
Paleomagnetic dating of the West Clearwater Lake impact structure (Québec, Canada)

William Zylberman^{*†1,2}, Jérôme Gattacceca¹, Yoann Quesnel¹, Pierre Rochette¹,
Gordon Osinski², François Demory¹, and Adam Coulter²

¹Centre européen de recherche et d'enseignement de géosciences de l'environnement (CEREGE) – Aix
Marseille Université, INSU, Institut de recherche pour le développement [IRD], CNRS : UMR7330 –
Europôle Méditerranéen de l'Arbois - Avenue Louis Philibert - BP 80 - 13545 Aix-en-Provence cedex 4,
France

²Centre for Planetary Science and Exploration, Departments of Earth Sciences Physics and
Astronomy, Western University (CPSX - UWO) – 1151 Richmond Street, London, Ontario, Canada,
N6A 5B8, Canada

Résumé

Accurate dating of impact events is necessary to correctly estimate the frequency of large impacts on Earth. With accurate ages, the terrestrial cratering record can be used to estimate the size frequency distribution of the impactors during Earth's geological history (Johnson and Bowling, 2014). This has important implications to understand the potential environmental effects of impacts (e.g., mass extinctions, generation of economic deposits) and thus for risk assessment. Unfortunately, only about 21 out of the 188 confirmed impact structures (Earth Impact Database, 2015) – that is, a small minority – are accurately and precisely dated so far (Jourdan, 2012). An estimation of the impact age can be obtained by paleomagnetic study of melt-bearing impactites and comparison with the apparent polar wander path.

This work presents new alternating-field and thermal demagnetization data on 51 samples from the ≥ 36 km West Clearwater Lake complex impact structure (Québec, Canada). We found an average direction of the characteristic natural remanent magnetization compatible with the expected paleomagnetic direction at 260-270 Ma. This result is in good agreement with a recent $^{40}\text{Ar}/^{39}\text{Ar}$ dating that yielded an age of 286.2 ± 2.2 Ma for this impact structure (Schmieder et al., GCA 2015).

A future paleomagnetic dating of the adjacent ≥ 26 km-diameter East Clearwater Lake impact crater may help answer the question of the possibility of an impact doublet at Clearwater. This perspective is of great interest as the existence of an impact doublet on Earth has never been proved while 'false doublets' seem more common than previously thought.

Key-words: Paleomagnetism – Impact – Clearwater – Dating

Planetary and Space Science Centre (2015) Earth Impact Database online: <http://www.passc.net/EarthImpactData>

*Intervenant

†Auteur correspondant: zylberman@cerege.fr

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