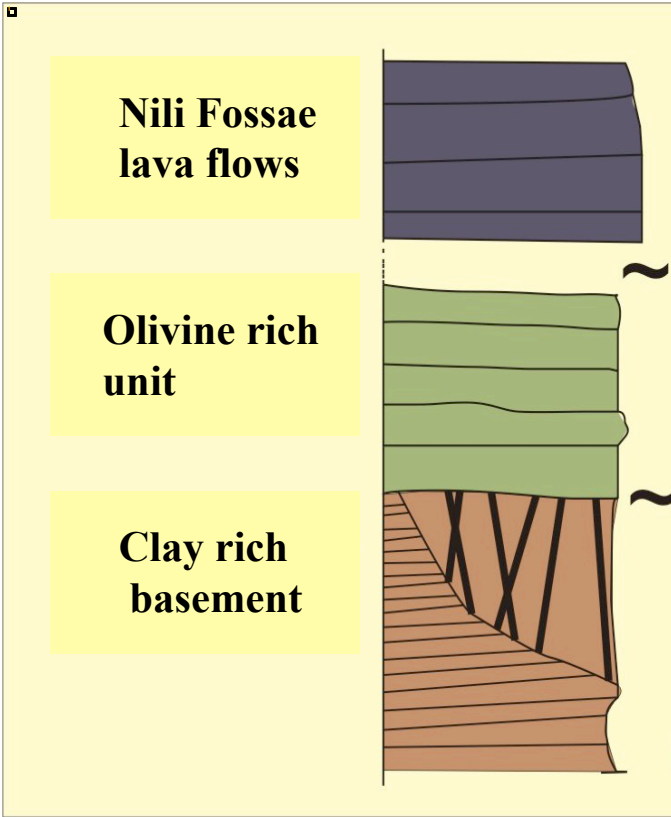


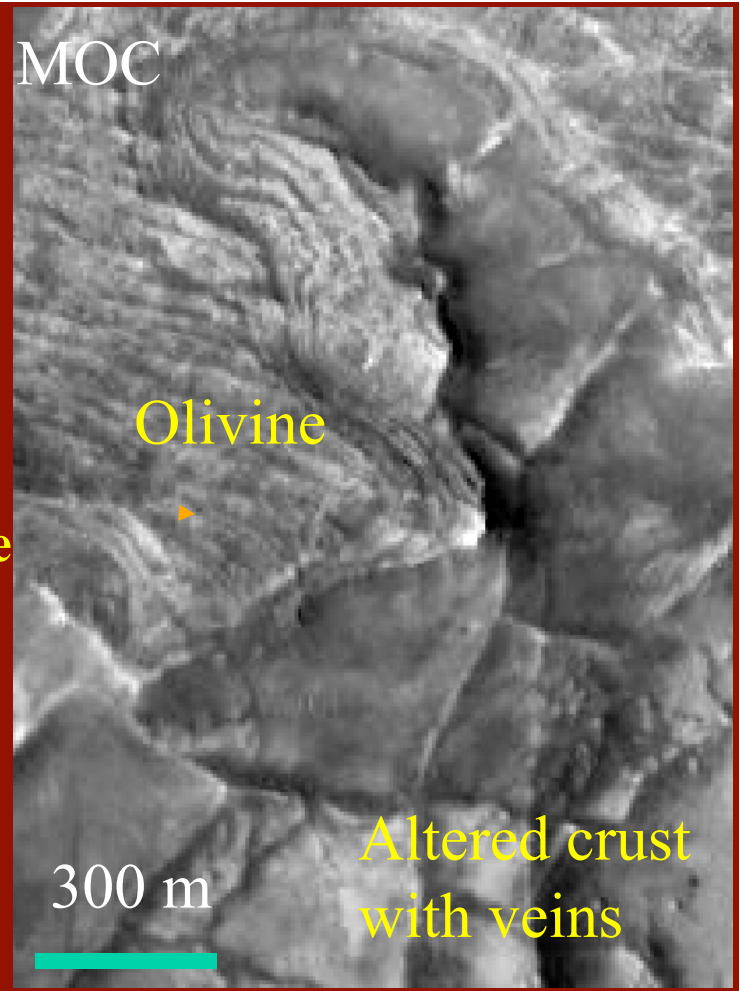
Nili Fossae :

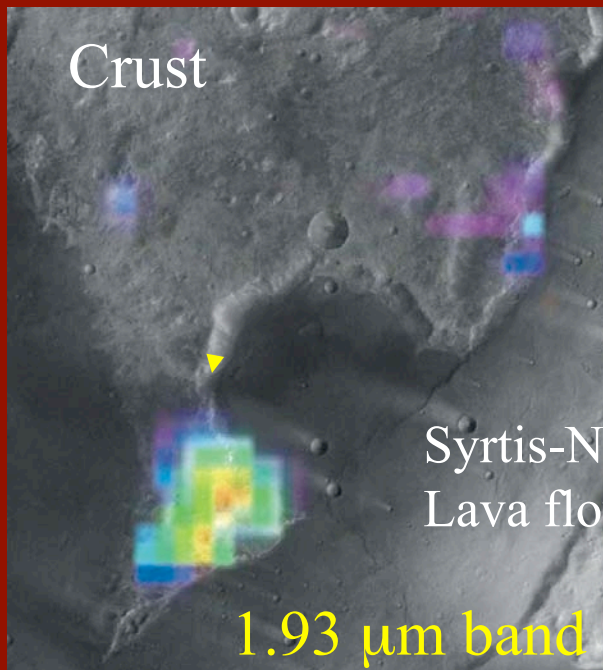
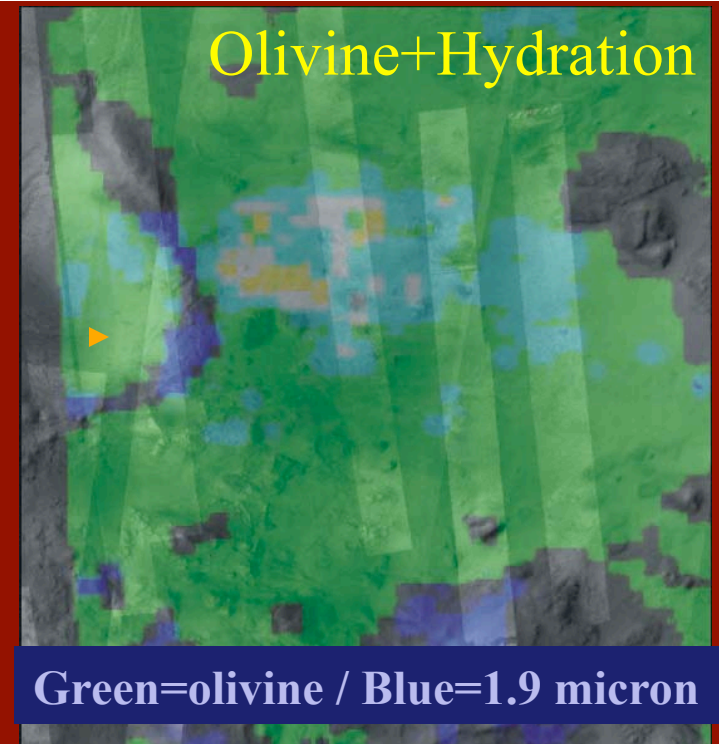
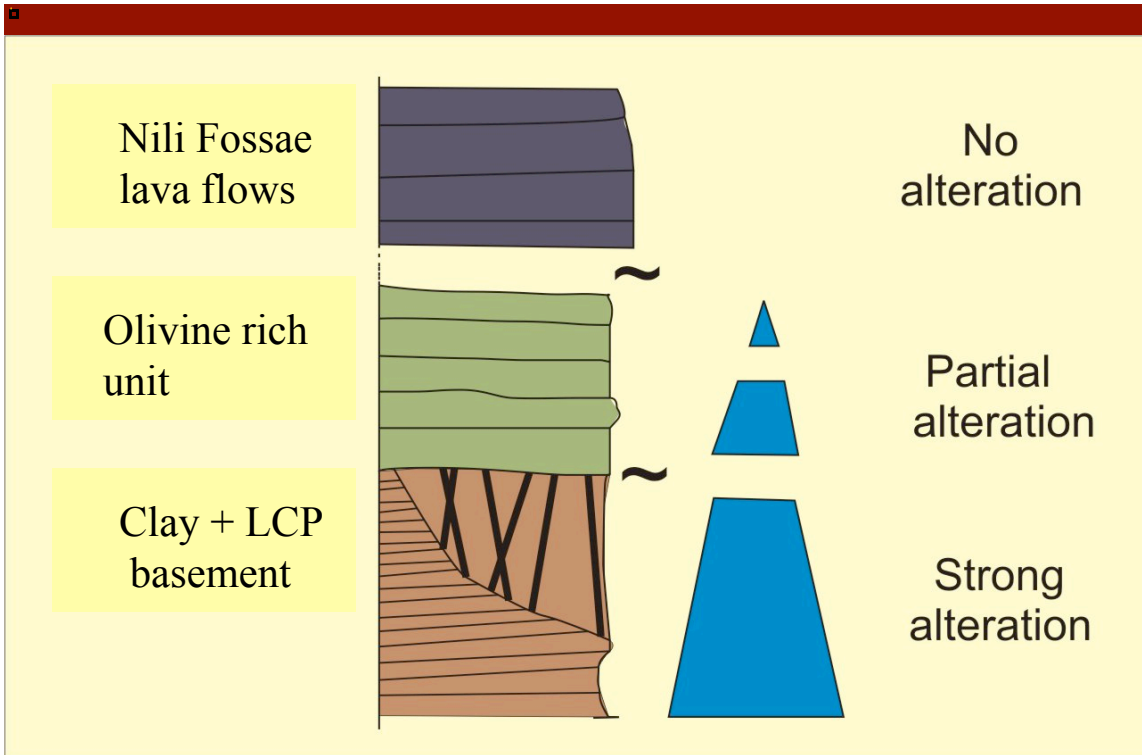
Regional stratigraphy and relative chronology of fluvial episodes



