

Radar soundings of the North Polar Cap of Mars

A. Frigeri¹, R. Orosei¹, M. Cartacci¹, A. Cicchetti¹, G. Mitri¹,
S. Giuppi¹, R. Noschese¹, G. Picardi² and J. Plaut³

¹Istituto di Astrofisica e Planetologia Spaziali (IAPS), Istituto Nazionale di Astrofisica (INAF), Roma Italia

²Università "La Sapienza", Roma, Italia

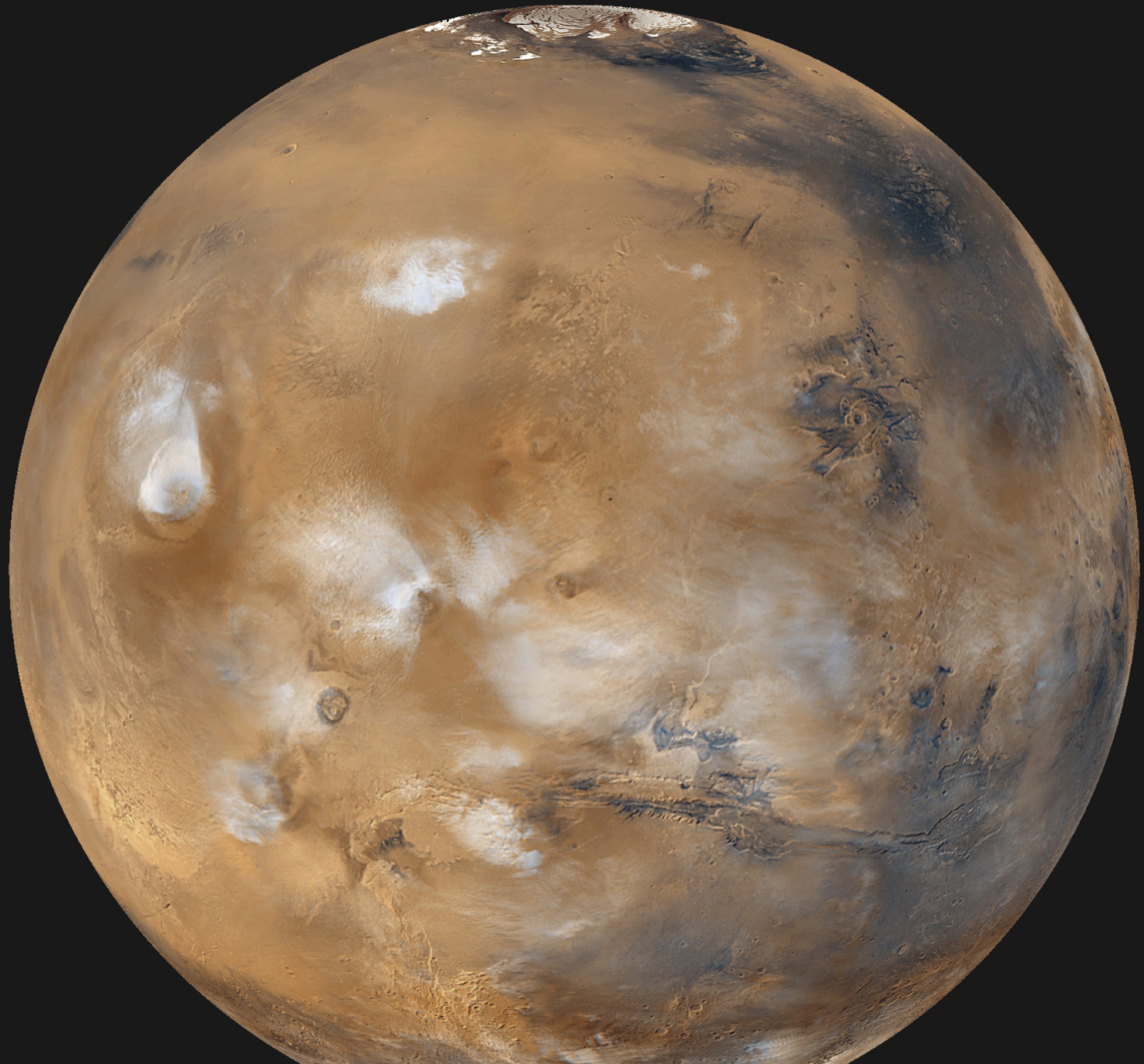
³Jet Propulsion Laboratory, California Institute of Technology, Pasadena, USA



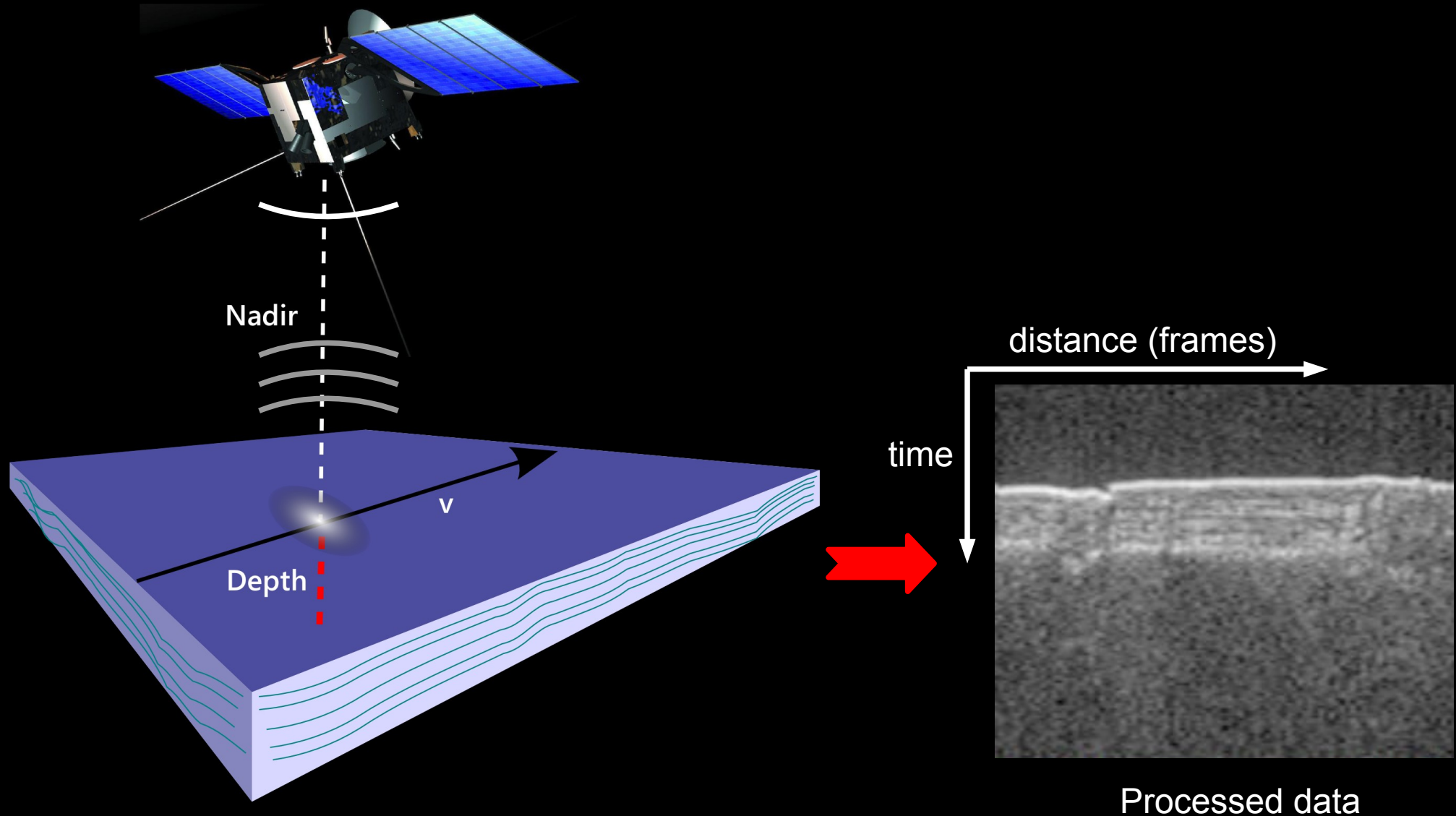
3rd Moscow Solar System Symposium

IKI - Space Research Institute of Russian Academy of Sciences

Moscow – October 8th-12th, 2012



Planetary subsurface radar sounders



Planetary subsurface radar sounders on Mars' north polar icecap

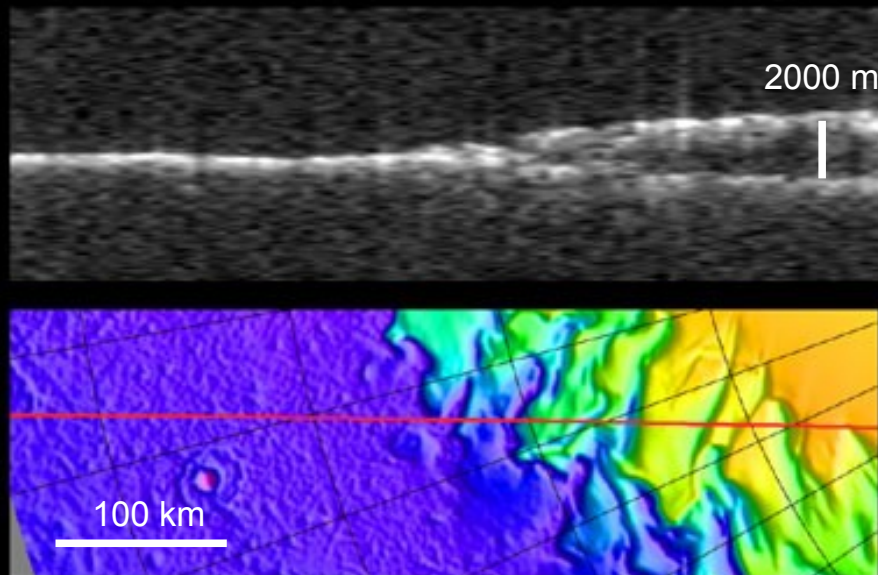
MARSIS (2003 - ongoing)

