). In terms of co-authorship relationship, the minimum number of documents and citations of an author was set as 5. The ranking in terms of total link strength is as follows: Ergintav, Semih (149 total link strength), Bohnhoff, Marco (86 total link strength), Altunisik, Ahmet Can (67 total link strength), Askan, Aysegul (65 total link strength), and Kalafat, Dogan (64 total link strength). Bibliometric visualization in the context of co-authorship is given in figure 4.

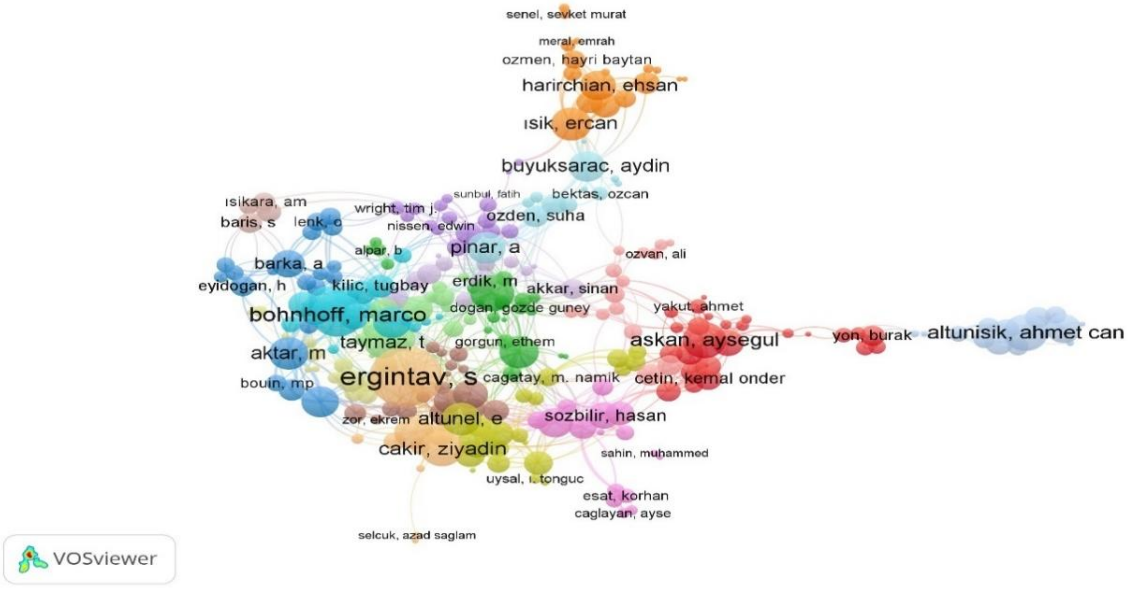

Figure 4: Co-authorship & authors - total link strenght (network visualization)

3.2.3. Analysis of Authors

The minimum number of documents and citations of an author was determined as 10. In the image created in the bibliometric map, it was determined that there are 80 items, 6 clusters, 1386 Links, and Total Link Strength 8327.

In terms of total link strength, Barka, Aykut (1238 total link strength) ranks 1st, Ergintav, Semih (966 total link strength) ranks 2nd, Bohnhoff, Marco (645 total link strength) ranks 3rd, Taymaz, Tuncay (552 total link strength) ranks 4th, and Pinar, Ali (537 total link strength) ranks 5th. The bibliometric visualization in terms of total link strength is given in Figure 5.

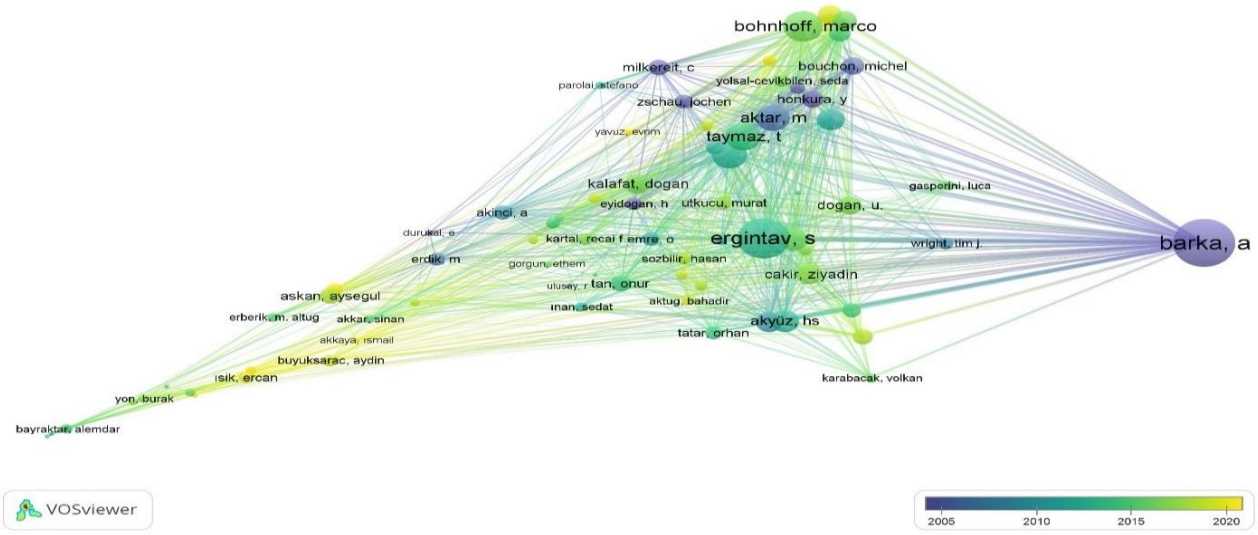

Figure 5: Prominent authors - total link strenght (overlay visualization)

