

Chapter 7

Geochemistry and Sedimentology Study of a Core From Chott Geuttar: Central Tunisia Climatic and Environmental Significance

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ABSTRACT

Endoreic saline systems in Tunisia such as that of Chott El Guettar recorded the climatic changes as well as the setting of millennial cycles. This study deals with high-resolution proxies (colors variability, geochemistry, magnetic susceptibility, and grain size distribution) to find the different cycles. Cycles should be attributed either to internal or external forcing. The output of this study demonstrates a sun-driven Holocene cyclostratigraphy of 1000yr that was previously discussed in the literature. Since color studies were confirmed by direct analyses, this method was used to carry a higher resolution. The solar periodicity clearly identified with a continuous cycle of around 2500 years and with two others of around 1000 and 1660 years only during the Early Holocene. This work confirmed the cycles found by colors study through the real analyses such as geochemical and magnetic measurement.

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INTRODUCTION

Water and air circulations around the planet change as the climate changes. Nonetheless, some regions immediately respond; others should wait a lapse of time to modify the record of their depositional environments. North Africa is climatically susceptible, and it is the first region in the Mediterranean basin to be affected by climate change. For academic and practical objectives, saline systems have been an important topic of study. Economically, they provide valuable evaporate minerals and brines (Tagorti et al., 2013; Ben Smida, 2016). Sedimentological, they give a lot of information about the sedimentary history and the depositional environment (Essefi et al., 2013). To climatologists, the sedimentary records of these systems could be a subject of paleoclimatic (Essefi et al., 2013; 2014; Mefteh et al., 2015) and cyclostratigraphic (Essefi et al., 2014) research.

Sebkhas or chott are considered wetlands. Sebkha is an Arabic word that refers to the salt lakes that are subject to periodic inundations. It is a depression occupied by a generally salty lake and where evaporites are deposited. Throughout human history, wetlands have been considered a valuable natural resource (Scholz and Lee, 2005). 'Wetlands are areas of marsh, fen, peatland, or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish, or salt, including areas of marine water the depth of which at low tide does not exceed six meters,' according to the Ramsar Convention, which brought wetlands to the attention of the international community (Goodwin, 2017). Wetlands are more prevalent in areas where precipitation exceeds water loss through evapotranspiration and surface runoff (Scholz and Lee, 2005). Moreover, 'Wetlands are a halfway world between terrestrial and aquatic ecosystems and exhibit some of the characteristics of both,' says another, more succinct definition (Smith, 1980). In fact, chott El Geuttar is considered wetlands. It is an endorheic system that never has a link to the sea due to the uplifted reliefs avoiding any contact with marine environments (Essefi et al., 2014).

Numerous saline systems have been established in Tunisia. Some of them are endorheic (Essefi, 2009; 2013; Bedoui, 2016; Bedoui et al., 2022); others are exoreic (Lakhdar, 2009). In this part, the studied systems will be introduced in terms of geographic, geologic, and climatic settings. These saline systems are candidates to record the climatic variability. Moreover, the studied saline systems will be introduced in their Mediterranean framework. Then, global phenomena and their effect on North Africa such as the Mediterranean Oscillation (MO), the North Atlantic Oscillation (NAO), and the Atlantic Multidecadal Oscillation (AMO) were introduced to understand the change in El Guettar saline systems with a global line of thinking.

As Complicated areas in which many factors can intervene, saline environments must be studied globally; that is to say that many specialties are involved. The study of saline environments is at the crossroads of many specialties. For this reason,

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