**Contact 2
Syrtris event**

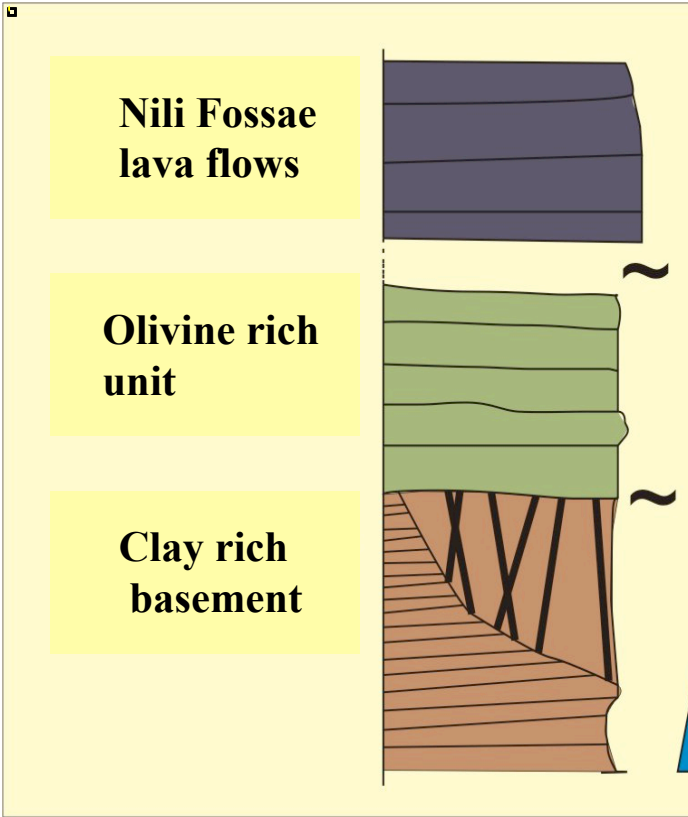
**Contact 1:
Bedrock/olivine**





**Strong alteration of the crust
+ Local alteration of olivine-rich layer**

See Mustard et al, JGR, 2007
Mangold et al., JGR, 2007

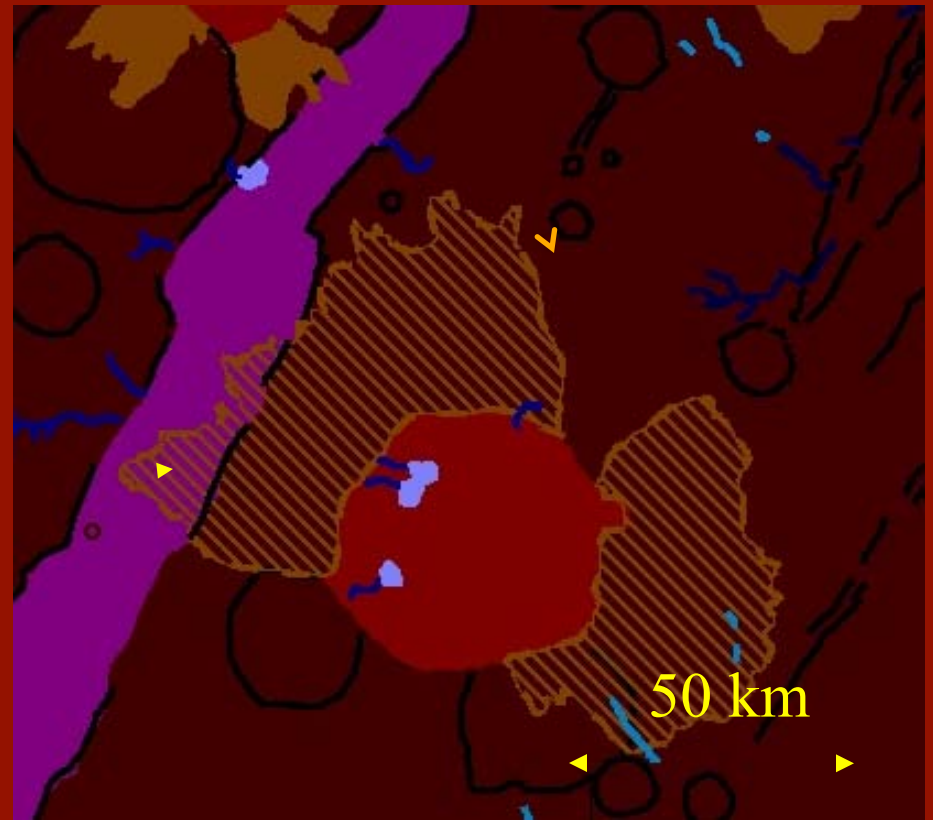
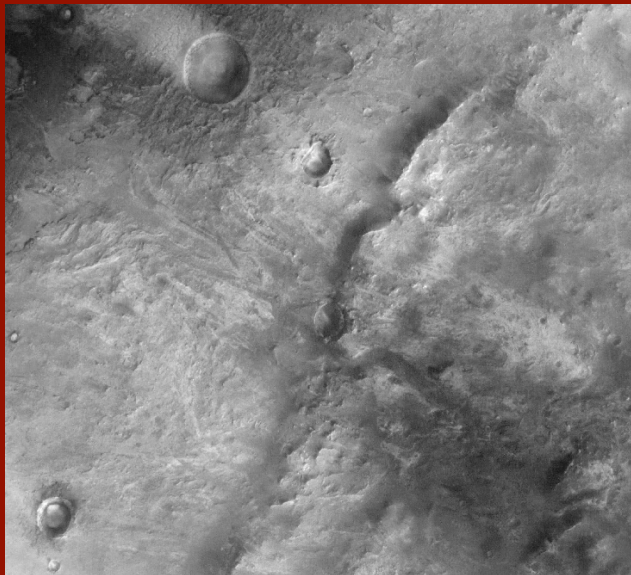


**Large crater (Hargraves)
with ejecta on landing site**

**Contact 2
Syrtris event**

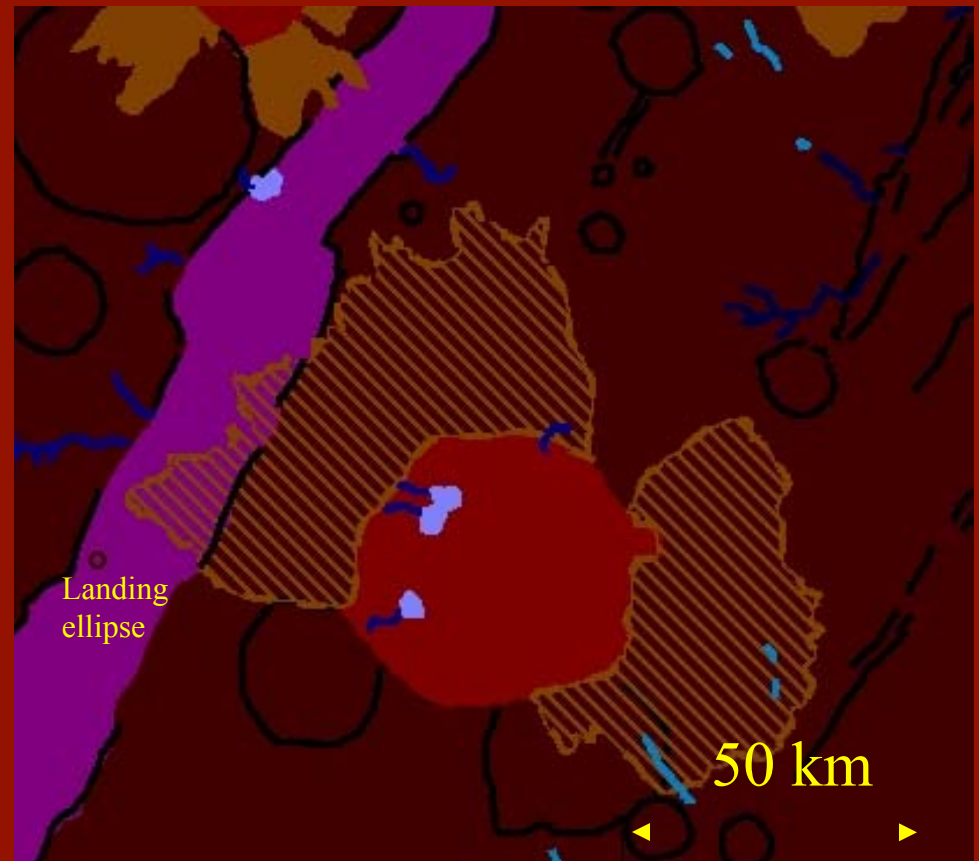
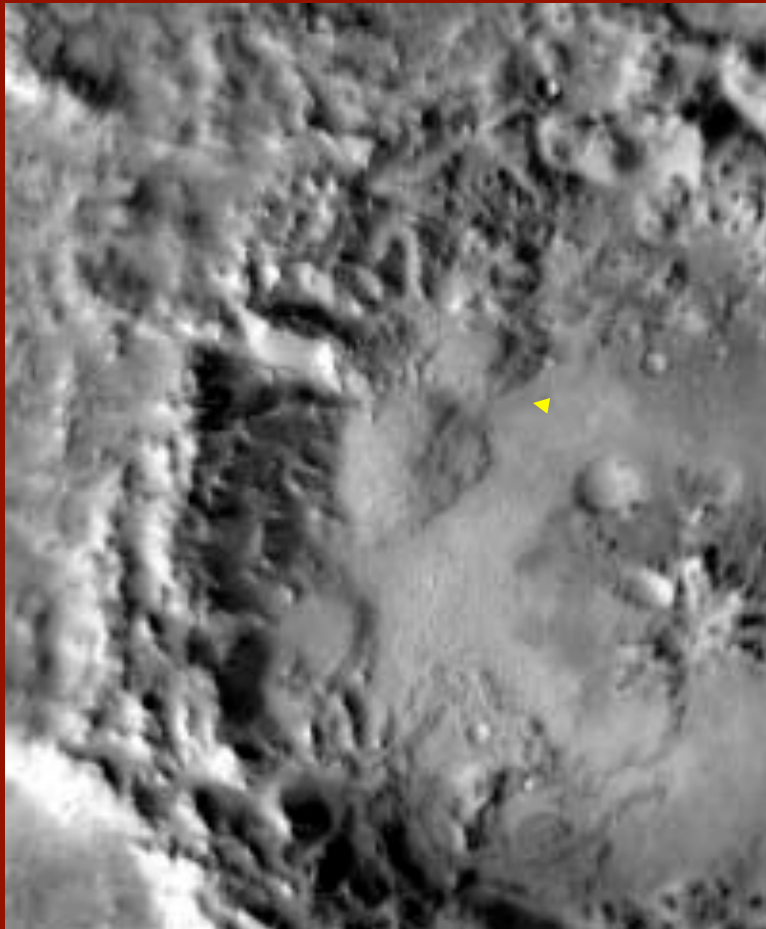
When did the fluvial
landforms form relative
to this stratigraphy?