Developed by Italian Space Agency

PI: G. Picardi

Onboard ESA Mars Express

Frequency: 1.3 – 5.5 MHz, v. res ~100m



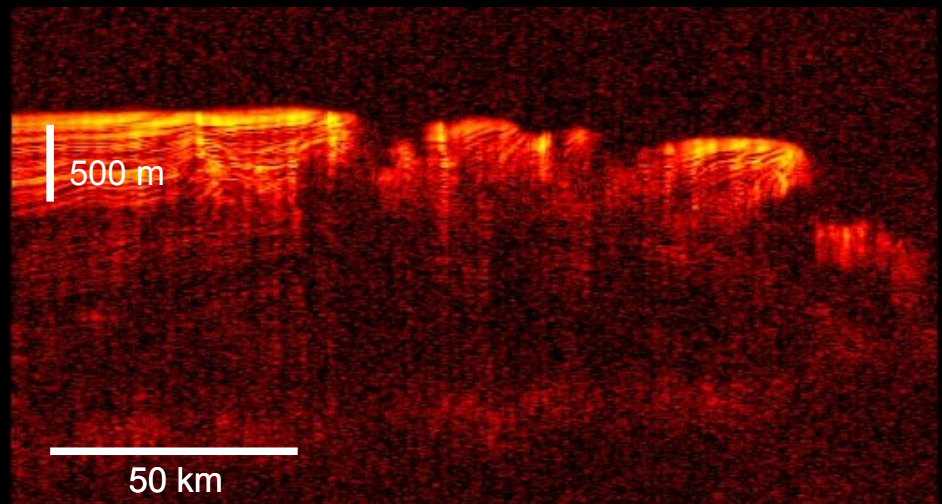
SHARAD (2005 - ongoing)

Developed by Italian Space Agency

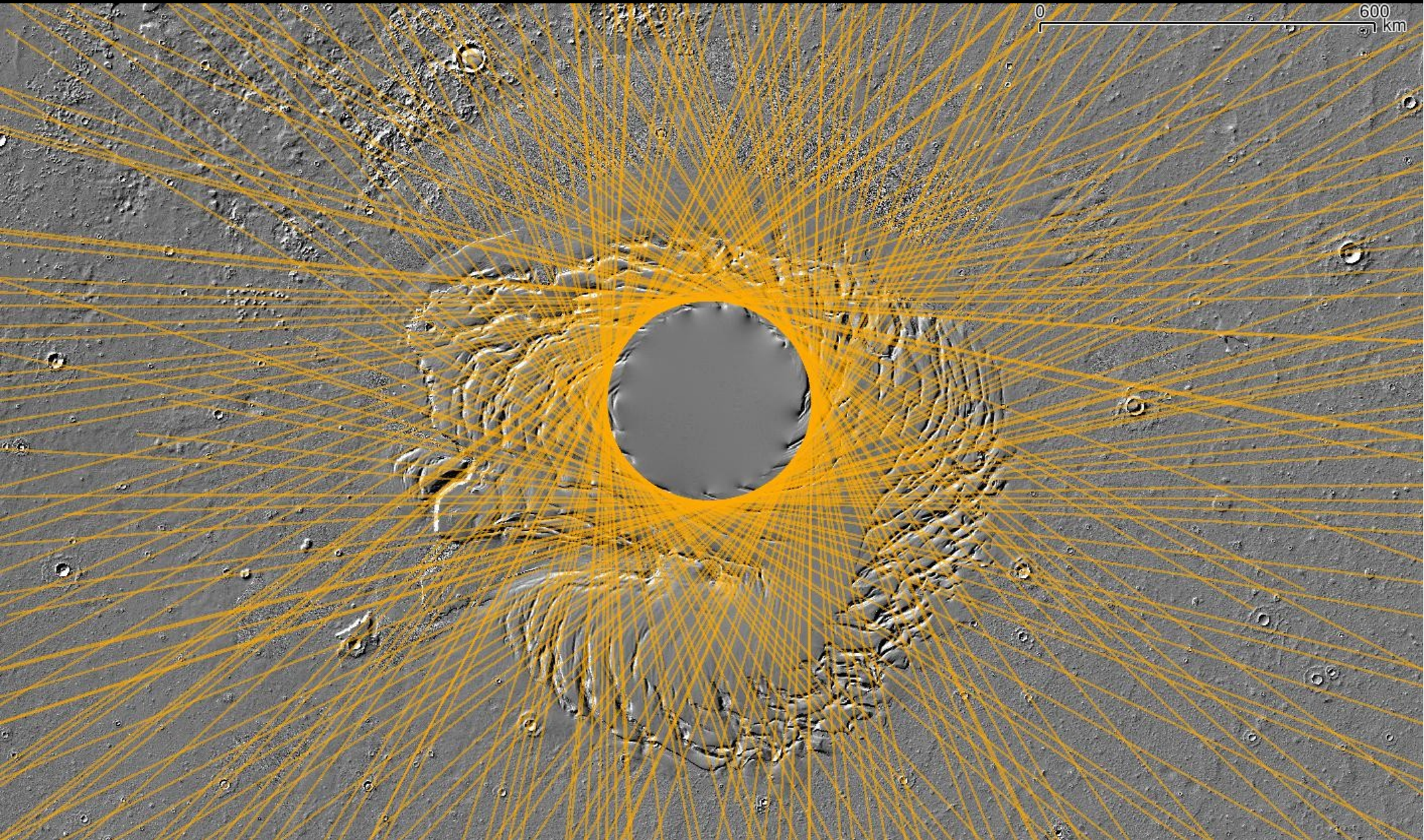
Team Leader: R. Seu

Onboard: NASA Mars Reconnaissance Orbiter

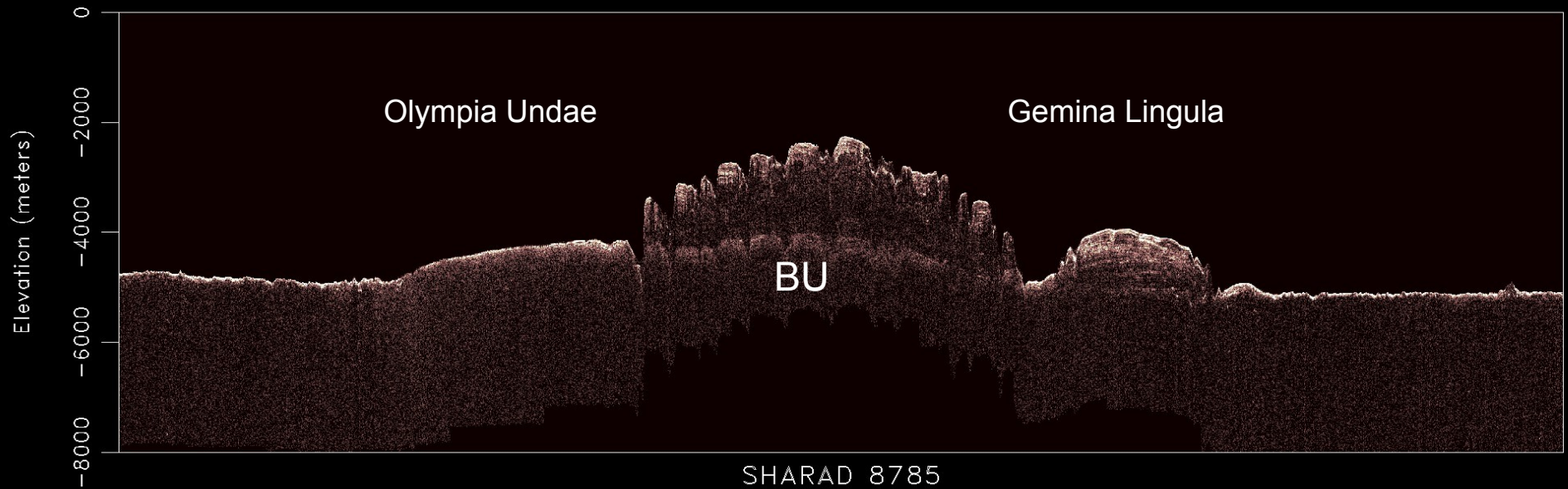
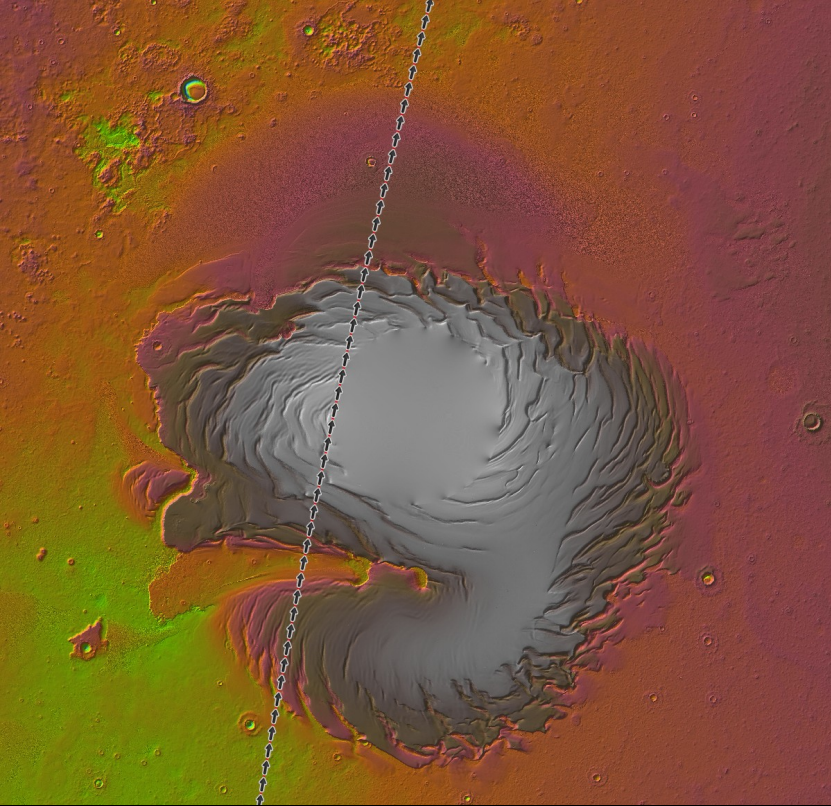
Frequency: 25 MHz, v. res ~10m



