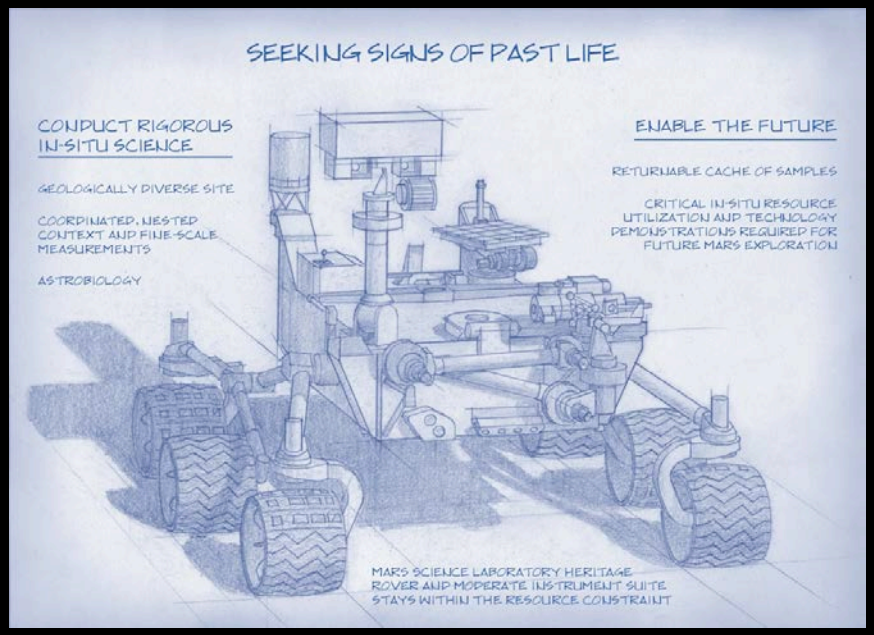
e-mars.geologie-lyon.fr

Laboratoire de Géologie de Lyon
Terre Planètes Environnement



Oxia Planum, landing site for Mars 2020

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(2) IAS, France

Mars 2020 First Landing Site Workshop
May 14–16, 2014, Crystal City, VA

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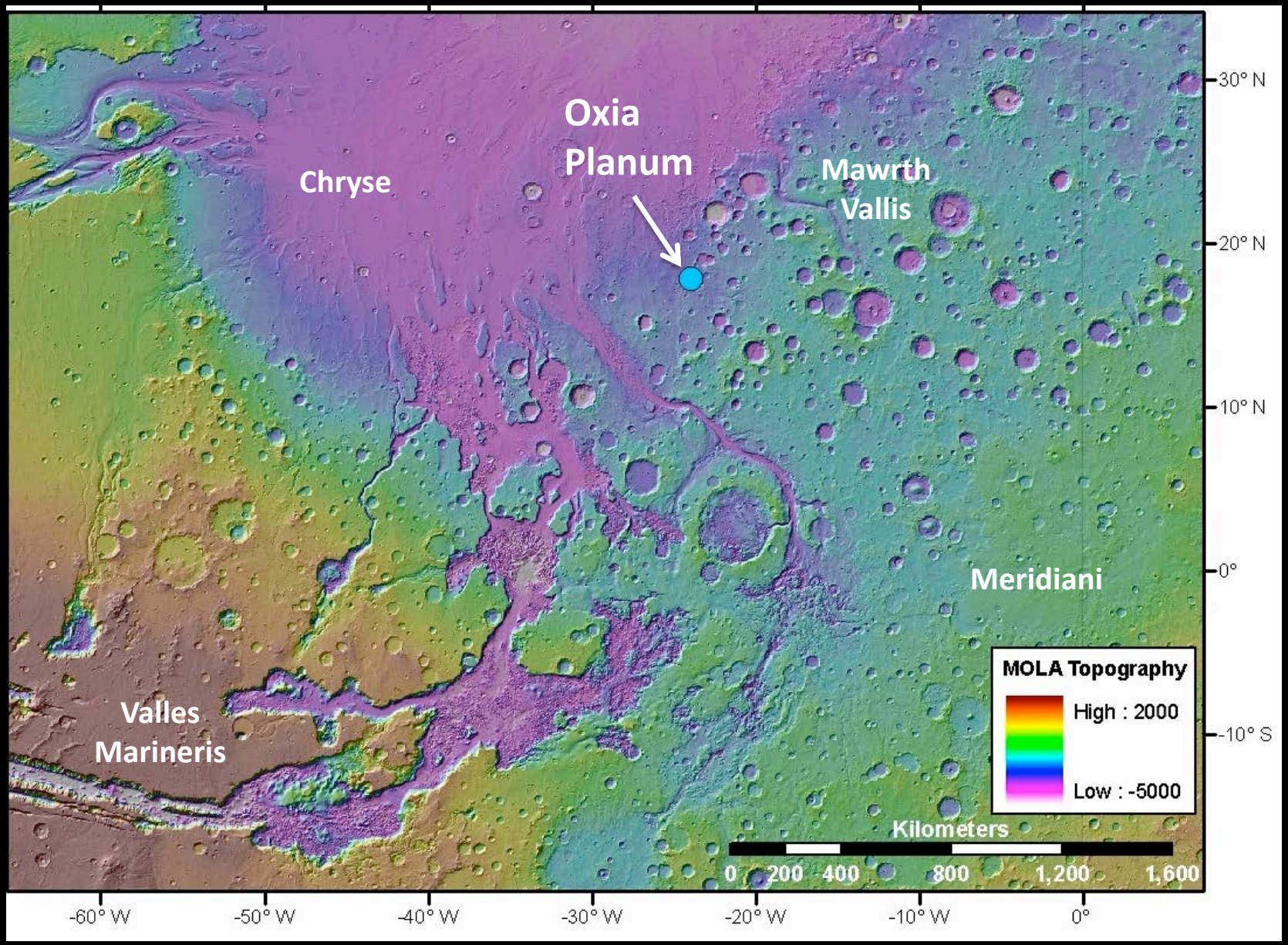
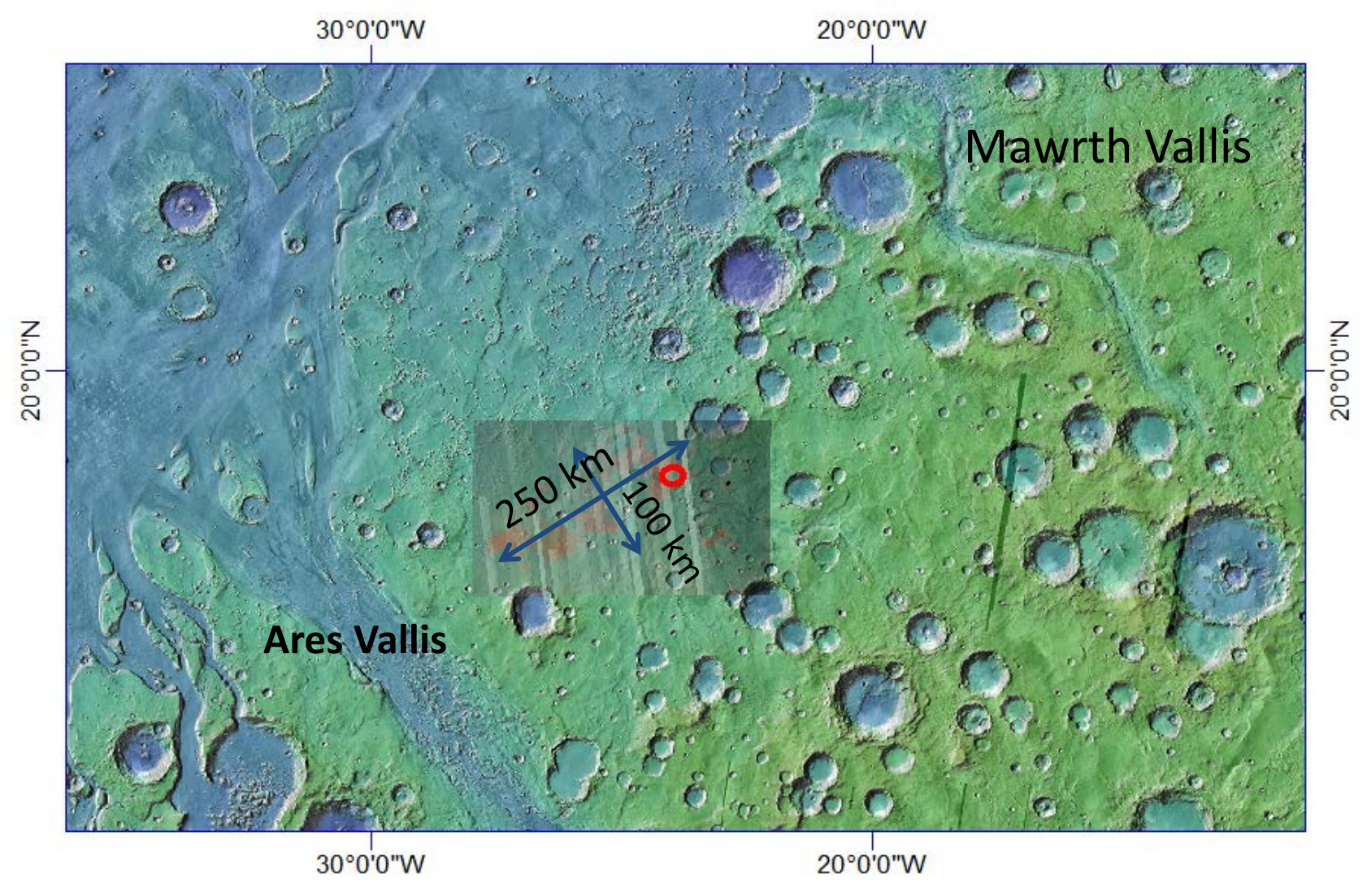
Oxia Planum location

