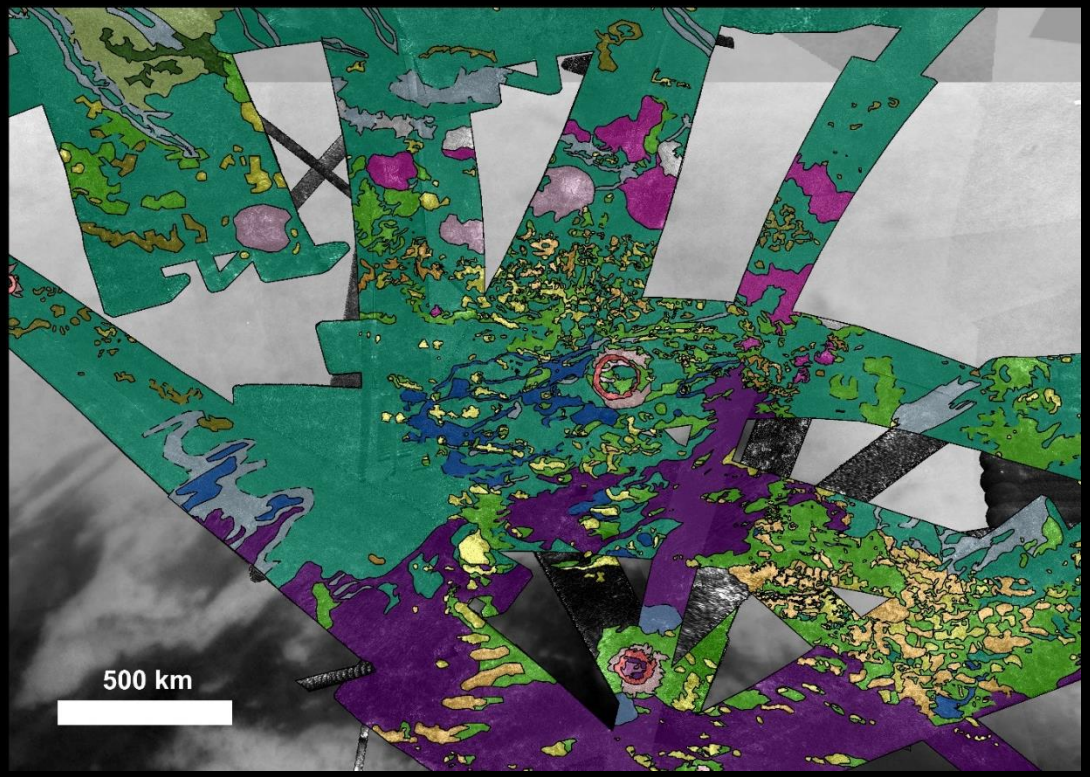
Geomorphological map of the Afekan Crater region, Titan



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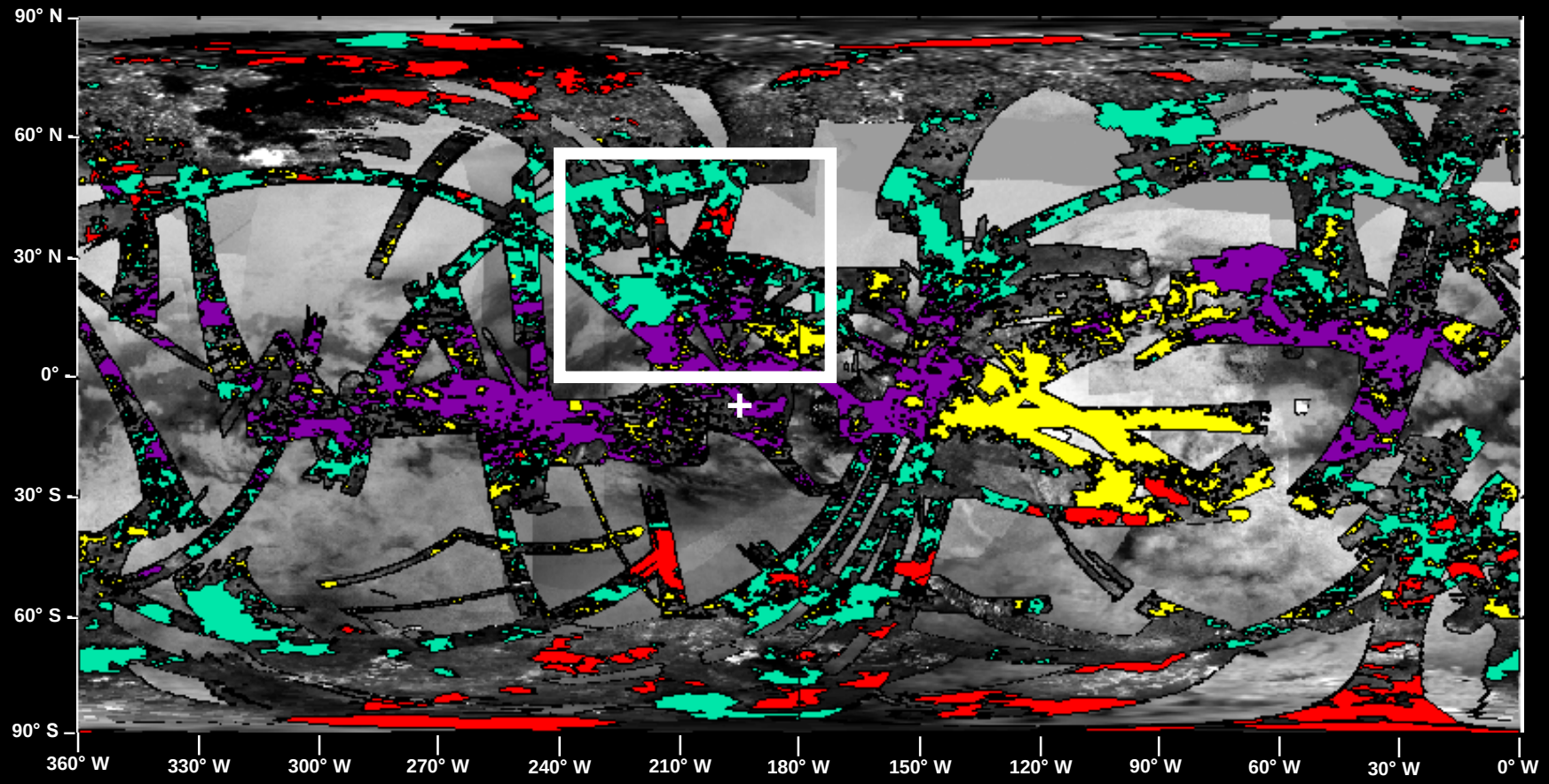
Titan's zonal terrain distribution