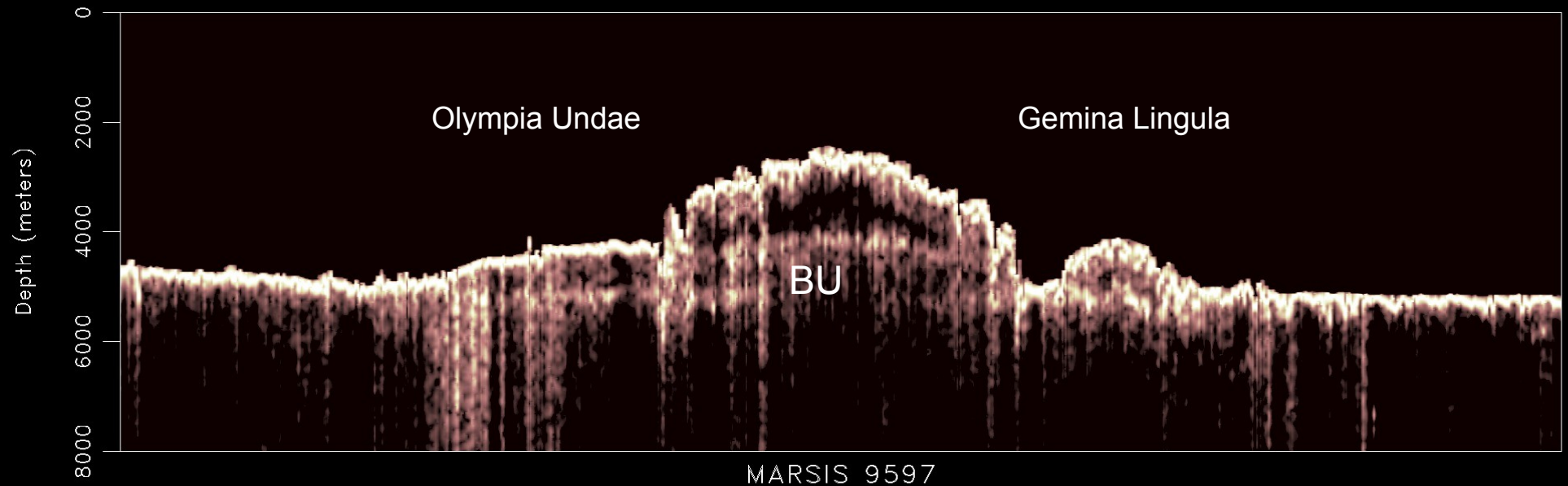
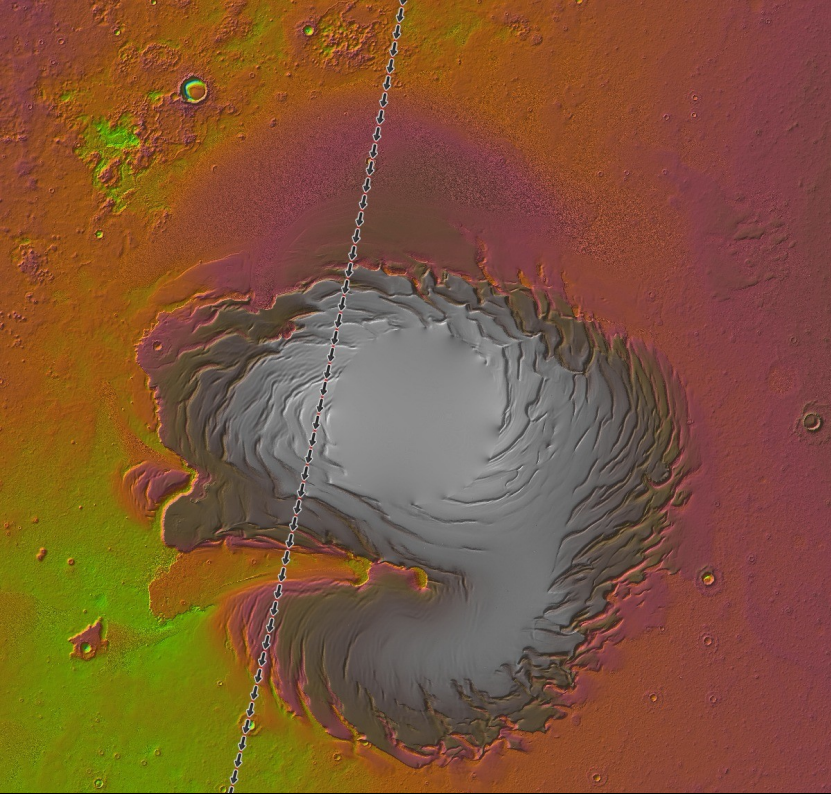
2011 MARSIS Polar Campaign