The ranking of the authors in terms of the number of documents is as follows: Ergintav, Semih (56 documents), Pinar, Ali (37 documents), Bohnhoff, Marco (35 documents), Askan, Aysegul (35 documents), and Isik, Ercan (31 documents). The bibliometric visualization in terms of the number of documents is shown in Figure 6.

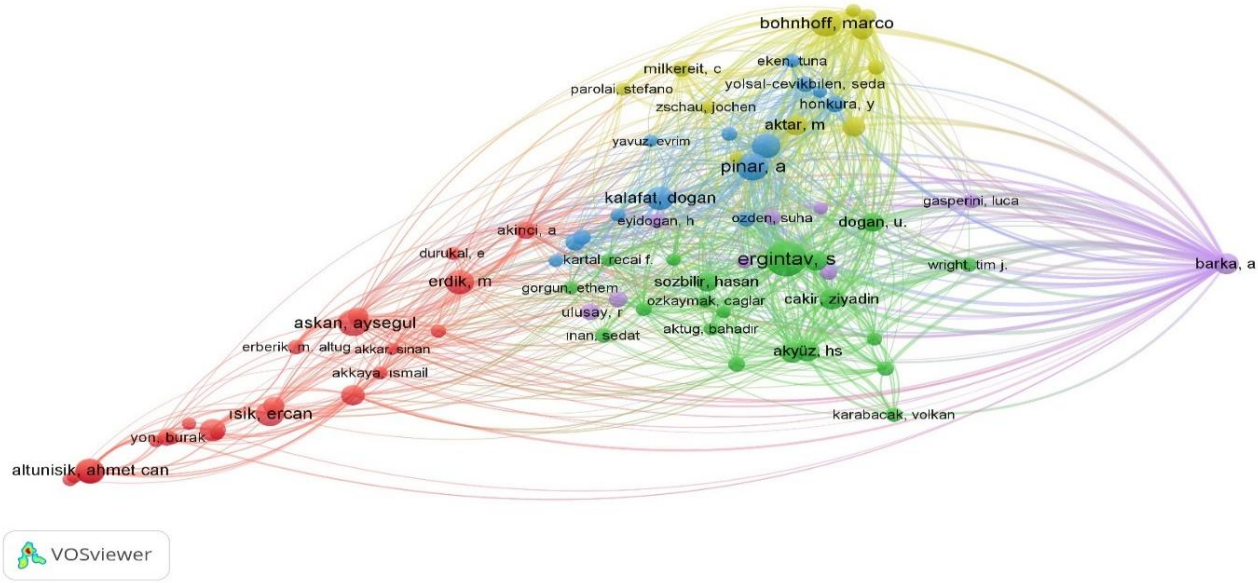

Figure 6: Authors documents(network visualization)

The ranking of the authors in terms of citations to their works is as follows: Barka, Aykut (3702 citations), Ergintav, Semih (2372 citations), Taymaz, Tuncay (1891 citations), Wright, Tim J. (1578 citations), and Aktar, Mustafa (1404 citations). The bibliometric map of the authors in terms of citations is shown in figure 7.

