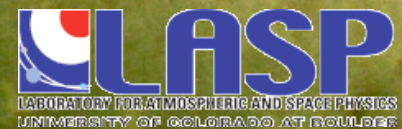
An aerial photograph of a Martian canyon system, showing a prominent winding channel and various sedimentary features. The terrain is reddish-brown with distinct horizontal layers of rock. The channel winds through the canyon, with some areas showing more rounded, possibly eroded features. The overall scene illustrates the complex geological and sedimentary processes on Mars.

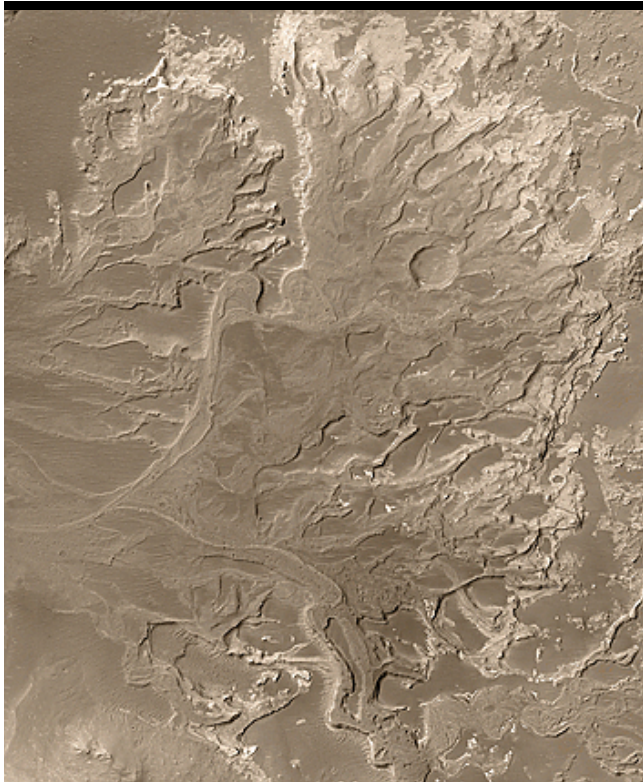
**Modeling ideas - erosion, sediment transport (MARSSIM, GOLEM, CHILD?) and deposition (*SEDFLUX?*) on Mars**

Gaetano Di Achille

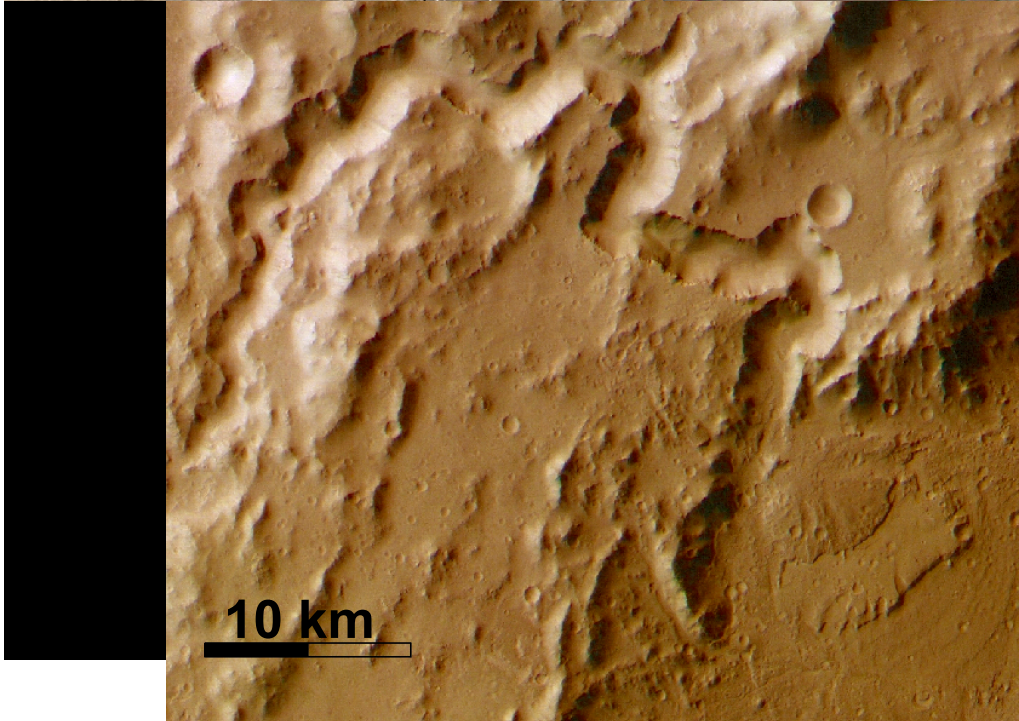
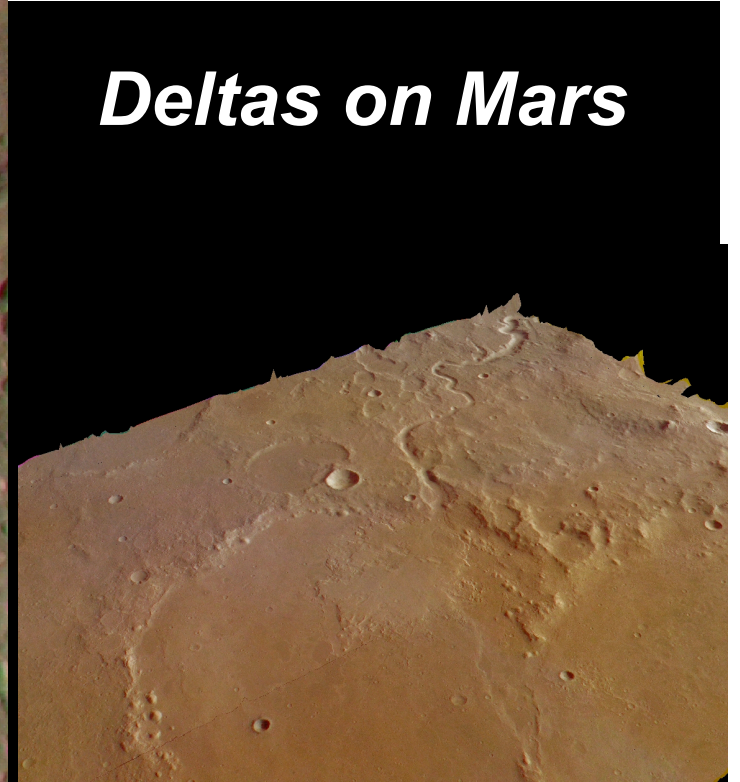
*LASP, University of Colorado*