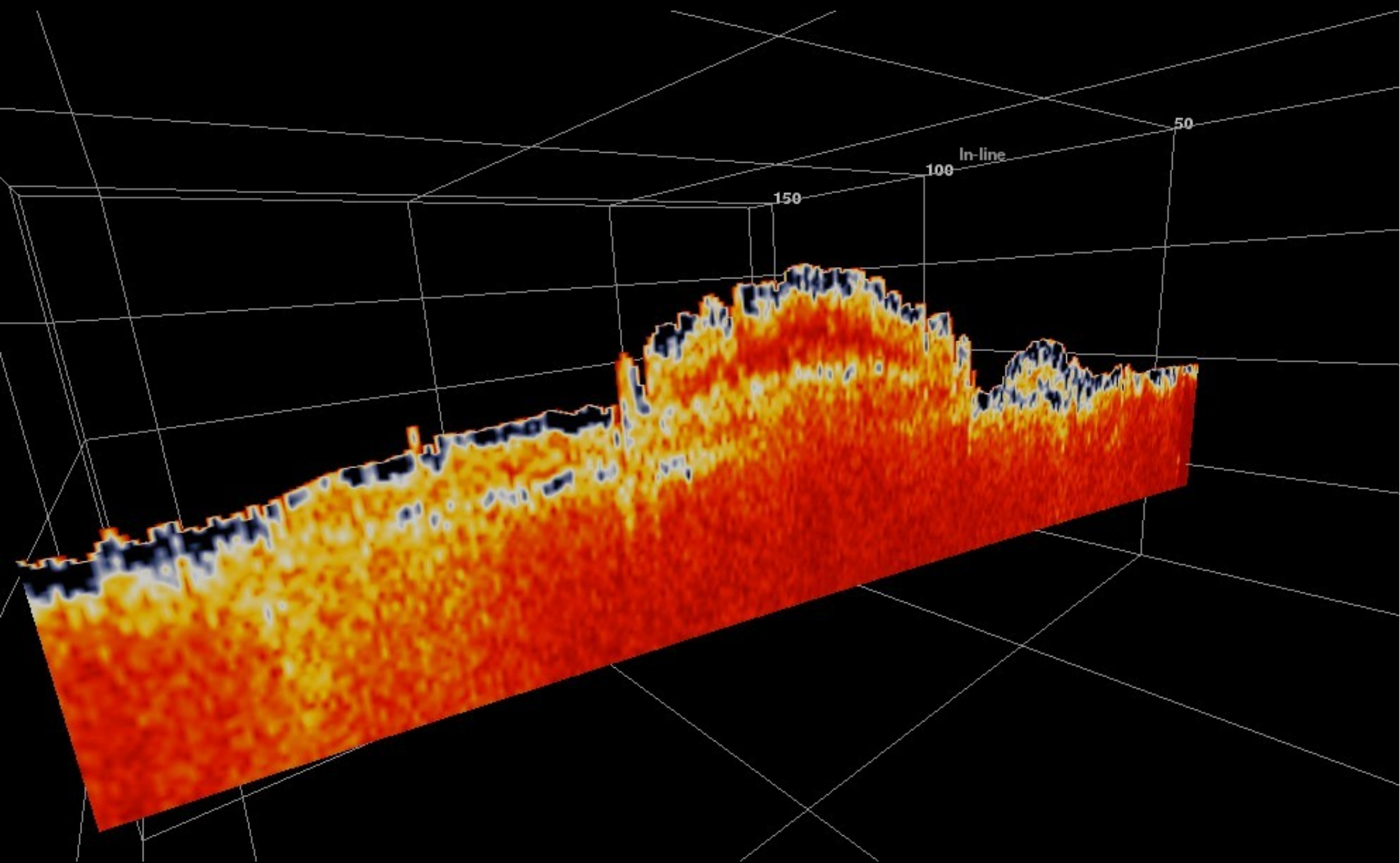


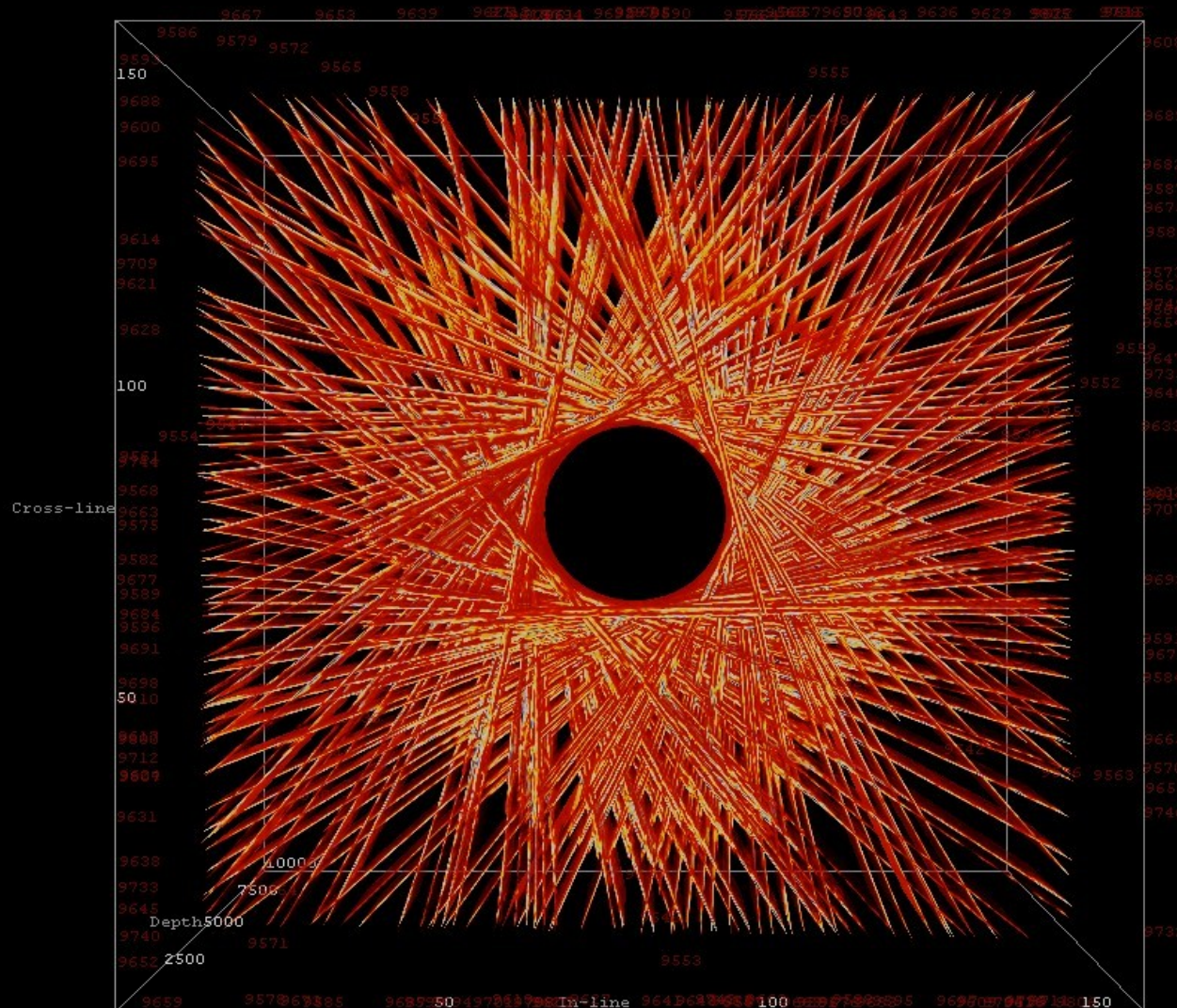
North Pole: SHARAD



