COMBINING «NEW» AND TRADITIONAL CHRONOMETERS FOR THE CALIBRATION OF BASIN FORMATION AND PROCESSES RECORDED IN ANCIENT SEDIMENTS. EXAMPLES FROM THE PERMIAN AND TRIASSIC

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Over the past ten years the analytical procedures of radioisotope age dating have seen substantial improvements, which helped raising the resolution of dating magmatic rocks and volcanic ash layers in fortunate cases to the sub-m.y.-level. In suitable geological settings the highly precise and accurate new age data allow the in-situ calibration of basin formation and the quantification of sedimentary processes and evolutionary rates of organisms with no need to involve time-scales with their inherent uncertainties.

Rocks of Permian and Triassic age and with outstanding exposures and excellent "traditional" stratigraphic constraints in the Southern Alps and in China have played a key role in improving and testing the U-Pb-zircon chronometer applied to sedimentary systems. The geological problems addressed to date cover topics as different as (A) linking surface and deep crustal processes and (B) the evaluation of sedimentary rhythms and the quantification of carbonate accumulation.

(A) In an exceptional section across the South Alpine Lower Permian crust, high-resolution U-Pb zircon age data document a close temporal link between continental basin formation, shallow crustal magmatism and the emplacement of large volumes of mafic magmas in the lower crust (Ivrea Zone) possibly documenting the initial stage of a phase of continent-scale strike slip.

(B) The integration of high-resolution numeric ages with a tight bio- and lithostratigraphic framework for Middle Triassic platform carbonates and basin deposits in the Southern Alps not only indicate high rates of carbonate production and accumulation when observed at sufficiently small time intervals but also confirm the existence of sub-Milankovitch high-frequency stratal patterns in platform carbonates.

Coordinated inter-laboratory calibration experiments are now underway and promise further progress of the quality of radioisotope age dating and of the comparison of different chronometers. In future such tools are expected to become more widely applicable and they will likely play a crucial role in improving the quantified analysis of ancient sedimentary systems.