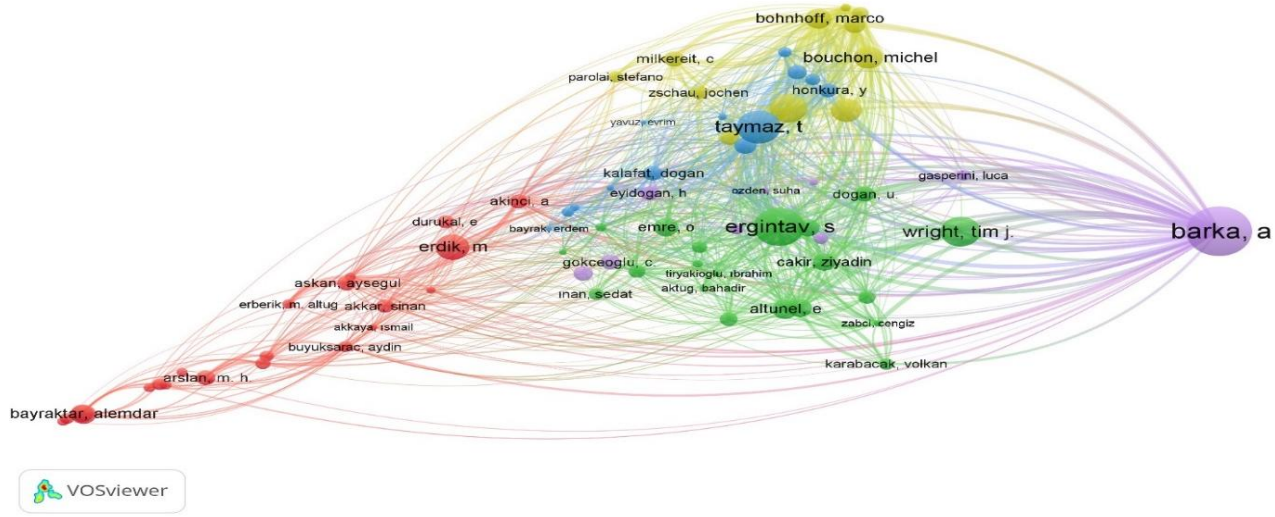

Figure 7: Authors - citations (network visualization)

3.2.4. Prominent Countries

The number of documents of a country is set as at least 5 and the number of citations as 1. 51 items, 8 clusters, links: 642, total link strength: 24020. In terms of document distribution, Türkiye (2188 documents), the USA (437 documents), Germany (195 documents), France (194 documents) and England (189 documents) stand out. In terms of citations, Türkiye (46484 citations), the USA (19491 citations), France (8882 citations), England (8699 citations) and Italy (5950 citations). In terms of total link strength in terms of countries, Türkiye ranks first (14126), followed by the USA (6636), France (4759), Germany (3050), and England (2900). Visuals related to this issue are shown in Figure 8.

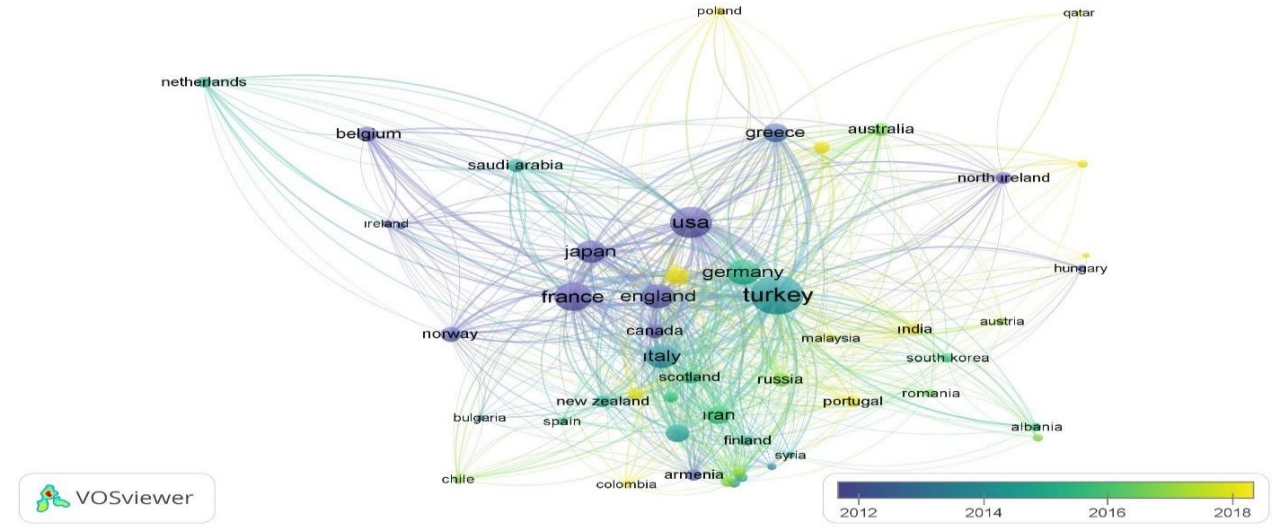

Figure 8: Prominent countries total link strength (overlay visualization)

3.2.5. Co-occurrence & Author Keywords (Analysis of Author Keywords)

Analyzes were made on the condition that a keyword (Minimum number of occurrences of a keyword) was used at least 10 times. The first 10 keywords are earthquake (occurrence: 527), Turkey (occurrence: 252), North Anatolian Fault Zone (occurrence: 147), liquefaction (occurrence: 75), seismicity (occurrence: 69), seismic hazard (occurrence: 65). , disaster (occurrence:64), landslide (occurrence:45), post-traumatic stress disorder (occurrence:43), and reinforced concrete (occurrence:43). Bibliometric visual analysis revealed a total of 148 items, 8 clusters, 1209 links and 2721 total link strength.