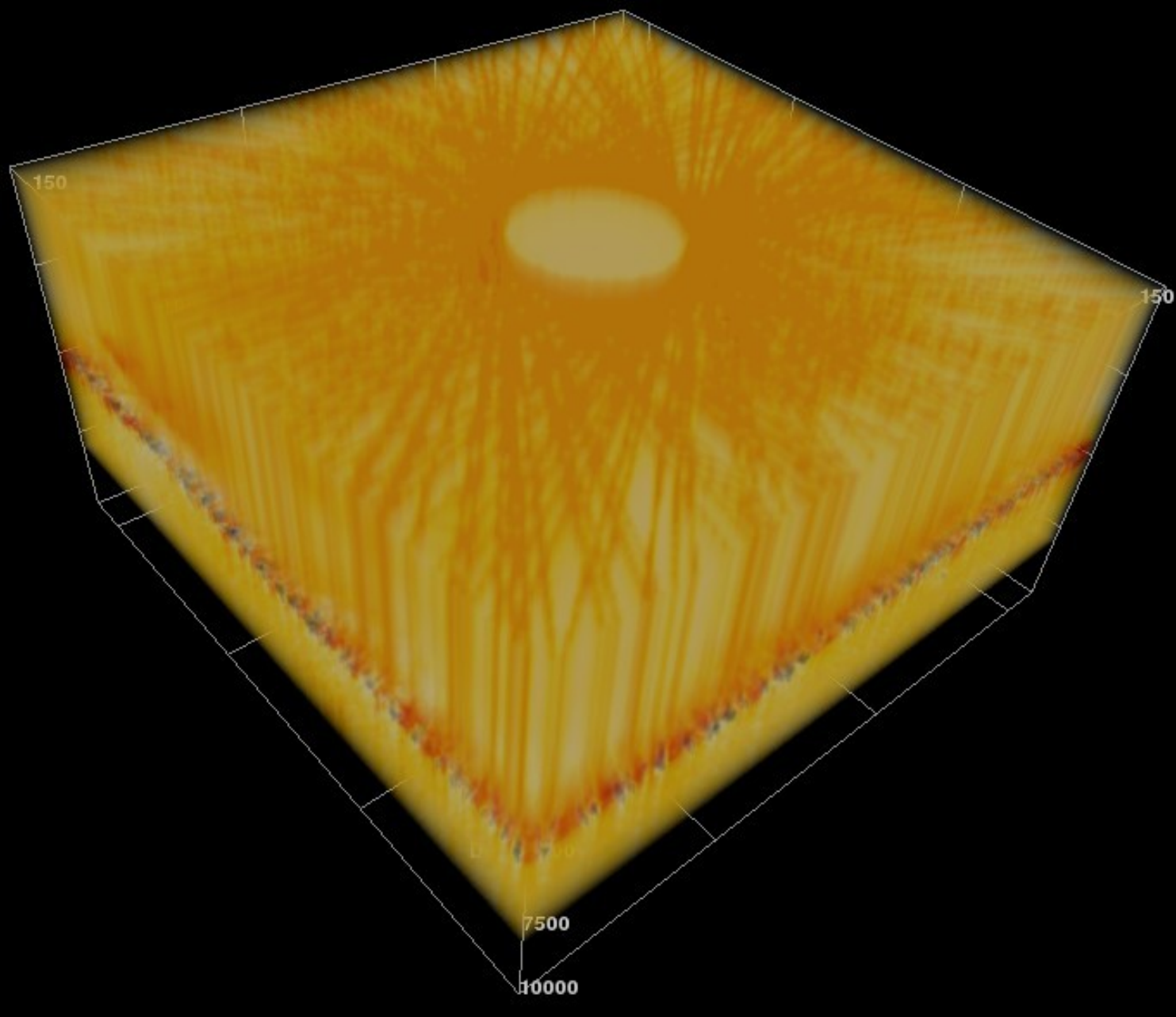
North Pole: MARSIS

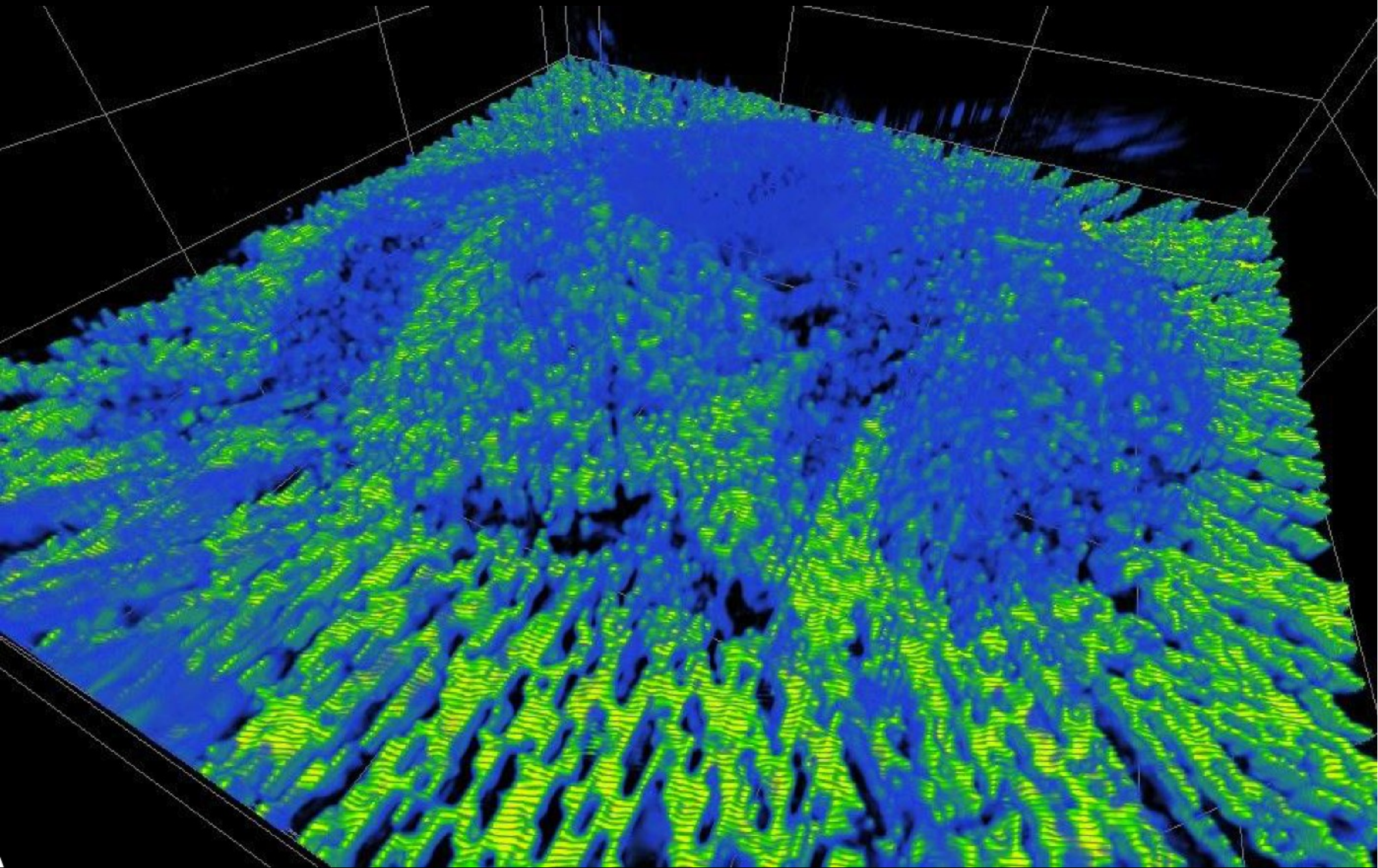


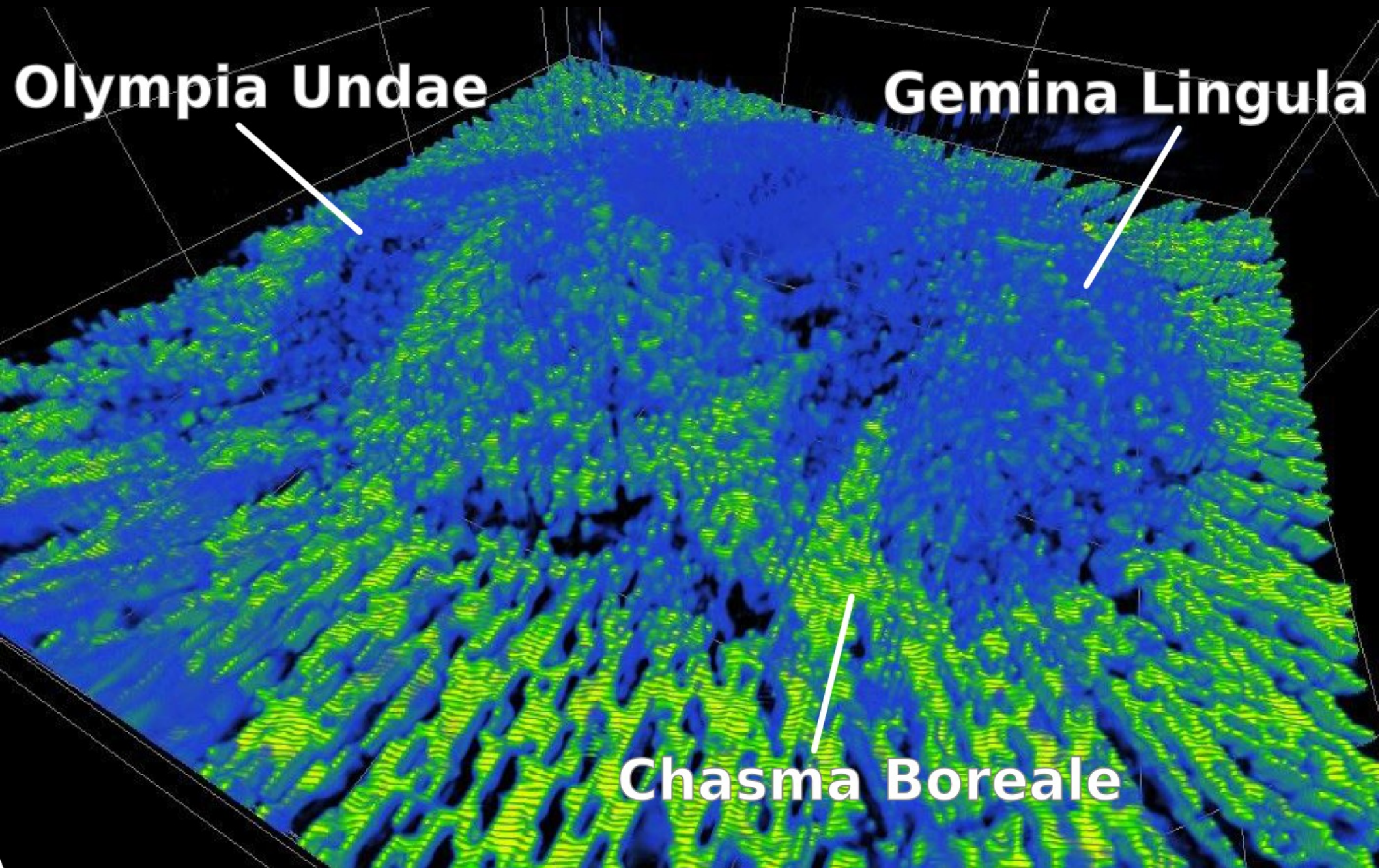