**Contact 1:
Bedrock/olivine**



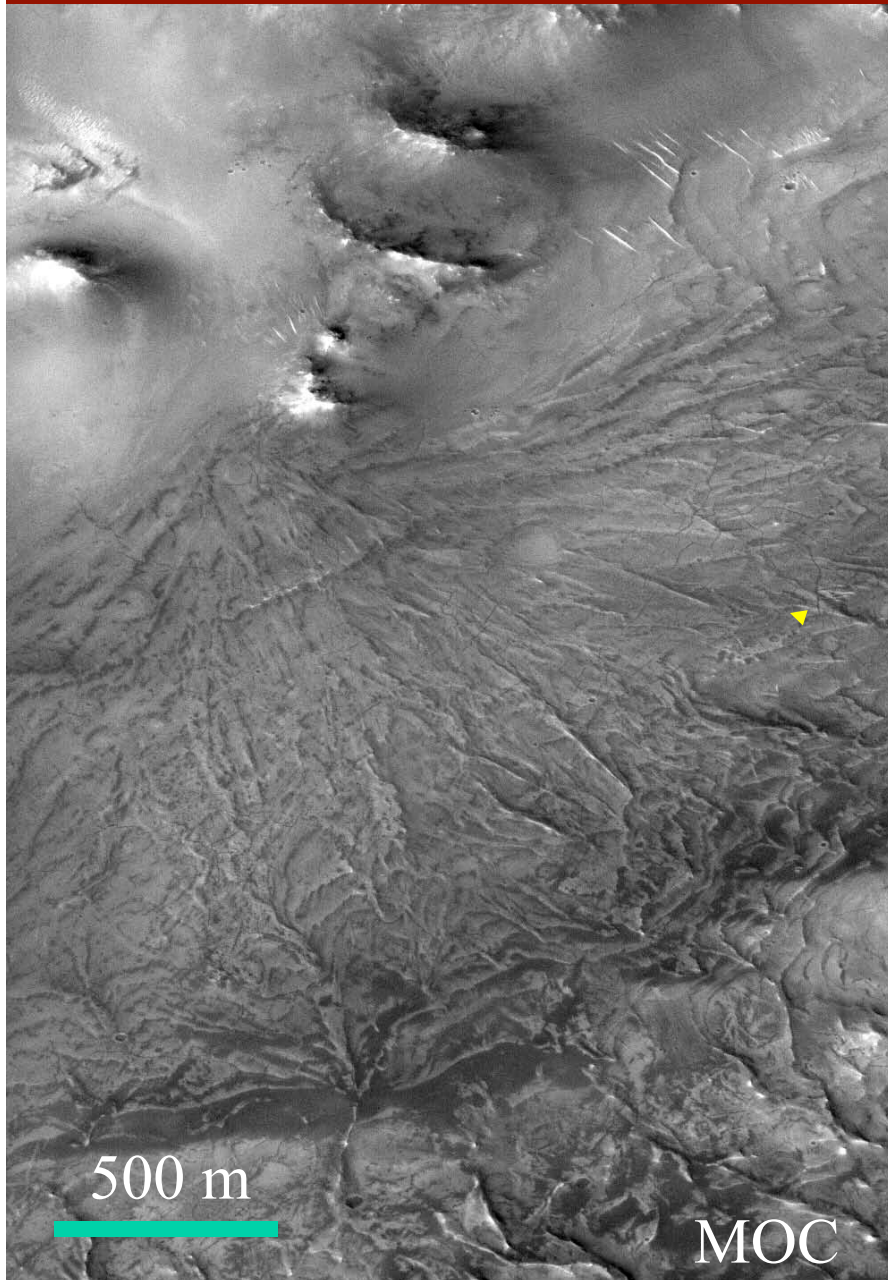
1. Sapping-like valleys and associated fans