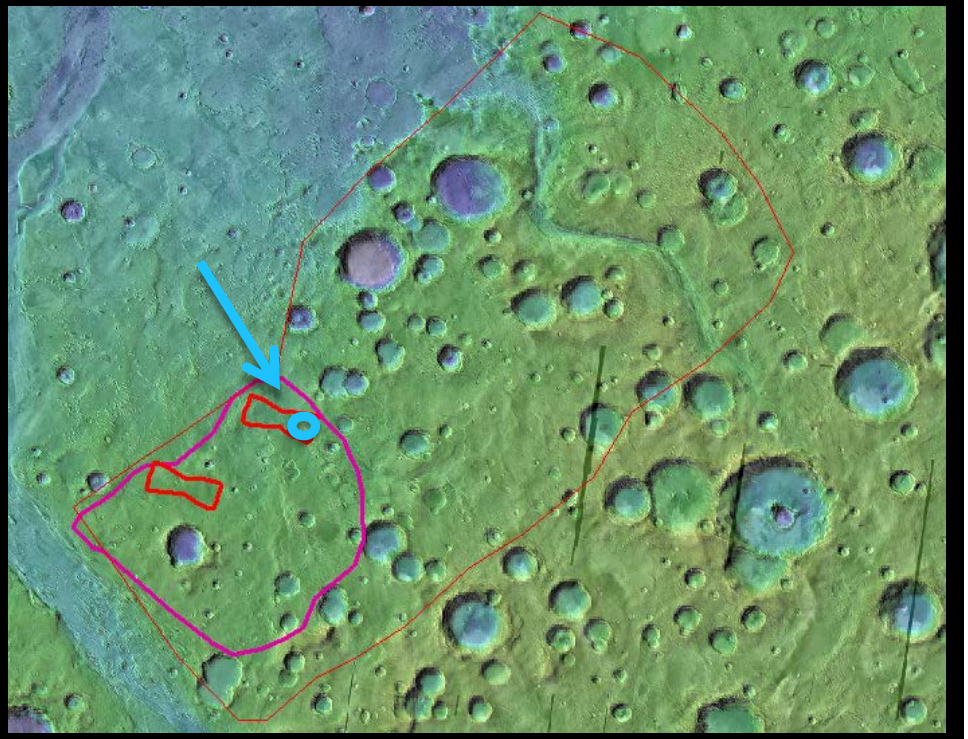


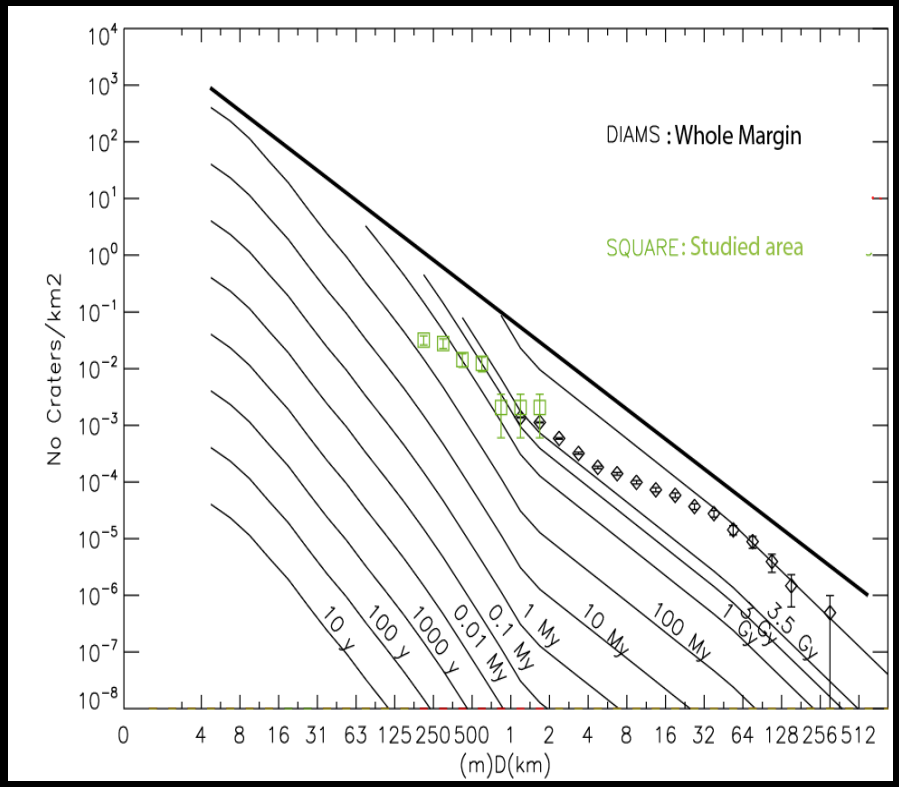
Oxia Planum, wide clay-bearing plain



Oxia Planum, wide clay-bearing unit

Geological context: Noachian age

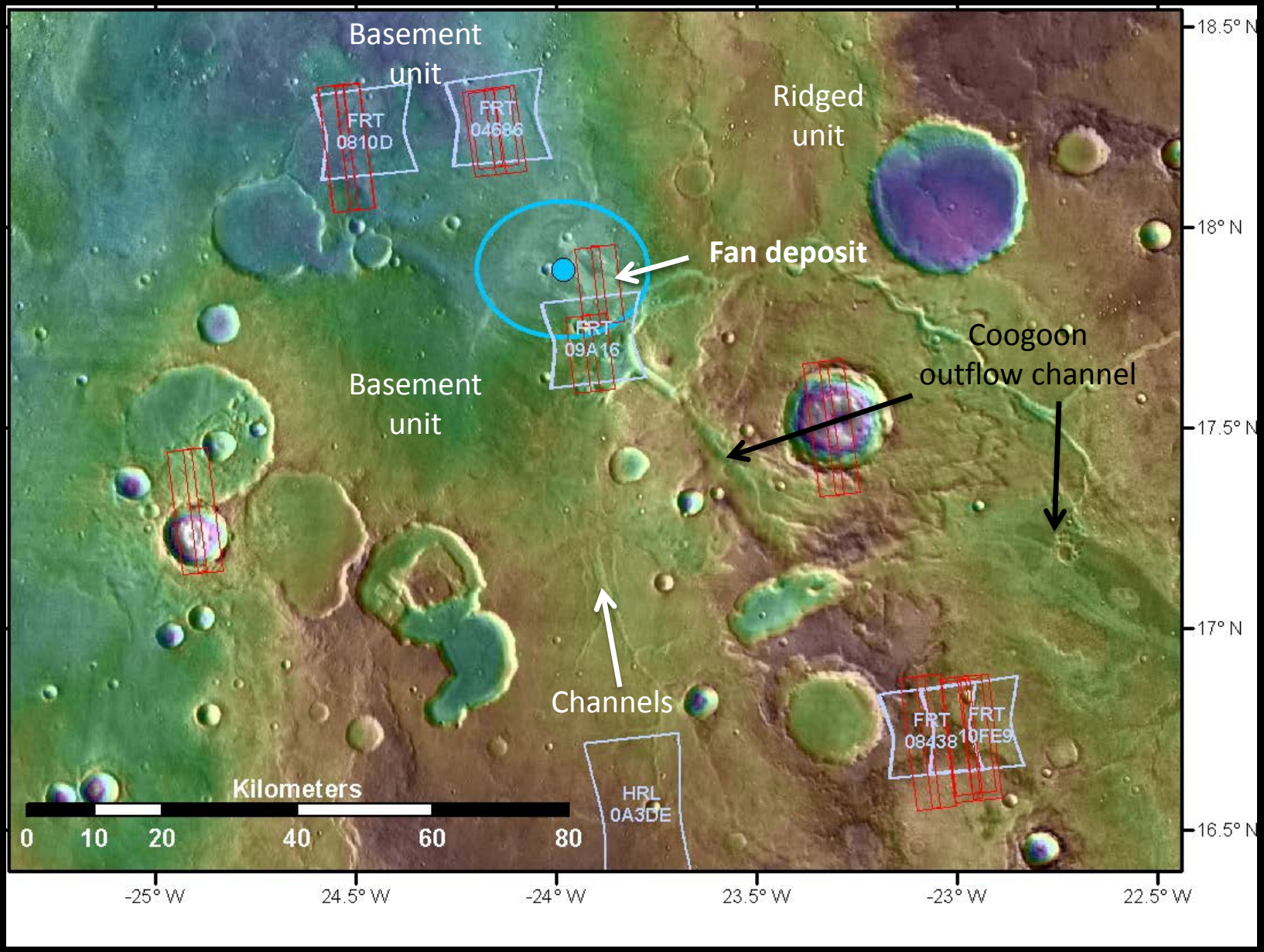