Afekan Crater region is typical; has good SAR coverage

Determine processes in equatorial and mid-latitudes



Plains

Dunes

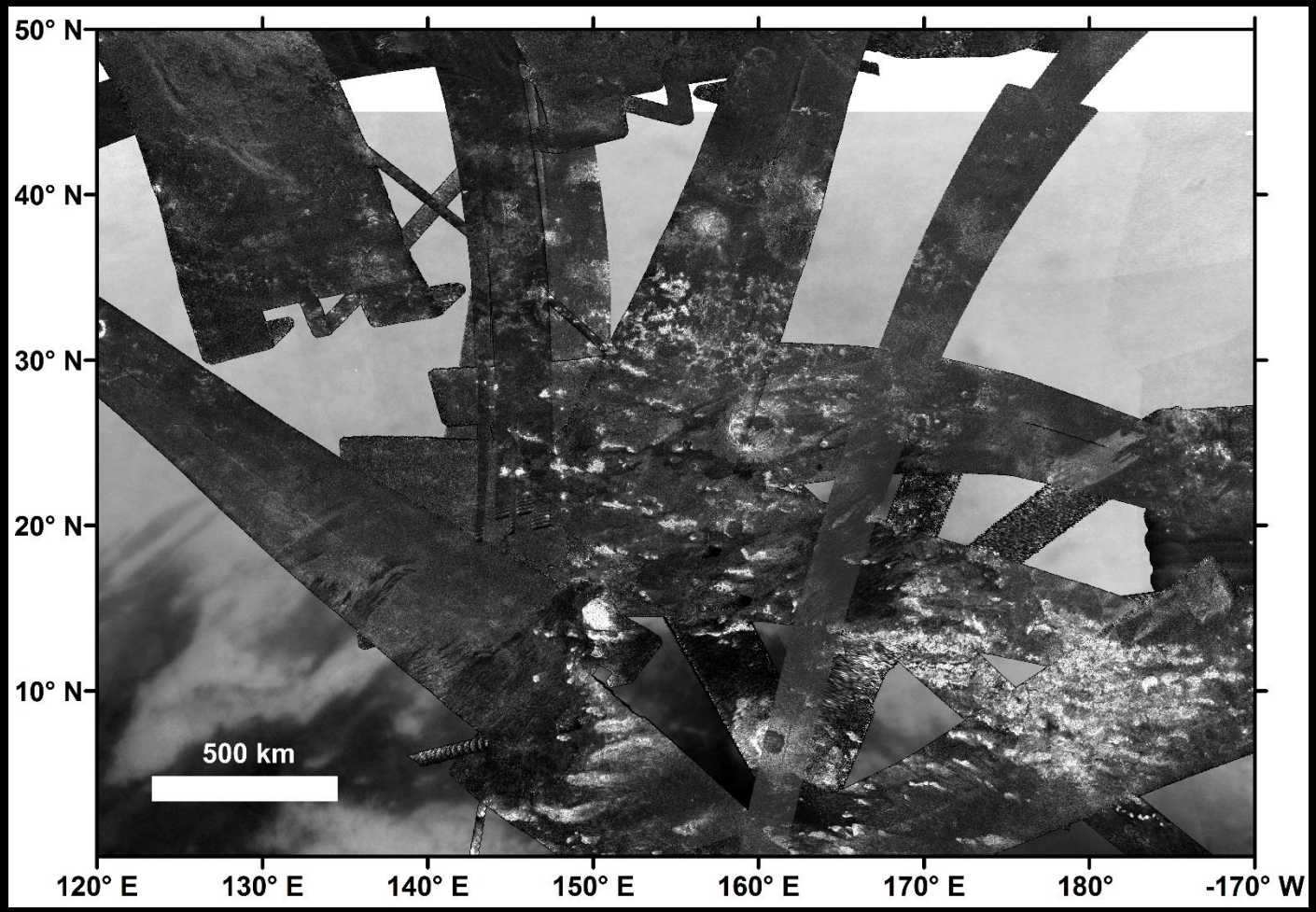
Mountains/ Hummocky

Labyrinth

4000 Km

2.2 cm SAR radar backscatter basemap

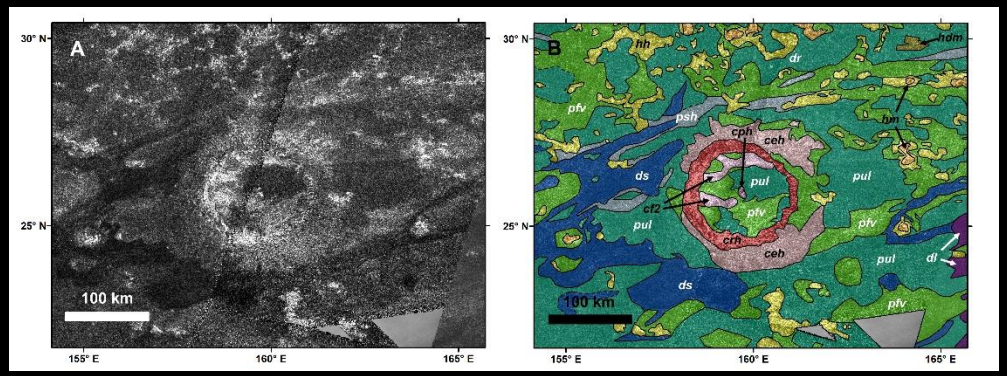
Other datasets used for terrain characterization:
IR (0.93 micron, Cassini ISS), IR multi-band (Cassini VIMS), topography, radiometry



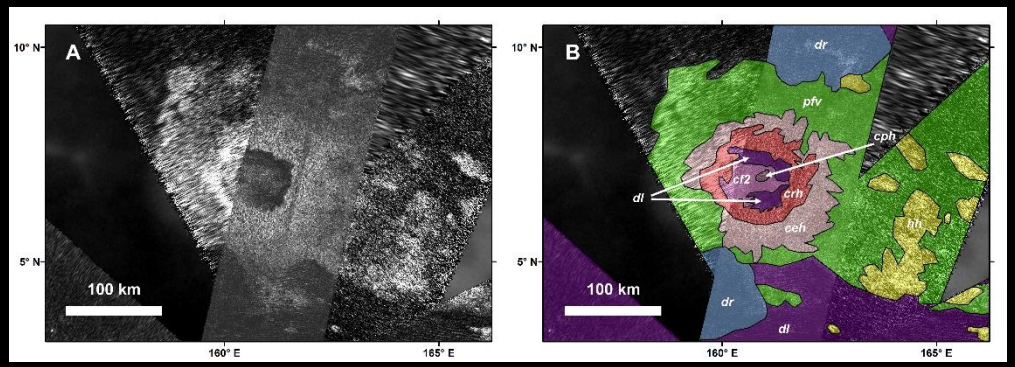
Crater units

High radar backscatter; consistent with H_2O ice-rich materials

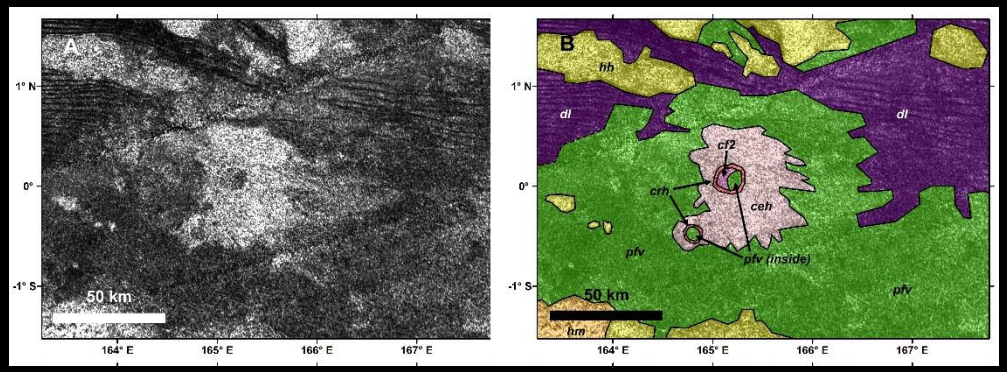
Afekan crater
(25.7°N, 200.2°W)



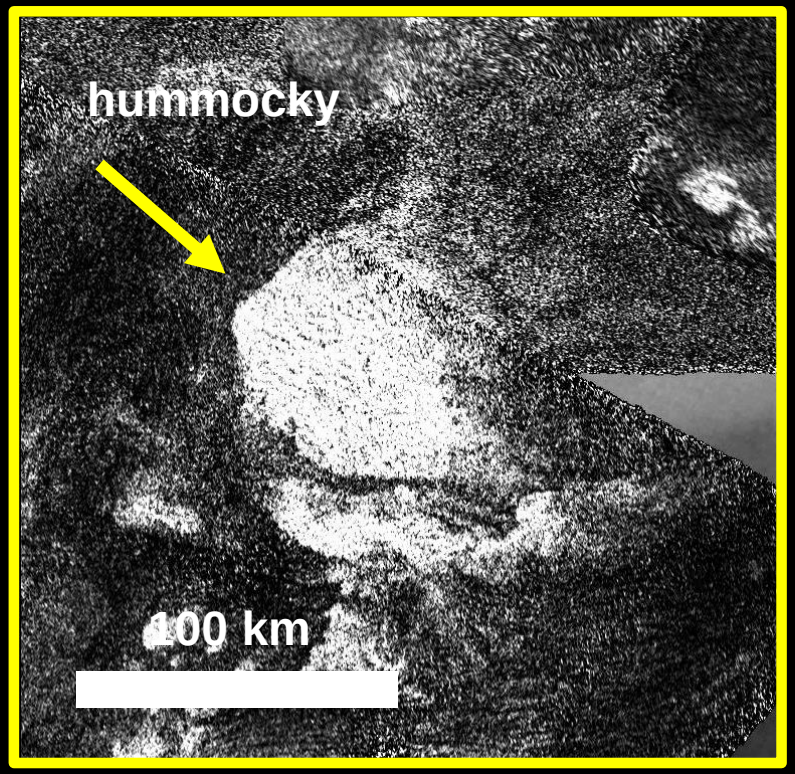
Selk crater
(6.8°N, 199.1°W)



