



## **Are Knickpoints in Martian Valley Network Recorders of Past Ocean Levels?**

Sergio Duran, Thomas Coulthard, Stuart McLelland, and Chris Skinner

University of Hull, School of Environmental Sciences, Physical Geography, United Kingdom (s.duran@2016.hull.ac.uk)

The presence of an extensive network of sinuous channels and valleys in the Martian landscape provides evidence for a wetter and warmer early Mars where water was much more abundant than it is at present. We undertook an analysis of all major channel systems on Mars and detected sharp changes in the river long profiles associated with steep headwall theatre-like valleys and terraces left downstream by channel incision. These breaks in channel longitudinal slope, headwalls and terraces exhibit a striking resemblance with terrestrial fluvial knickpoints. On Earth, such knickpoints can be formed by more resistant bedrock or where changes in channel base-level have initiated erosion that migrates upstream (such as tectonic uplift or sea level change). We observed common elevations of Martian knickpoints in eleven separated valley systems ponding into the Martian northern lowlands. As they are spread across the planet, we suggest that these Martian knickpoints were formed by base-level changes due to changing ocean-levels rather than local lithology. Thus, they potentially represent a record of past ocean levels on Mars.