Crater counts on Oxia-Mawrth region

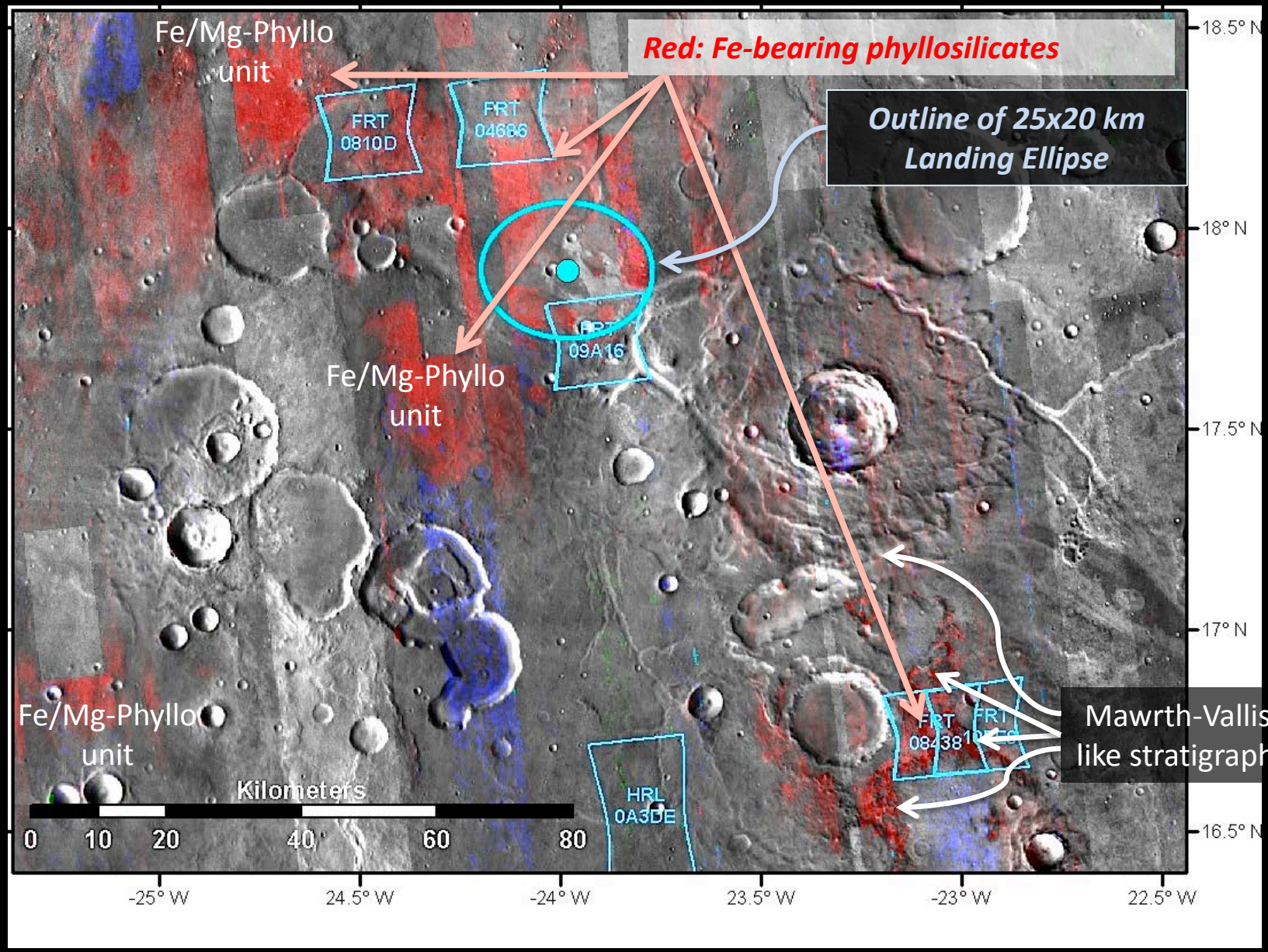
- Oxia-Mawrth Region is **4 Gy (+/- 200 My) old**
- Intense crater obliteration from 4 Ga to 3.6 Ga
- Moderate but continuous erosion since 3.6 Ga