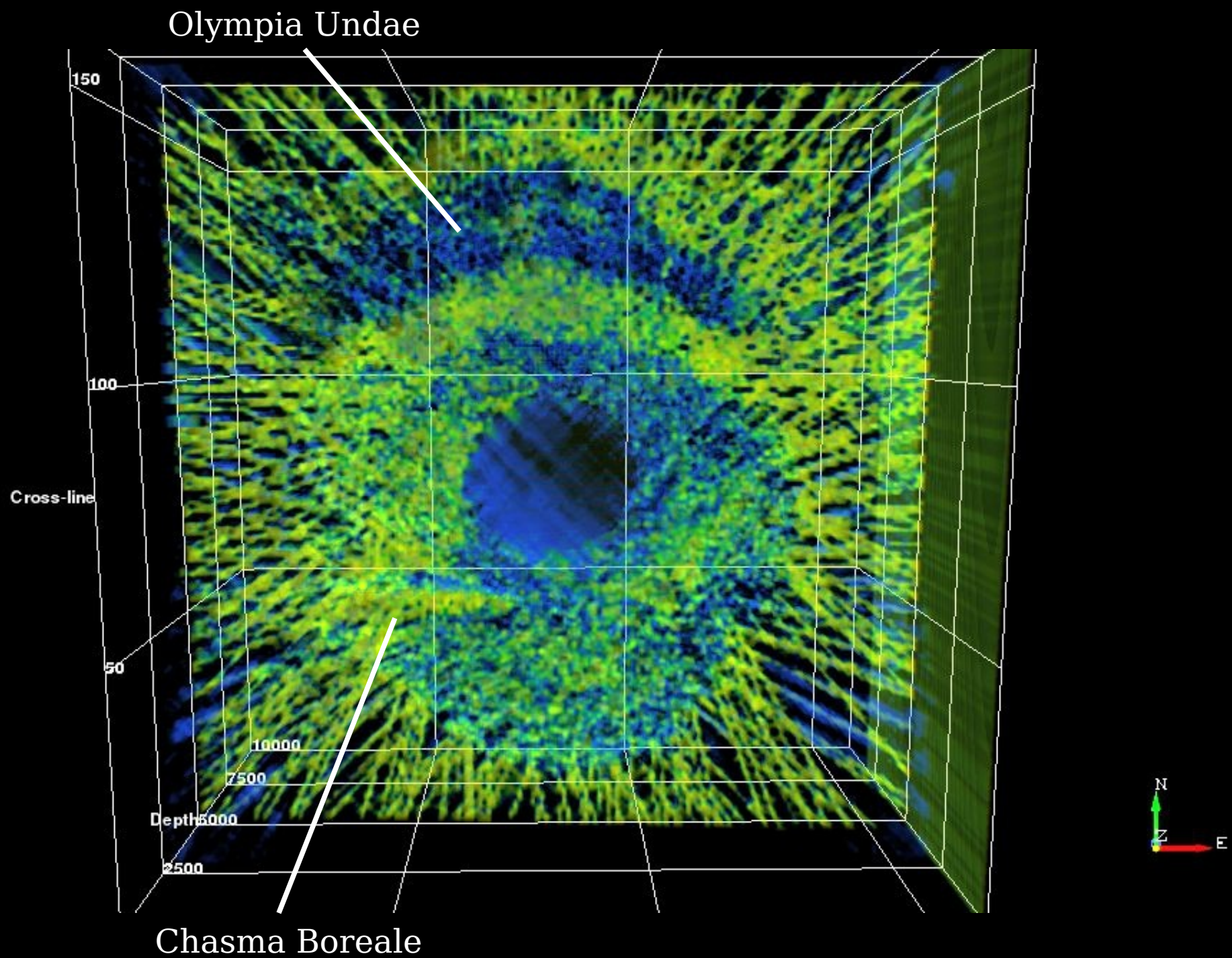


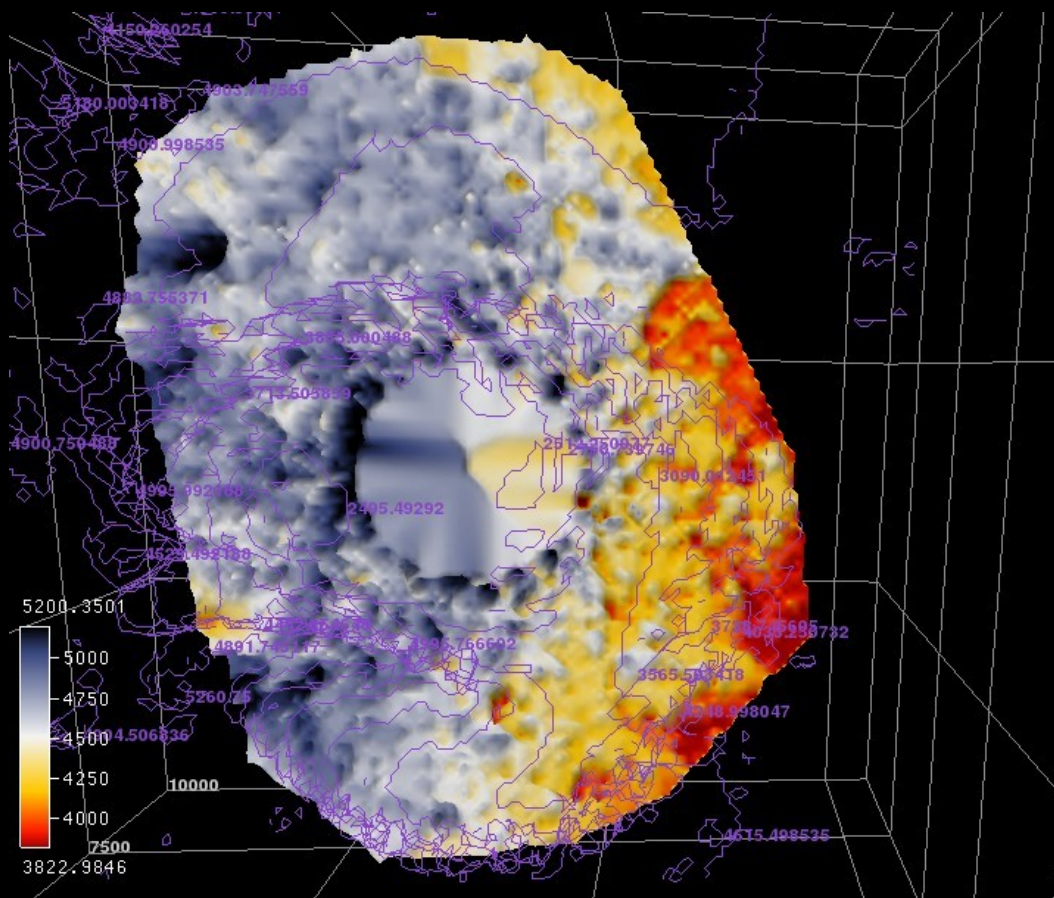
161 radargrams (106 with S/N > 25 dB)



