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The Upstream and Downstream impact of Milankovitch cycles in continental nonmarine sedimentary records

Luis Valero (1), Miguel Garcés (1), Pedro Huerta (2), and Lluís Cabrera (1)

(1) Departament d'Estratigrafia, Paleontologia i Geociències Marines, Facultat de Geologia, Universitat de Barcelona, Spain (geo.valero@gmail.com), (2) Departamento de Geología, Escuela Politécnica Superior de Ávila, Universidad de Salamanca Ávila, Spain

Discerning the effects of climate in the stratigraphic record is crucial for the comprehension of past climate changes. The signature of climate in sedimentary sequences is often assessed by the identification of Milankovitch cycles, as they can be recognized due to their (quasi) periodic behaviour. The integration of diverse stratigraphic disciplines is required in order to understand the different processes involved in the expression of the orbital cycles in the sedimentary records.

New advances in Stratigraphy disclose the different variables that affect the sedimentation along the sediment routing systems. These variables can be summarized as the relationship between accommodation and sediment supply (AS/SS), because they account for the shifts of the total mass balance of a basin. Based in these indicators we propose a synthetic model for the understanding of the expression of climate in continental basins. Sedimentation in internally drained lake basins is particularly sensitive to net precipitation/evaporation variations. Rapid base level oscillations modify the AS/SS ratio sufficiently as to mask possible sediment flux variations associated to the changing discharge. On the other hand, basins lacking a central lacustrine system do not experience climatically-driven accommodation changes, and thus are more sensitive to archive sediment pulses. Small basins lacking carbonate facies are the ideal candidates to archive the impact of orbital forcing in the landscapes, as their small-scale sediment transfer systems are unable to buffer the upstream signal. Sedimentation models that include the relationship between accommodation and sediment supply, the effects of density and type of vegetation, and its coupled response with climate are needed to enhance their reliability.