Fans inside the crater with hydrated ejecta

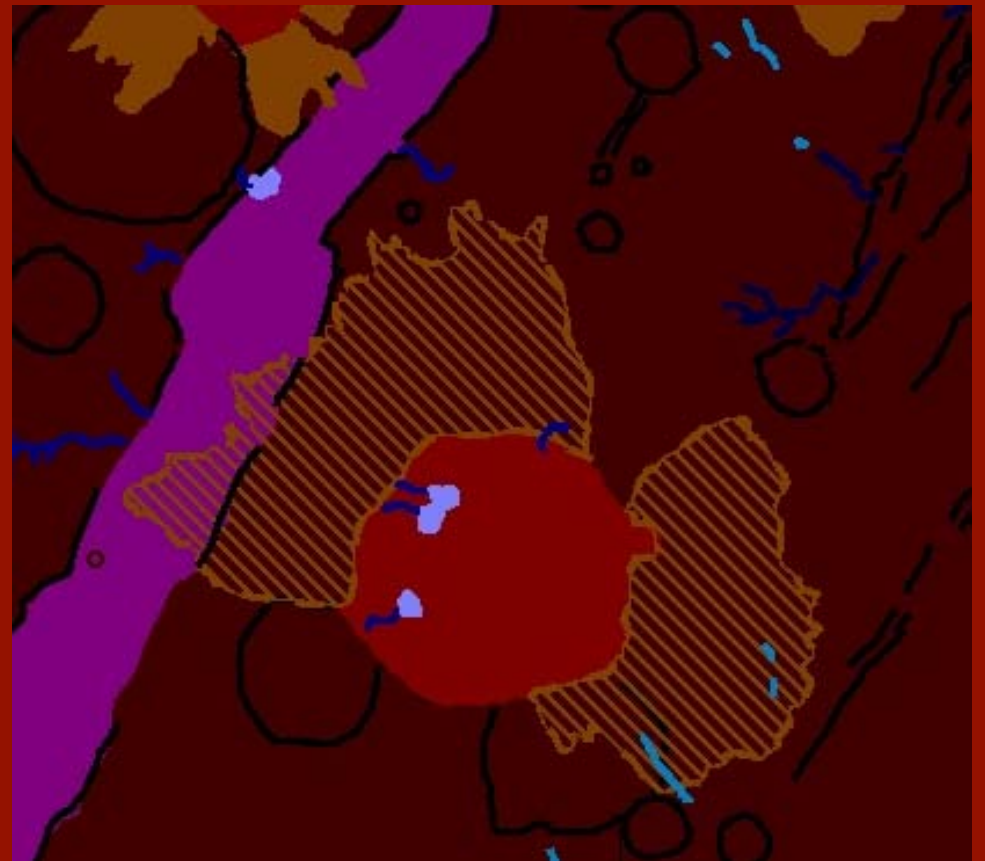


Themis day

1. Sapping-like valleys and associated fans

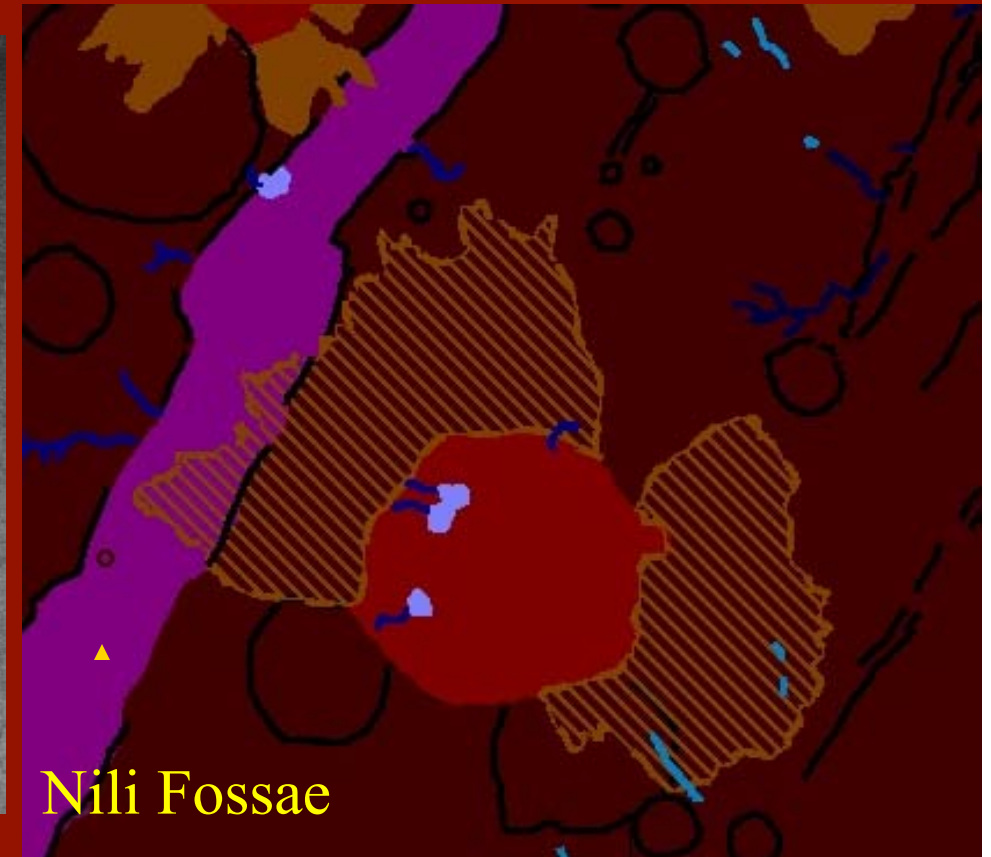


Fans inside the crater
=> After Nili Fossae trough as well



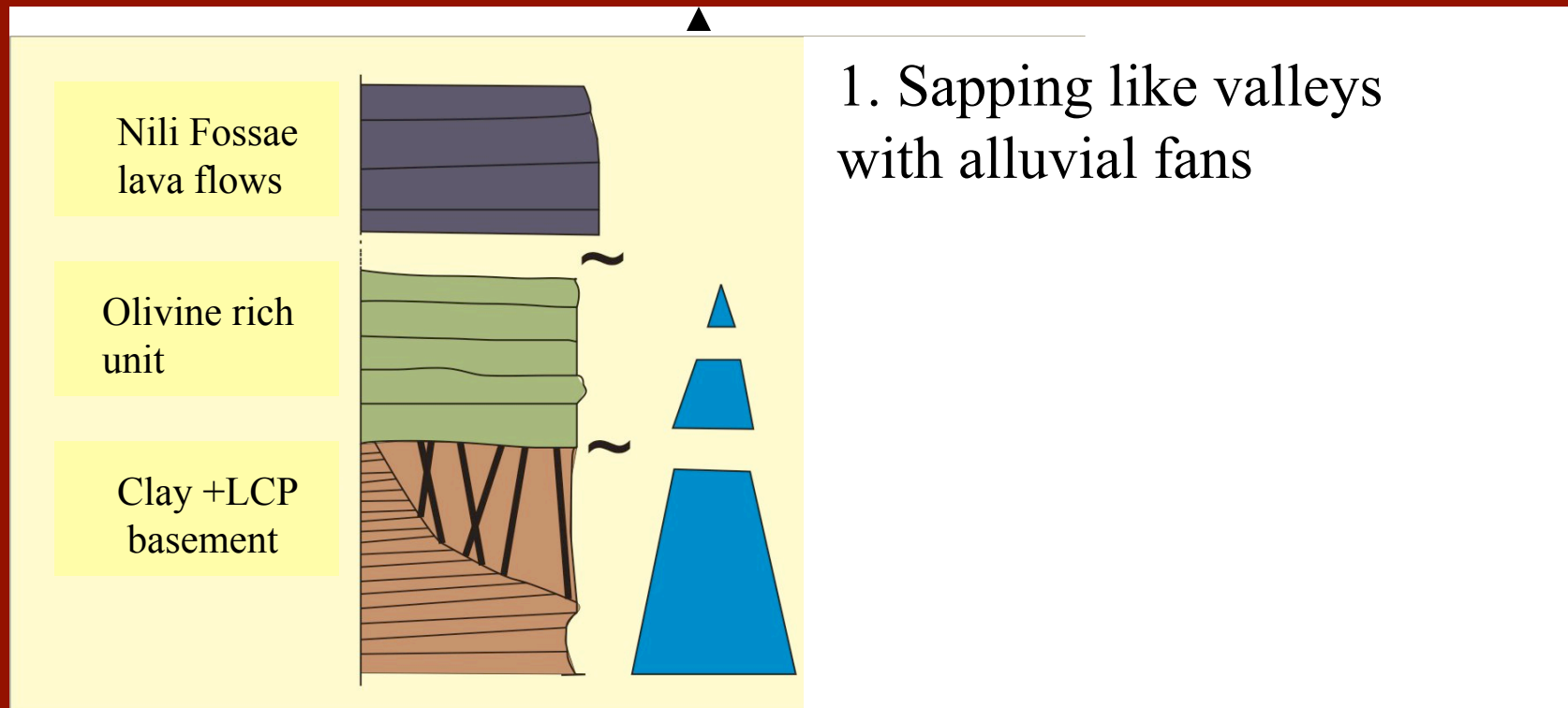
1. Sapping-like valleys and associated fans

Sapping-like valleys
inside Nili Fossae floor

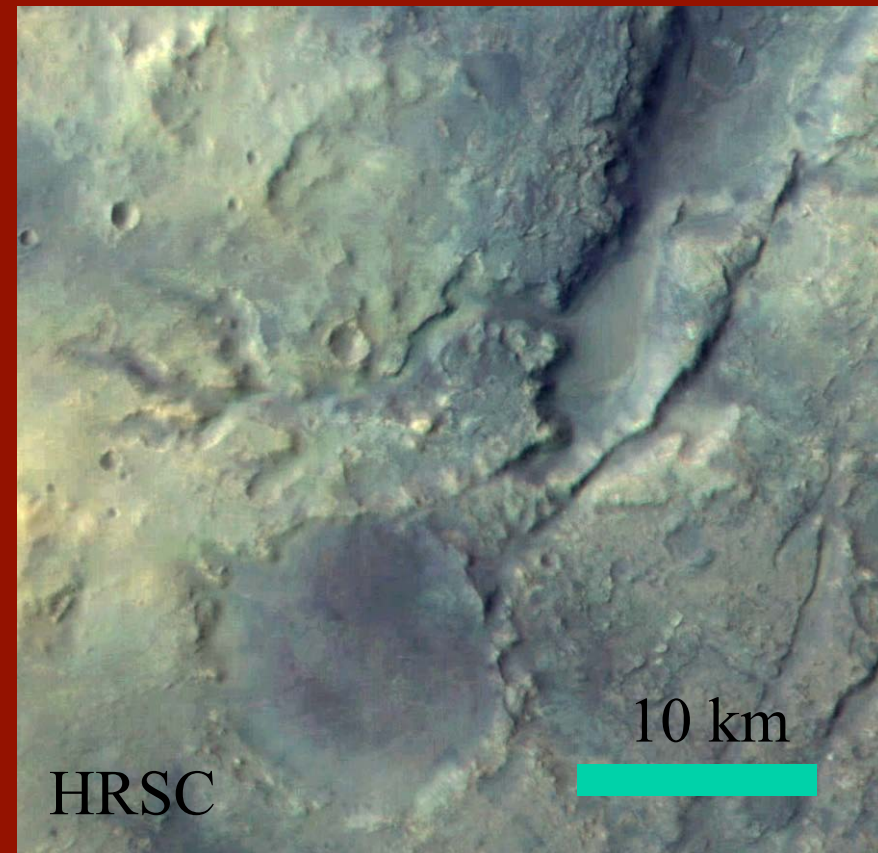
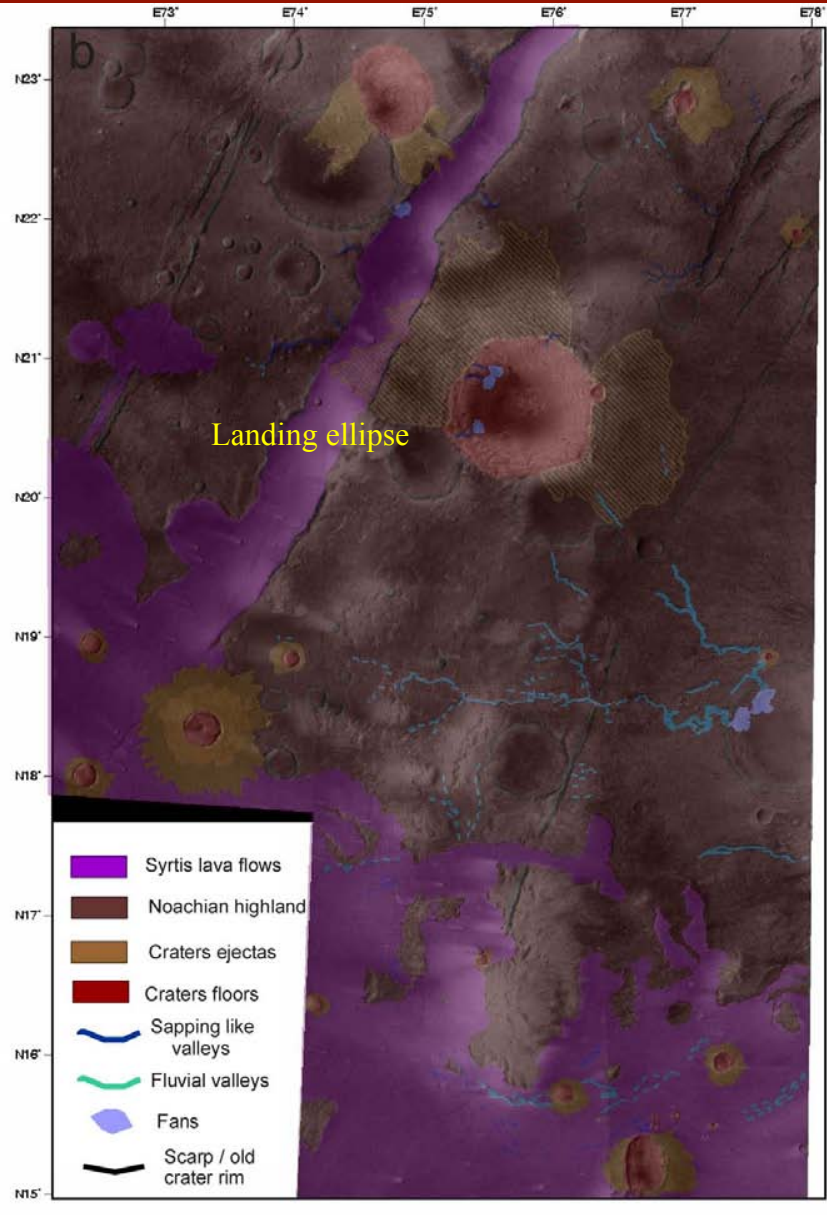


