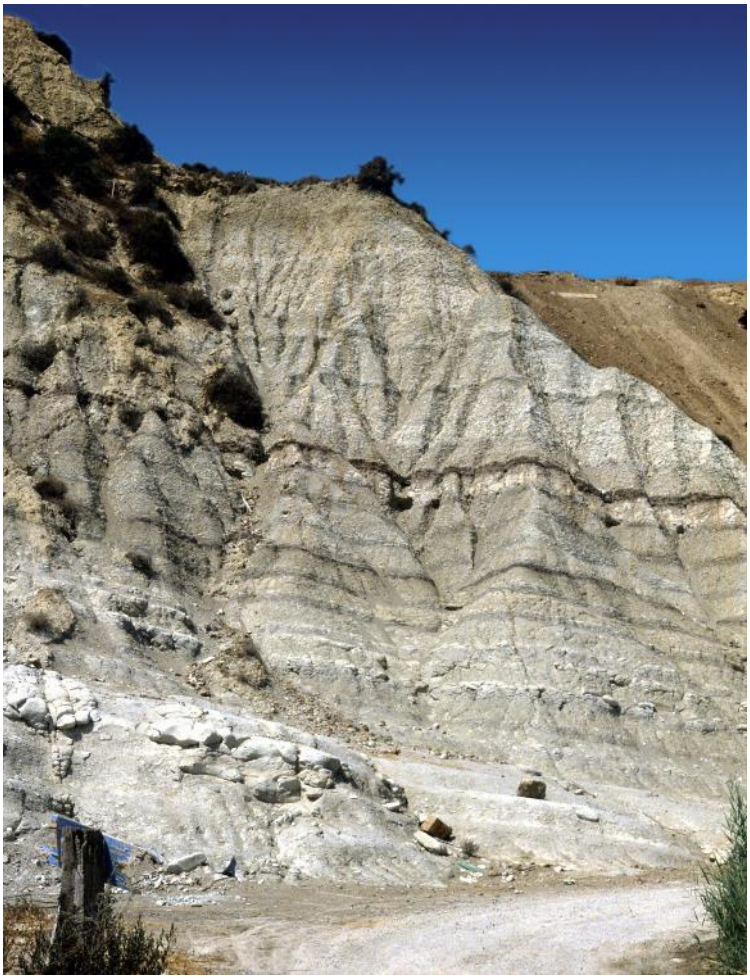
The Gelasian-Calabrian climate transition: a central Mediterranean perspective

(*Proposer: Prof. Luca Capraro*)

The exceptionally thick and fossil-rich successions of recently uplifted, open marine sediments that are exposed along the shoreline of Southern Italy ad Sicily have been investigated since the early days of stratigraphy. Since the 19th century, these successions have been utilized for establishing marine stages that, in many instances, are still employed worldwide (Cita et al., 2006; Rio et al., 2003). It is generally agreed that the interval between 2.6 and 0.7 Ma, which includes the whole Gelasian and Calabrian Stages, is a time of dramatic changes in the global climate system, with a gradual yet sharp increase in the severity of glacial intervals in response to an overall augment of ice cover in the whole Northern hemisphere (Head et al., 2008; Pillans and Gibbard, 2012).



In particular, the most recent thrust towards the "modern" climate variability is represented by a long-lived episode known as the "mid-Pleistocene revolution" or "Early-Middle Pleistocene transition" (EMPT; ca. 1.2–0.6 Ma), when the low-amplitude and high-frequency (41-ka) climatic periodicity was progressively replaced by high-amplitude, low-frequency (100-ka) cycles. This scenario points to a slow build-up of major ice caps during glacial periods and their rapid melting in the wake of a transition towards milder climates, thus implying the existence of a marked asymmetry and non-linear behavior of the climatic system.

In the central Mediterranean on-land record, documentation of this critical interval is excellent and marine sections encompassing the Gelasian-Calabrian interval are very common. In particular, the reference areas are the Crotone sedimentary basin (Calabria, Southern Italy), which hosts an extensive record of richly fossiliferous, hemipelagic sediments laid in a shelfal setting, and the southern coastline of Sicily, where a deep-sea record of the Gelasian and its transition to the Calabrian is spectacularly exposed.

The research project proposed hereby will focus on documenting the changes in regional and global climates that took place over this critical interval by means of a micropaleontological and geochemical approach, namely the reconstruction of stable oxygen and carbon isotope records for

selected foraminifer species and the analysis of terrestrial pollen. This task is to be accomplished by collecting and integrating new data from a number of sections in the Crotone area and/or Southern Sicily, which have been already selected during previous investigations.

These records, once fixed within a tight chronostratigraphic framework based on paleomagnetic and biotic evidences, will permit reconstructing the dynamics of natural systems before and during the EMPT in the central Mediterranean, as well as improving its global correlation potential.

Available financial support on May, 24: DOR and financial support from external institution (e.g., INGV) for analytical expenses. Scientific collaborations and exchanges with other national and foreign institutions (e.g., INGV, Universities of Venezia, Bologna and Palermo, Université d'Orléans (France), Cambridge University (UK), Tongji and Xi'an Universities (China), etc.) are planned.