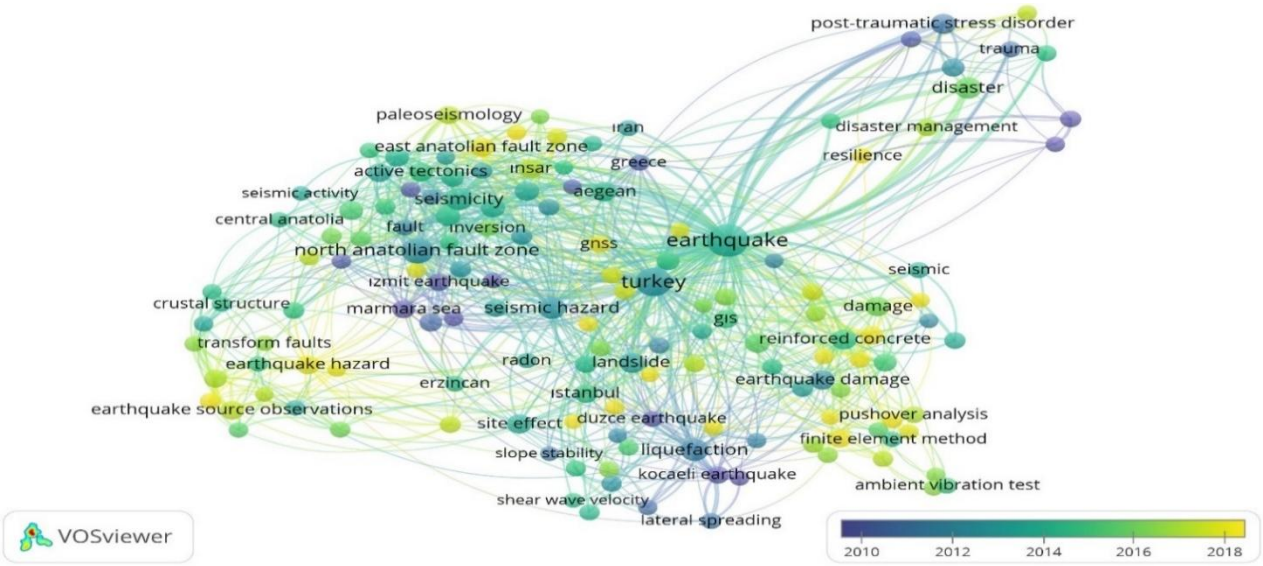

Figure 9: Co-accurence & author keywords (overlay visualization)

4. Discussion and Conclusion

This study, aimed to analyze the studies on Earthquake & Türkiye in the WOS database in a bibliometric framework. Within the scope of bibliometric analysis of the studies on Earthquake & Türkiye, it is understood that there were no publications in some years in terms of publication years. It is seen that the number of studies on the subject has increased in recent years. It is thought that the earthquake disasters that first affected Elazığ province in Türkiye in 2020 and Izmir province in the following months, as well as the earthquake disasters centered in Kahramanmaraş on February 6, 2023, had an impact.

It is understood that Geophysical Journal International, Bulletin of the Seismological Society of America, and Natural Hazards journals are prominent on the subject. The fact that these prestigious journals emphasize the study topics in fields such as natural disasters, earth sciences, tectonics, and seismology may have influenced their prominence. In this context, researchers who want to conduct studies on Earthquake and Türkiye should not ignore the prominent journals on this subject.

In terms of documents; when the top 5 most cited studies on Earthquake & Türkiye are examined, it is understood that they are generally discussed within the framework of faults and tectonic movements. The citation of any publication in scientific studies indicates the popularity of that publication (Chen et al., 2022). In this context, in line with the data shown in Table 1, it is understood that Stein et al. (1997) "Progressive failure on the North Anatolian fault since 1939 by earthquake stress triggering" ranks first within the framework of study constraints. Their findings such as earthquake sequences due to stress triggering on the North Anatolian Fault line between 1939-1992 and the interaction of earthquakes in this context may have brought this study to the forefront as a reference.

In terms of authors and co-authorship, the number of publications is an indicator of the author's productivity. The number of citations is an indicator of the impact of the author on the scientific community related to the field of study (Merigó et al., 2015). In terms of total link strength, Barka, Aykut; Ergintav, Semih, and Bohnhoff, Marco are the authors with larger nodes in Figure 5. In terms of the number of documents, Ergintav, Semih; Pinar, Ali, and Askan, Aysegul were the most productive authors. In terms of the number of citations, Barka, Aykut; Ergintav, Semih, and Taymaz, Tuncay stood out as the authors with the highest level of impact on the study topic. In terms of co-authorship, Ergintav, Semih; Bohnhoff, Marco; Altunisik, Ahmet Can; Askan, Aysegul, and Kalafat, Dogan were identified as the authors with the highest linkage strength. These findings are thought to be a reference for national and international researchers on co-authorship.

In terms of countries, it is an expected result that Türkiye ranks first. In terms of total link strength, number of citations, and number of documents in terms of countries, the USA, France, Germany, England, and Italy were identified as the main countries related to the subject of the study in addition to Türkiye. In their bibliometric study, Liu et al. (2012) found similarities between the prominent countries identified in earthquake-related studies and the prominent countries in this study. In terms of the total link strength between countries, Figure 8 shows that there is a high level of relationship between Türkiye and the USA, France, Italy, the UK, Germany, and Japan in line with the thickness of the connection between nodes. In particular, the similarity between the North Anatolian Fault Zone, which has a large study area in Türkiye, and the San Andreas Fault Zone in California (Allen, 1982) can be shown as one of the indicators of the strong relationship between the USA and Türkiye.

