High Resolution Stereo Camera on MARS EXPRESS

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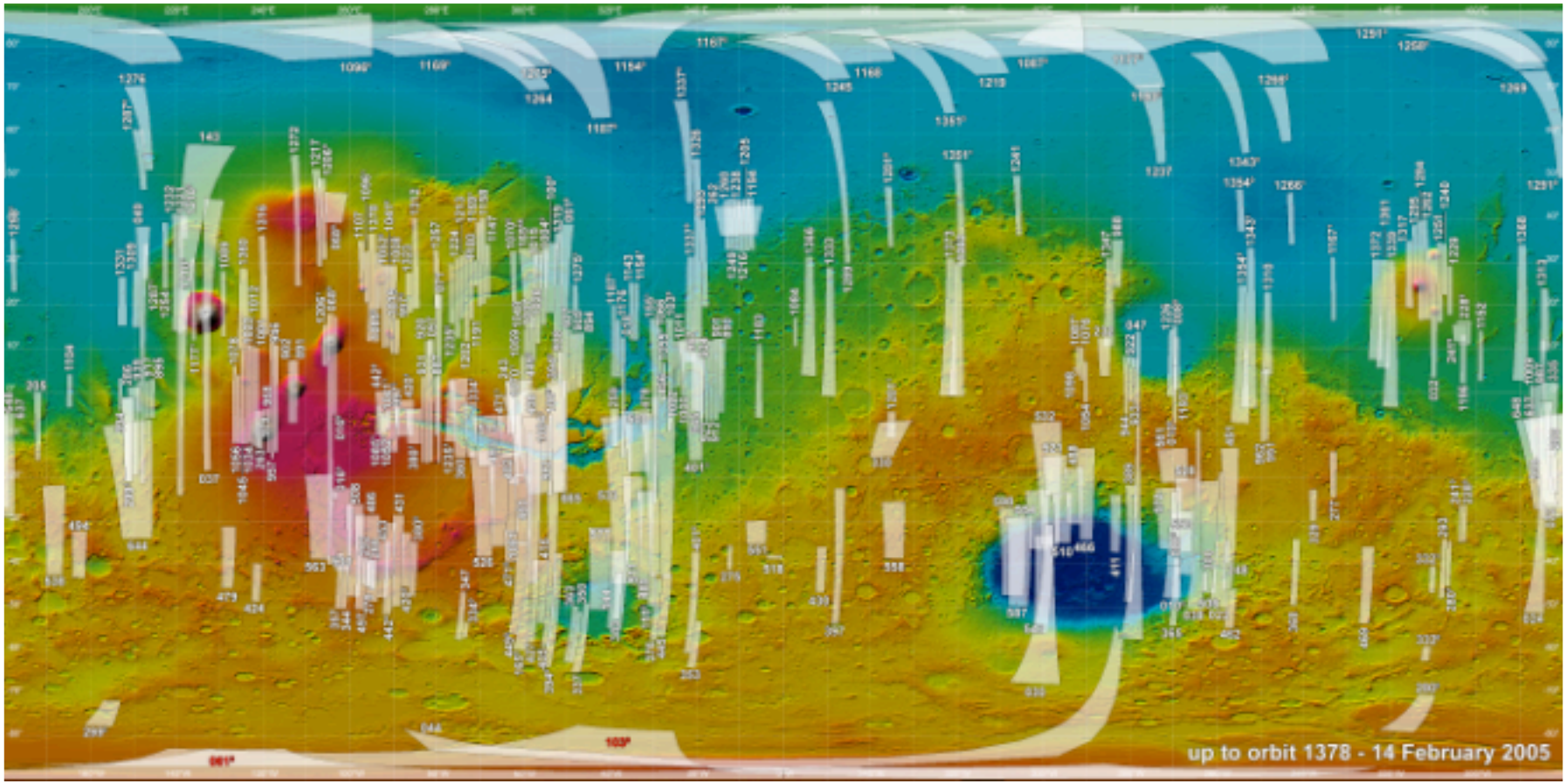
COVERAGE BY HRSC AFTER ONE YEAR IN ORBIT

