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New age constraints on the Ouarzazate Group (Morocco): implications on the hypothesis of True Polar Wander during the Ediacaran

Boris Robert[1,2], Fernando Corfu[1], and Olivier Blein[3]
[1]The Centre for Earth Evolution and Dynamics, University of Oslo, Oslo, Norway
[2]GFZ - German Research Centre for Geosciences, Potsdam, Germany
[3]BRGM - Bureau de Recherches Géologiques et Minières, Orléans, France

The Ediacaran (635-541 Ma) is the last geological period of the Precambrian during which major changes occurred in the superficial layers of the Earth (biosphere, cryosphere, oceans, atmosphere). The paleomagnetic data from the main continents of this epoch display very fast polar wander excursions, which seemed to occur simultaneously on several continents. Two main competing hypotheses have been proposed in the literature to explain these data: (1) very fast True Polar Wander episodes (TPW), which represent the global movement of the mantle and the crust with respect to the Earth's spin axis, or (2) perturbations of the Earth's magnetic field. On geological timescales, the TPW is speed-limited to some degrees per million years while magnetic field changes could be much faster (degrees per kyrs). The velocity of the polar wander excursions of the Ediacaran is therefore a critical parameter to distinguish these two families of solutions. The volcanic rocks of the Ouarzazate group (575-545 Ma) in the Anti-Atlas belt recorded a large polar wander excursion from ~571 to ~565 Ma, which is also observed in Laurentia and Baltica at about the same time. Because the age uncertainties are too high, the existing SHRIMP U-Pb ages obtained on zircons are not precise enough to distinguish these two hypotheses. In this study, we bring new high-precision CA ID-TIMS ages on zircons from seven tuff layers that recorded the rapid paleomagnetic variations. Our results show, in most of the samples, a large spread in age, indicating either the presence of inherited zircons or strong Pb loss in some of the zircons. Four of the samples display a good consistency in the zircon ages, and could represent the age of the tuff emplacement. In this presentation, we will discuss the two hypotheses based on these new geochronological constraints.