

Disentangling sea level fluctuations and climate changes across the Sinemurian-Pliensbachian global carbon cycle perturbation

(Proposers: Dr. Marco Franceschi, Prof. Nereo Preto)

Project description:

A global disturbance of the C-cycle characterizes the Sinemurian-Pliensbachian boundary in the Early Jurassic, known as the Sinemurian Pliensbachian Boundary Event (SPBE). At this time, in Western Tethys carbonate platforms were developing and were separated by deep basins. In Eastern Tethys (South China), a transgression was occurring, and led to the formation of the Guangdong Sea while Large lacustrine basins were developing in the eastern portion of Laurasia (Sichuan Basin).

The SPBE corresponds to an important reorganization of the shallow water carbonate systems in the Western Tethys, associated to profound modifications in the carbonate factories and to unique bioevents. The SPBE is associated to subaerial exposure of carbonate shelves in the Southern Alps and, intriguingly, it shares this feature with other global C-isotope perturbations, namely the Late Carnian Carnian Pluvial Episode and the Early Jurassic Toarcian Ocean Anoxic Event. This suggests potential cause-effect relationships between global C-cycle perturbations and sea-level fluctuations, but explanations are so far only hypothetical and the mechanisms on which these causal links could rely are unclear.

We propose to investigate this topic by examining Early Jurassic marine series encompassing the SPBE in the Southern Alps, Central Apennines and Guangdong Province (southeast China). The PhD candidate will tackle this project by applying an integrated stratigraphy approach relying on field and lab work (e.g., stable isotopic stratigraphy; carbonate petrography) on sections in the mentioned areas. The broad objective will be establishing Tethys-wide correlations and reconstructing the eustatic curve in the Sinemurian-Pliensbachian interval in the effort of precisely determining the relative timing of the SPBE C-isotope perturbation and sea-level fluctuations.

Available financial resources and support:

DOR grants (Preto, Franceschi), Open Project of Wuhan State Key Lab for GPMR (Franceschi), logistic and operative support to field work (Osservatorio Geologico Coldigioco).