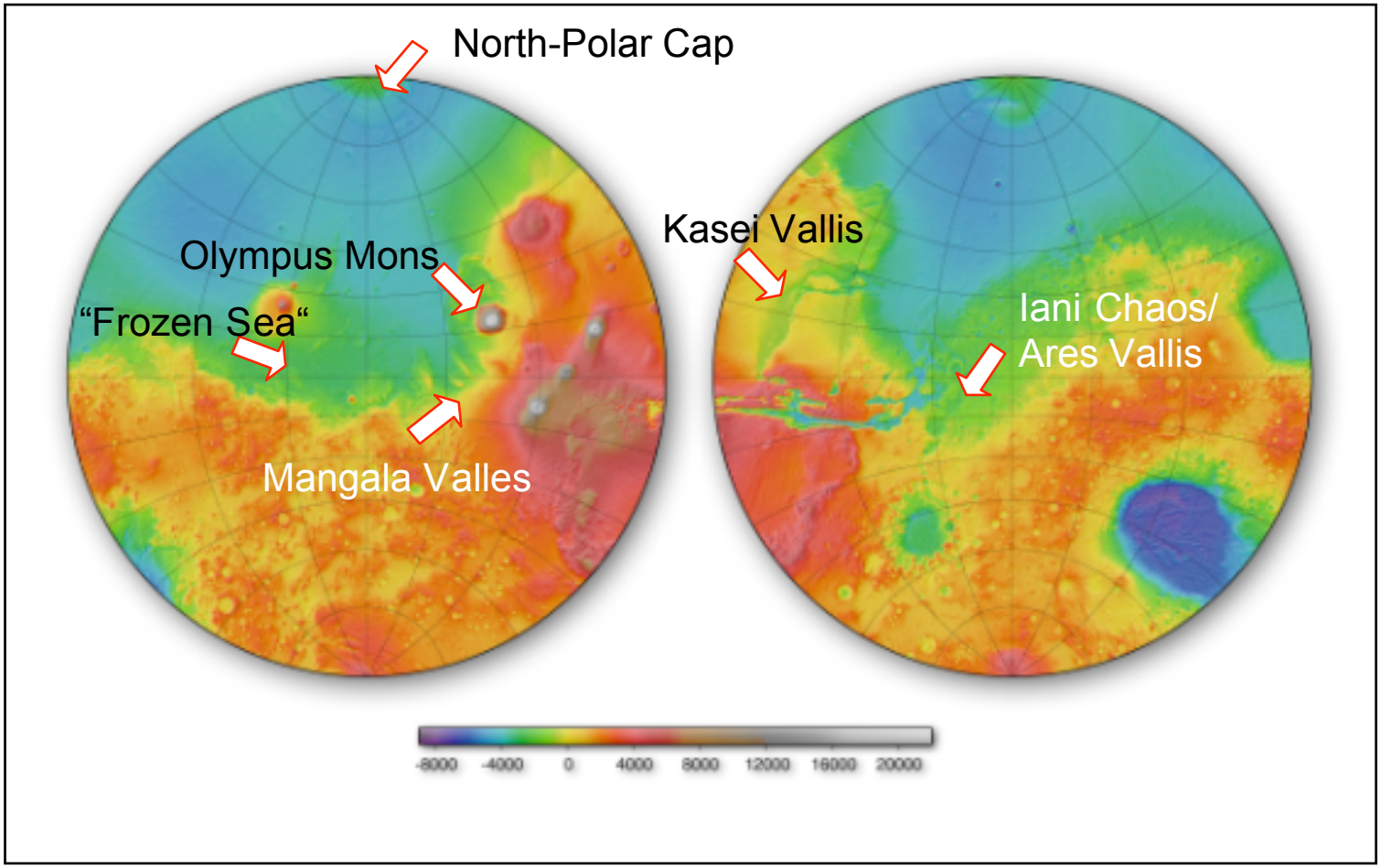
~ 20 % of the martian surface better than 50 meters per pixel, ~10% of the martian surface better than 20 meters per pixel, all imagery in color and 3D



TOPOGRAPHY OF MARS

Areas of Focused Research on

Water, Ice/Glaciers, and Volcanism



OLYMPUS MONS

Myr = million years

Olympus Mons East:

