

Soft-Rock Deformation in Carbonate Series Associated to the Southern Atlas Margin Uplift: Characterization, Dating and Implications

Aurelien Pierre¹ and Christophe Durllet²

¹Talisman Energy Inc., Calgary, Alberta, Canada

²Université de Bourgogne, laboratoire Biogéosciences, Dijon, France

Abstract

Soft-sediment deformation over a wide area (several square kilometers) can be induced by various processes including earthquakes. Numerous studies have established univocal criteria in order to identify the seismic geobodies. Seismic activity often relates to tectonic movements. Seismic activity can also be associated with numerous other causes that include volcanism and marine landslides. In the Holocene to Pleistocene sedimentary series, many studies showed the effect of such events on the sedimentary record. In the much more ancient series like the Jurassic or Cretaceous, it is more difficult to clearly establish genetic relationships between soft deformed beds and particular seismic activity.

Within the Atlasic Basin, Jurassic formations accumulated in an aborted transtensional basin that was bounded by the Mesetas microplates to the north and southwest, the Saharan craton to the south and open to the Tethys Ocean to the East. The Amellago transect is a unique exposure of a Lias-Dogger carbonate system (Durllet et al, 2001, Bourrillot et al. 2008, Pierre et al. 2010). The continuity offers a unique opportunity for observation, semi-quantification of the deformation and dating of a deformation event. Previous studies (Durllet et al, 2001, Bourrillot et al. 2008, Pierre et al. 2010) established the regional stratigraphic framework of the Amellago transect. In Amellago area, the average subsidence is 70m/my over a 10 my period (Pierre et al. 2010). This important subsidence allowed a complete record of the Aalenian and the possible associated geodynamic implications.

The aim of this paper is (1) to recognize and date a mappable seismicite in the Jurassic carbonates of the Amellago area using unequivocal criteria and (2) to clarify and recognize the influence of tectonism in the Atlas basin during the post rift thermal relaxation period.

References Cited

Bourrillot, R., Neige, P., Pierre, A., Durllet, C., 2008, Early-Middle Jurassic Lytoceratid ammonites with constrictions from Morocco: paleobiogeographical and evolutionary implications. *Palaeontology*, Vol. 51, n° 3, pp. 597-609.

Durllet, C., Almeras, Y., Chellai, E. H., Elmi, S., Le Callonnec, L., Lezin, C., Neige, P. 2001. Anatomy of a Jurassic carbonate ramp: a continuous outcrop transect across southern margin of the High Atlas (Morocco). *Géologie Méditerranéenne*, Vol .28, pp. 57-61.

Pierre, A., Durllet, C., Razin, P., and Chellai, E. (2010). Spatial and temporal distribution of ooids along a Jurassic carbonate ramp: Amellago outcrop transect, High-Atlas, Morocco. Geological Society London Special Publications, vol. 329, pp 65-88.