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Assessing the amount of water shaping the Earth, Moon and Mars using metre-scale topographic analysis

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We are using emerging high resolution elevation data from orbital stereo-images on the Moon (LROC) and Mars (HiRISE) and from airborne laser altimetry on Earth to characterise and quantify the action of water on these surfaces. We use hydrological analysis techniques based around the local characteristics of the terrain (slope, curvature) and far-field properties, which incorporate upstream effects of the terrain (upslope drainage area). Our previous work (Conway et al. 2011, GeolSoc Spec. Ed. 356, 171-201) has already shown using these techniques that it is possible to distinguish processes that involve different quantities of water acting on the surface of the Earth: namely overland flow, debris flow (sediment-water mix) and dry mass wasting. We have already applied this schema successfully to Mars and will present an extension of this work as well as its first application to the moon.