- **Lava, Ice/Snow, Water**

  Lava produced between 200 Myr and 20 Myr ago

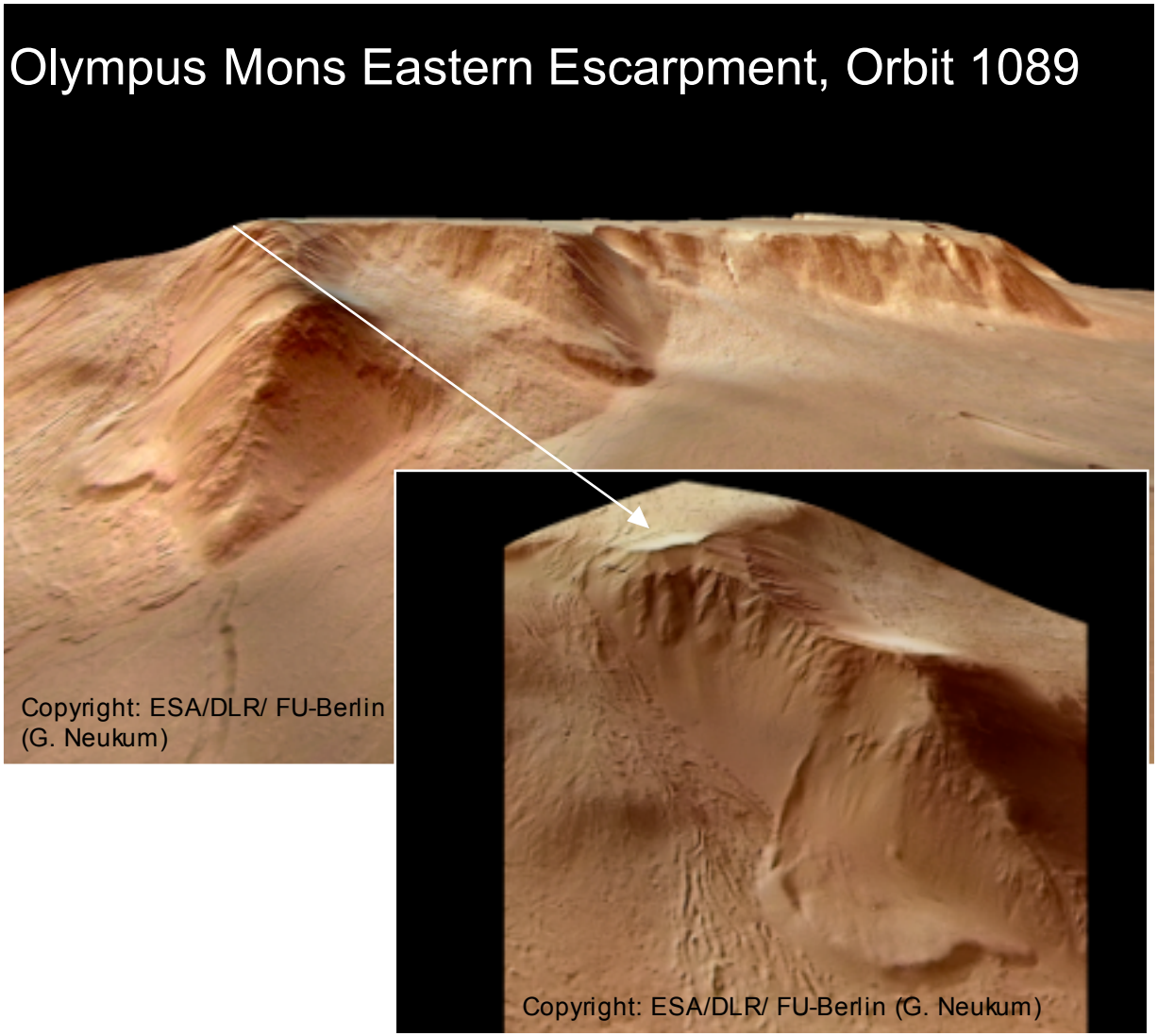
  Melting by lava of a snow/ice layer on the volcanic shield, liquid water on the surface as recent as 20 Myr ago

Olympus Mons West:

- **Lava, Ice/Snow, Water**

  Lava produced between 200 Myr and 2.5 Myr ago

  Water mobilized from underground and formation of glaciers as recent as 4 Myr ago



« FROZEN SEA »

- **Characteristic features**

  Area of the “Frozen Sea” is 800 km by 900 km.

