

THE MARTIAN P/T TRANSITION: SOUNDING MARS EARLY EVOLUTION AND HABITABILITY.J.-P. Bibring¹, F. Poulet¹, A. Morbidelli²¹IAS, CNRS/Université Paris-Sud, 91405 Orsay, France, bibring@ias.u-psud.fr, ²Observatoire de la Côte d'Azur, Nice, France.

The global mineralogical mapping of Mars by orbiting hyperspectral imagers (OMEGA/Mars Express and CRISM/MRO) have enabled a profound revisiting of early Mars History. Specifically, Mars still exhibits terrains with composition tracing the various steps from its early differentiation till the end of the heavy bombardment. The initial crust has evolved through distinct alteration phases, first as hydrated phyllosilicates [1,2], during the Phyllosian, then as sulphates [3], during the Theikian. These two periods are interpreted to trace drastic changes in the ancient Martian environment [4]. In parallel, distinct mafic rock-minerals are also mapped in the ancient crust with variations from place to place in term of composition.

Of specific interest is the global change that occurred between these two eras, the so-called Phyllosian/Theikian or P/T transition. The drop of the dynamo may have played a critical role, which will be discussed in the framework of the global planetary evolution during the primordial bombardment. This transition also marks the termination of the potential habitability era on Mars, based on long standing surface bodies of liquid water.

A reference Martian Chronology can be built, with all major events such as the formation of the dichotomy, the volcanic building of Tharsis and its related tectonic effects, the filling of the Northern Plains or the formation of the basins, placed in a consistent History dominated by the exogenous processes linked to the early and late primordial bombardment, and the internal activity governed by the radioactive budget.

The Noachian period indeed covers eras of huge diversity. If ever Mars has ever been habitable, it occurred within a very limited period of the Noachian: the Phyllosian, which ended much before the bombardment ceased. We will present the results on which such a History can be built.

References: [1] Poulet et al. (2005) *Nature*, 438, 623-627. [2] Mustard et al. (2008) *Nature*, 454, 305-309. [3] Gendrin et al. (2005) *Science*, 307, 1587-1591. [4] Bibring et al. (2006) *Science*, 312, 400-404.