INTRODUCTION
Recent exploration of Mars using near-infrared (NIR) reflectance spectroscopy has produced one of the most important discoveries in planetary science and one that is generating unabated interest (e.g., Bibring et al. 2006; Vaniman et al. 2014). Data from the Mars Express Observatoire pour la Minéralogie, l’Eau, les Glaces et l’Activité (MEx/OMEGA) and Mars Reconnaissance Orbiter Compact Reconnaissance Imaging Spectrometer for Mars (MRO/CRISM) instruments have revealed thousands of exposures of phyllosilicate-rich rocks within the martian crust (Poulet et al. 2005; Murchie et al. 2009; Ehlmann et al. 2011a; Carter et al. 2013). Data from the rover Curiosity have allowed the identification of clay in fluvo-lacustrine materials on the floor of Gale Crater (Vaniman et al. 2014; Bristow et al. 2015), and the rover Opportunity provided information that helped to characterize a clay-bearing suite at Endeavor Crater (Arvidson et al. 2014). Most of the deposits correspond to ancient (Noachian-age, 3.7–4.3 Ga), layered bedrock, most often exposed in impact craters (Ehlmann et al. 2011a; Carter et al. 2013). While geomorphic evidence has long suggested the presence of water on ancient Mars, at least during brief episodes (Carr 1996), the unambiguous detection of phyllosilicates (Poulet et al. 2005) is the first clear evidence for sustained aqueous activity (Bibring et al. 2005). Furthermore, they seemingly date to the same period when life was forming or beginning to take hold on Earth. Considering that (1) phyllosilicates are among the best materials for preserving evidence of life (Walter and Des Marais 1993) and (2) microbial activity on Earth promotes phyllosilicate formation (Douglas and Beveridge 1998) and acts as a modifier of phyllosilicate composition (Cuadros et al. 2013a), martian clays are very important astrobiological targets. Beyond the possible link to life, martian clays are important because they provide information about hydrous processes that took place on Mars, such as the water chemistry, water-to-rock ratio, and temperature.

So far, the chemical and mineralogical characterization of...