Paleomagnetism of Avalonia's sedimentary rocks: Insights into Ediacaran glaciations (635-539 Ma)

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Résumé

The Ediacaran (635-539 Ma) witnessed profound changes in the biosphere, atmosphere, oceans and cryosphere. Numerous relics of glaciations have been recognized in almost all the continents of that epoch and several hypotheses have been proposed, all of which could have important implications for the evolution of the surficial layers of the planet: (1) the Snowball Earth, which corresponds to the total glaciation of the planet, (2) rapid True Polar Wander episodes, resulting in abrupt paleolatitudinal changes of the continents of up to 90∘, and (3) mid to high latitudinal positioning of Ediacaran continents. Paleomagmetism is a critical tool for testing these hypotheses through the reconstruction of the paleolatitude of the continents. This study assesses these hypotheses in terms of their application to the origin of the ca. 580 Ma Gaskiers glacial deposits from the microcontinent Avalonia in its type locality in Newfoundland, Canada. Paleomagnetic samples were collected from below, within, and above these glacial deposits to reconstruct the paleolatitudinal evolution of the microcontinent during the Ediacaran. Proximal Ediacaran volcanic rocks and dykes were sampled for U-Pb geochronology to better constrain the depositional age of sedimentary paleomagnetic targets. The Ediacaran paleomagnetic signal is complex, owing to potential contamination by remagnetization and/or intense perturbations of the geomagnetic field. Therefore, our paleomagnetic analyses also include detailed analyses of magnetic minerals carrying the paleomagnetic directions of magnetization in order to identify potential remagnetizations and/or unusually rapid paleomagnetic variations across the stratigraphy. In this contribution, we will present our preliminary results.

Mots-Clés: glaciation, paléogéographie, paléomagnétisme, précambrien, géologie

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