The fan overlies Nili Fossae trough
=> Formed later

Relative chronology of these fluvial landforms



2. Sapping-like valleys and associated fans in trough

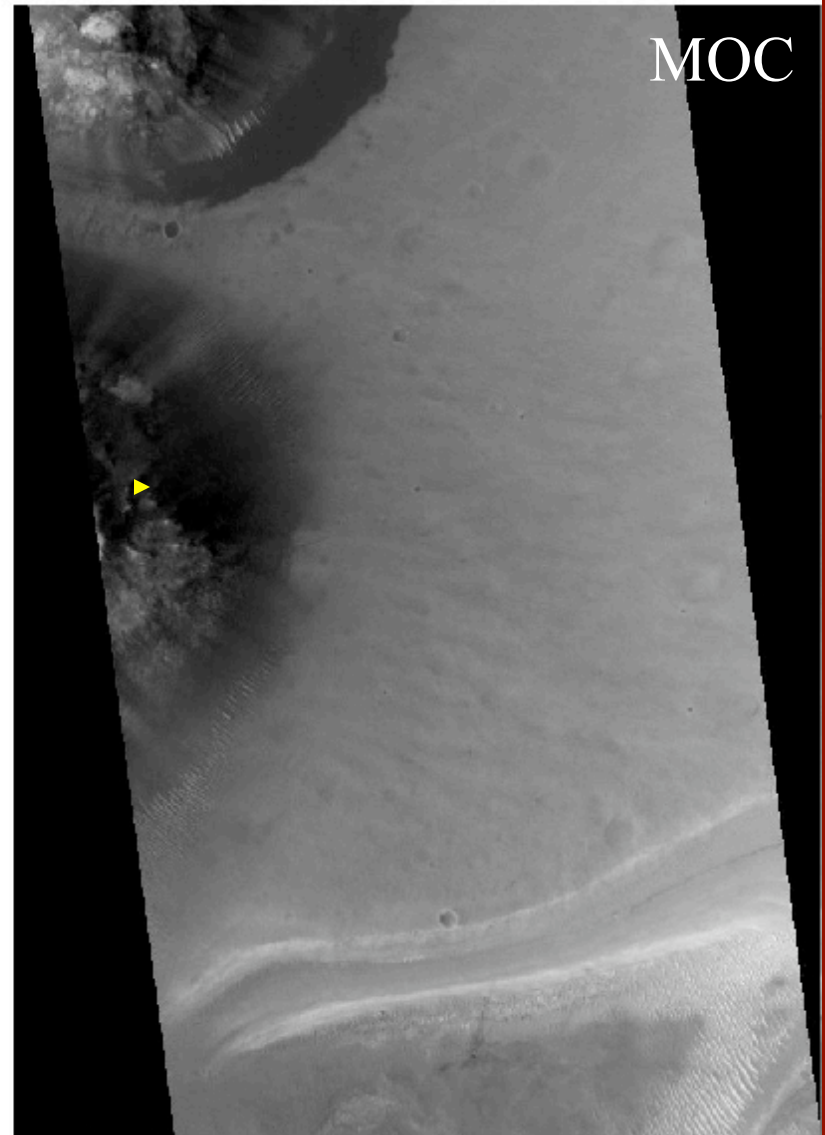
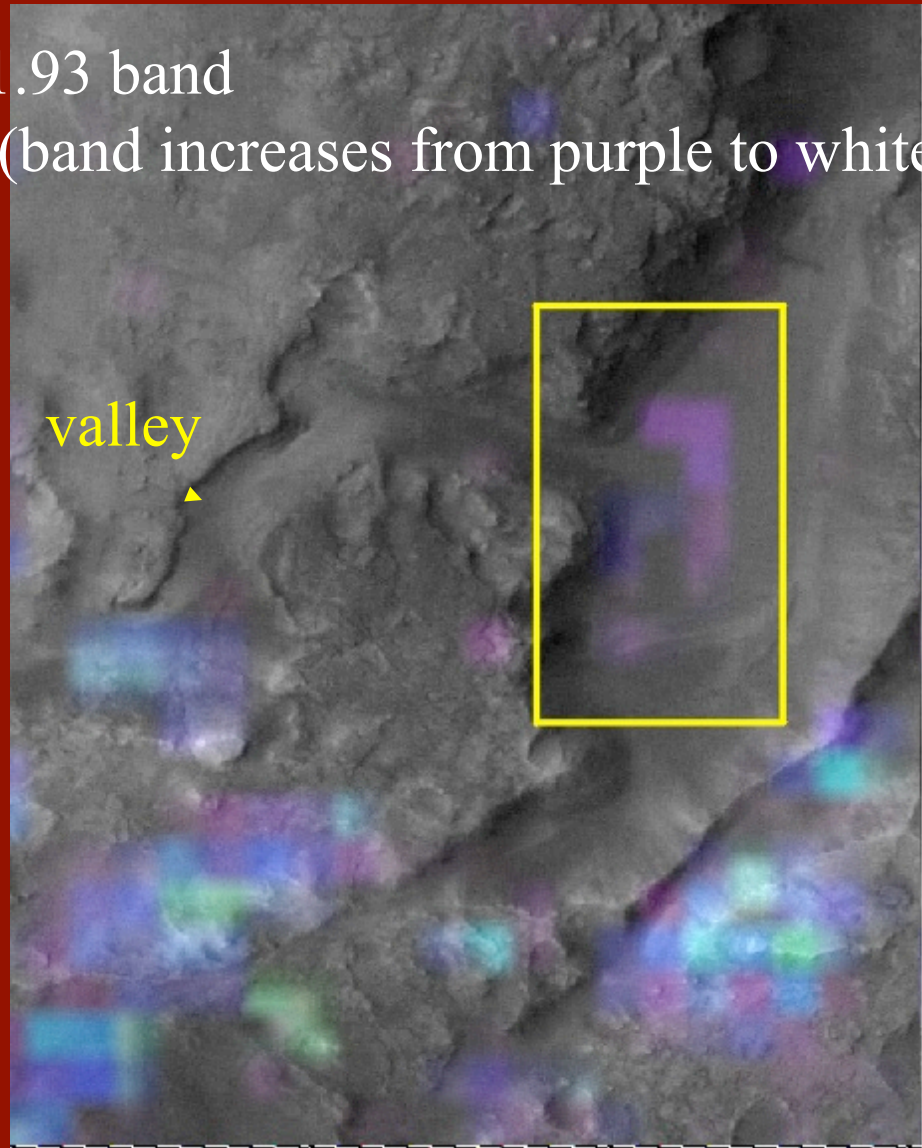


Fan at the outlet of sapping-like valleys

Slight hydration compared to bedrock => Transport of crustal rocks

1.93 band

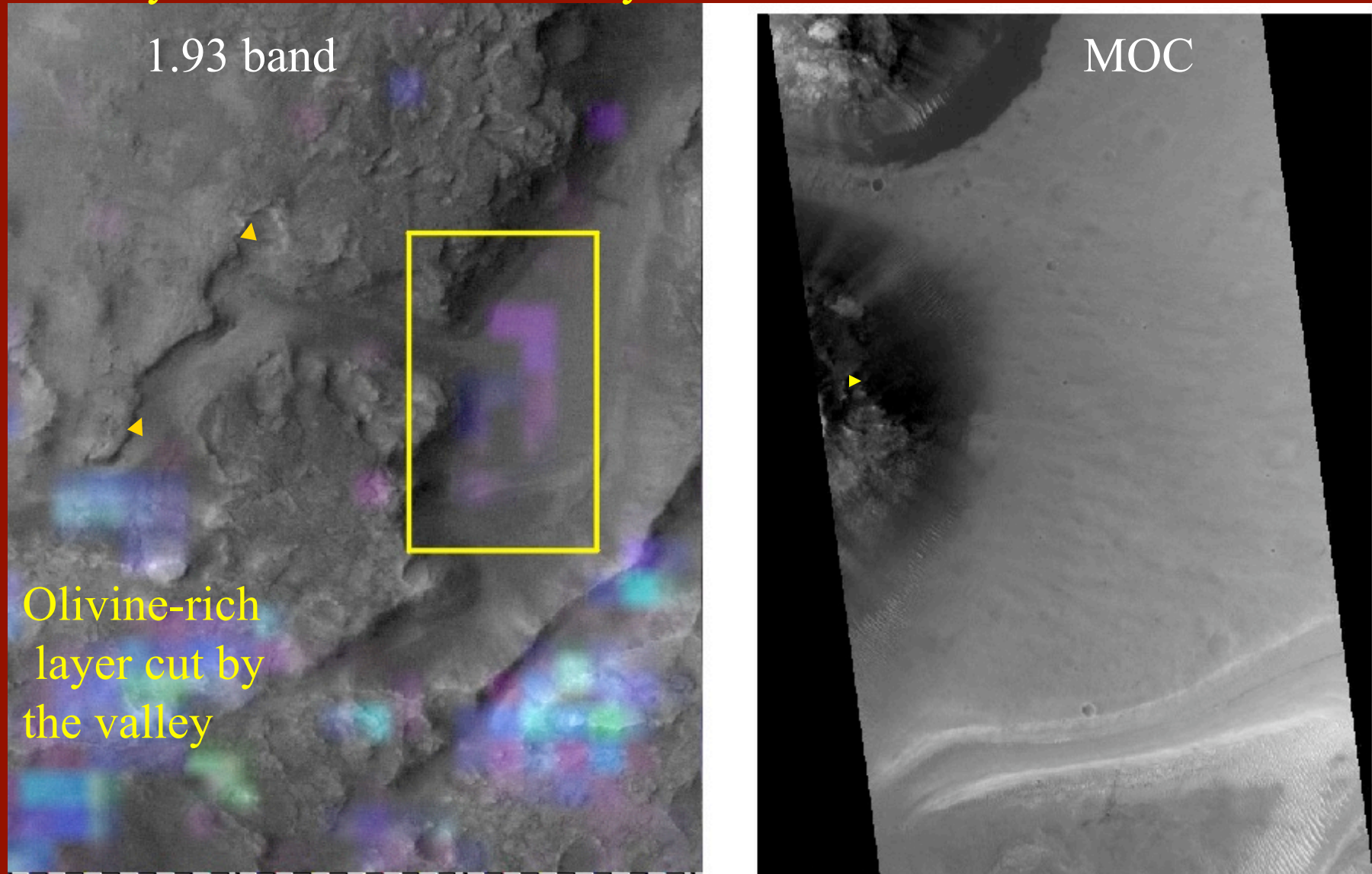
(band increases from purple to white)



