**RECENT HYDRATED MINERALS IN NOCTIS LABYRINTHUS CHASMATA, MARS.** P. Thollot[1], N. Mangold[1], S. Le Mouélic[1], R. E. Milliken[2], L. H. Roach[3], J. F. Mustard[3], [1]Lab. de Planétologie et Géodynamique, UMR6112, CNRS et Université de Nantes, 2 rue de la Houssinière, BP 92208, 44322 Nantes cedex 3, France, patrick.thollot@univ-nantes.fr, [2]Jet Propulsion Laboratory, Caltech, MS 183-301, 4800 Oak Grove Dr., Pasadena, CA 91109, USA, [3]Dep. of Geological Sciences, Brown University, 324 Brook St., Box 1846, Providence, RI 02912, USA.

**Introduction:** Hydrated minerals on Mars are most commonly found in terrains dating to the first billion years of the planet's history. However, the identification of a Late Amazonian alteration layer has been reported recently by [1]. This study examines spectral and imaging data over Noctis Labyrinthus in search for other occurrences of hydrated minerals.

**Data:** Mineralogy was determined from data acquired by CRISM [2]. We looked for absorption bands diagnostic of hydrated minerals. We carefully ratio spectra of outcrops of interest to nearby dusty areas in order to remove column dependant noise and potential water ice clouds signatures.

**Observations:** CRISM data reveals hydrated minerals in 2 distinct chasmata of Noctis Labyrinthus, shown as North (NC) and South (SC) Canyon (Fig. 1).

*Geologic context.* NC floor is flat and bears HCP spectral signatures [3]. Several landforms can be observed that suggest a volcanic origin. The model crater age determined by [3] is <100 My.

SC features pyroxene bearing plains but no obvious volcanic landforms. Stratigraphy is exposed by a ~5x6 km large, ~400 m deep depression, surrounded by two tongue-shaped pyroxene-rich units, of which one features a light-toned layer surrounding its base.

*Hydrated Mineralogy.* Light-toned outcrops are present, and seem stratigraphically "sandwiched" between darker units. Absorption bands at 1.4, 1.75, 1.9 and 2.2 µm, allow us to differenciate a "blue" and a "green" unit based on spectral signatures of hydrated materials. As shown in Fig. 2, possible spectral matches for the blue unit include sulfates such as gypsum and bassanite while the green unit signatures suggest the presence of hydrated silica (opal).

In SC, several units appear spectrally distinct, with Fe/Mg sulfates interstratified between hydrated silica and/or Fe/Mg/Al phyllosilicates.

**Discussion:** NC geology and mineralogy bears resemblance to that of the chasma examined by [1]. Emplacement of the light and dark toned units may have occurred from airfall of volcanic ash. Interaction of ashes with volcanic gases such as $SO_2$ and a source of water would have formed hydrated sulfates and hydrated silica. These altered deposits may be linked to the surrounding volcanic activity, then suggesting a young alteration (<100 My).

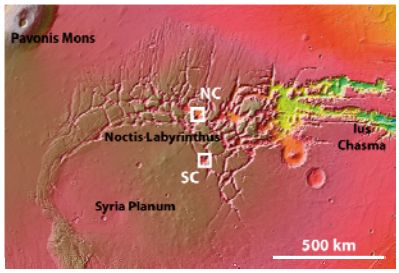


**Fig. 1** Context of the study area (MOLA map)

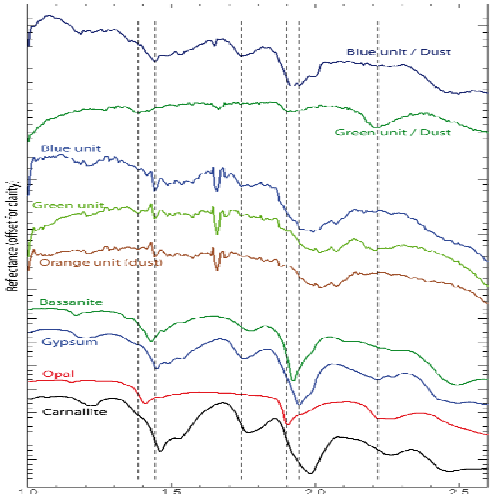


**Fig. 2** CRISM spectra (blue, green, orange) and ratios (upper two spectra) compared to reference spectra [4] (lower four spectra). The 1.65 µm band is an artifact of CRISM data.

As the original deposits fill a late Hesperian chasma, their age is younger than that of most hydrated minerals on Mars, which date from the Noachian to early Hesperian [5], [6].

**Conclusion:** With respect to their formation process, recent alteration minerals in Noctis Labyrinthus chasmata may be different from widespread deposits observed elsewhere on Mars. Their recent age would imply that their formation did not require a martian climate that is different from that of today.

**References:** [1] Mangold N. et al. (2009) *Icarus, accepted manuscript*. [2] Murchie S. L. et al. (2007) *JGR-Planets, 112*. [3] Mangold N. et al. (2009) *EPSL, in press*. [4] Clark R.N. et al. (2007) *USGS DDS231*. [5] Mangold N. et al. (2007) *JGR-Planets, 112*. [6] Mustard J. F. et al. (2008), *Nature, 454*.