In recent years, it is understood that countries such as Australia, Russia, the People's Republic of China, Poland, India, Pakistan, Iraq, Qatar, United Arab Emirates, Malaysia, Colombia, Czechia, Portugal, Sweden, Chile, and Georgia have come to the forefront. Increasing scientific studies on earthquakes within the cooperation framework between countries will provide important contributions to countries regarding earthquake resistance.

In terms of author keywords; earthquake, Turkey, North Anatolian Fault Zone, liquefaction, seismicity, seismic hazard, and disaster have become prominent words. The destructive earthquakes that occurred in the North Anatolian Fault zone in Türkiye from the 1939 Erzincan earthquake to the 1999 Marmara earthquakes seem to be frequently reflected in the keywords in academic studies. In this regard, Stein et al. (1997) stated that although there are different examples of migration of earthquake sequences, the North Anatolian fault line is quite remarkable. In this context, the North Anatolian fault zone (Rockwell et al., 2001; Cakir et al., 2005; Bohnhoff et al., 2017; Pinar et al., 1996), and Liquefaction have also come to the fore as keywords in various studies on seismicity in Türkiye (Cetin et al., 2021). In addition, it is understood from the keywords that earthquakes are handled in terms of earth science such as seismicity (Bohnhoff et al., 2016; Yamamoto et al., 2022), seismic hazard (Paradisopoulou et al. 2010; Askan et al., 2015; Işık et al., 2021) as well as disaster (Sever et al., 2004). Landslides were also among the keywords that came to the fore regarding earthquakes being a triggering factor (Martino et al., 2018; Karakas et al., 2021). The cluster formed by keywords such as post-traumatic stress disorder (Alfuqaha et al., 2023; İlhan et al, 2023), mental health, trauma, and depression shows the importance of studies on mental health after the earthquake disaster (Altindag et al., 2005; Harada et al., 2015; Liang et al., 2021; Wang et al., 2021; Çelik, 2023; Lu et al., 2023). In addition, the keyword child in this cluster may also indicate that children are addressed in the context of vulnerability after the earthquake. In addition, keywords such as resilience, disaster, disaster management, mental health, InSAR, GNSS, earthquake hazards, paleoseismology, and deformation have been used more frequently recently.

In this study, the most frequently cited studies in high impact indexes in terms of earthquakes and Türkiye, the linkage relations between countries, co-authorship networks, who are the most productive, most active and most connected authors, and the most frequently used keywords were determined. Considering the seismicity of Türkiye, bibliometric analysis of scientific studies will be an important reference for researchers who will conduct academic studies in this field. For future studies, more detailed bibliometric research on earthquake & Türkiye can be conducted by analyzing the indexes, databases, and types of publications outside the limitations of this study.

5. Limitations of the Study

One of the most important limitations of the study was the use of data from the WOS database. In addition, it was restricted to SCI-EXPANDED and SSCI in terms of WOS indexes. Although there were studies on history in 2024, the data in WOS were restricted to 1980 and 2023 within the framework of calendar year and analysis. In terms of publication type, the study was limited to articles and in terms of publication language, the study was limited to English.

References

AFAD. (2018). *Türkiye'de afet yönetimi ve doğa kaynaklı afet istatistikleri*. Afet ve Acil Durum Yönetimi Başkanlığı (AFAD). https://www.afad.gov.tr/kurumlar/afad.gov.tr/35429/xfiles/turkiye_de_afetler.pdf

AFAD. (2024a). *Açıklamalı afet yönetimi terimleri sözlüğü*. Afet ve Acil Durum Yönetimi Başkanlığı (AFAD). https://www.afad.gov.tr/aciklamali-afet-yonetimi-terimleri-sozlugu

AFAD. (2024b). *Aletsel dönem deprem kataloğu (1900-Günümüz M>=4.0)*. Afet ve Acil Durum Yönetimi Başkanlığı (AFAD).https://deprem.afad.gov.tr/event-instrumental

Akbıyık, A., & Tekindal, M. A. (2023). Deprem sonrası salgın oluşturma potansiyeline sahip enfeksiyon hastalıklarının belirlenmesi. *İzmir Katip Çelebi Üniversitesi Sağlık Bilimleri Fakültesi Dergisi, 8*(2), 489–499.

Akdemir, A., & Günaydın, T. İ. (2024). Türkiye'nin depremselliği ve burulma düzensizliği. *International Journal of Social and Humanities Sciences Research (JSHSR), 11*(104), 301–309. https://doi.org/10.5281/zenodo.10731964

Alfuqaha, O. A., Al-Masarwah, U. M., Farah, R. I., Yasin, J. A., Alkuttob, L. A., Muslieh, N. I., ... & Alshubbak, N. A. H. (2023). The impact of Turkey and Syria earthquakes on university students: Posttraumatic stress disorder symptoms, meaning in life, and social support. *Behavioral Sciences, 13*(7), Article 587. https://doi.org/10.3390/bs13070587

Allen, C. R. (1982). Comparisons between the North Anatolian Fault of Turkey and the San Andreas Fault of California. In A.M. Isikara & A. Vogel (Eds.), *Multidisciplinary Approach to Earthquake Prediction* (pp. 67–85). Vieweg+ Teubner Verlag.