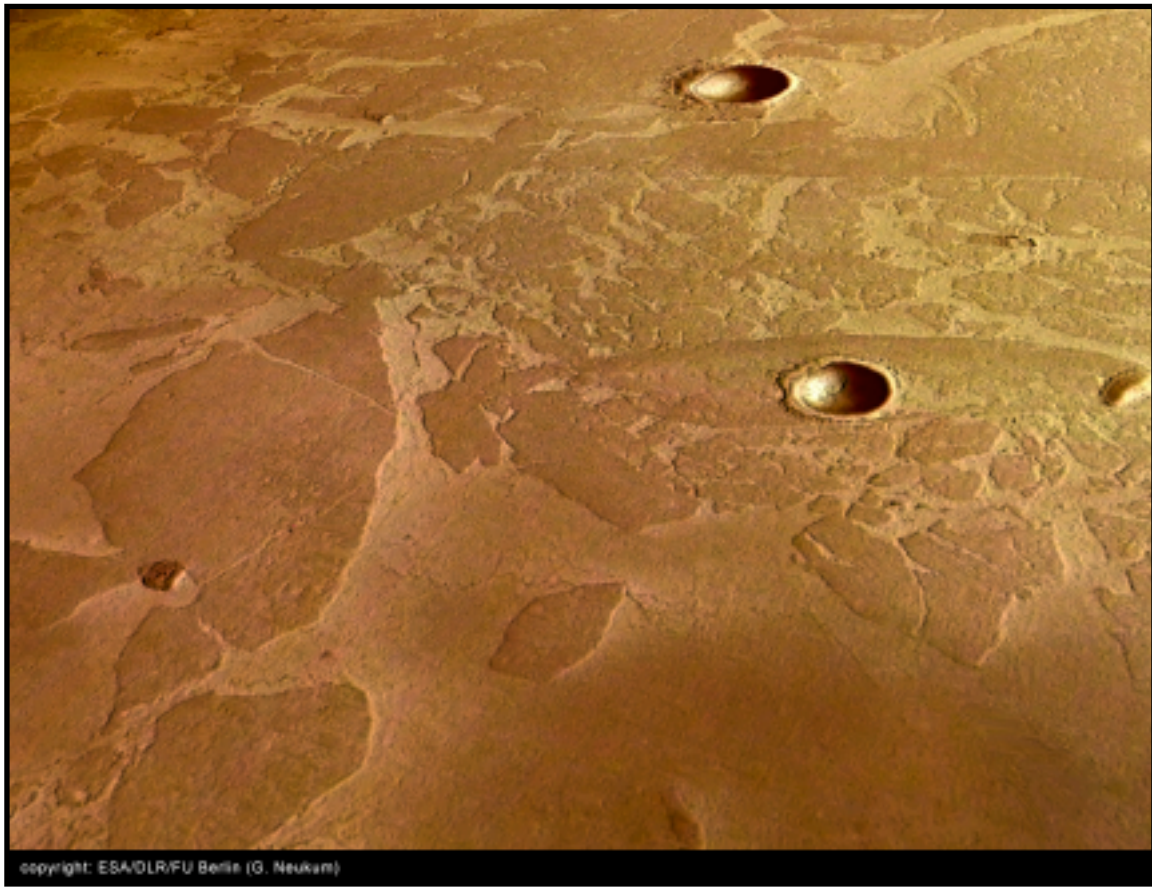
  Water came out of the surface from the nearby Athabasca Valles.

  Original water depth ~ 50 m, ice rafts of up to 30 km in size moved many kilometres away from one another.

  The Sea is now frozen. The ice has been kept stable and prevented from sublimation by a dust cover.

  The Sea came into being ~ 5 million years ago.