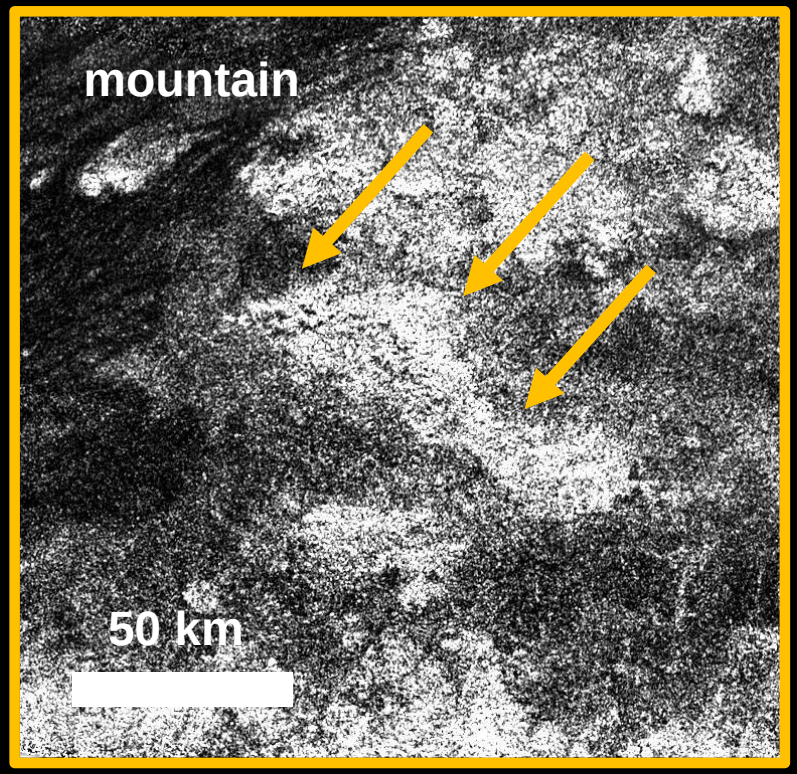
Mystis crater
(0.1°N, 194.8°W)



Mountain/Hummocky units



Gandalf Colles
(14.3°N, 209.7° W)



Moria Montes
(15.3°N, 190.6°W)

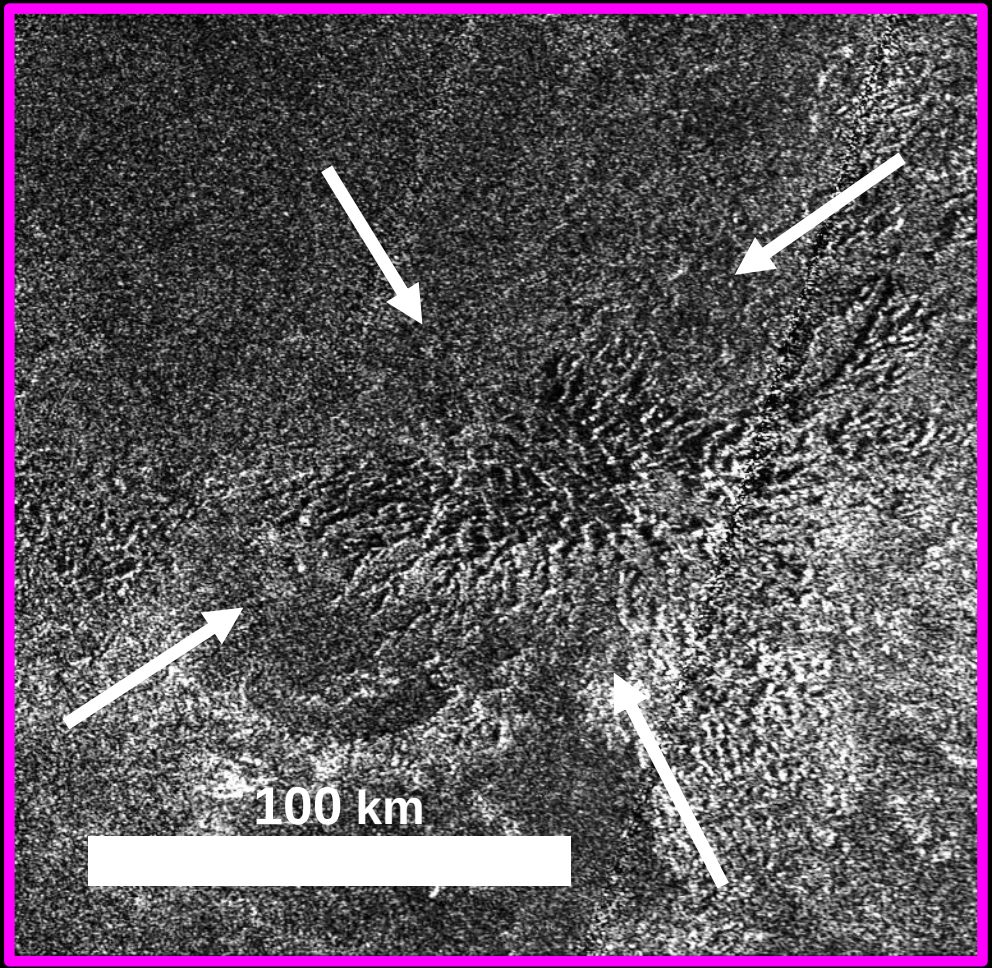
High radar backscatter
Mountains show distinct bright-dark paring of ridgelines
Consistent with H_2O ice-rich materials

Labyrinth terrain

Highly dissected

Topographically expressed

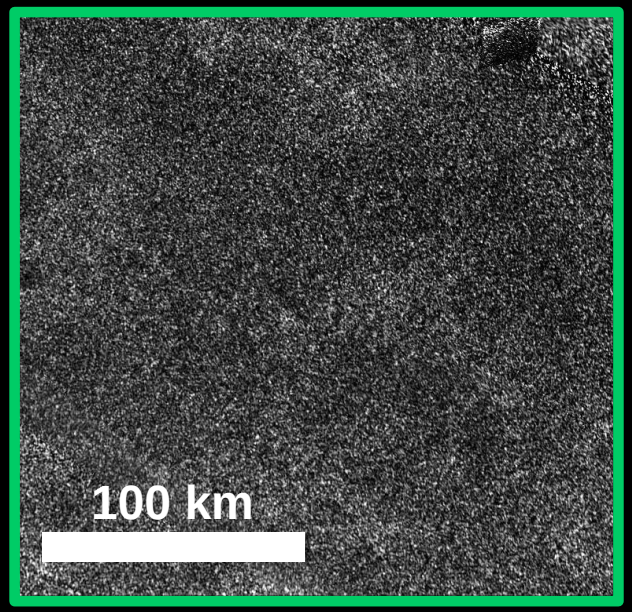
Consistent with organic materials



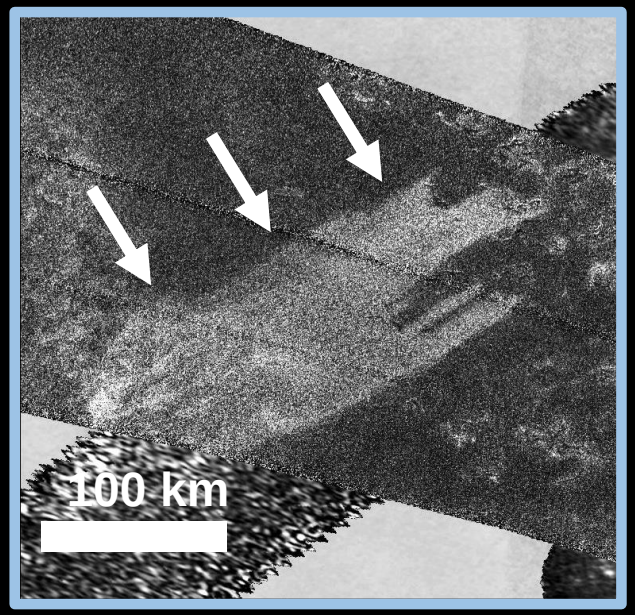
Richese Labyrinth
(41.8°N, 159.9°W)