Altindag, A., Ozen, S., & Sir, A. (2005). One-year follow-up study of posttraumatic stress disorder among earthquake survivors in Turkey. *Comprehensive Psychiatry, 46*(5), 328–333. https://doi.org/10.1016/j.comppsych.2005.01.005

Altun, F. (2018). Afetlerin ekonomik ve sosyal etkileri: Türkiye örneği üzerinden bir değerlendirme. *Sosyal Çalışma Dergisi, 2*(1), 1–15.

Arık, M., Azazi, H., & Akcan, M. B. (2023). A review of "earthquake" based on bibliometric mapping. *Journal of Current Debates in Social Sciences, 6*(2), 119–130.

Askan, A., Karimzadeh, S., Asten, M., Kilic, N., Şişman, F. N., & Erkmen, C. (2015). Assessment of seismic hazard in the Erzincan (Turkey) region: Construction of local velocity models and evaluation of potential ground motions. *Turkish Journal of Earth Sciences, 24*(6), 529–565. https://doi.org/10.3906/yer-1503-8

Avdar, R., & Avdar, R. (2022). Türkiye'de yaşanan doğa kaynaklı afetlerin sosyo-ekonomik etkileri. *Afet ve Risk Dergisi, 5*(1), 1–12.

Aydınbaş, G. (2023). Sosyoekonomik boyutuyla Türkiye'de depremler üzerine bir inceleme: Kahramanmaraş depremi örneği. In G. Karakuş, F. Yakut & N. D. Şimşek (Eds.), *Sosyal bilimlere çok yönlü yaklaşımlar: Tarih, turizm, eğitim, ekonomi, siyaset ve iletişim* (pp. 177–212). Özgür Yayın Dağıtım Ltd. Şti.

Balbay, E. G., Kurutkan, M. N., Yıldız, P., & Balbay, Ö. (2024). Earthquake-related lung diseases: A bibliometric analysis of publications. *Sağlık Bilimlerinde Değer, 14*(1), 8–17. https://doi.org/10.33631/sabd.1299277

Barka, A. A., & Kadinsky-Cade, K. (1988). Strike-slip fault geometry in Turkey and its influence on earthquake activity. *Tectonics, 7*(3), 663–684. https://doi.org/10.1029/TC007i003p00663

Berberian, M. (1995). Master blind thrust faults hidden under the Zagros folds-active basement tectonics and surface morphotectonics. *Tectonophysics, 241*(3–4), 193–224. https://doi.org/10.1016/0040-1951(94)00185-C

Bohnhoff, M., Dresen, G., Ceken, U., Kadirioglu, F. T., Kartal, R. F., Kilic, T., ... & Mencin, D. (2017). GONAF–The borehole geophysical observatory at the North Anatolian Fault in the eastern Sea of Marmara. *Scientific Drilling, 22*, 19–28. https://doi.org/10.5194/sd-22-19-2017

Bohnhoff, M., Ickrath, M., & Dresen, G. (2016). Seismicity distribution in conjunction with spatiotemporal variations of coseismic slip and postseismic creep along the combined 1999 Izmit-Düzce rupture. *Tectonophysics, 686*, 132–145. https://doi.org/10.1016/j.tecto.2016.07.029

Bozkurt, E. (2001). Neotectonics of Turkey–A synthesis. *Geodinamica Acta, Special Issue: SI, 14*(1–3), 3–30. https://doi.org/10.1016/S0985-3111(01)01066-X

Cakir, Z., Akoglu, A. M., Belabbes, S., Ergintav, S., & Meghraoui, M. (2005). Creeping along the Ismetpasa section of the North Anatolian Fault (Western Turkey): Rate and extent from InSAR. *Earth and Planetary Science Letters, 238*(1–2), 225–234. https://doi.org/10.1016/j.epsl.2005.06.044

Carvalho, M. M., Fleury, A., & Lopes, A. P. (2013). An overview of the literature on technology roadmapping (TRM): Contributions and trends. *Technological Forecasting and Social Change, 80*(7), 1418–1437. https://doi.org/10.1016/j.techfore.2012.11.008

Cetin, K. O., Cakir, E., Ilgac, M., Can, G., Soylemez, B., Elsaid, A., ... & Gor, M. (2021). Geotechnical aspects of reconnaissance findings after 2020 January 24th, M6.8 Sivrice–Elazig–Turkey earthquake. *Bulletin of Earthquake Engineering, 19*(9), 3415–3459. https://doi.org/10.1007/s10518-021-01112-1

Chen, Y., Lin, M., & Zhuang, D. (2022). Wastewater treatment and emerging contaminants: Bibliometric analysis. *Chemosphere, 297*, 133932. https://doi.org/10.1016/j.chemosphere.2022.133932

Çelik, A. K. (2023). Deprem sonrası travma belirtileri, umut ve iyi oluş arasındaki ilişkinin incelenmesi. *TRT Akademi, 8*(18), 574–591. https://doi.org/10.37679/trta.1275268

Dirik, D., Eryılmaz, İ., & Erhan, T. (2023). Post-truth kavramı üzerine yapılan çalışmaların VOSviewer ile bibliyometrik analizi. *Sosyal Mucit Academic Review, 4*(2), 164–188. https://doi.org/10.54733/smar.1271369

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research, 133*, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

EM-DAT. (2024). Entry criteria: Minimal requirements for a disaster to be entered in EM-DAT. https://doc.emdat.be/docs/protocols/entry-criteria/.