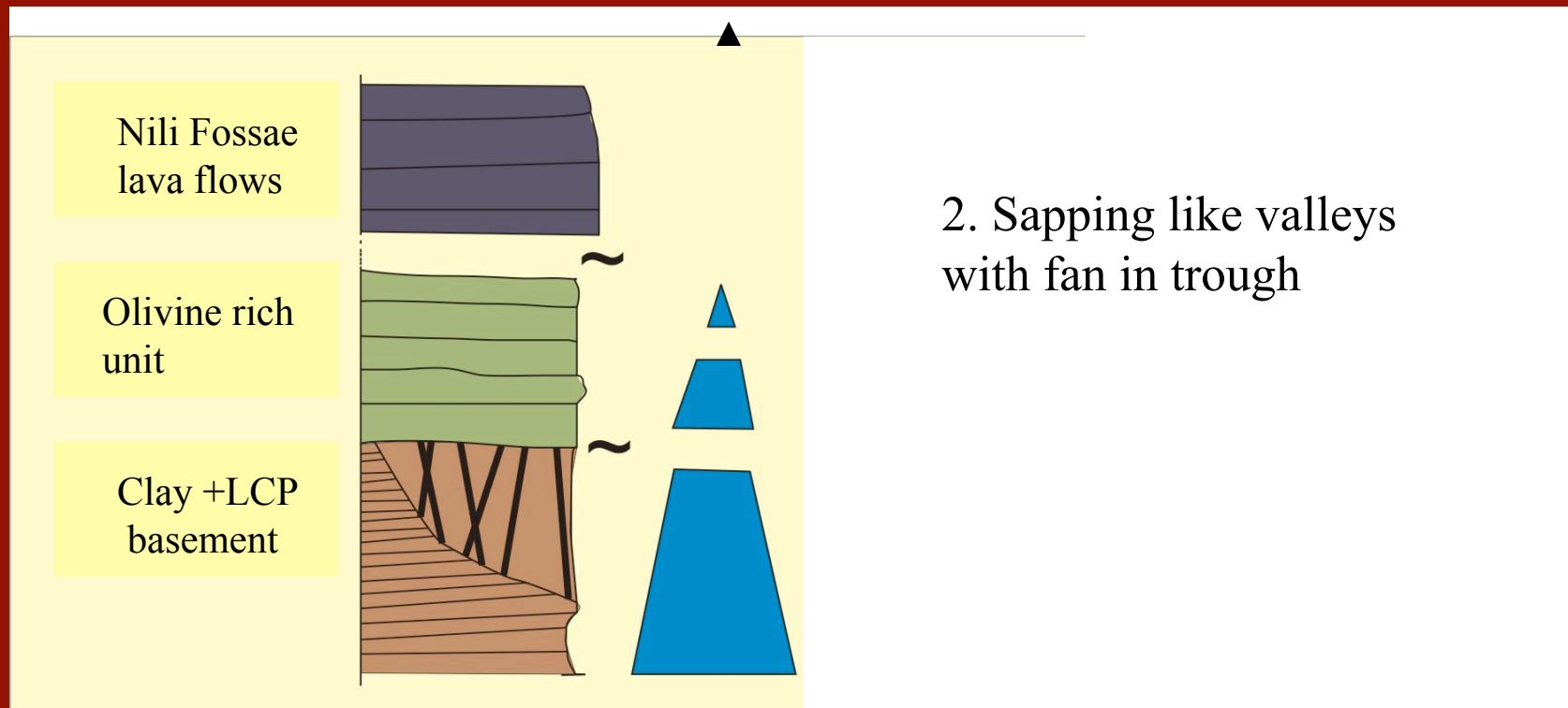
Fan at the outlet of sapping-like valleys

Slight hydration compared to bedrock => Transport of crustal rocks

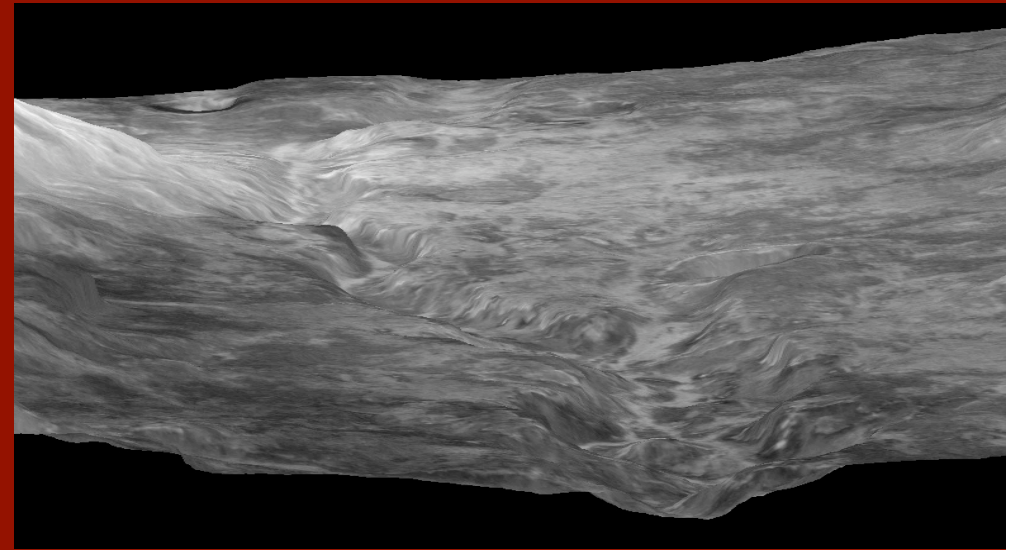
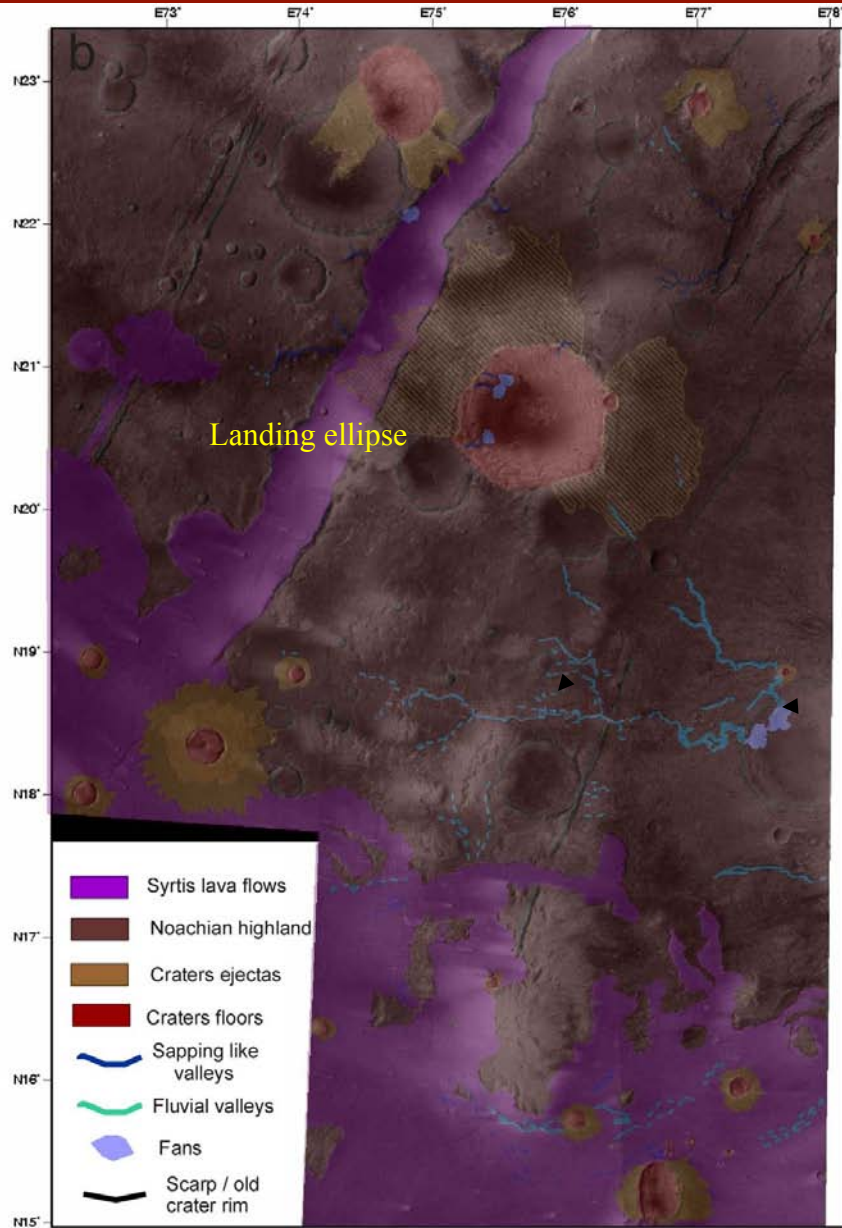
Valleys cut the olivine-rich layer => Post-olivine rocks