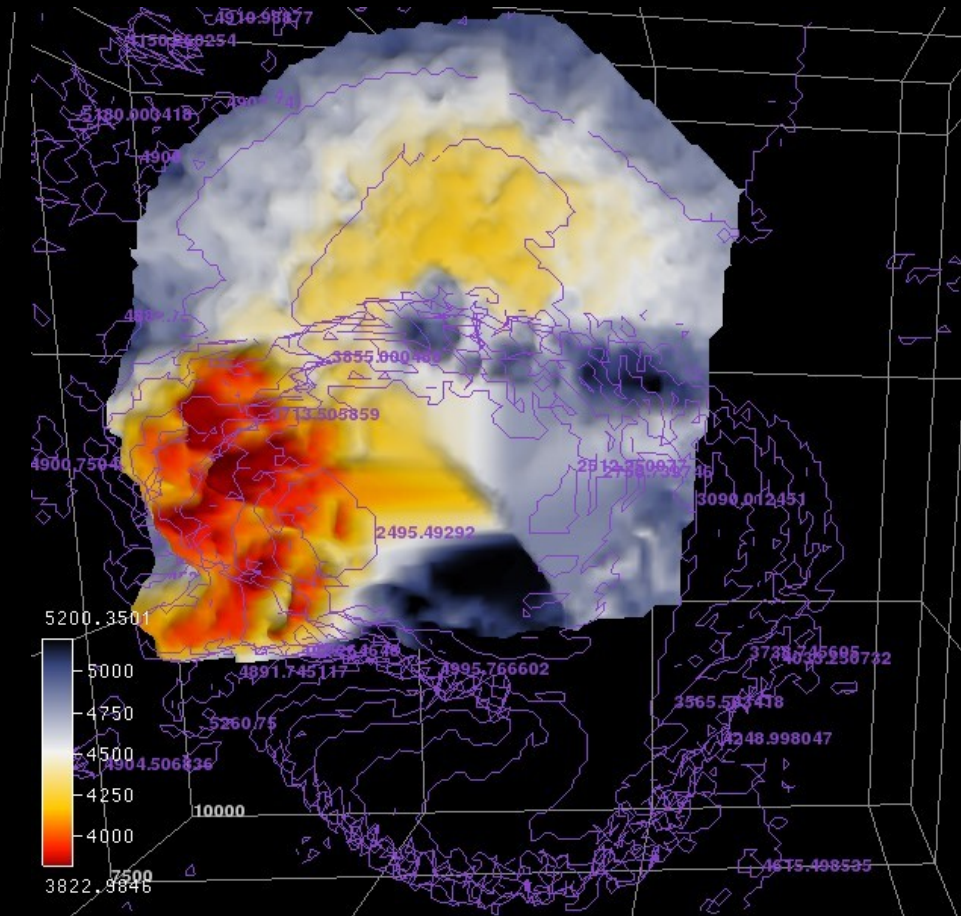






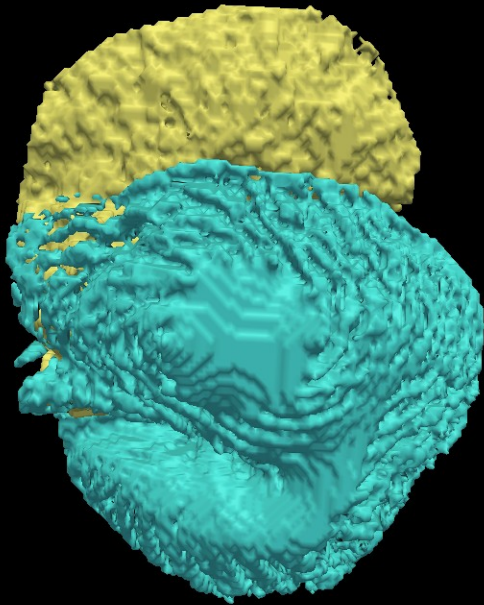


Bottom of the Basal Unit

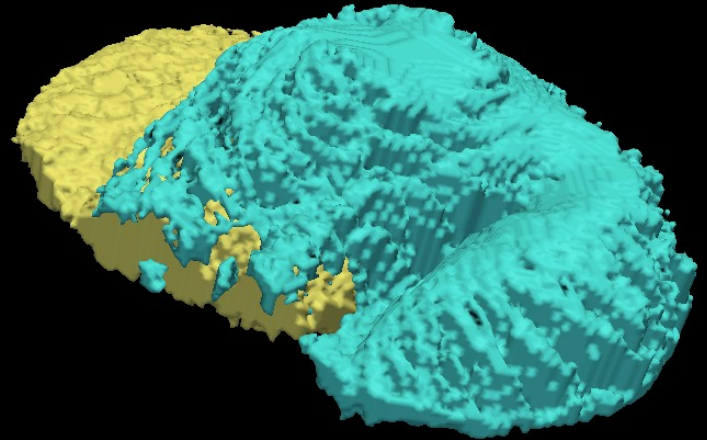


Top of the Basal Unit

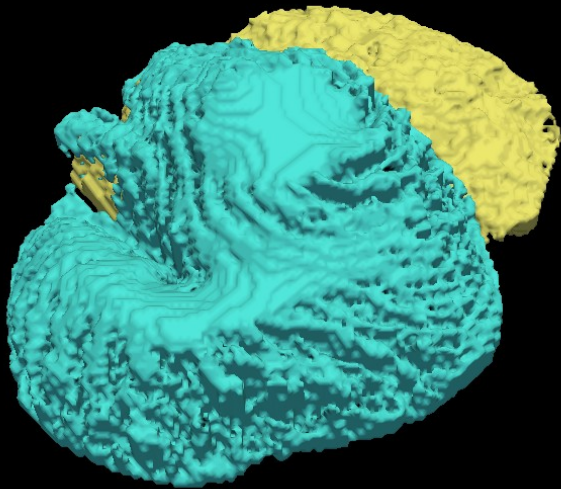
A



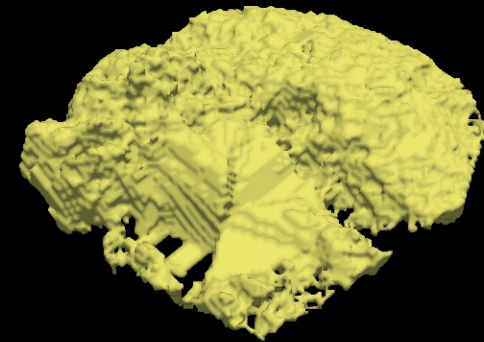
B

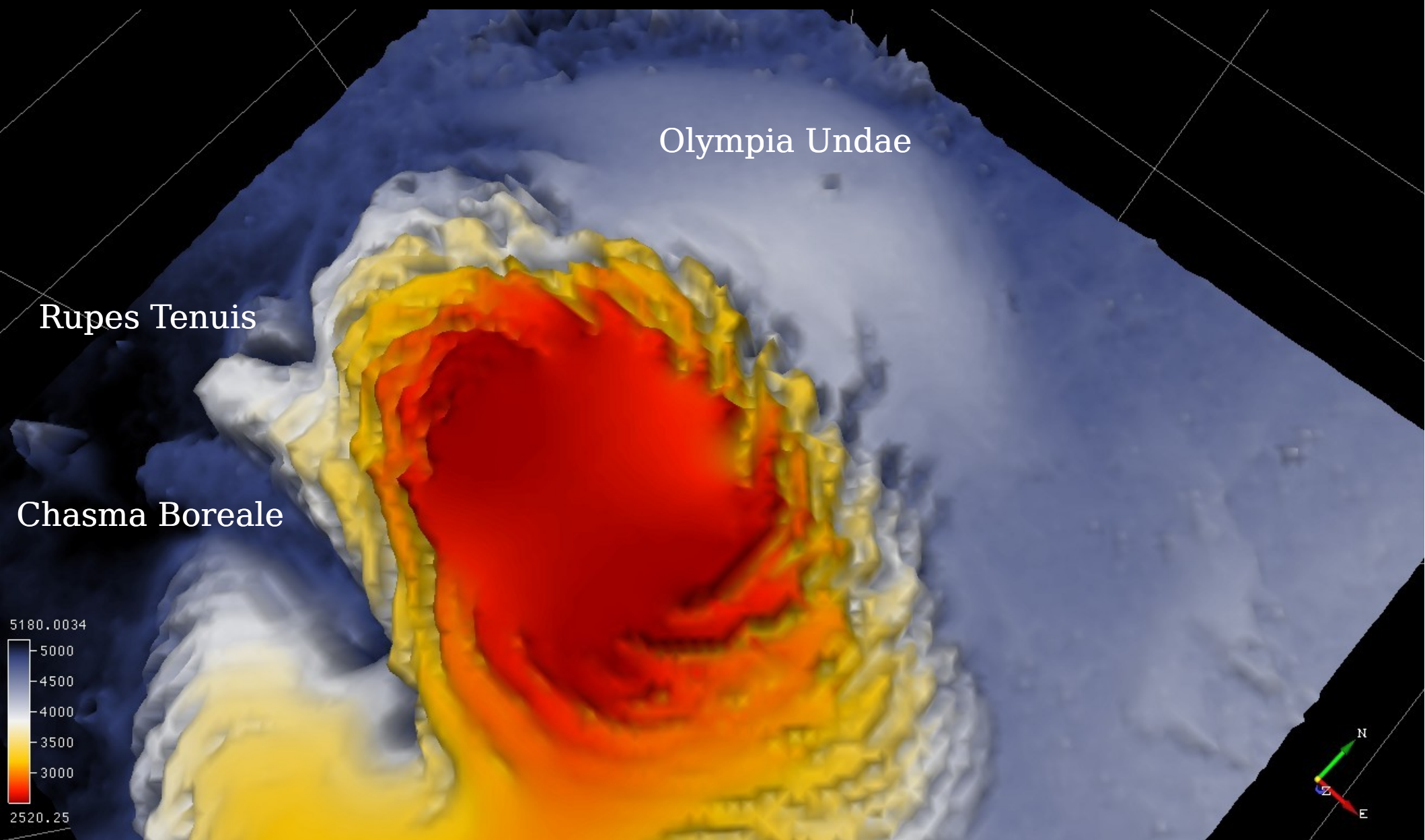


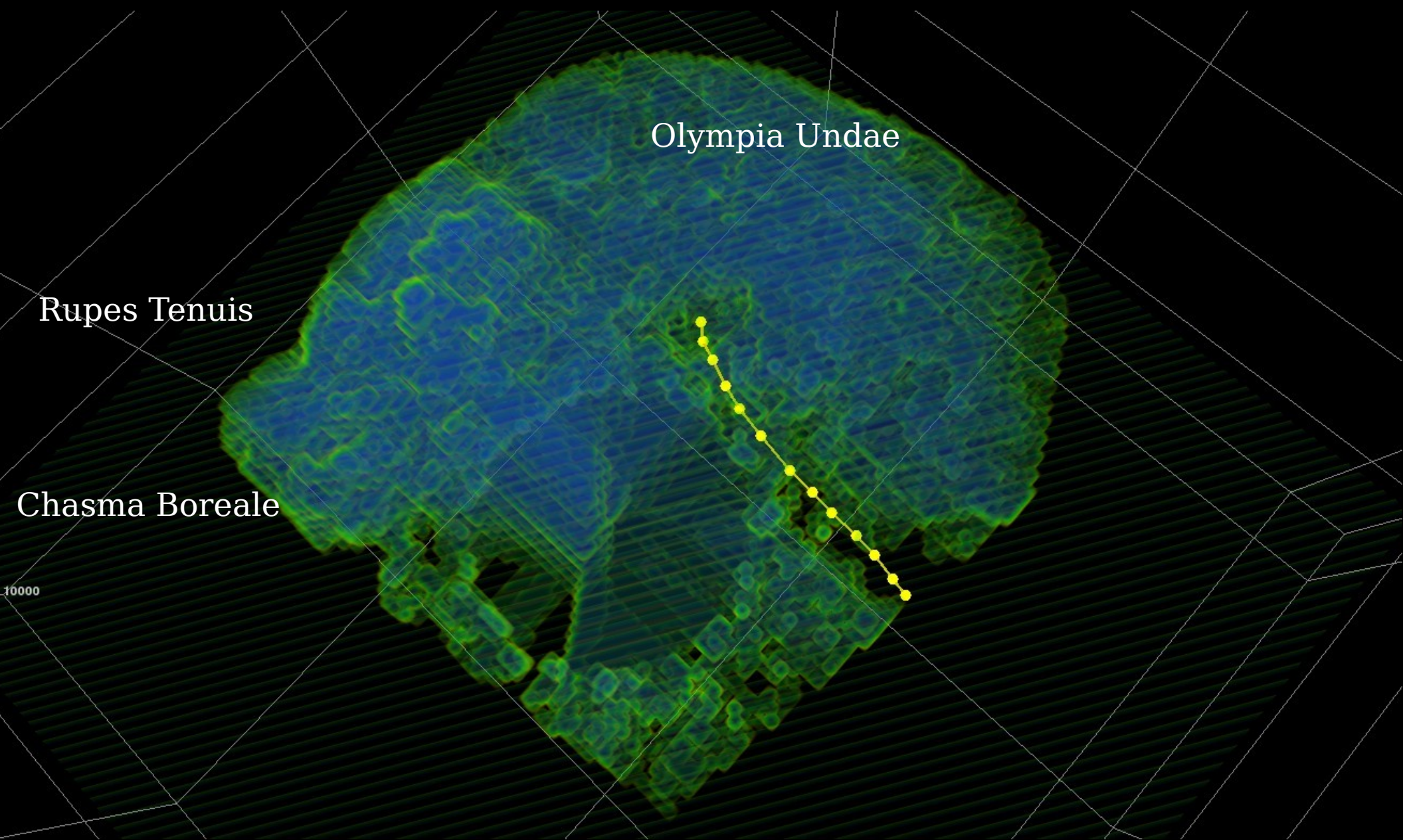
C



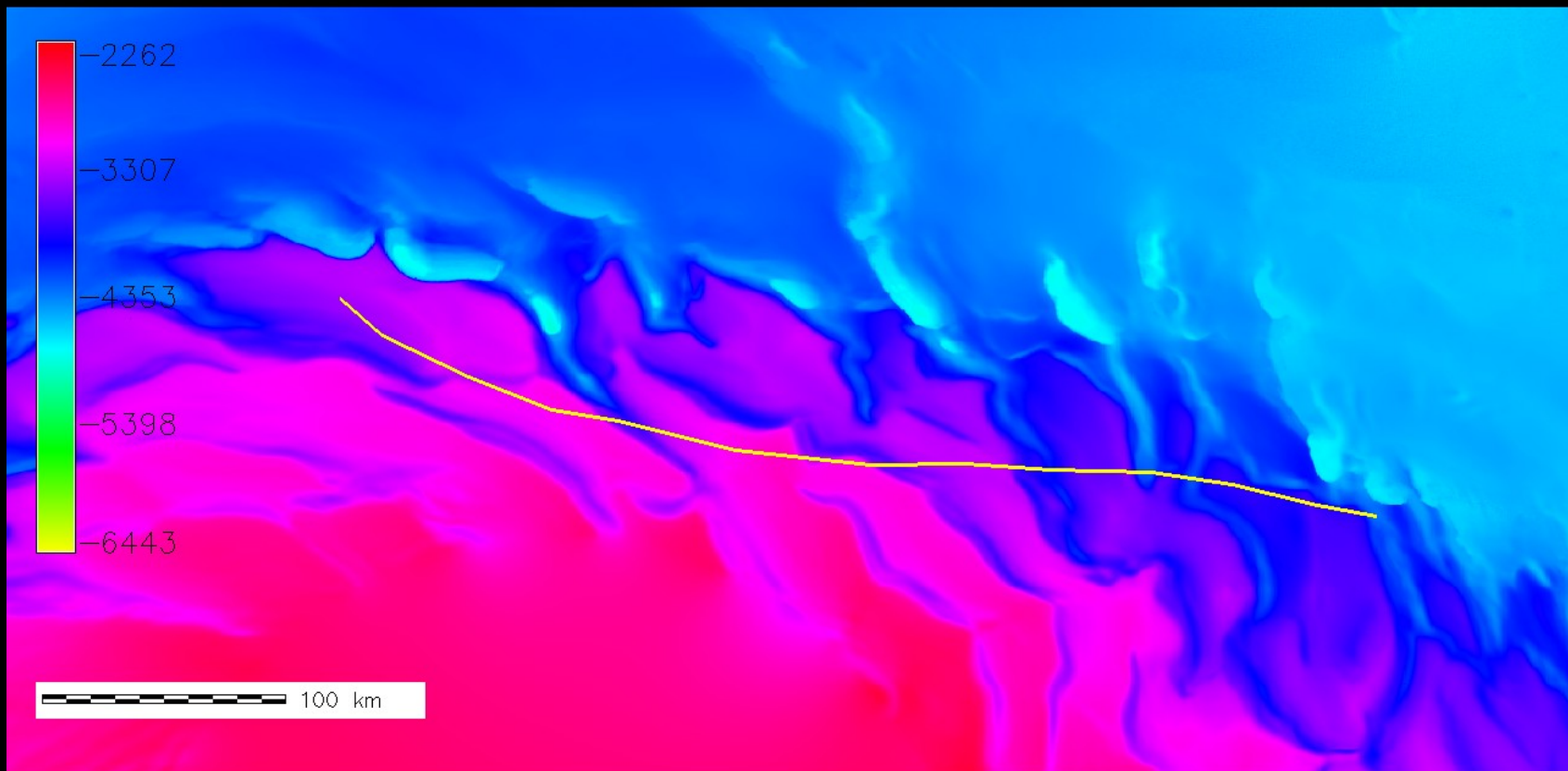
D







Buried reentrant axis



Summary

- *Planetary subsurface radar sounders represent a new generation of remote sensing instruments extending our knowledge of a planetary body to the third dimension*
- *Recent Study of the Mars North pole by MARSIS:*
