



Frasnian conodont abundance and environmental control in northwestern Algerian Sahara

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ABSTRACT

The conodont abundance and diversity of the Frasnian (Upper Devonian) is analyzed in two well-exposed geological sections, so-called Ben Zireg and South Marhouma of the northwestern Algerian Sahara. The results presented herein show a significant conodont abundance in the Ben Zireg section with 117 elements/kg, which is higher than that observed in the South Marhouma section with only 14 elements/kg. The magnetic susceptibility measurements presented herein may suggest the impact of the terrigenous input on conodont abundance. Indeed, the strata belonging to the middle Frasnian substage in both sections expose higher MS values matching with lower conodont diversity. However, the decrease of the MS signal is correlated with a constant increase in conodont abundance. This new quantitative MS-conodont, revealed by an inverse correlation between MS and conodont abundance, suggesting that MS could potentially serve as a proxy for paleoecological interpretations.

The comparison between Ben Zireg and southern Marhouma illustrates the key role of paleogeography in shaping conodont abundance along the stable Gondwana margin. Proximal areas such as Marhouma, located closer to the paleocontinents, were more exposed to elevated detrital input, which likely suppressed conodont proliferation and led to reduced abundance. In contrast, more distal settings like Ben Zireg were exposed to lower terrigenous influx, resulting more optimal ecological conditions that supported higher conodont abundance and diversity.

1. Introduction

The Frasnian stage records several major events, such as the Upper and Lower Kellwasser anoxia, perturbing significantly the marine biodiversity within a short span of 7 Ma. In fact, this period emphasizes one of the highest transgressions in Earth's history, favouring a global expansion of hemipelagic platforms (Haq and Schutter, 2008). This long-term transgression led to multiple occurrences of anoxia that spread all over the North African shelf (Lüning et al., 2004), causing mass extinctions hitting the marine life at the Frasnian/Famennian boundary. In this context, Ben Zireg (Bechar basin) and Marhouma (Ougarta basin) sections represent the best-selected sections in the Algerian Sahara Platform to study global environmental perturbations across the Frasnian due to their well-exposed strata and the

biochronology data already known (Göddertz, 1987; Petter, 1959; Mahboubi and Gatovsky, 2015; Mahboubi et al., 2015). Previous results based on multiple approaches analyses revealed an outer ramp setting for both Ben Zireg and South Marhouma sections with fine-grained limestone facies (Mahboubi et al., 2019).

Despite their valuable interest in correlating and dating the Upper Devonian strata, only few studies have focused on conodonts in Algerian sections. Among these, the Ben Zireg section has yielded the highest conodont diversity, with 117 elements per kilogram and 48 identified species in comparison to other sections near the Western African Craton and Hoggar Shield, where conodont occurrences are sparse (Wendt et al., 2006). However, the recent conodont examinations of the South Marhouma section revealed poorly preserved specimens and limited diversity, with a total abundance of 14 elements per kilogram of

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