Plains units

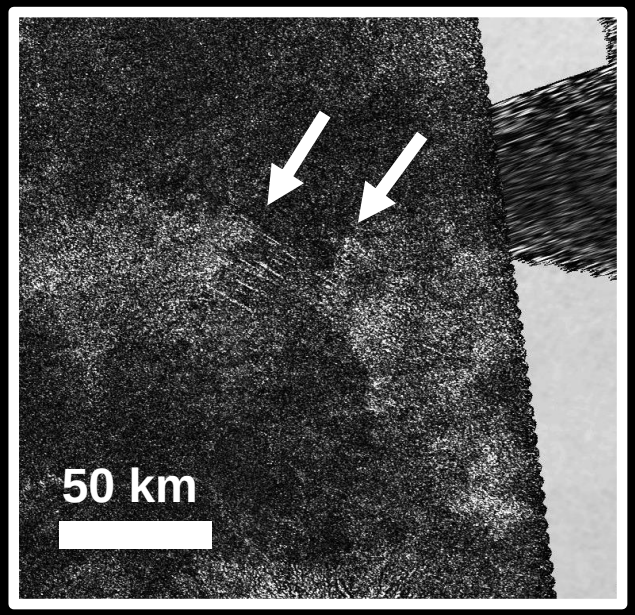
Uniform levels of backscatter
Undifferentiated plains most extensive unit on Titan
Consistent with sedimentary materials
Interpretation varies per plain type



Undifferentiated plains
***Caladan Planitia* (31°N, 226°W)**
"Blandlands"
Organic aeolian dust deposit



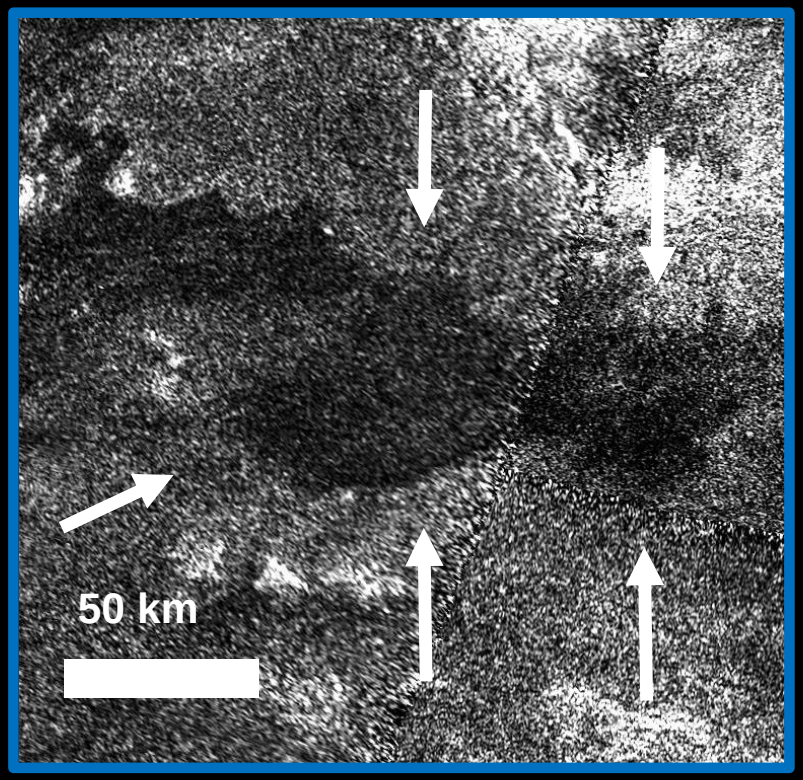
Streak-like plains
***Tishtrya Virgae* (25°N, 180°W)**
Fluvio-aeolian
H_2O water ice deposit



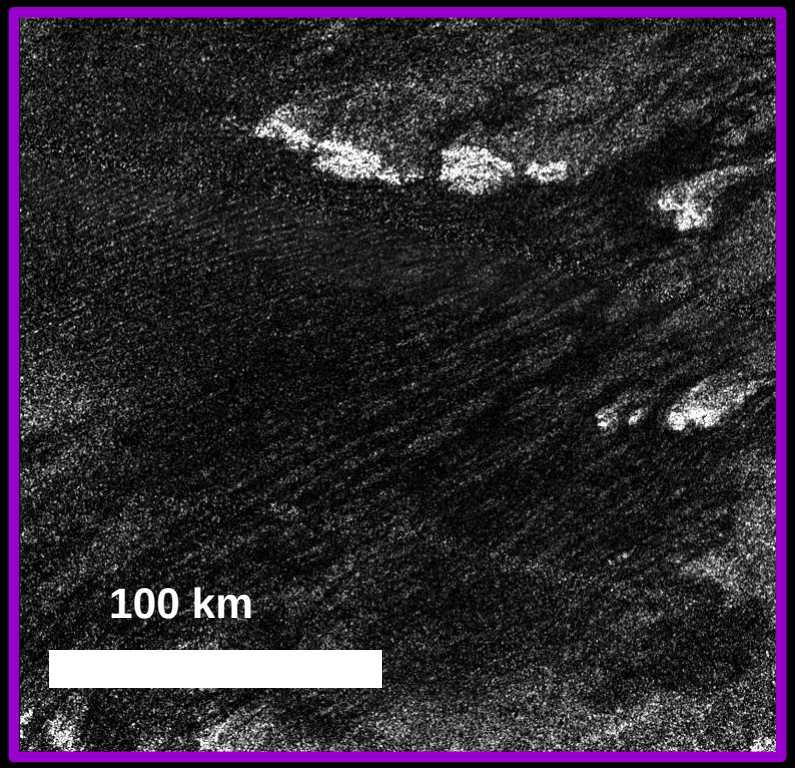
Lineated plains
(42.5°N, 215.5°W)
yardangs
unknown composition

Dune units

Low radar backscatter; low IR reflectance
Aligned dune crests or extensions
Organic wind-deposited materials