 - Volumetric (3D) study allows to detect features that are difficult to investigate in vertical profiles
 - From Marsis data, the BU shows a reentrant under Olympia Cavi, 80 km wide and 400 km long, buried under ULD
 - Ongoing work:
 - Clutter simulation, velocity modeling, comparison with SHARAD data

Thanks!

contacts:

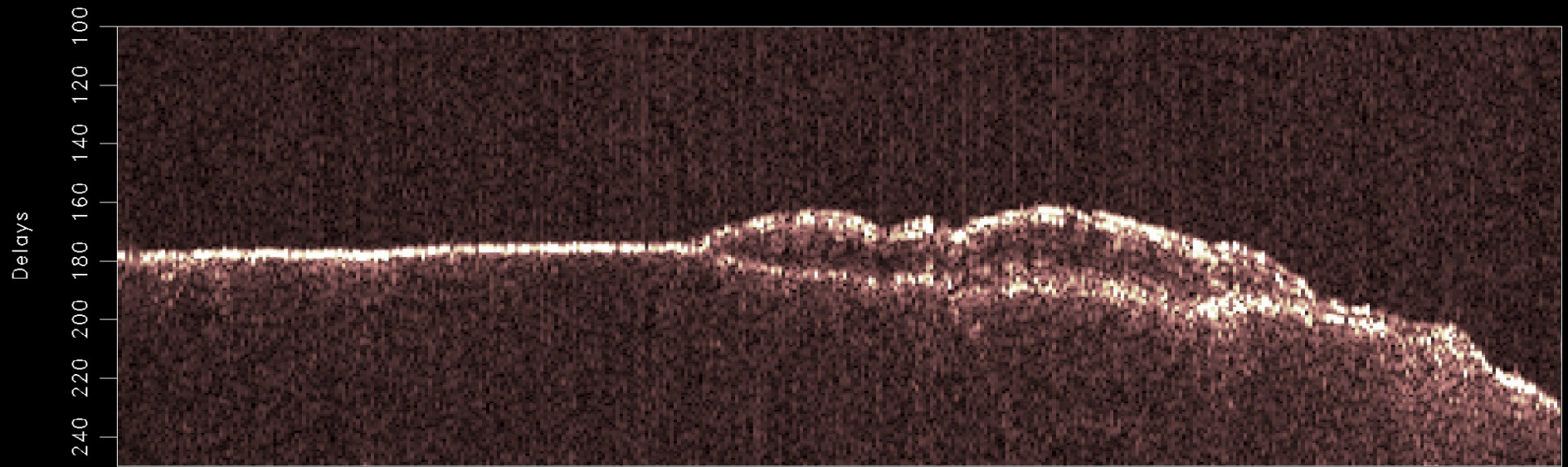
Alessandro.Frigeri@iaps.inaf.it

Roberto.Orosei@iaps.inaf.it

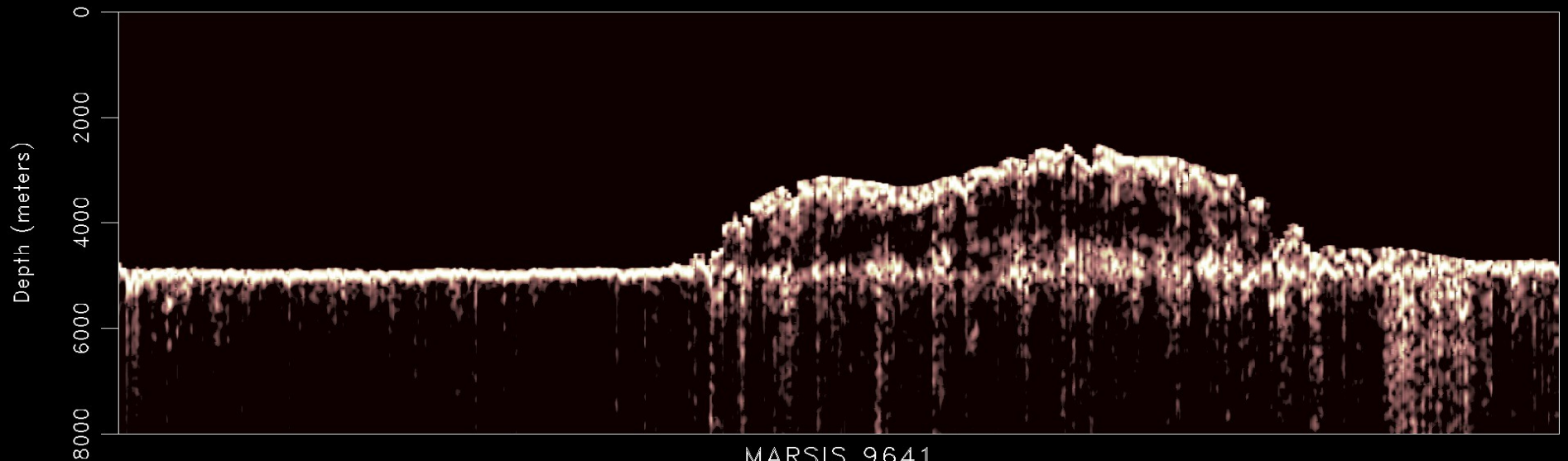
Istituto di Astrofisica e Planetologia Spaziali – INAF – Roma, Italia

BACKUP SLIDES

MARSIS L2 post-processing



MARSIS 9641



MARSIS 9641