Geological context: morphology

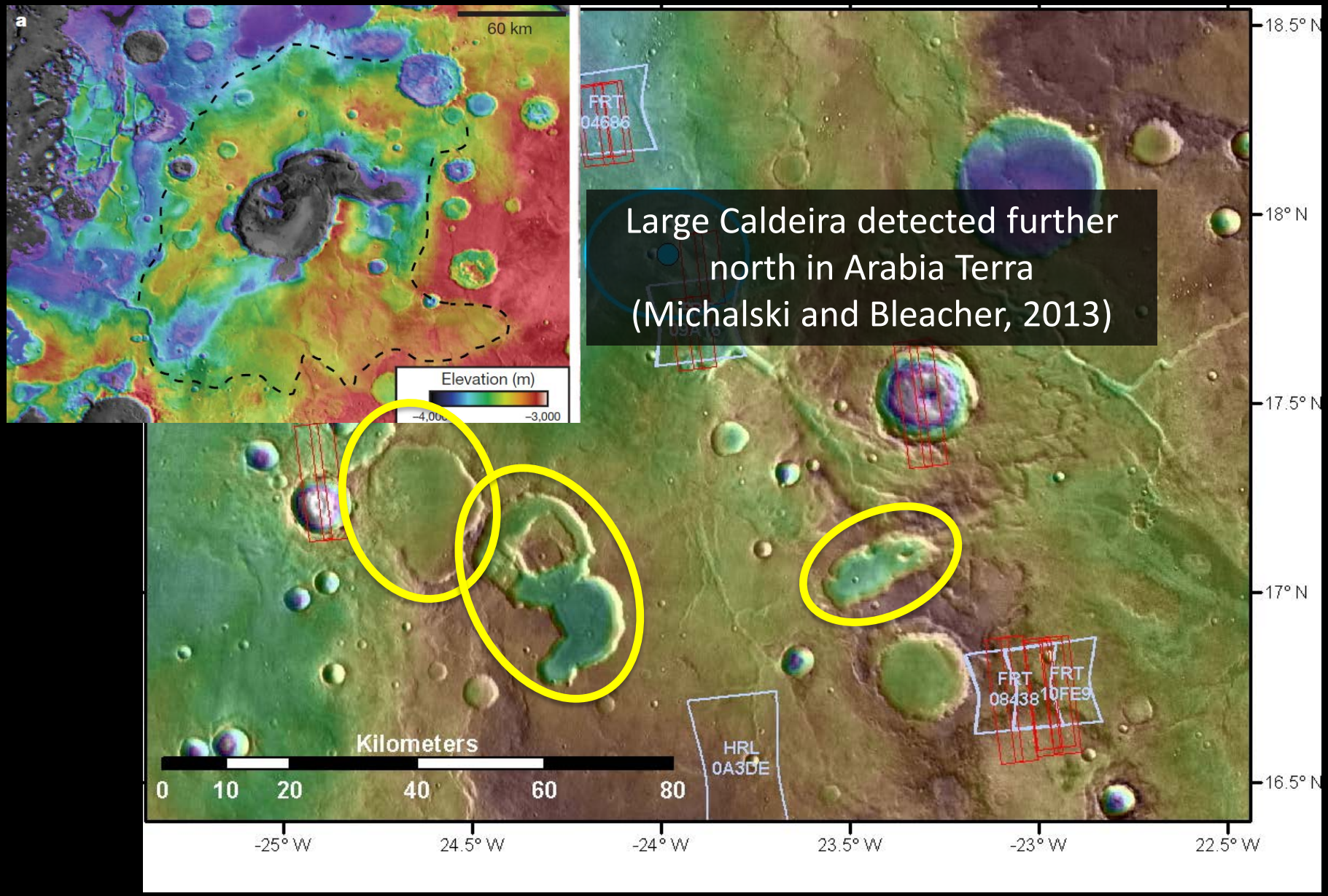


Geological context: hydrated minerals

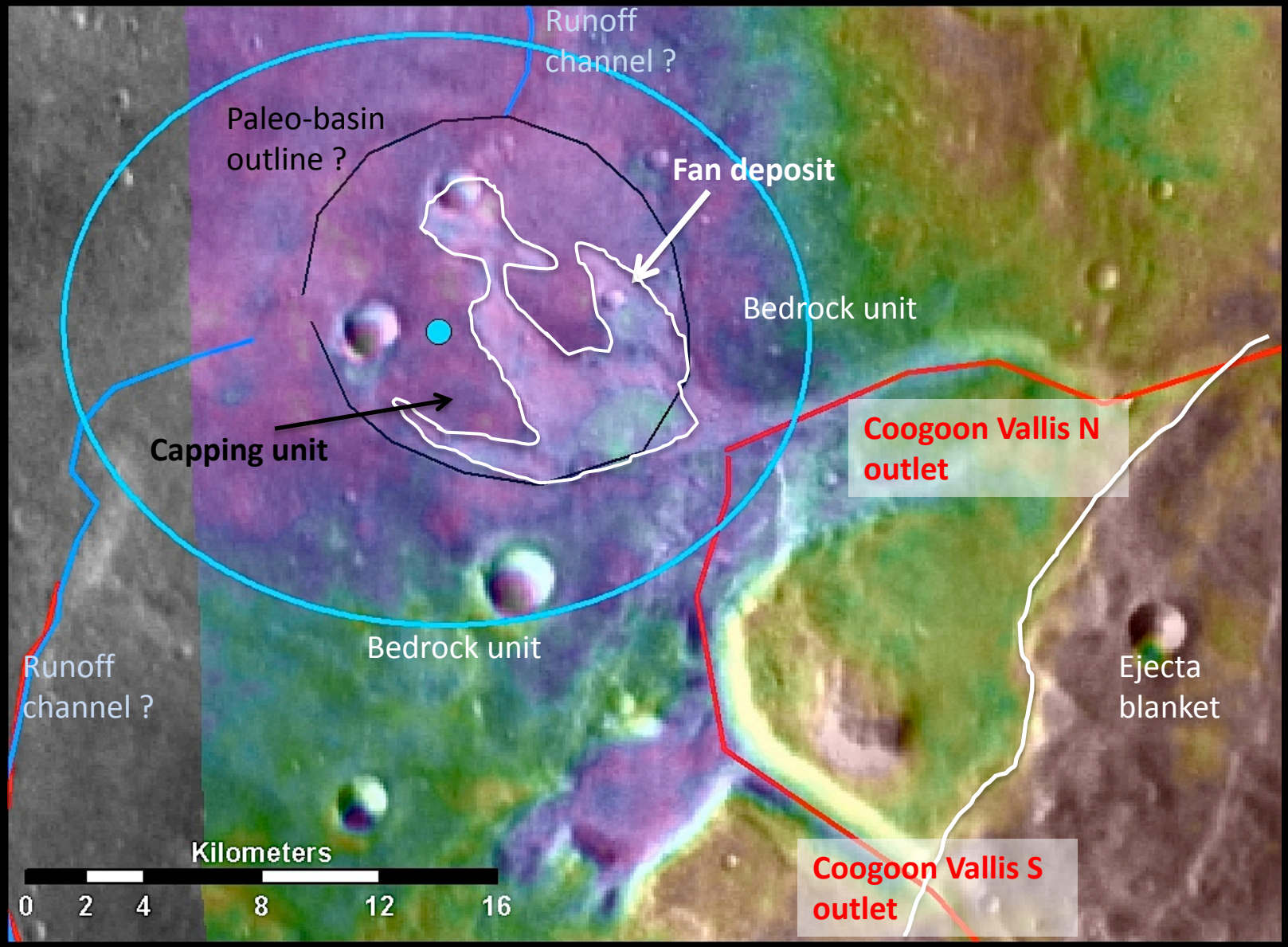
CRISM MSP 100m/pix



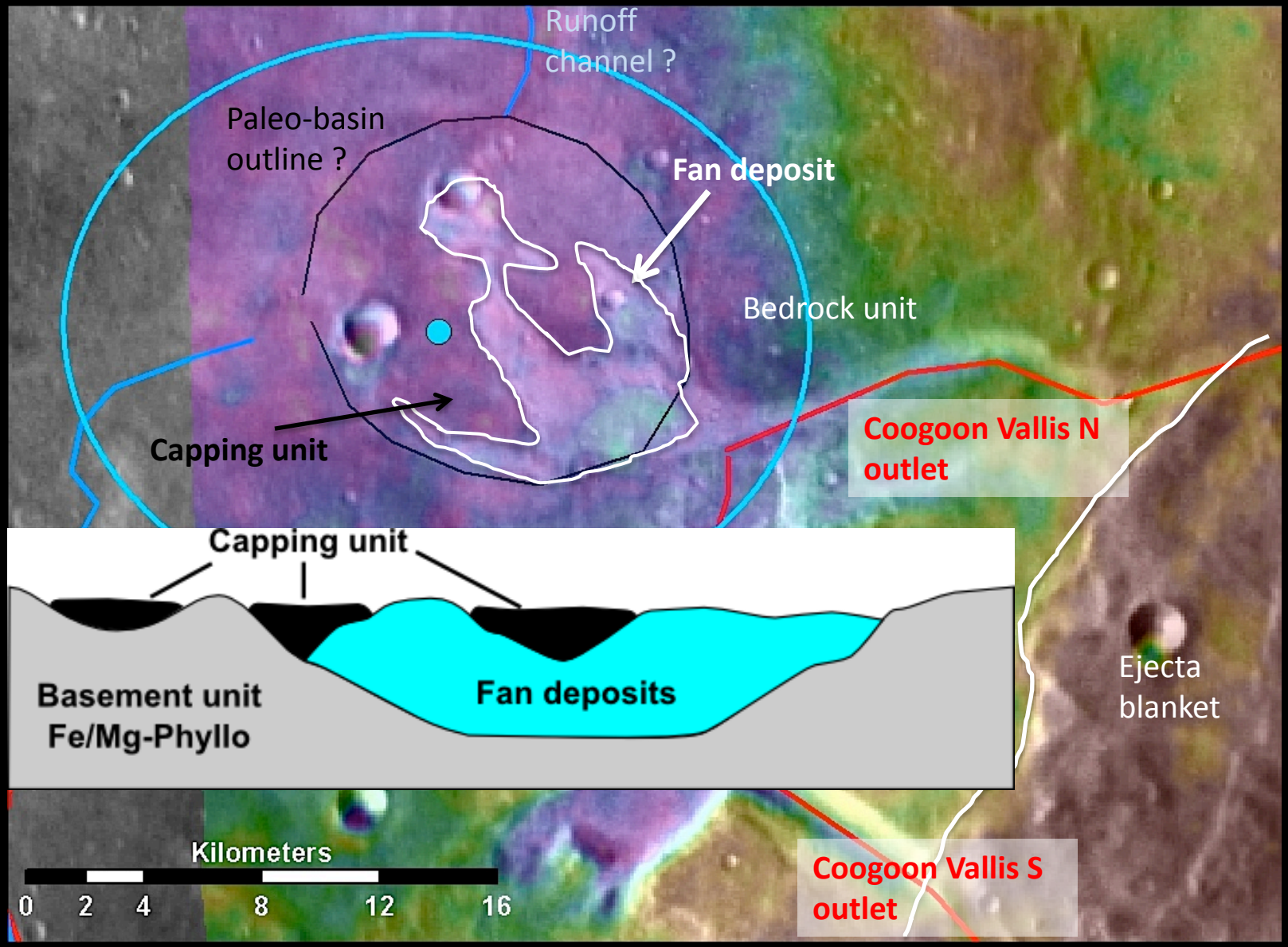
Geological context: evidence for volcanism