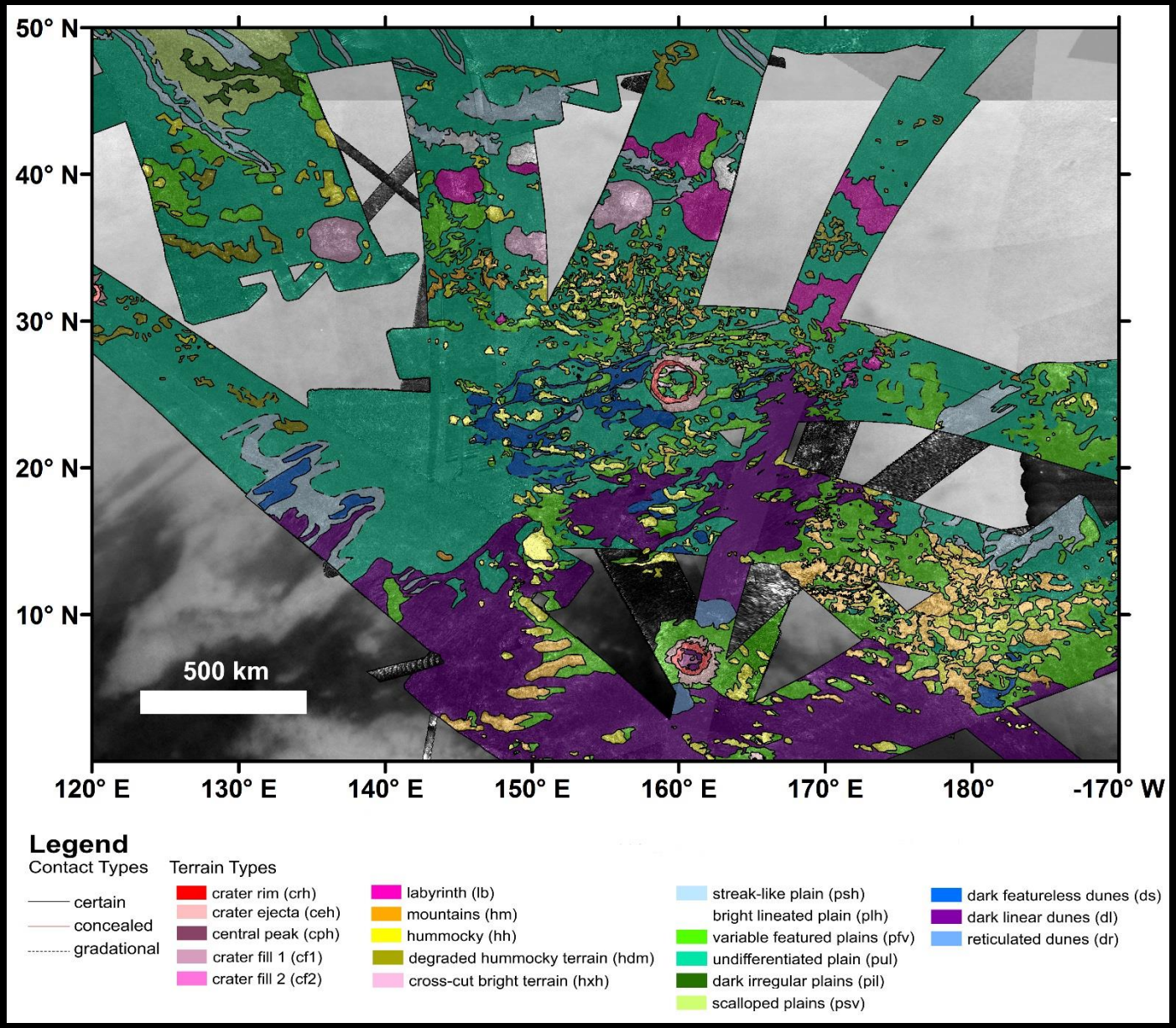


Sand sheets
***Tlaloc Virgae* (23°N, 202°W)**
no dune structure

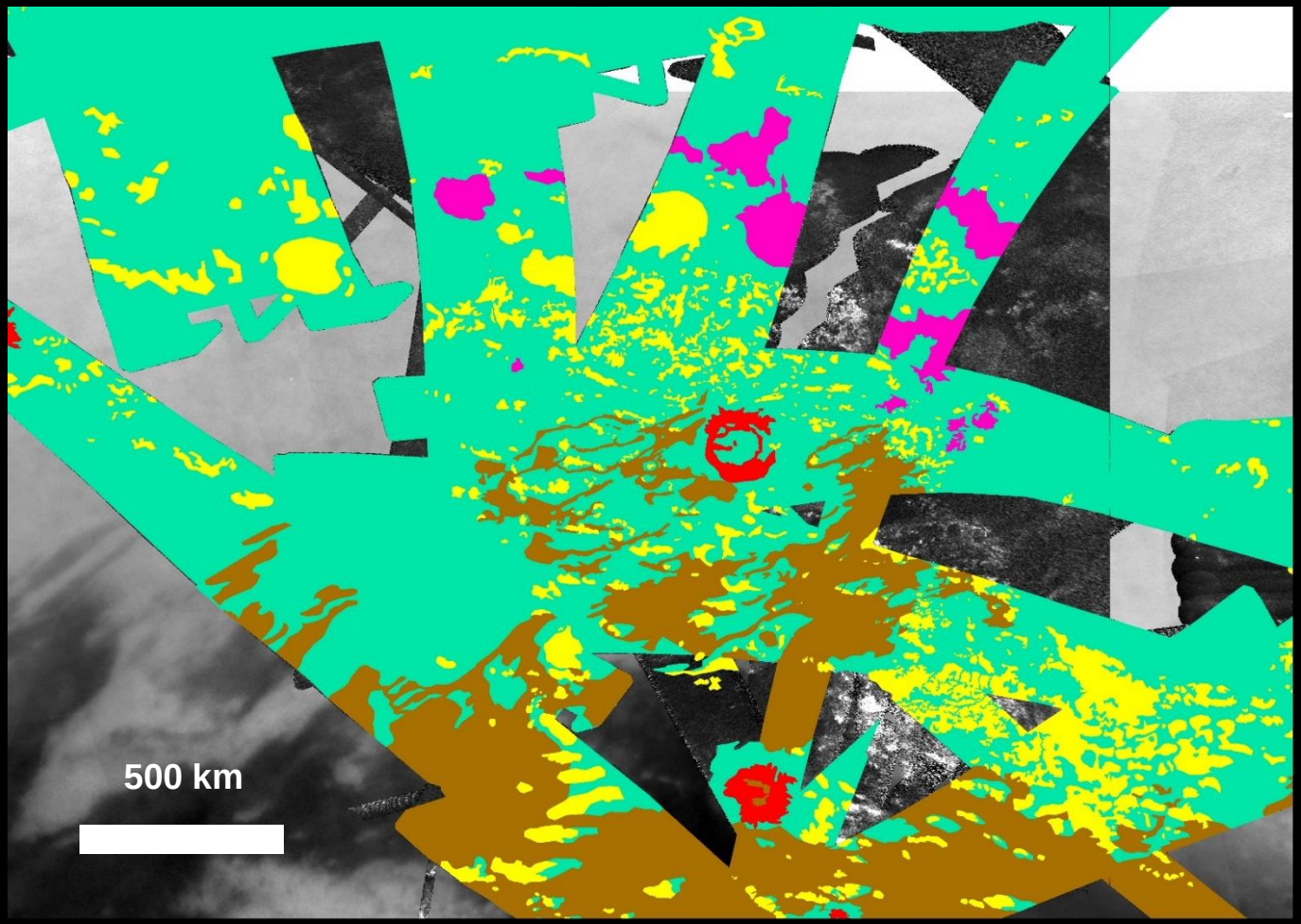


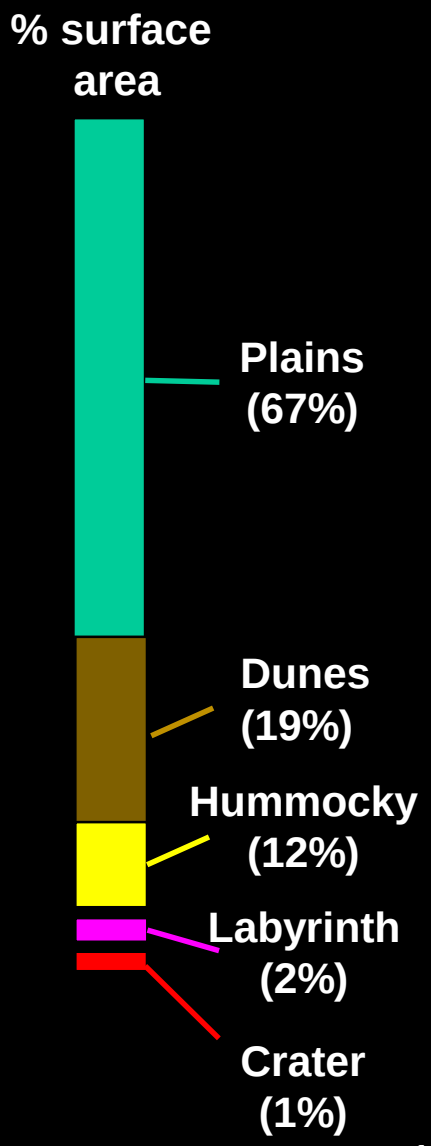
Linear dunes
***Shangri-La dune sea* (17°N, 195°W)**
Evident dune structure