“Frozen Sea“ near Mars‘s Equator, Orbit 32



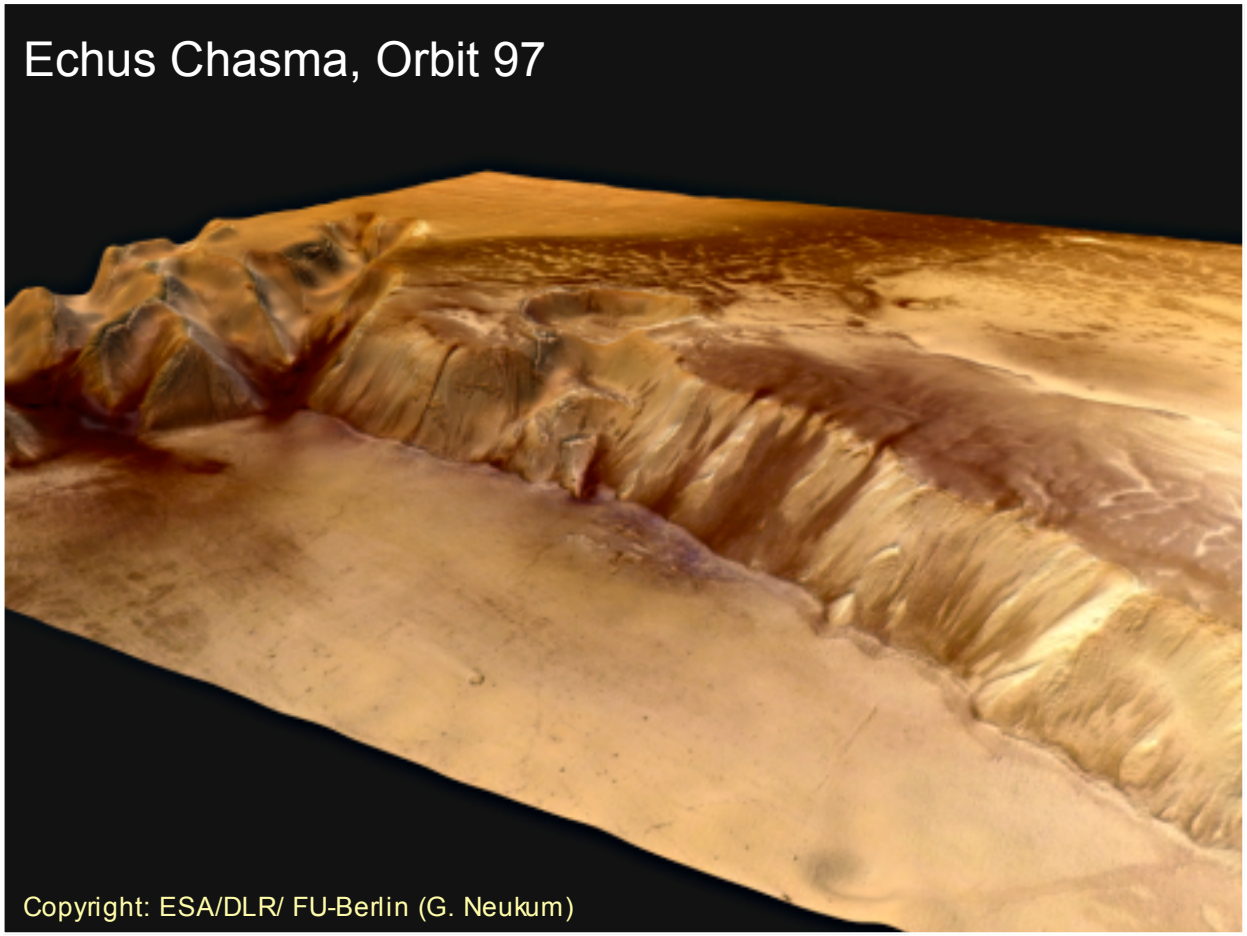
Echus Chasma

- **Source region of Kasei Valles, the greatest outflow channel on Mars**

  Liquid water was present on the surface billions of years ago.

  Gigantic waterfalls poured over the four thousand meter high cliff and fed a lake in the valley.

  Later when it became colder gigantic glaciers developed and carved Kasei Valles.