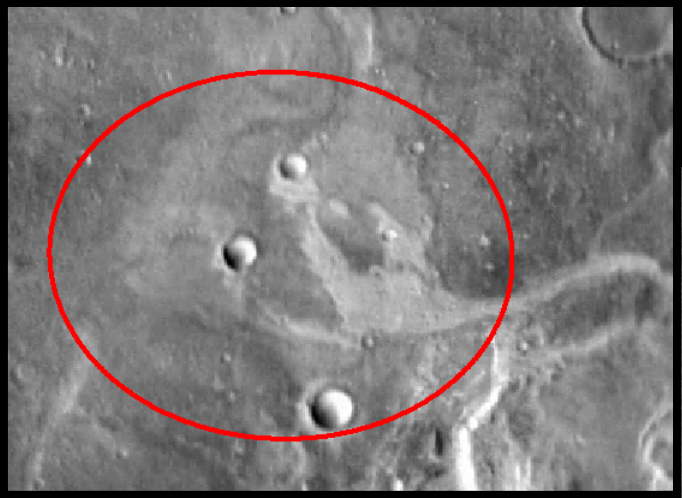
Geological context: Fan shaped deposit in paleo-basin at the mouth of Coogoon Valles

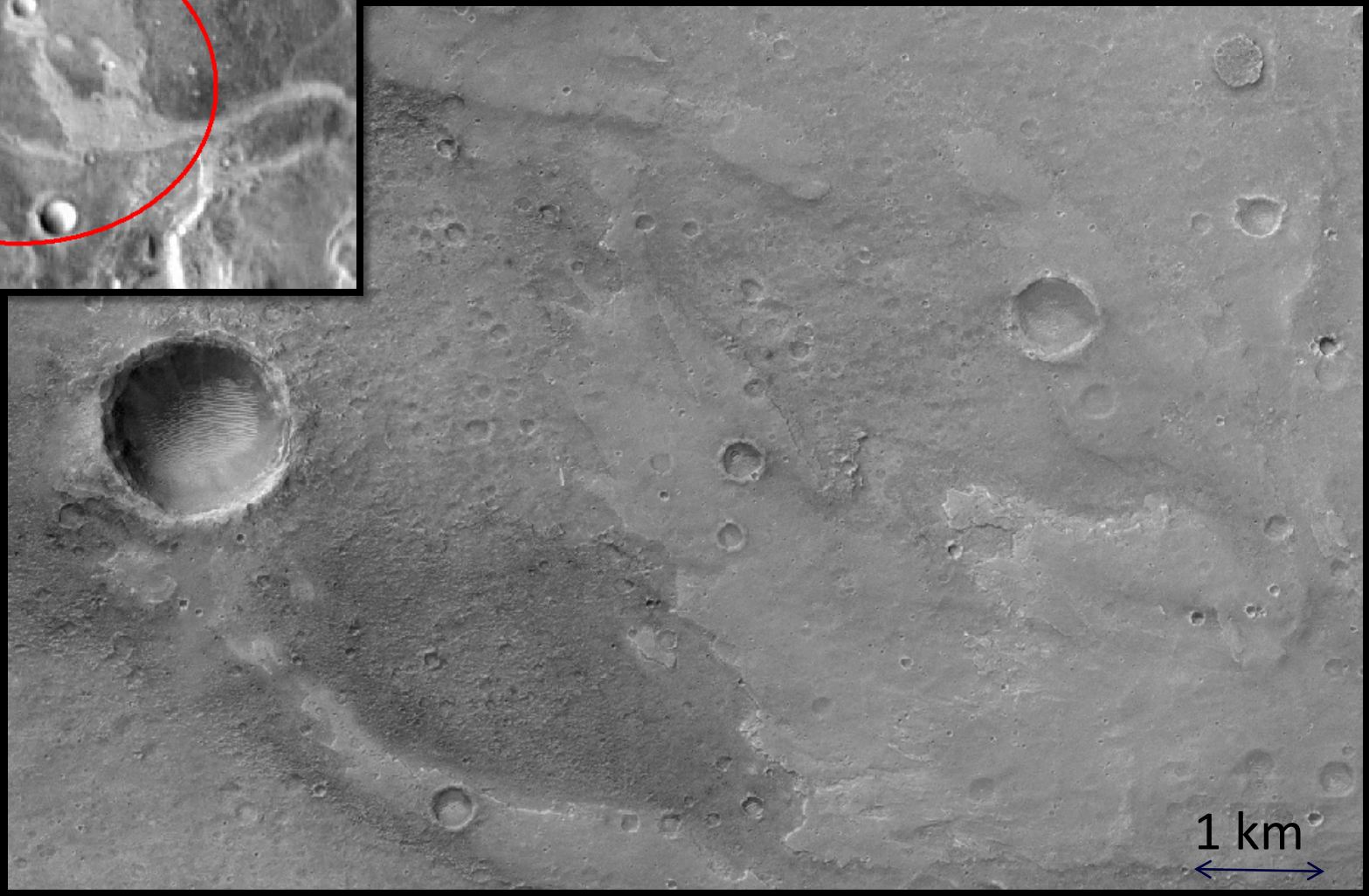


Geological context: Fan shaped deposit in paleo-basin at the mouth of Coogoon Valles



