

---

# Magnetic properties of large Apollo lunar samples

Jérôme Gattacceca<sup>\*1</sup>, Yoann Quesnel<sup>1</sup>, Pierre Rochette<sup>1</sup>, Minoru Uehara<sup>1</sup>, Eduardo Lima<sup>2</sup>, Benjamin Weiss<sup>3</sup>, Laurent Baratchart<sup>4</sup>, Juliette Leblond<sup>4</sup>, and Sylvain Chevillard<sup>4</sup>

<sup>1</sup>CEREGE CNRS/ Aix-Marseille Université – Centre de Recherche et d’Enseignement de Géosciences de l’Environnement [CEREGE] – BP 80, 13545 Aix en Provence, Cedex 4, France

<sup>2</sup>Department of Earth, Atmospheric and Planetary Sciences (EAPS) – Massachusetts Institute of Technology 77 Massachusetts Avenue Cambridge, MA 02139-4307, États-Unis

<sup>3</sup>Department of Earth, Atmospheric and Planetary Sciences (EAPS) – Massachusetts Institute of Technology 77 Massachusetts Avenue Cambridge, MA 02139, États-Unis

<sup>4</sup>APICS (INRIA Sophia Antipolis) – INRIA – 2004, route des Lucioles - BP 93 06902 Sophia Antipolis Cedex (France), France

## Résumé

Paleomagnetic studies of lunar samples shed light on the existence and timing of the ancient lunar dynamo, with insights to the inner structure and thermal evolution of the Moon, as well

as constraints for dynamo modeling [e.g., Weiss and Tikoo 2014 *Science*]. The intrinsic magnetic properties of lunar rocks also offer clues to their petrogenesis [e.g., Rochette et al. 2010 *EPSL*]. However, because of curation constraints, these studies are usually performed on small cm-scale samples, typically below 100 mg for paleomagnetism. Such a small size, combined with anisotropy and other spurious effects, have been shown to be the source of additional complexity for paleomagnetic analyses [Tikoo et al. 2012 *EPSL*] and raises question about how representative their magnetic properties are for the bulk rock.

We measure here the natural remanent magnetization and magnetic susceptibility of 105 large unprocessed Apollo samples (ranging from 40 g to 3 kg) using portable instruments developed specifically for this project. The aim is to gain information about the evolution of the lunar field with time, and identify samples with anomalous magnetic record or magnetic properties. We will discuss how these measurements compare with the existing laboratory measurements, what they tell us about lunar rocks, and how they can be used to select samples for in-depth paleomagnetic study.

---

\*Intervenant