KASEI VALLES

Glacial and Fluvial Activity over much of the History of Mars

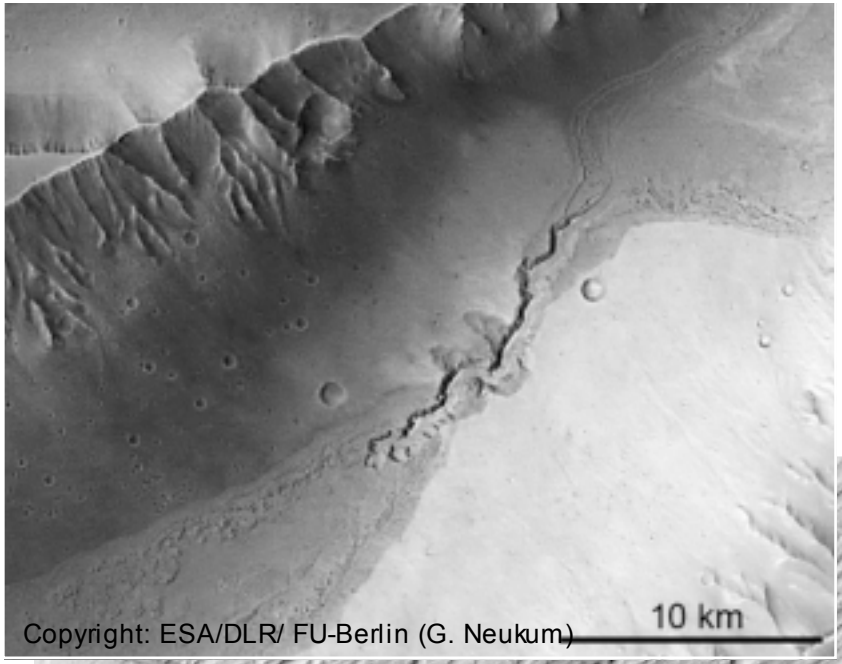
- **Glacial Activity/Water**

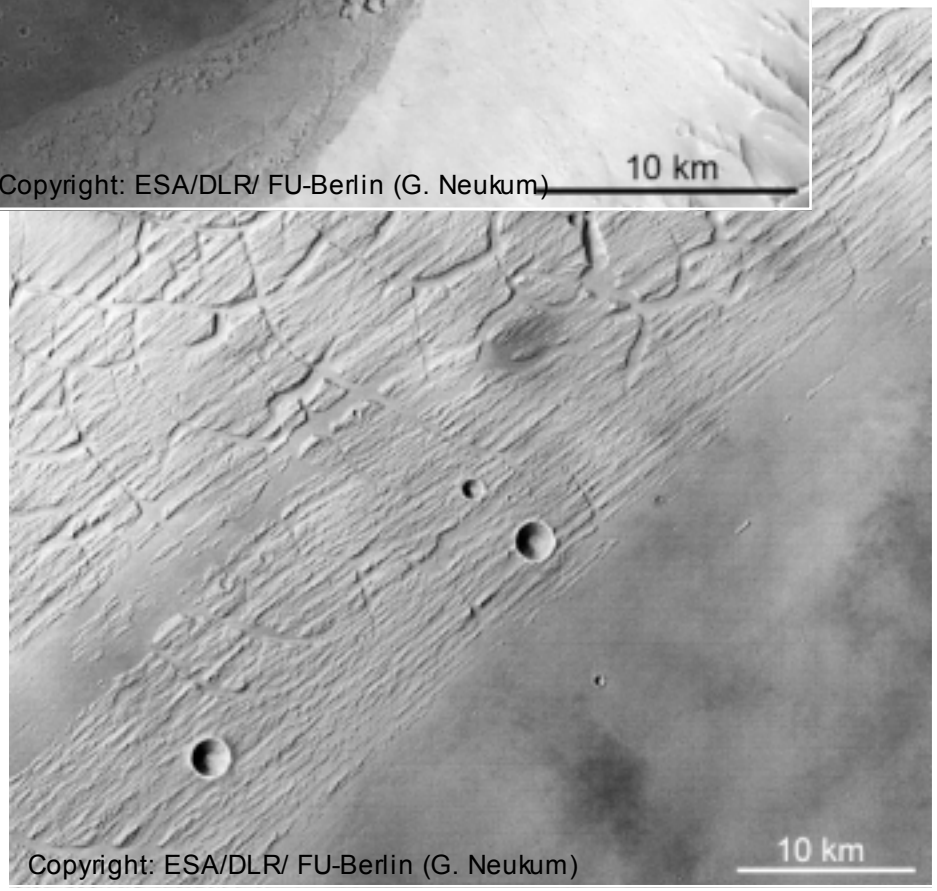
  The scour marks in the valley are most likely due to glacial erosion rather than fluvial erosion, contrary to what was previously thought

  The glacier was fed by water from the Echus Chasma region that was driven out from underground by volcanic activity

- **Water/Volcanism**

  Water was released by volcanic action as recent as 20 Myr ago on the channel floor