Fan shaped deposit

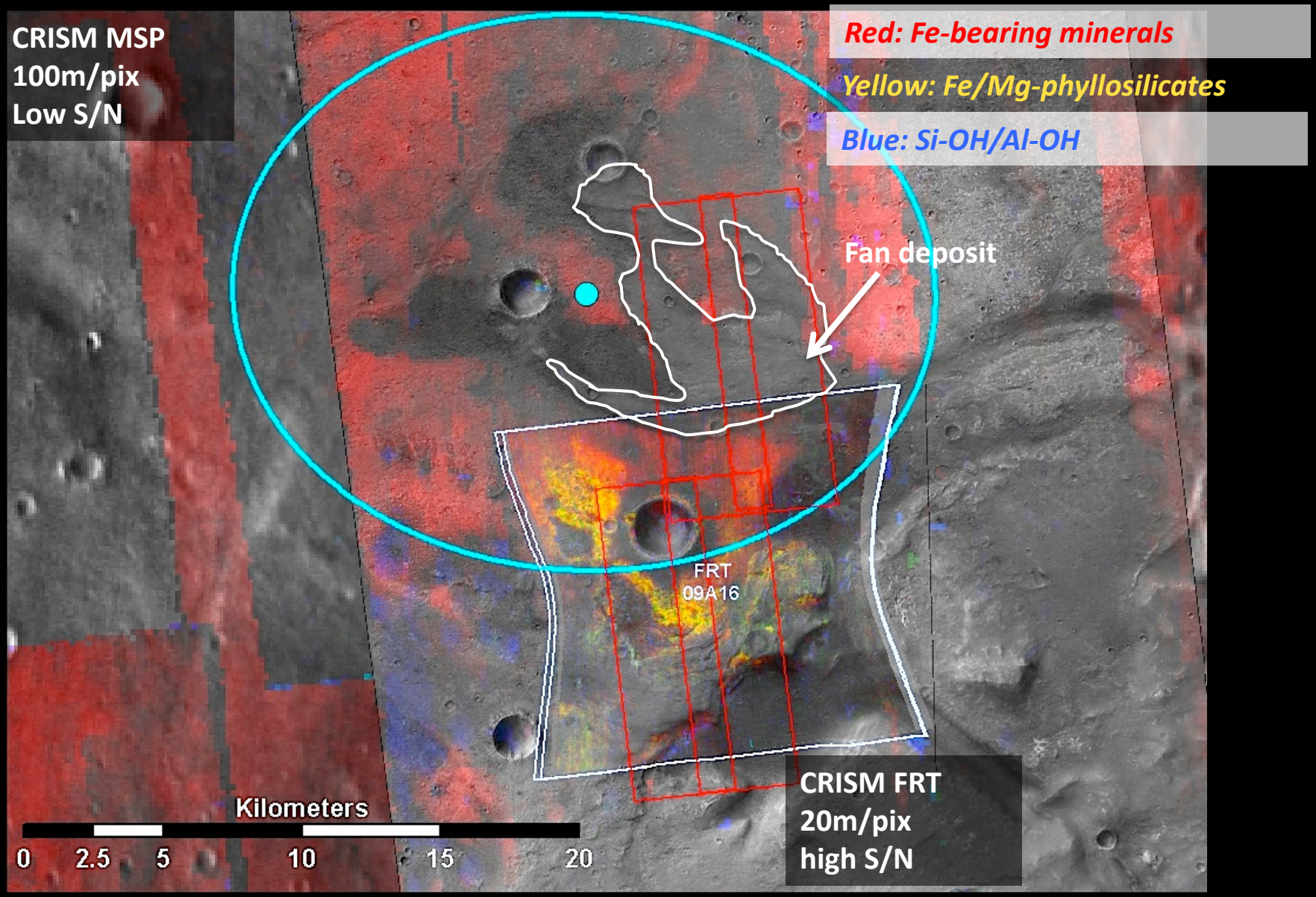




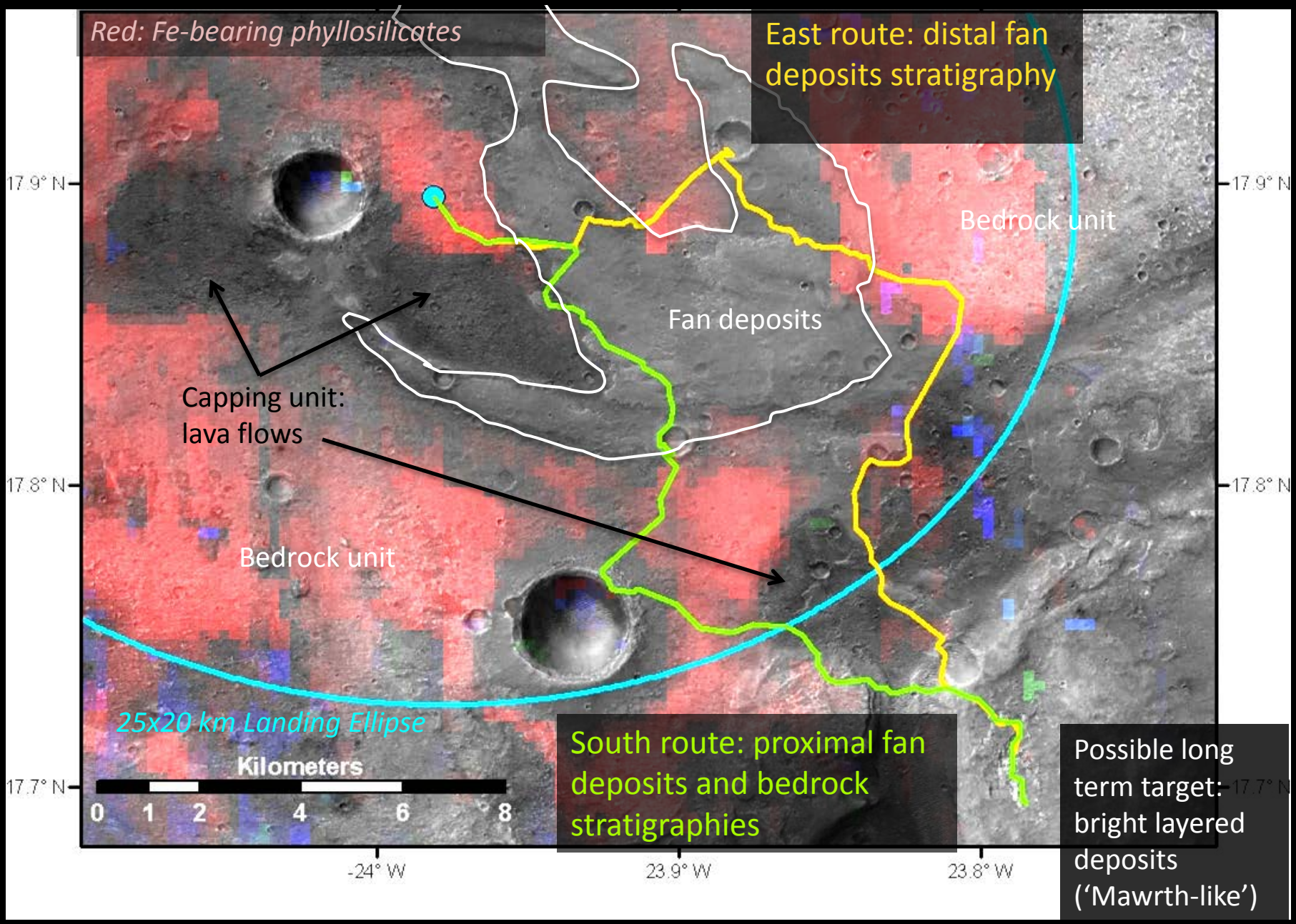
Zoom on divergent Finger-like terminations

Flat surface and No obvious channels : subaquous delta fans ?