Afekan Region Geomorphologic map



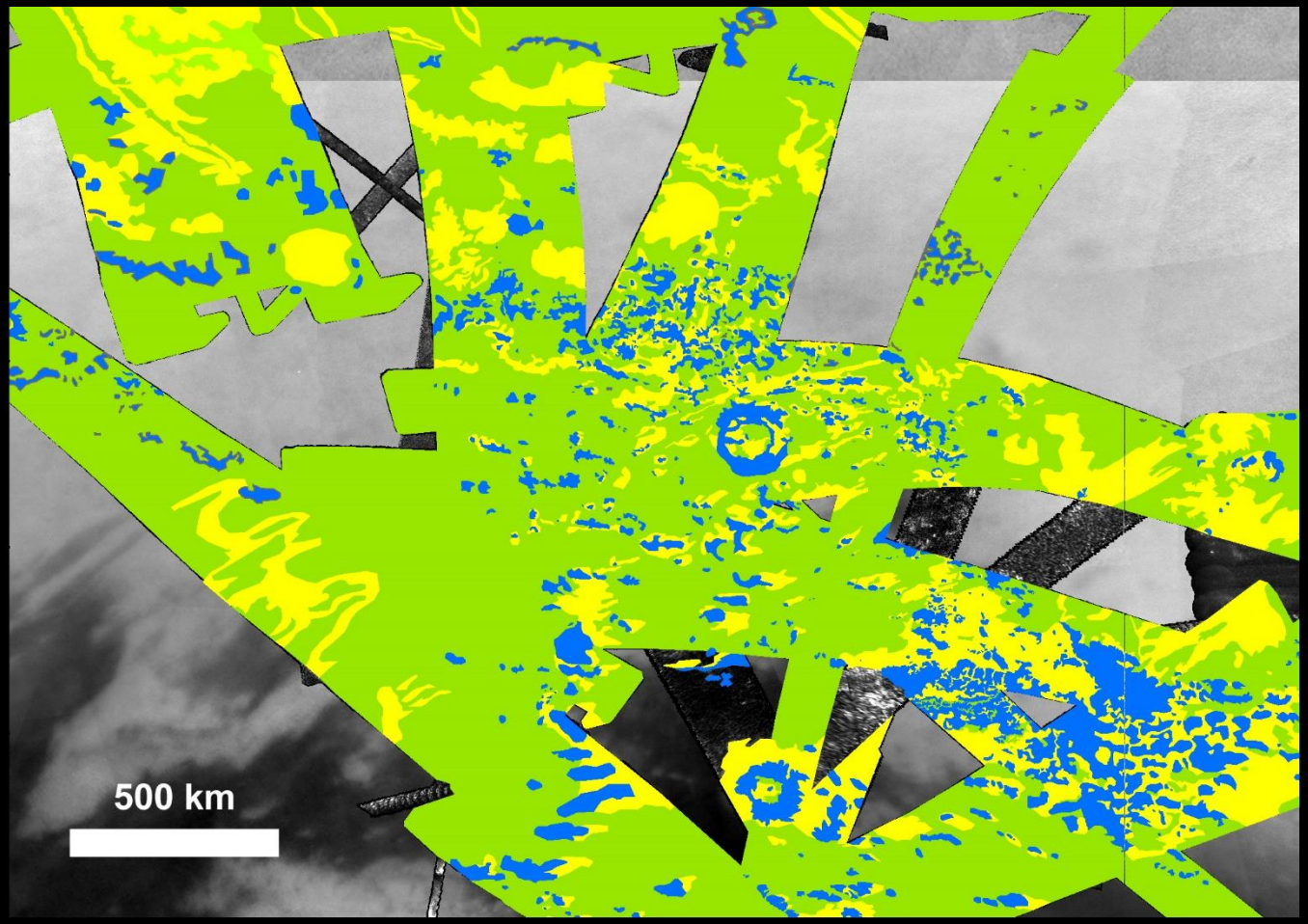
Plains dominate Titan

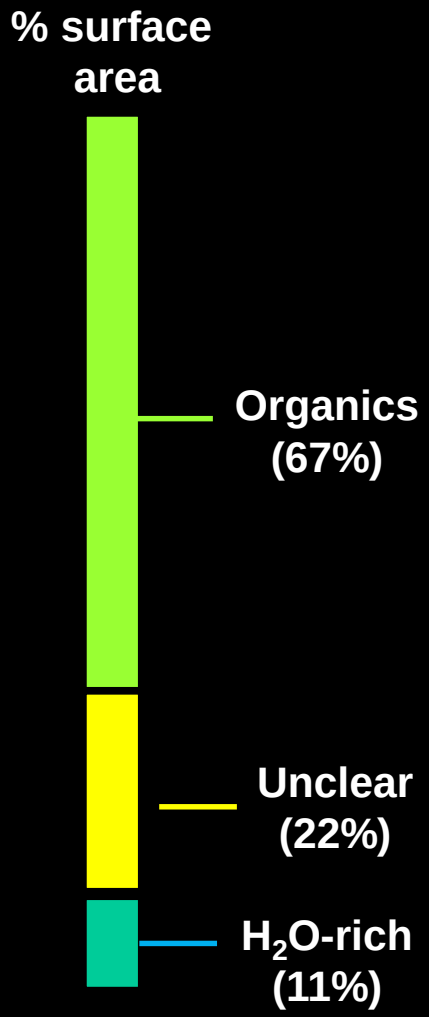




Afekan Crater region map colorized based on terrain class

Titan covered in organics

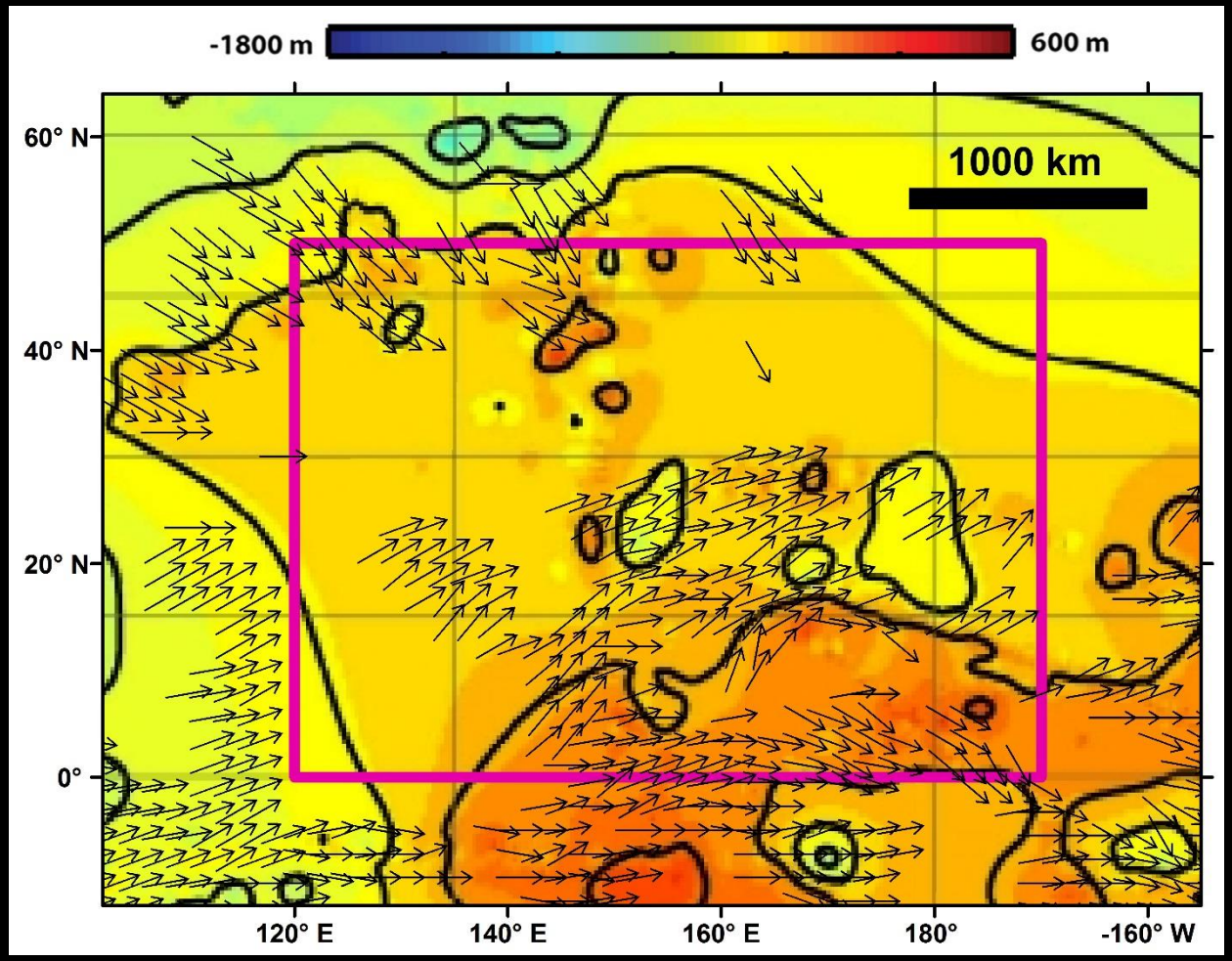




Afekan Crater region map colorized based on composition

AeolianWorld Titan