Genç, F. N. (2007, 5–7 Aralık). *Türkiye'de kentleşme ve doğal afet riskleri ile ilişkisi* [Bildiri Sunumu]. TMMOB Afet Sempozyumu, Ankara, Türkiye.

Gülyol, Y. (2024). Deprem kaynaklı ikincil travmatik strese genel bir bakış. *HABITUS Toplumbilim Dergisi, 5*, 37–60.

Harada, N., Shigemura, J., Tanichi, M., Kawaida, K., Takahashi, S., & Yasukata, F. (2015). Mental health and psychological impacts from the 2011 Great East Japan Earthquake Disaster: A systematic literature review. *Disaster and Military Medicine, 1*, 1–12. https://doi.org/10.1186/s40696-015-0008-x

Ho, Y. S. (2013). Comments on "A bibliometric study of earthquake research: 1900–2010." *Scientometrics, 96*, 929–931. https://doi.org/10.1007/s11192-012-0915-2

Işık, E., Harirchian, E., Büyüksaraç, A., & Levent Ekinci, Y. (2021). Seismic and structural analyses of the eastern Anatolian region (Turkey) using different probabilities of exceedance. *Applied System Innovation, 4*(4), Article 89. https://doi.org/10.3390/asi4040089

Kaçmaz, K. S., & Kaçmaz, C. (2023). Çocuklarda deprem sonrası rehabilitasyon çalışmalarının bibliyografik analiz yöntemiyle incelenmesi: Sistematik derleme. *İzmir Katip Çelebi Üniversitesi Sağlık Bilimleri Fakültesi Dergisi, 8*(2), 537–543.

Kalafat, D. (2023). Türkiye'de deprem oluş düzenleri. *Yerbilimleri, 44*(3), 222–233.

Karagöz, K. (2007, 5–7 Aralık). *1999 Marmara depreminin ekonomik etkileri: Ekonometrik bir yaklaşım* [Bildiri Sunumu]. TMMOB Afet Sempozyumu, Ankara, Türkiye.

Karakas, G., Nefeslioglu, H. A., Kocaman, S., Buyukdemircioglu, M., Yurur, T., & Gokceoglu, C. (2021). Derivation of earthquake-induced landslide distribution using aerial photogrammetry: The January 24, 2020, Elazig (Turkey) earthquake. *Landslides, 18*(6), 2193–2209. https://doi.org/10.1007/s10346-021-01660-2

Kılıç, M. (2023). Kahramanmaraş depremlerinin etkilediği 10 ilin il risk azaltma planlarındaki yapı stoğu durumlarının incelenmesi ve deprem sonrası durum ile karşılaştırılması. *Acil Yardım ve Afet Bilimi Dergisi, 3*(2), 49–56.

Liang, Y., Zeng, H., Liu, Y. G., Xu, A. M., & Liu, W. H. (2021). Prevalence of post-traumatic stress disorder after earthquakes among the elderly in China: A meta-analysis. *World Journal of Emergency Medicine, 12*(2), 137–142. https://doi.org/10.5847/wjem.j.1920-8642.2021.02.009

Liu, H., Hong, R., Xiang, C., Lv, C., & Li, H. (2020). Visualization and analysis of mapping knowledge domains for spontaneous combustion studies. *Fuel, 262*, Article 116598. https://doi.org/10.1016/j.fuel.2019.116598

Liu, X., Zhan, F. B., Hong, S., Niu, B., & Liu, Y. (2012). A bibliometric study of earthquake research: 1900–2010. *Scientometrics, 92*(3), 747–765. https://doi.org/10.1007/s11192-011-0599-z

Lu, W. T., Zhao, X. C., Wang, R., Li, N., Song, M., Wang, L., ... & Wang, X. Y. (2023). Long-term effects of early stress due to earthquake exposure on depression symptoms in adulthood: A cross-sectional study. *Injury, 54*(1), 207–213. https://doi.org/10.1016/j.injury.2022.07.047

Martino, S., Lenti, L., & Bourdeau, C. (2018). Composite mechanism of the Büyükçekmece (Turkey) landslide as conditioning factor for earthquake-induced mobility. *Geomorphology, 308*, 64–77. https://doi.org/10.1016/j.geomorph.2018.01.028

Merigó, J. M., Mas-Tur, A., Roig-Tierno, N., & Ribeiro-Soriano, D. (2015). A bibliometric overview of the *Journal of Business Research* between 1973 and 2014. *Journal of Business Research, 68*, 2645–2653. https://doi.org/10.1016/j.jbusres.2015.04.006