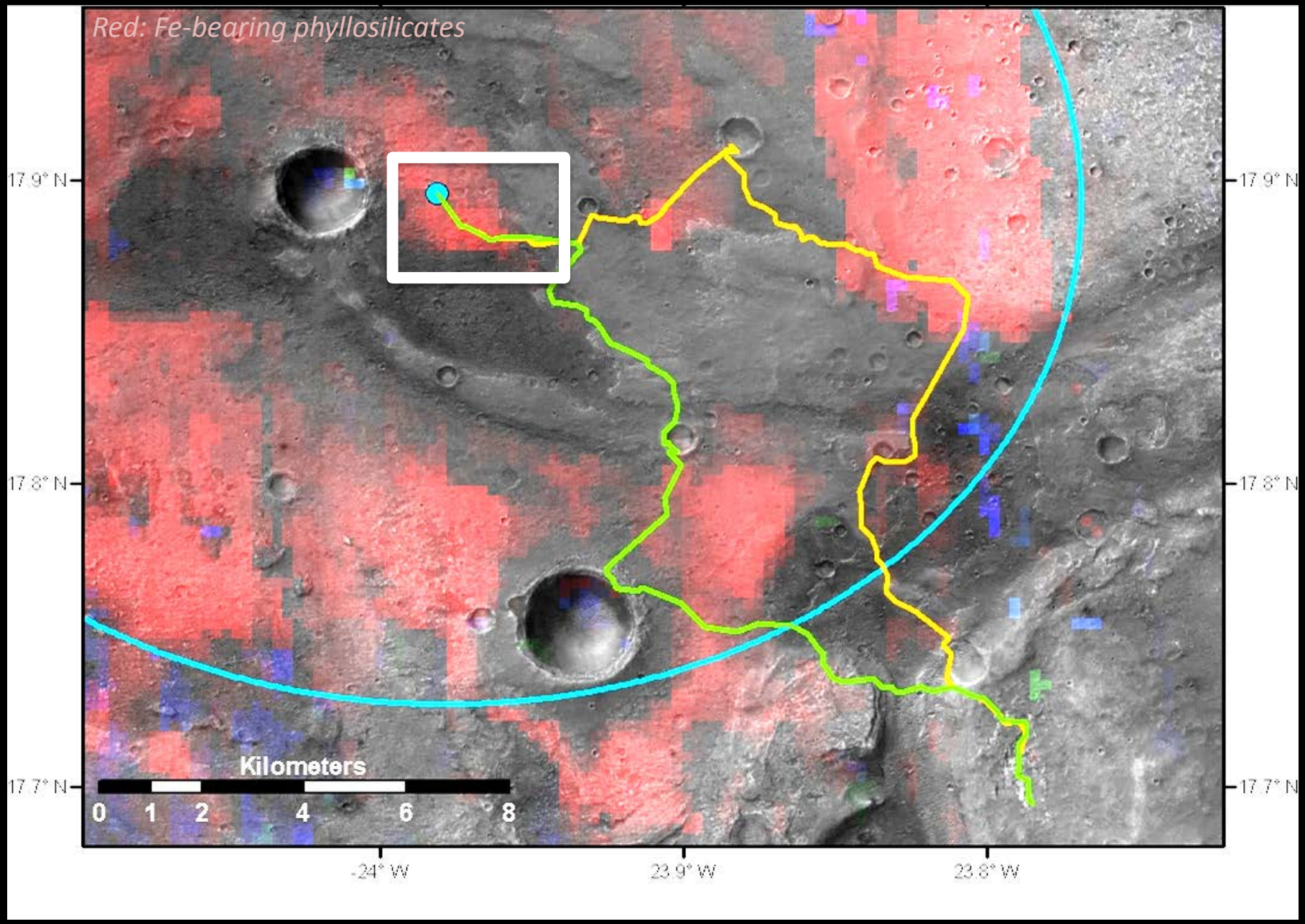
Geological context: Fe/Mg-phyllosilicates, hydrated silica/kaolinite



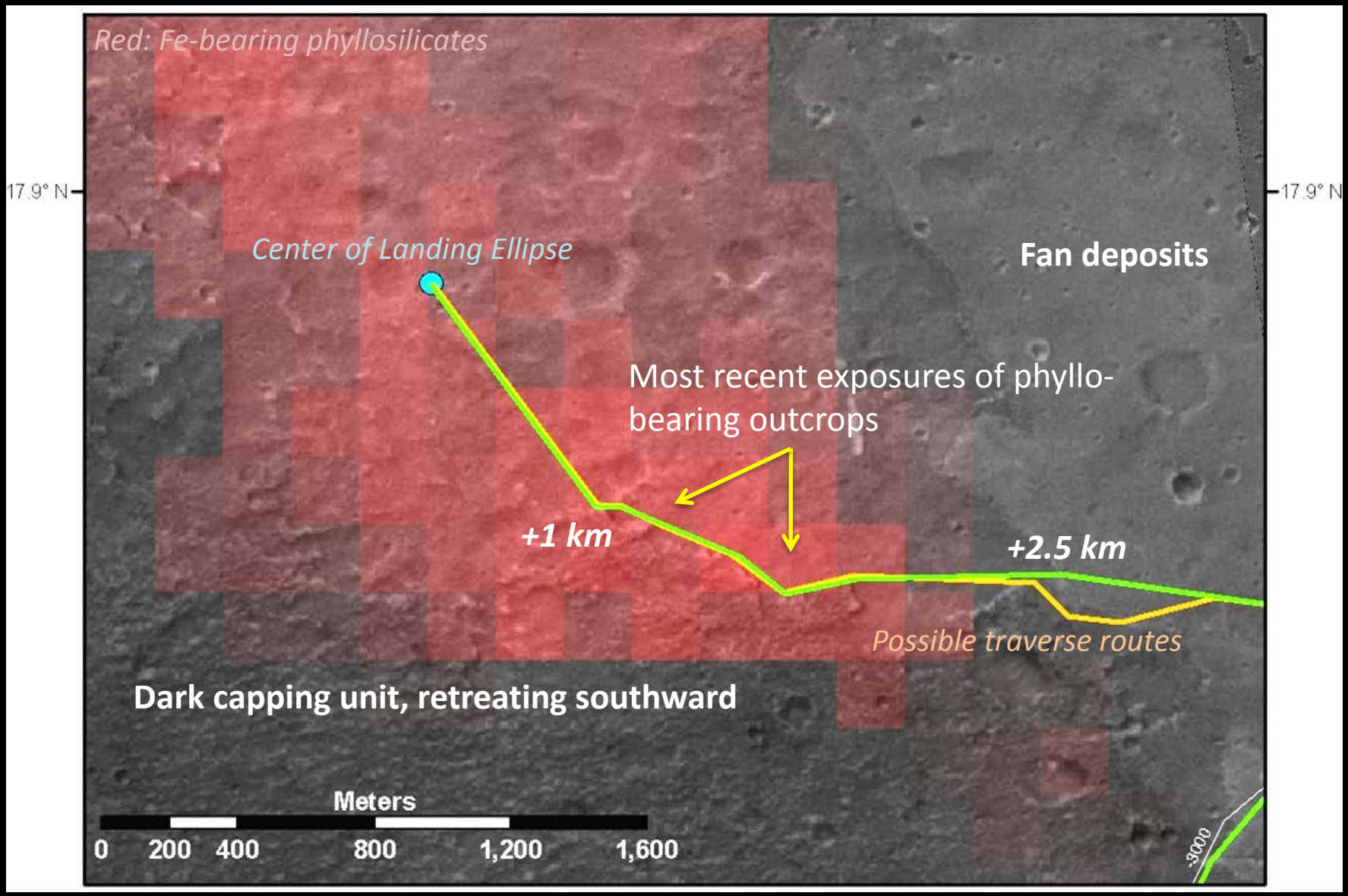
Possible traverse routes from ellipse center



