Arab Islamic historical documents as a climatological source in the Maghreb

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Arab historiographical studies can provide detailed climatic data and information on natural disasters through the exploitation of academically revised and re-edited ancient manuscripts. Maghrebian scholars have written valuable chronicles and annals that can form the basis of relevant paleoclimatic series.

Documentary data from all over the world can contribute to our understanding of the climate of the past. Such data are found in the archives of societies, and it is the aim of historical climatologists to give these documents voice and credibility. Progress in codicology and paleography has made it possible to examine old manuscripts more efficiently (Mathisen 2008). In particular, critical source editions and transcription projects have made these handwritten texts accessible to researchers from disciplines outside of the historical sciences. Apart from this indisputable progress, however, uncountable manuscripts still remain unexplored in archives and libraries around the world (Zaydān 1997). The first attempts to make such manuscripts accessible to a broader audience were made by Benedictine Monks in the 17th century. Frenchman Bernard de Montfaucon (1655–1741), author of Bibliotheca bibliothecarum, is considered one of the founders of this field.

Arabic historiography
The manuscripts discussed here are examples of a long and noble tradition of historiographical writing by the Arab people that mostly characterizes urban life (e.g. Ibn Khaldun 1378). They are also a mirror of the golden era of literature in the Arabic world that spanned nearly a century, starting from 753 CE (al-Jābirī 2009). The study of such manuscripts is only one of the approaches for analyzing the cultural transformations of past Arab societies, but alone, this is not sufficient; it is also crucial to place Arab historiography in its physical, historical, and geographical context, as was done by al-Munajjid (1960), Pedersen (1984), Sayyid (1997), Sāmarrā’ī (2001), Binebine (2004), Gacek (2009), and others. The editing process of Arabic manuscripts entails the collection of as many available copies of a specific manuscript as possible in order to compare and re-edit them in an orderly manner using legible and clear writing. Moreover, indexations and further contextualization of works within the fields of codicology and paleography are a part of the editing process. The final product can be read by non-specialists in Arabic literature, such as paleoclimatologists who aim to identify the relevant climatic information. Despite the various efforts made, however, the field of Arab manuscript research is still in a rather embryonic state with hundreds of thousands, if not several millions, of manuscripts to explore.

Weather descriptions in Arabic historiography
Arabic historiography, which is primarily a narration of human actions, might be subject to personal, political, religious, and/or otherwise biased interpretations, but this usually does not interfere with the descriptions of weather and natural conditions. Regarding weather conditions, accurate recording of heavy rains, extreme cold, or solar eclipses are available in Arabic historiographic texts. These are examples of the types of observations that are most likely to be of use in reconstructing paleoclimatic timeseries. Moreover, extreme natural events and sudden disasters, famines, and epidemics are also mentioned in the manuscripts, due to their severe impact on human societies.

Examples of weather descriptions
One of the pioneers of general concepts of geography in the Maghreb region was al-Idrīsī (d. 1165), born in Ceuta, which was then subordinate to the Almoravid State in Morocco. He was a scientist, writer, geographer, and cartographer who lived in Palermo, Sicily, in the kingdom of Roger II. Apart from his geographical and cartological work, al-Idrīsī is best known for his Nuzhat al-mushtaq fi ikhtirāq al-āfāq (نذرة المستحقل في اختراق الأفق), or in Latin Tabula Rogeriana, which translates into “the map of Roger” – a book that is organized into seven climate zones of the Earth. He analyzed the succession of seasons and meteorological conditions according to the latitude and longitude. In
the introduction of his work, al-Idhāri writes: "The Earth is divided into two parts, between them the equator which is the longest line in the sphere. The circularity of the Earth at the equator position is three hundred and sixty degrees, and the degree is twenty-five parasangs... However, sixty-four degrees from the equator there are no building in the Earth due to the severity of the cold, the majority of living creatures are in the northern quarter of the Earth, and the southern quarter, which is above the equator is uninhabited due to its heat..." Ibn Khalidun (d. 1406), a social scientist and historian born in Tunisia, included a passage about the regional variation of the climate and its impact on the human character in his book al-Muqaddimah (الالموقدمة) (1378/1379). In his view, the inhabitants of temperate zones are temperate in their physical appearance and character and in their ways of life. They have all the natural conditions necessary for a "civilized" life, such as a means of making a living, dwellings, crafts, political leadership, and royal authority. They thus have religious groups, dynasties, sciences, countries, cities, buildings, horticulture, splendid crafts, and everything else that was considered "temperate".

Moreover, other Maghrebian historians developed a detailed style for ordering historical events, including descriptions of weather events at the time, which can be found in many precious manuscripts, such as Kitāb al-īstiqāsā li-akhbār duwal al-Maghrib al-Aqṣā (الكتاب الاستقصاء لأخبار دول المغرب الأقصى) authored by al-Nāṣirī (d. 1897). Al-Nāṣirī is considered to be one of the best historians of the 19th century in Morocco, as he compiled the entire history of Morocco in several volumes, as well as that of the Islamic West starting with the Islamic conquest by Oqba Ibn Nāfi at the beginning of the 8th century until the end of the 19th century. These volumes include numerous records of climatic information, which indicate, for instance, the wind speed: "In 919 CE, the strong winds uprooted trees and demolished houses in Fez (Morocco) and people stayed in the mosques." The same work mentions — apart from weather conditions and natural disasters — weather-related agricultural and economic events and processes, even with some details of the weight of fallen hailstones: "In 331 AH (Year of the Hijra, roughly equivalent to 942 CE), such as: "In 942 CE, the great flood of the Cordoba river..." In 333 AH (944 CE), he mentions events with extraordinary temporal and spatial precision, sometimes specifying the exact timing: "This year, a major earthquake occurred in Cordoba, Spain, during the year of 331 AH (Year of the Hijra, roughly equivalent to 942 CE), such as: "In 942 CE, the great flood of the Cordoba river..." In 333 AH (944 CE), he mentions events with extraordinary temporal and spatial precision, sometimes specifying the exact timing: "This year, a major earthquake occurred in Cordoba, Spain, during the year of 331 AH (Year of the Hijra, roughly equivalent to 942 CE), such as: "In 942 CE, the great flood of the Cordoba river..."

In his al-Bayān manuscript (Fig. 1), Ibn Idhārī mentions several important events that occurred in Cordoba, Spain, during the year of 331 AH (Year of the Hijra, roughly equivalent to 942 CE), such as: "In 942 CE, the great flood of the Cordoba river..." In 333 AH (944 CE), he mentions events with extraordinary temporal and spatial precision, sometimes specifying the exact timing: "This year, a major earthquake occurred in Cordoba, Spain, during the year of 331 AH (Year of the Hijra, roughly equivalent to 942 CE), such as: "In 942 CE, the great flood of the Cordoba river..."

Further potential

Historical climatology research demonstrates the great potential of the archives of societies of the Maghreb region for the reconstruction of past climate of the Mediterranean and beyond. This documentary data is characterized by high precision and a general accuracy of the descriptions of events. To date, texts from Arab historiography are hardly exploited in historical climatology. Furthermore, it must be emphasized that private and public libraries around the world still contain important collections of unused manuscripts (Fig. 2), which may provide relevant data for the reconstruction of past climates in the western Mediterranean.

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Figure 2: Collection of manuscripts in a private library belonging to the heirs of Abdelkader Meklach in Tétouan, Morocco.