

Ichnological record of environmental changes in early Quaternary (Gelasian– Calabrian) marine deposits of the Stirone Section, northern Italy

Peter Pervesler,^{1*} Alfred Uchman,² Johann Hohenegger,¹ And Stefano Dominici³

¹University of Vienna, Department of Palaeontology, Althanstrasse 14, A-1090 Vienna, Austria, peter.pervesler@univie.ac.at, johann.hohenegger@univie.ac.at; ²Jagiellonian University, Institute of Geological Sciences, ul. Oleandry 2a, Pl-30-063 Kraków, Poland, alfred.uchman@uj.edu.pl; ³University of Florence, Museo di Storia Naturale, Via La Pira 4, 50121 Florence, Italy, stefano.dominici@unifi.it

*Corresponding author.

¹palaios.ku.edu

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Correspondence Analysis

ABSTRACT

Nineteen ichnotaxa occur in a 94-m-thick section of Gelasian–Calabrian siliciclastic deposits along the Stirone River. The most common trace fossils are grouped in 17 clusters based on a K-Means Cluster Analysis. This grouping is related to distal, archetypal and proximal *Cruziana* ichnofacies. Successions of ichnotaxa and clusters as represented in Detrended Correspondence Analyses determine environmental trends that helped establish a sequence stratigraphic scheme, which is not always obvious in the sedimentary record. The depositional sequences are separated by three sequence boundaries (A–C), which are well expressed in the ichnological record. Primary fabrics are less frequent in the archetypal and proximal *Cruziana* ichnofacies than in their idealized models. This is probably due to less intense storms in the small and protected paleo-Adriatic Sea and to intense bioturbation. Small-scale intervals with low ichnodiversity and ichnofabrics commonly dominated by one trace fossil are present. This suggests stressed conditions and opportunistic colonization related to small, but probably frequent, seafloor disturbances. The record of these disturbances—possibly caused by storm and bottom currents, deposition, or possibly erosion—has been obliterated by subsequent bioturbation. The disappearance of *Schaubcylindrichnus*, the smaller size of *Scolicia* and *Ophiomorpha*, and a slight decrease in trace fossil diversity in the Calabrian part of the section is interpreted to record climate cooling. This is also supported by the general decrease in ichnodiversity in Pleistocene versus Pliocene shallow-marine to slope siliciclastic facies.