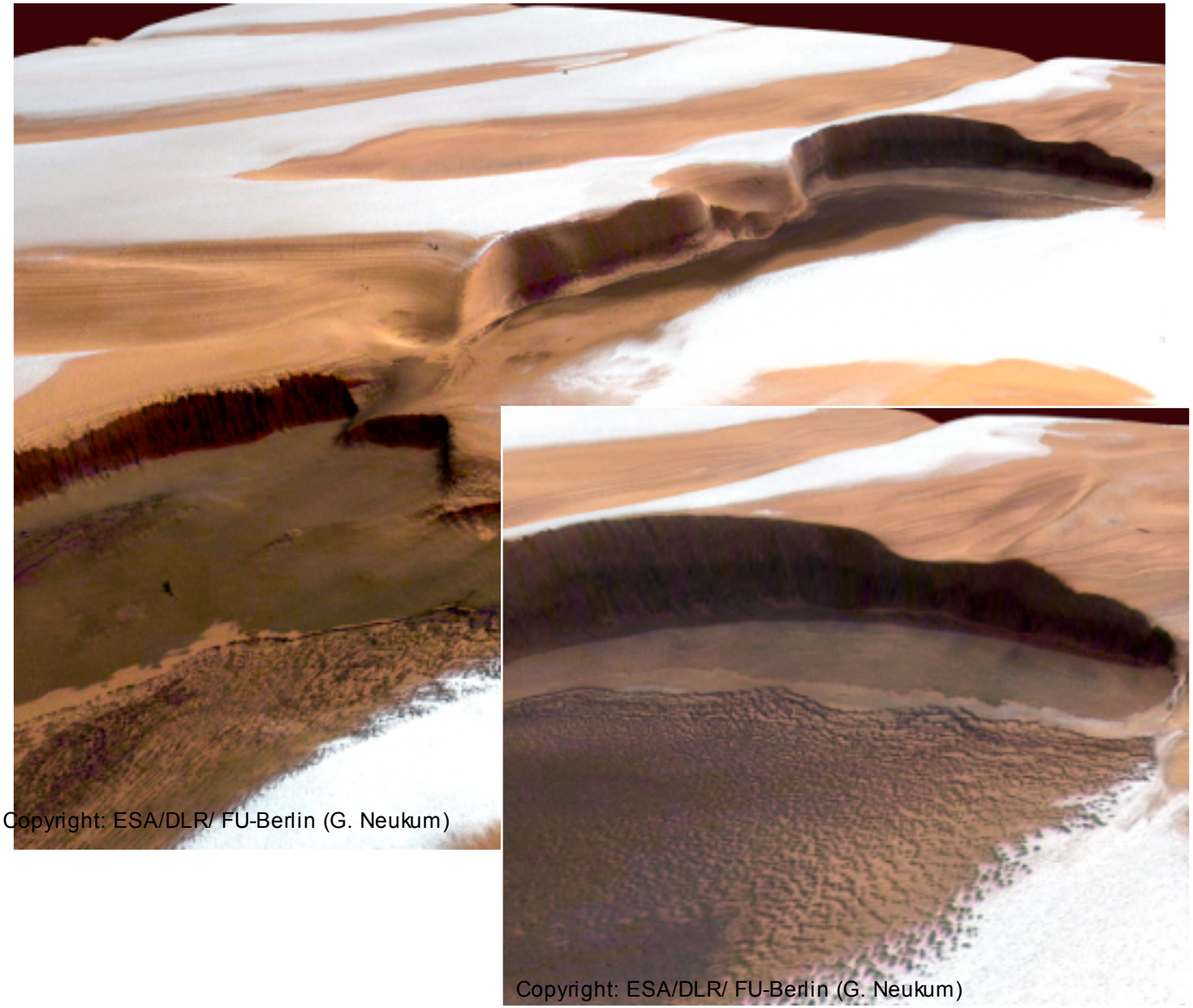


NORTH POLE

◆Layers of Water Ice and Dust for the First Time in 3D

◆Cliffs Almost 2 km high

◆ Dark Material in Caldera-like Structures and Dune Fields: Volcanic Ash?



NORTH POLE

- Fields of Volcanic Cones
- Up to 600 m high
- Likely very recent volcanic activity
- Possibly ongoing?