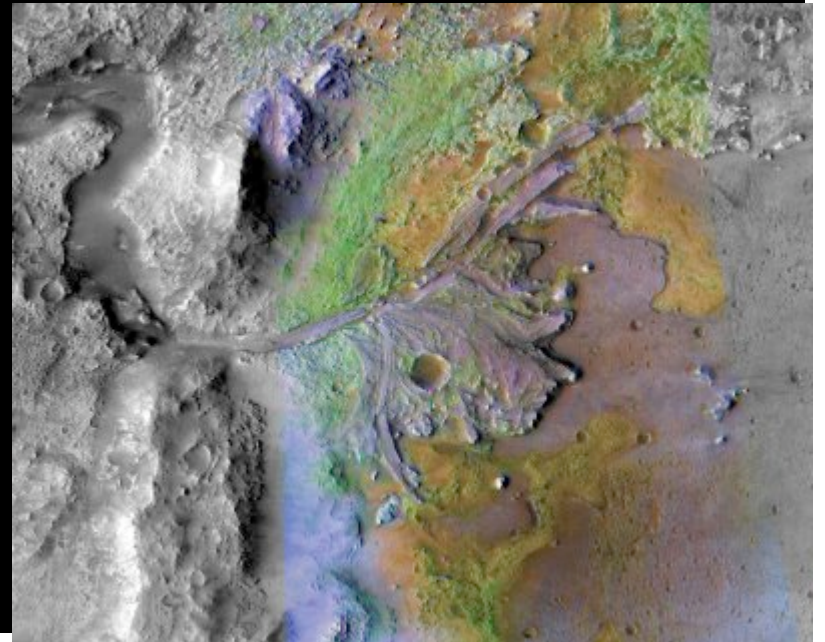
# *Deltas on Mars*



10 km



10 km



## ***WHAT WE CAN MEASURE***

### ***Morphometry of basins, deltas, and feeder channels***

- Bathymetry
- Width, depth, and slope of channels
- Volume and slope of deposits
- In some cases: “stratigraphy”, mineralogy and sediments’ grain-size (at least the coarsest)

## ***WHAT WE CAN INFER***

- Hydrological characteristics of channels (Manning, Darcy-Weisbach, MARSSIM)
- Paleohydrological and geological reconstructions of the sedimentary basins
- Time for the formation of the deposit (e.g. Moore et al., Bhattacharya et al., Kleinhans, Barnhart et al.,)

## ***OPEN ISSUES***

***Paleoclimatic conditions*** (warm-wet vs. cold-dry)

***Water sources*** (surface runoff vs. groundwater seepage)

***Paleohydrology*** (e.g. discharges, sediment load)

***Sedimentology*** (morphodynamics, time for formation and effect of gravity)

# ***WHY THE MODELING?***

***In general, it can help to better understand:***

- Paleohydrological boundary conditions of the depositional systems
- Effects of gravity on the morphodynamics (comparison with Earth)
- Formation time (e.g. by using channel erosion, morphometry of the deposits as controls)
- Response and adjust of the deposition after base level changes

***For local studies where inputs are “known” (e.g. discharges, water level, etc.)***

- Validation of possible scenarios
- Paleohydrological reconstructions

***For regional studies where inputs are unknown (e.g. discharges, water level, etc.)***

- Use of MARSSIM to obtain input parameters
- Use of the results in SEDFLUX
- Test of paleoclimatic scenarios that match the observational evidence