Feature alignments suggest wind transport dominates equatorial and mid-latitudes



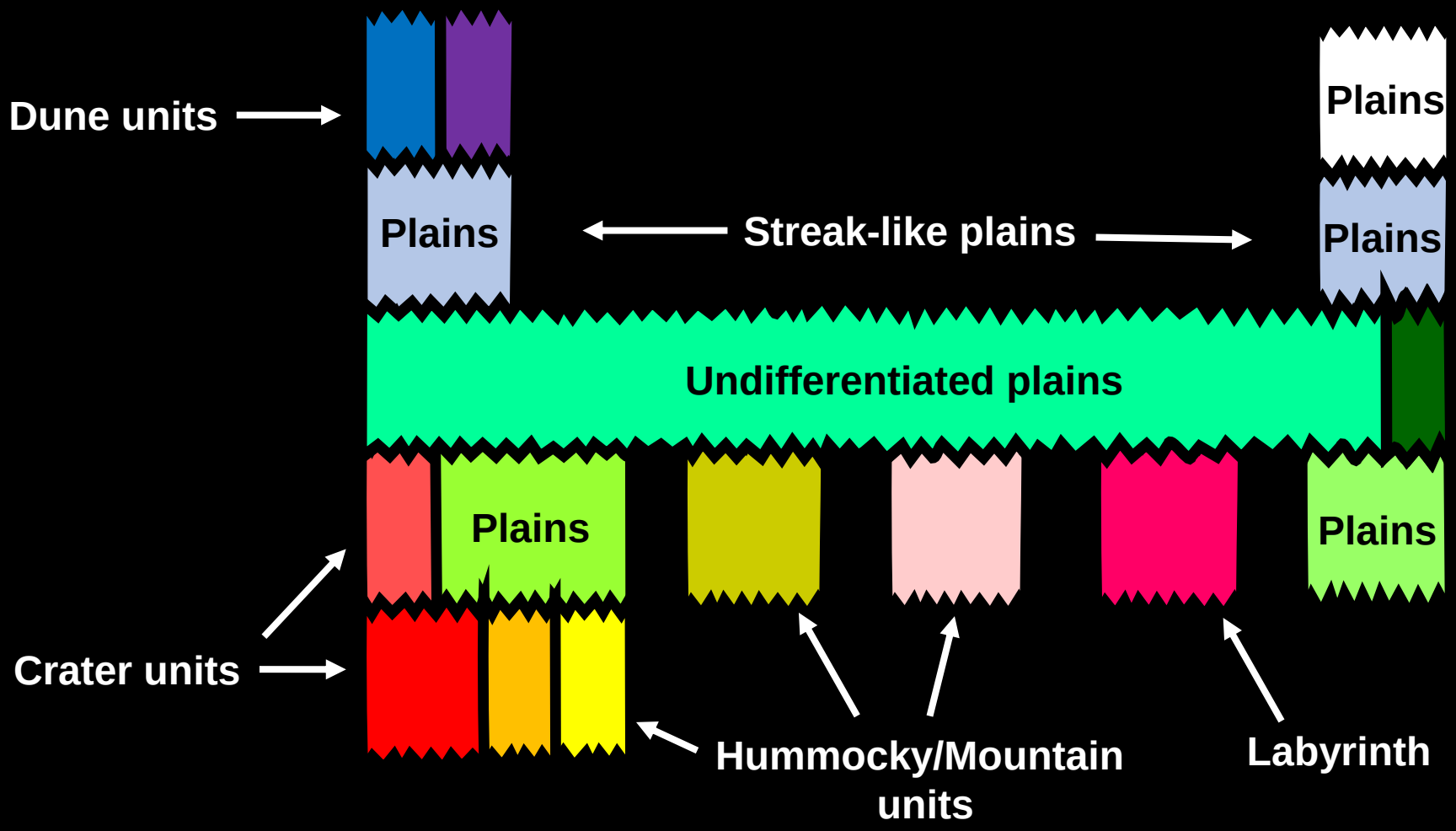
Transport against topographical gradient

Mid-latitude deposition belt

W to E transport

Relative stratigraphy

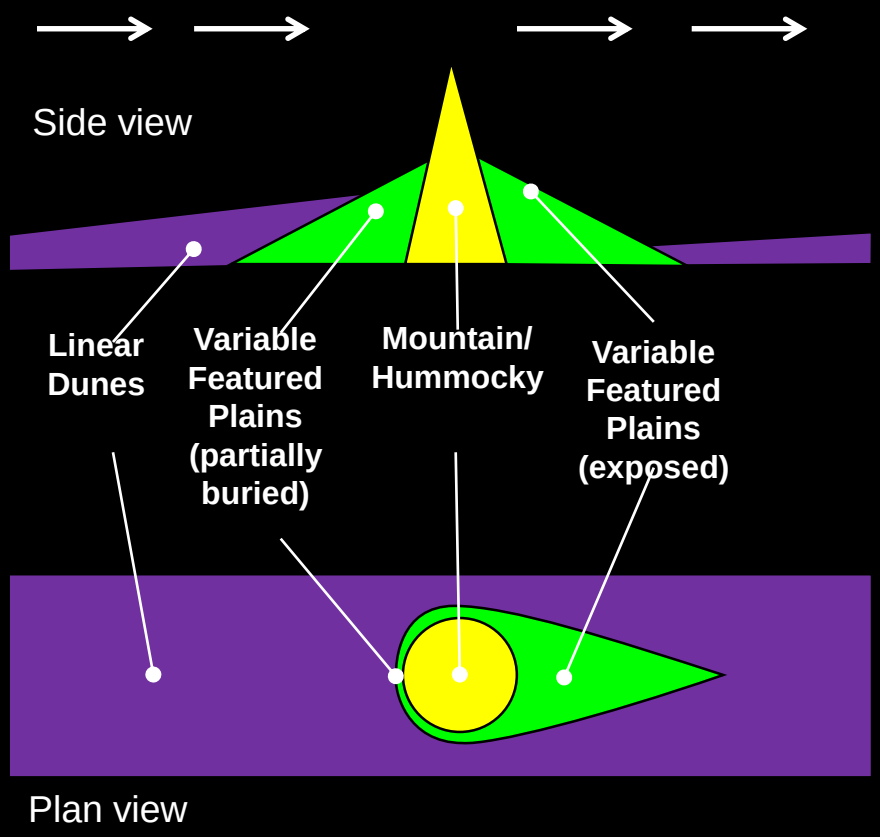
hummocky, labyrinth oldest→crater→plains→dunes youngest