Relative chronology of hydrated fan

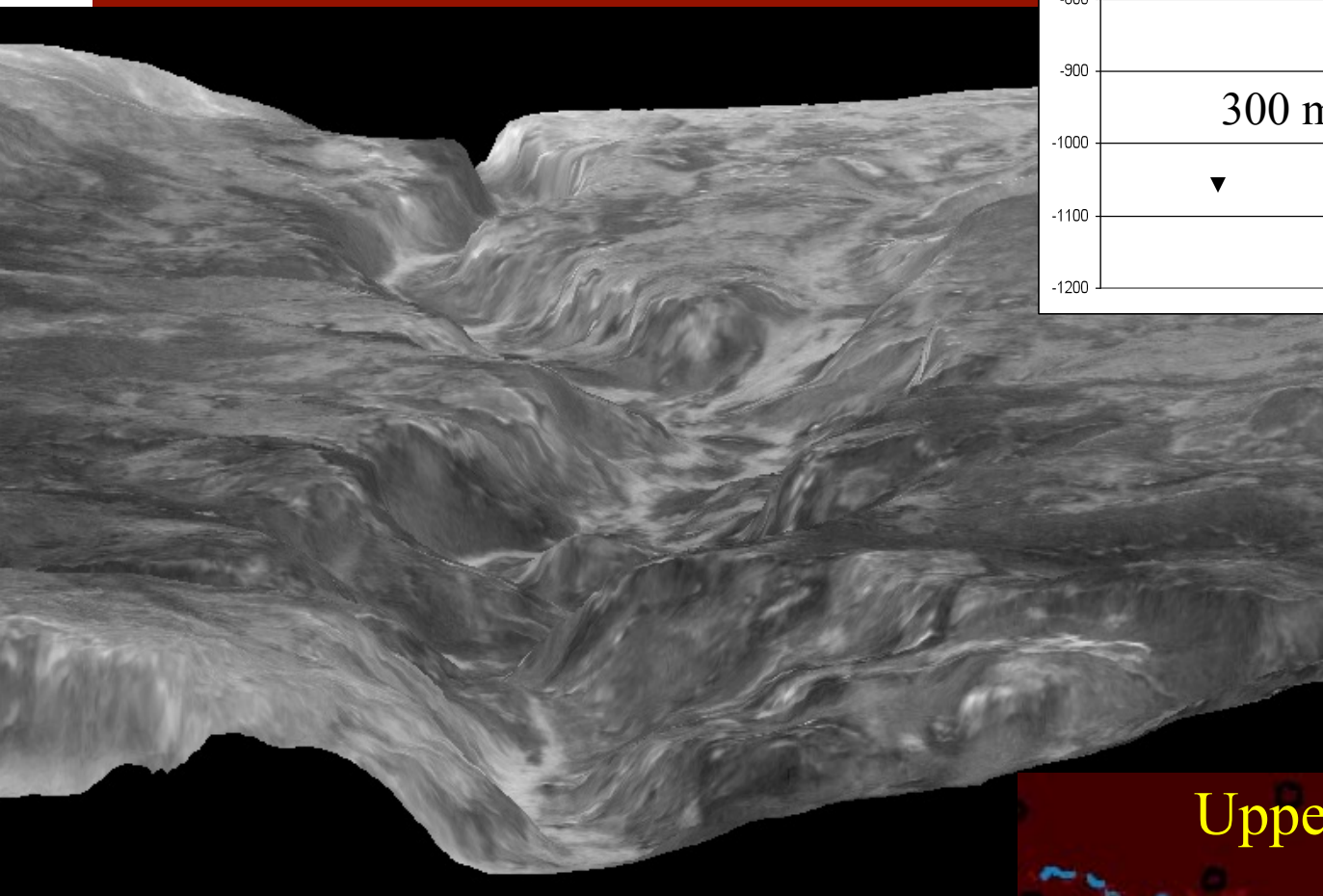
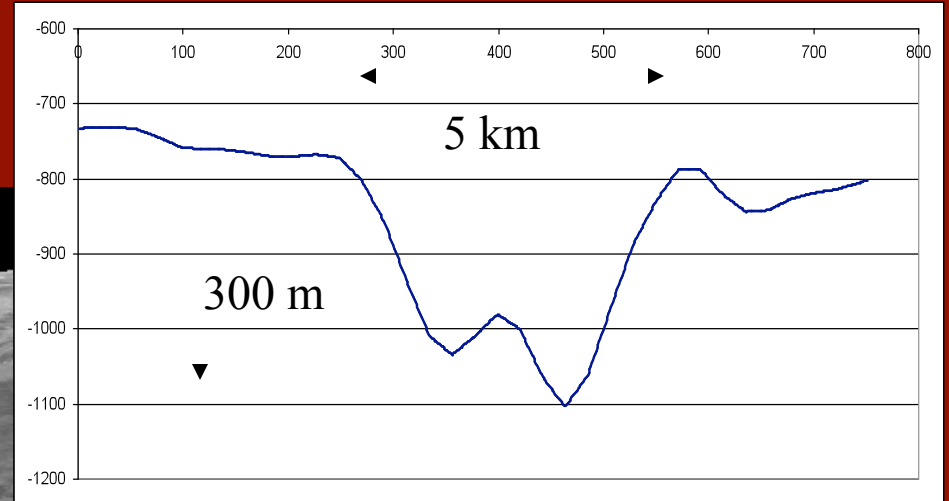


3. Sinuous valleys with fans



Upper valley: Deep and large valley

> 300 m deep



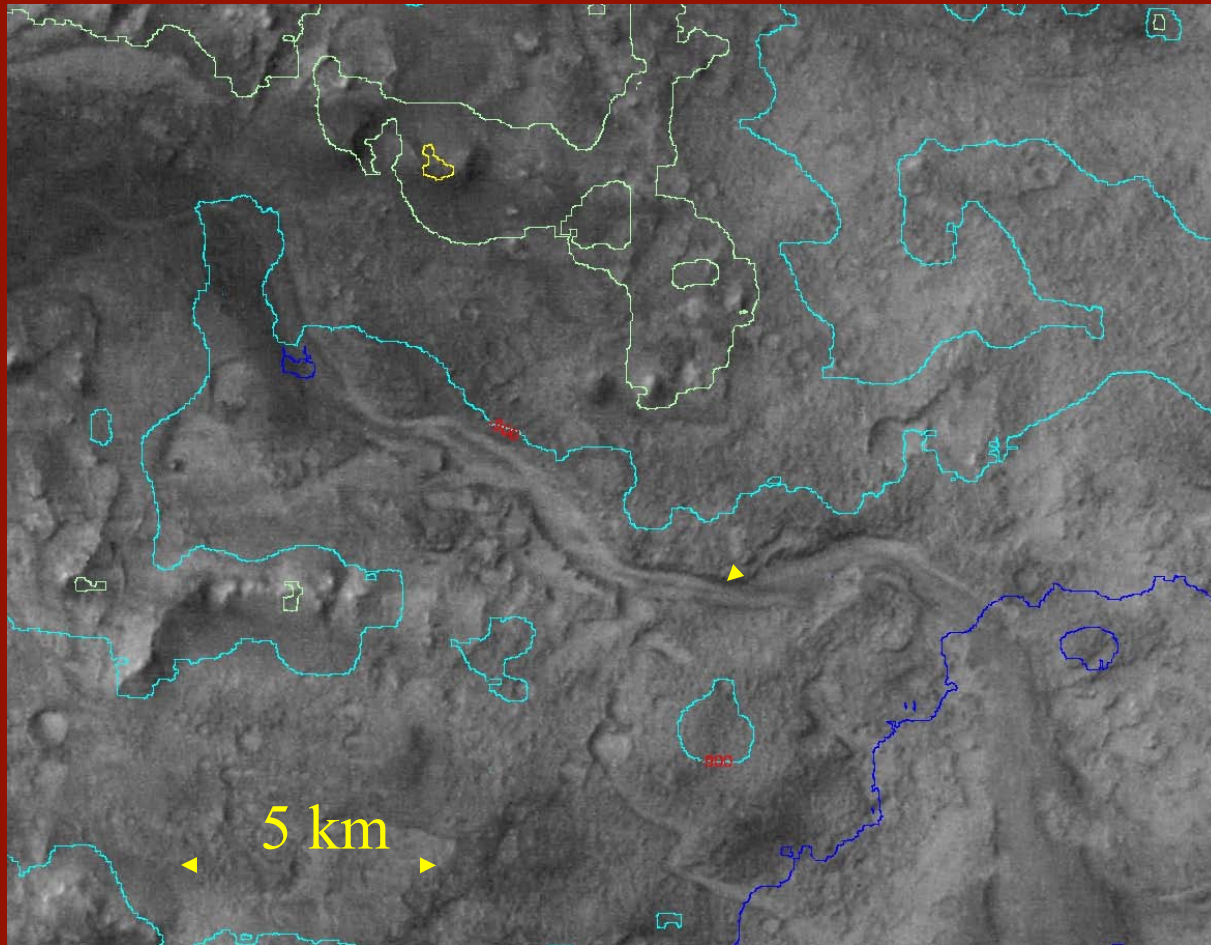
Long term activity

Eroded volume >50 km³

Upper valley



Lower valley: Very shallow compared to the upper valley

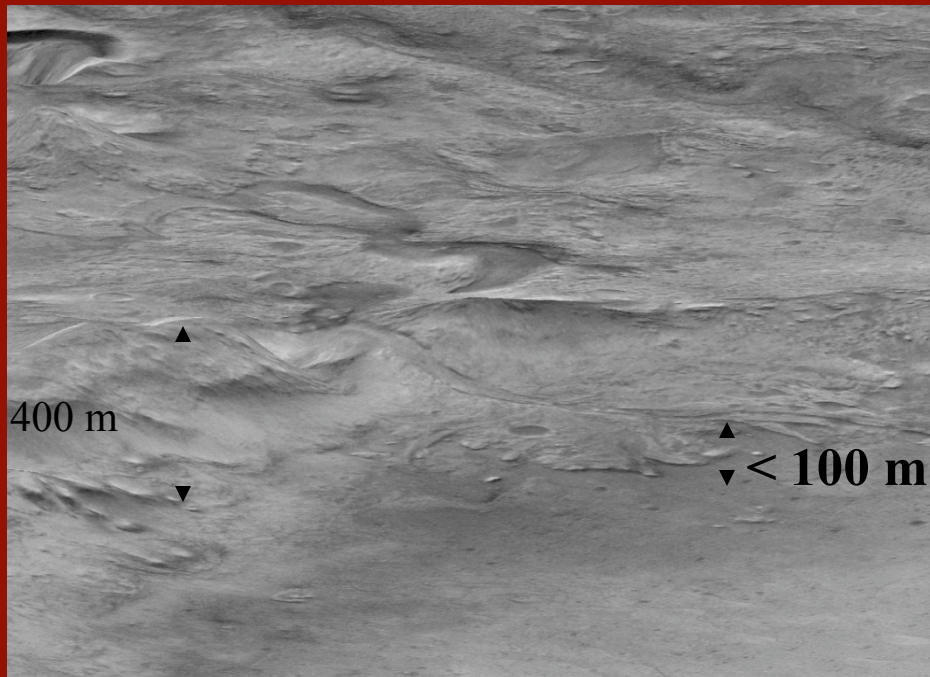


Valley not visible
in topography
(here HRSC DEM)

Valley < 50 m deep
Much smaller valley!



