Influence of water and clay minerals for slope angles on Mars

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An internal frictional angle is determined from a frictional coefficient, which is largely influenced by water and clay minerals. Pore water reduces effective stress, then slope angles becomes smaller. Therefore, slope angles are approximately 25 under hydrostatic condition in contrast with ~35 under dry condition. Most mineral exhibit a constant frictional coefficient μ=0.6-0.85, whereas clay minerals are characterized by a markedly lower frictional coefficient ~0.1 at presence of water (e.g. Behnsen and Faulkner, 2012; Moore and Lockner, 2004). Since a slope angle is roughly equivalent to an internal frictional angle, it is considered that slope angles are affected to become smaller by presence of water and clay minerals including water.
Clay minerals are widely recognized on Mars (Ehlmann and Edwards, 2014) by infrared spectroscopic tools. We focus on a slope angle of Martian topography and research the areas where water might exist.

We focus on Recurring Slope Lineae (RSL) which might suggest the existence of flowing water on Mars (e.g. McEwen et al., 2011; Stillman et al., 2017). Some RSL are found in Coprates Chasma, eastern part of Valles Marineris. We compared slope angles of RSL confirmed points with not confirmed points.
We measured slope angles about 10 points in Coprates Chasma. Slope angles are 31-37 in almost all points and there is no tendency by the presence of RSL and hydroxylated silicates. Therefore, we considered that the contributions of water and clay minerals for slope angles are not prominent in Coprates Chasma.
Furthermore, we verified whether there is contribution of water for slope angles on other areas where water might exist in the same way.

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