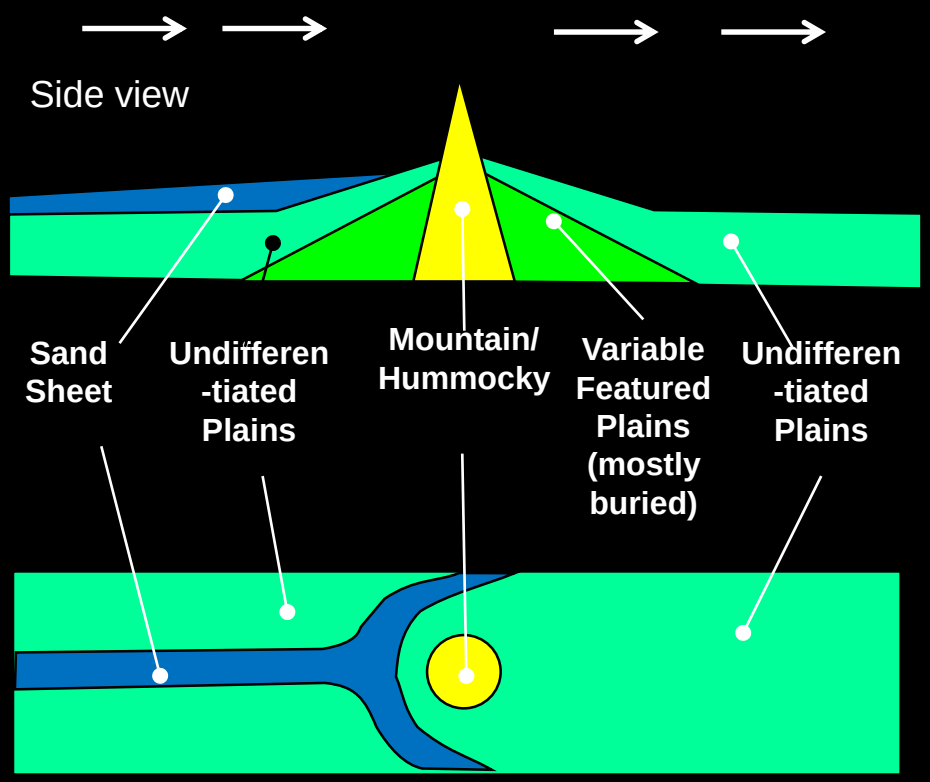
Titan terrain relations

Equatorial and mid-latitude zones explained

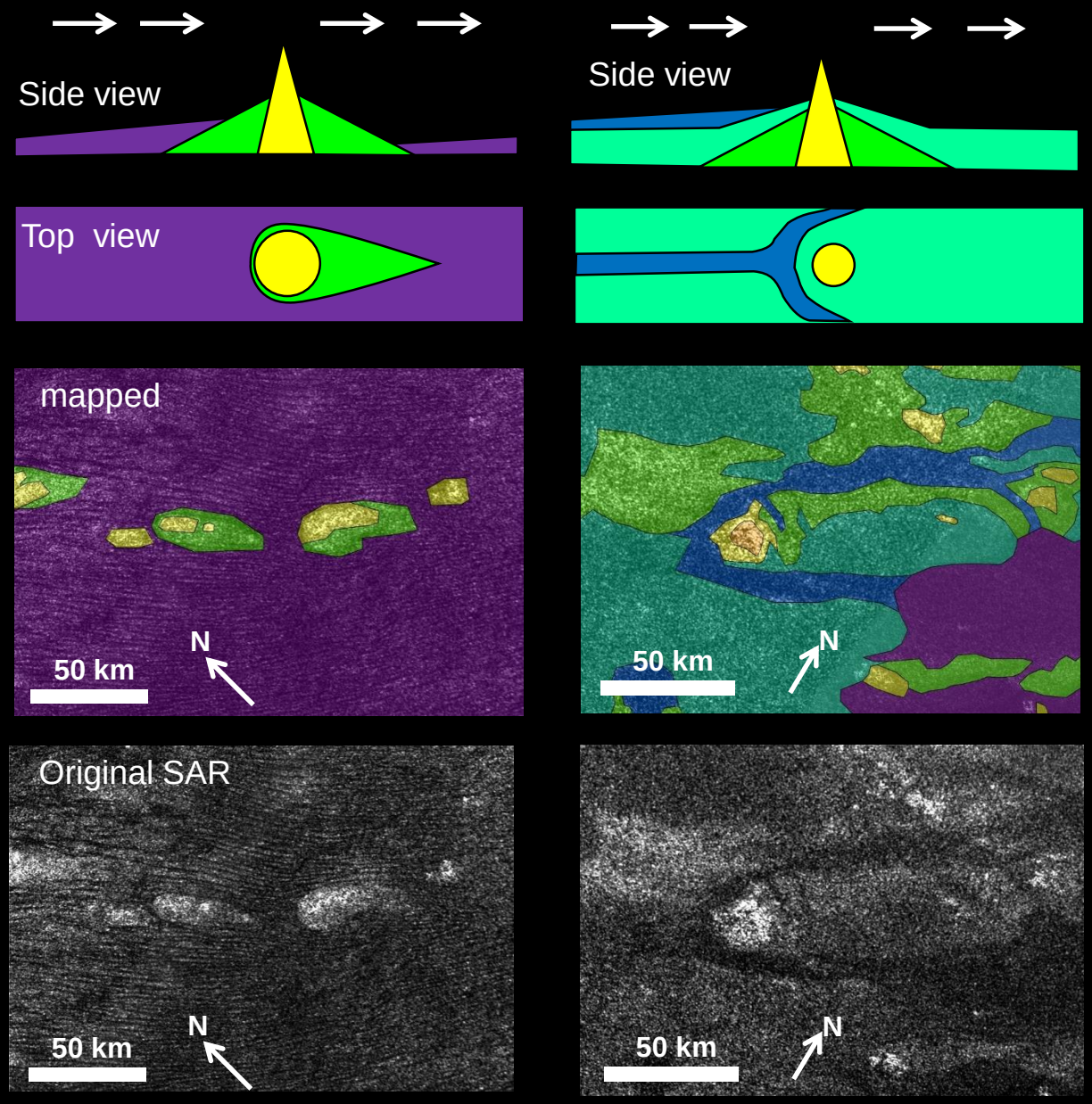
Equatorial zone
Large sand supply



Mid-latitudes
Limited sand supply



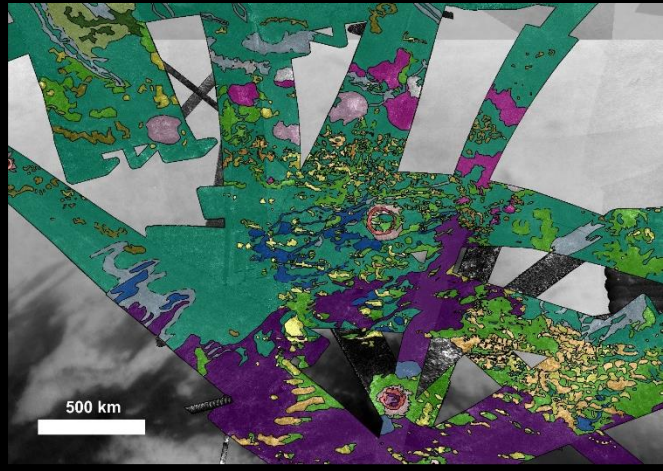
Terrain pattern exemplified



Equatorial example (4 N, 185.7 W)

Mid-latitude example (25.3 N, 195 W)

Conclusions



Mapping of Afekan region complete

Multiple Titan terrain classes defined: craters, mountain/ hummocky, labyrinth, plains, dunes

Organic materials cover crustal ices

Plains units dominate Titan; organic dunes distant 2nd

Titan stratigraphy developed

Aeolian processes explain Titan mid-latitude and equatorial regions