Volume of the terminal fan:



Fan < 100 m thick in average

Volumes < 5 km³

- ▶ At least 10 times less than the erosion of the valley



Upper valley

Strong Erosion

High eroded volume

Lower valley and fan

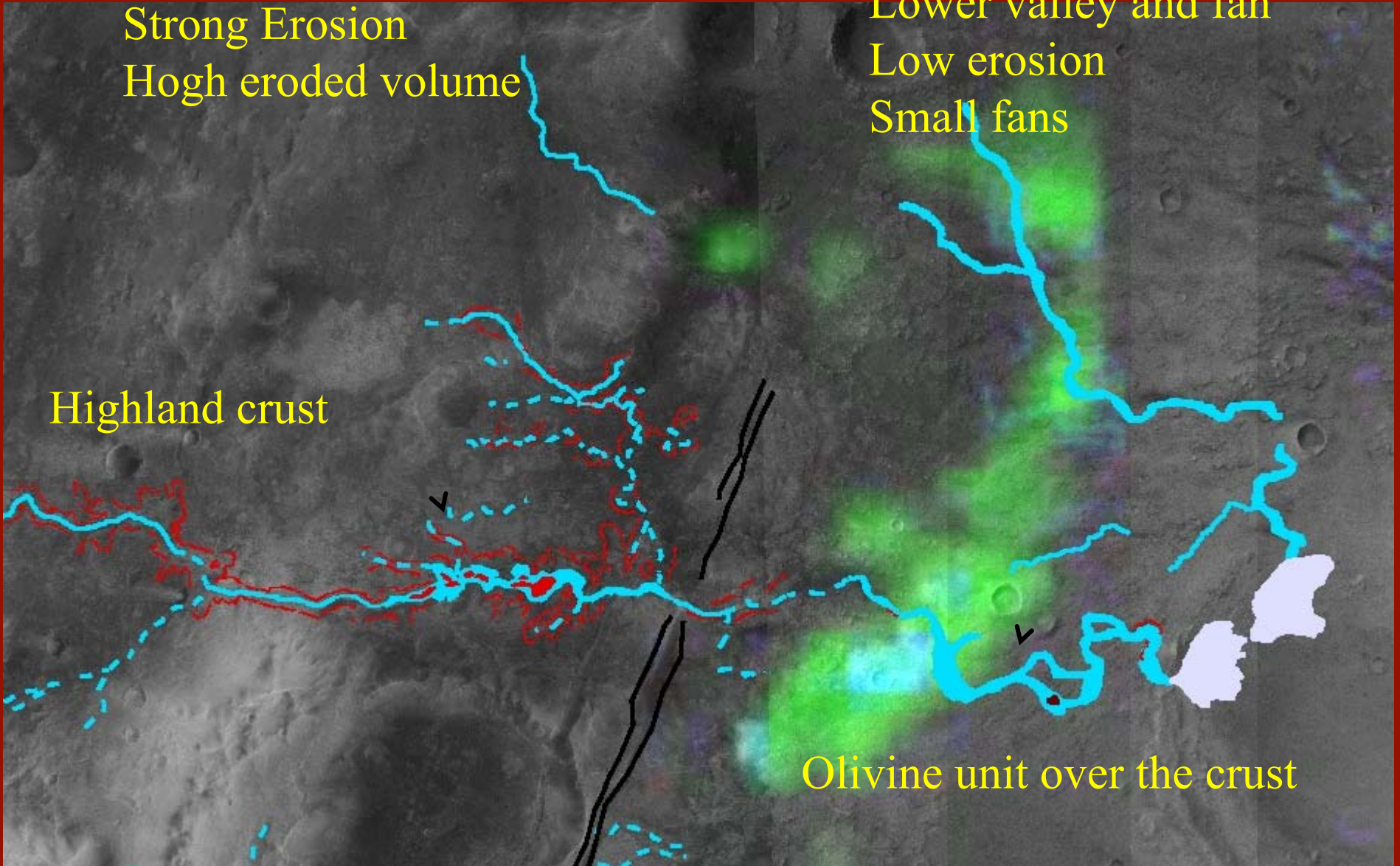
Low erosion

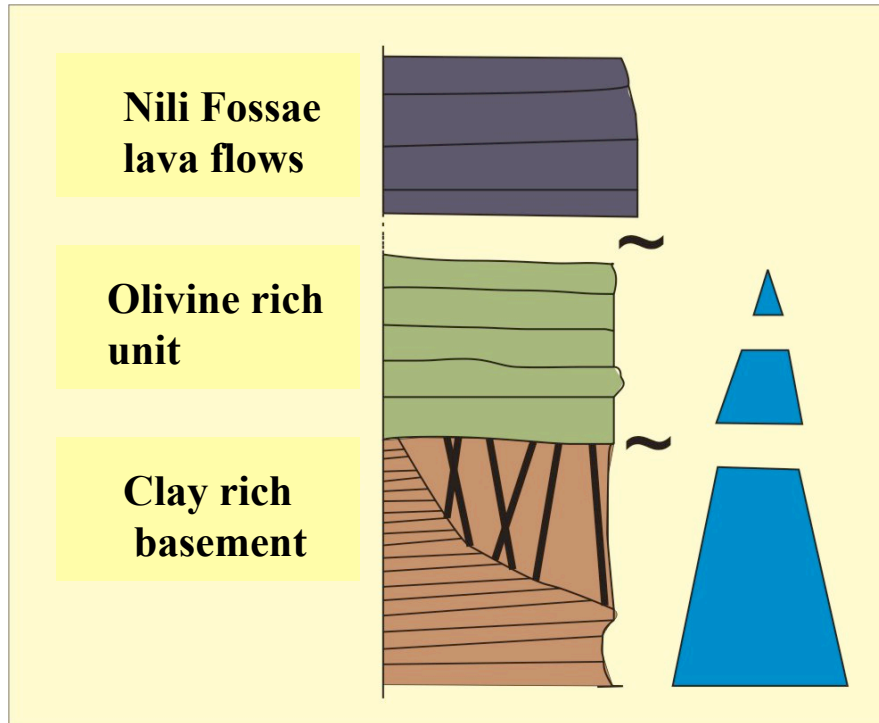
Small fans

Highland crust

Olivine unit over the crust

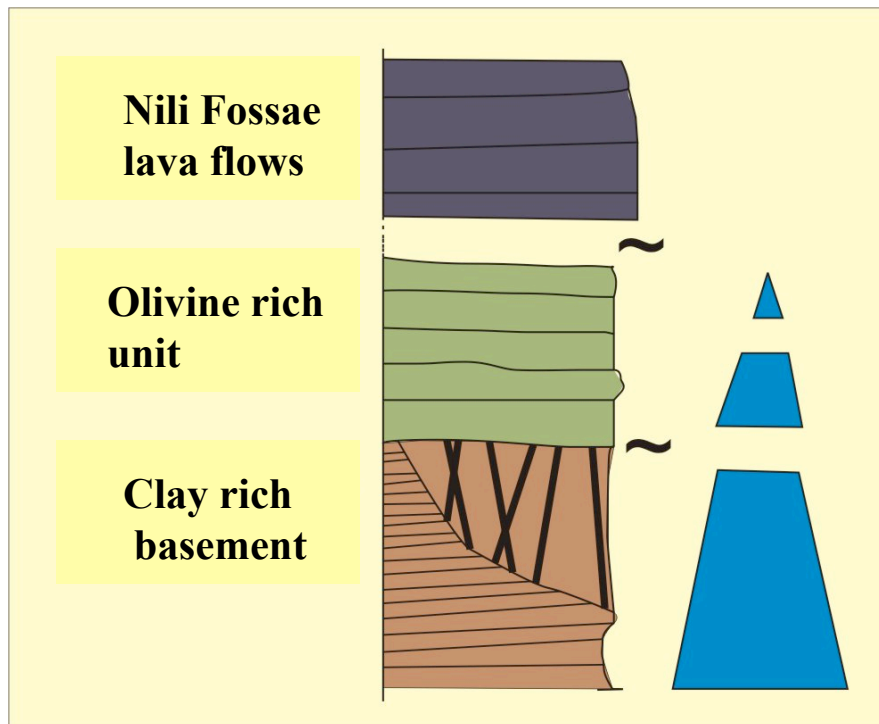
Close up on the composition: Difference=olivine rich layer





- ▲ 3East: Jezero fans and eastern valley over olivine unit (last stage of activity)
- ▲ 3West: Upper valleys dissect bedrock before the olivine unit
- ▼





▲
1 Sapping like
valleys with fans

▲
2. Trough fill and
3 East Jezero fans

▼
3 West Upper valleys

- Late fans uncertain to be related to any alteration but, they suggest episodes of stable liquid water at the surface
- The upper valleys and fans are possible relics from a climatic optimum
⇒ long history possibly related to the alteration of the bedrock?