Morante-Carballo, F., Bravo-Montero, L., Montalván-Burbano, N., & Carrión-Mero, P. (2023). Bibliometric analysis of earthquake research in America: A comparative study using Web of Science and Scopus databases. *International Journal of Safety & Security Engineering, 13*(5), 965–973. https://doi.org/10.18280/ijsse.130520

Okutkan, C., & Gün, R. Ş. (2023). Türkiye'de depremle ilgili eğitim alanında yapılan lisansüstü tezlerin bibliyometrik analiz yöntemiyle incelenmesi. *Korkut Ata Türkiyat Araştırmaları Dergisi, 13*, 1699–1715. https://doi.org/10.51531/korkutataturkiyat.1394975

Özceylan, D., & Coşkun, E. (2012). Türkiye'deki illerin sosyo-ekonomik gelişmişlik düzeyleri ve afetlerden sosyal ve ekonomik zarar görebilirlikleri arasındaki ilişki. *İstanbul Üniversitesi İşletme Fakültesi Dergisi, 41*(1), 31–46.

Özel, G., & Solmaz, A. (2012). Türkiye'de deprem tekrarlanma zamanının tahmini ve neotektonik bölgelere göre depremselliğin Markov zinciri ile incelenmesi. *Çankaya University Journal of Science and Engineering, 9*(2), 125–138.

Paradisopoulou, P. M., Papadimitriou, E. E., Karakostas, V. G., Taymaz, T., Kilias, A., & Yolsal, S. (2010). Seismic hazard evaluation in western Turkey as revealed by stress transfer and time-dependent probability calculations. *Pure and Applied Geophysics, 167*(8–9), 1013–1048. https://doi.org/10.1007/s00024-010-0085-1

Parlak, B. (2023). Bütünleşik afet yönetişimi: Hibrid model önerisi. *TESAM Strateji Dergisi, 3*, 21–24.

Pinar, A., Honkura, Y., & Kikuchi, M. (1996). A rupture model for the 1967 Mudurnu Valley, Turkey earthquake and its implication for seismotectonics in the western part of the North Anatolian Fault Zone. *Geophysical Research Letters, 23*(1), 29–32. https://doi.org/10.1029/95GL03667

Rockwell, T., Barka, A., Dawson, T., Akyuz, S., & Thorup, K. (2001). Paleoseismology of the Gazikoy-Saros segment of the North Anatolian Fault, northwestern Turkey: Comparison of the historical and paleoseismic records, implications of regional seismic hazard, and models of earthquake recurrence. *Journal of Seismology, 5*(3), 433–448. https://doi.org/10.1023/A:1011435927983

Stein, R. S., Barka, A. A., & Dieterich, J. H. (1997). Progressive failure on the North Anatolian Fault since 1939 by earthquake stress triggering. *Geophysical Journal International, 128*(3), 594–604. https://doi.org/10.1111/j.1365-246X.1997.tb05321.x

Şahin, R., & Bilik, M. B. (2024). Deprem ve yoksulluk ilişkisi. *Sosyoloji Dergisi, 47*, 77–113. https://doi.org/10.59572/sosder.1462907

Taymaz, T., Jackson, J., & McKenzie, D. (1991). Active tectonics of the north and central Aegean Sea. *Geophysical Journal International, 106*(2), 433–490. https://doi.org/10.1111/j.1365-246X.1991.tb03906.x

Ünal, Y., Işık, E., Şahin, S., & Yeşil, S. T. (2017). Sağlık afet çalışanlarının depremlere ilişkin bireysel hazırlık düzeylerinin değerlendirilmesi: Ulusal Medikal Kurtarma Ekipleri (UMKE) derneği örneği. *Dokuz Eylül Üniversitesi Tıp Fakültesi Dergisi, 31*(2), 71–80.

Van Eck, N., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics, 84*(2), 523–538. https://doi.org/10.1007/s11192-009-0146-3

Wang, C., Wu, J., He, X., Ye, M., Liu, W., & Tang, R. (2019). Emerging trends and new developments in disaster research after the 2008 Wenchuan earthquake. *International Journal of Environmental Research and Public Health, 16*(1), Article 29. https://doi.org/10.3390/ijerph16010029

Wang, S., Shi, X., Chen, X., Zhu, Y., Chen, H., & Fan, F. (2021). Earthquake exposure and PTSD symptoms among disaster-exposed adolescents: A moderated mediation model of sleep problems and resilience. *Frontiers in Psychiatry, 12*, Article 577328. https://doi.org/10.3389/fpsyt.2021.577328

Yamamoto, Y., Kalafat, D., Pinar, A., Takahashi, N., Polat, R., Kaneda, Y., & Ozener, H. (2022). Seismic velocity structure along the North Anatolian Fault beneath the Central Marmara Sea and its implication for seismogenesis. *Geophysical Journal International, 228*(1), 396–411. https://doi.org/10.1093/gji/ggab351

Yu, Y., Li, Y., Zhang, Z., Gu, Z., Zhong, H., Zha, Q., ... & Chen, E. (2020). A bibliometric analysis using VOSviewer of publications on COVID-19. *Annals of Translational Medicine, 8*(13), Article 816. https://doi.org/10.21037/atm-20-4235