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Mapping the Recent Volcanotectonic Activity at Cerberus, Mars from HRSC and OMEGA observations

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The Cerberus plains on Mars have been studied for its possible fissural and recent volcanism since the release of the Viking images [1]. The more recent MOC and THEMIS images have permitted the observations of new evidences of volcanic, tectonic activity and water [2,3]. There are three spatially and temporally distinct, young, aqueous flood channels systems emanating from a system of linear fissures [2]. Recent flood eruptions of low viscosity lavas have been proposed to originate also at the fissures [1,2]. We present a new mapping of the Cerberus area, based on roughness map from MOLA data combined with a morphologic analysis from HRSC, THEMIS-VIS and MOC images. From this map, we propose different sources of the lavas with a major contribution of identified shield volcanoes which have been previously considered as a second order contribution. New ages of the most recent units have been derived from the combination of HRSC, THEMIS-VIS and MOC data. Our results confirm the recent ages of the lavas, as young as 10 millions years [4]. Some fissures affect these most recent lava flows which imply that the fissures have been tectonically active since the last volcanic events. We constrain a possible domain a viscosity for the lavas assuming that the lava flows are a Bingham fluid. The viscosity and yield strength of the lava are deduced from the geometrical parameters of the leveed lava channels. The rheology obtained (yield strength about 15 Pa and viscosity about 0.1-100 Pa.s) is similar to the rheology of very fluid basaltic flows, or picritic flows observed at hot spots on Earth. The geological mapping of these lavas and our estimations of lava rheology

are now confronted to the mineralogical diversity that can be retrieved form OMEGA on the Cerberus area with the objective of caracterizing what could represent the last event in the volcanic activity of the planet.

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