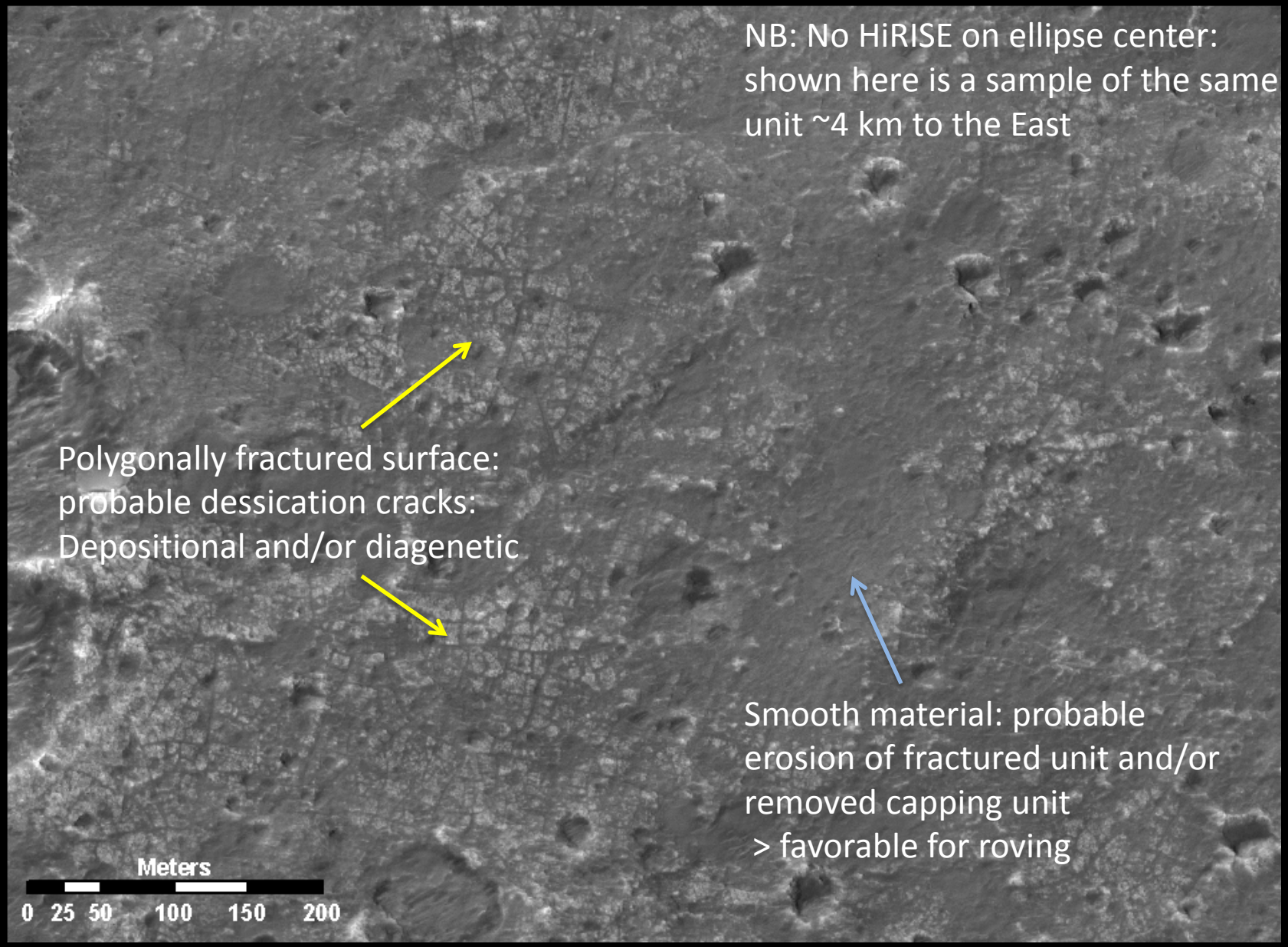
Land on Fe/Mg-Phyllo bearing unit



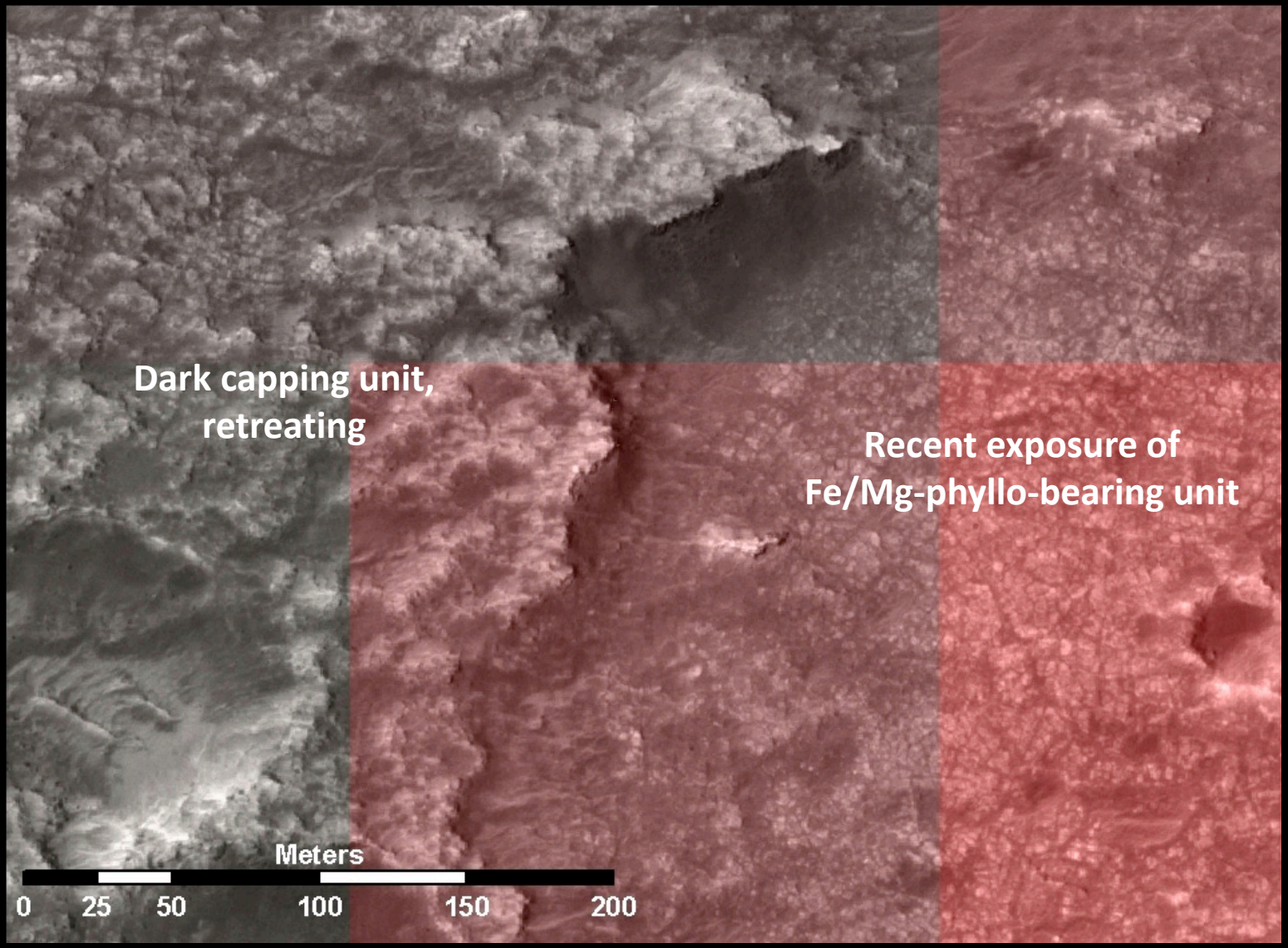
Land on Fe/Mg-Phyllo bearing unit

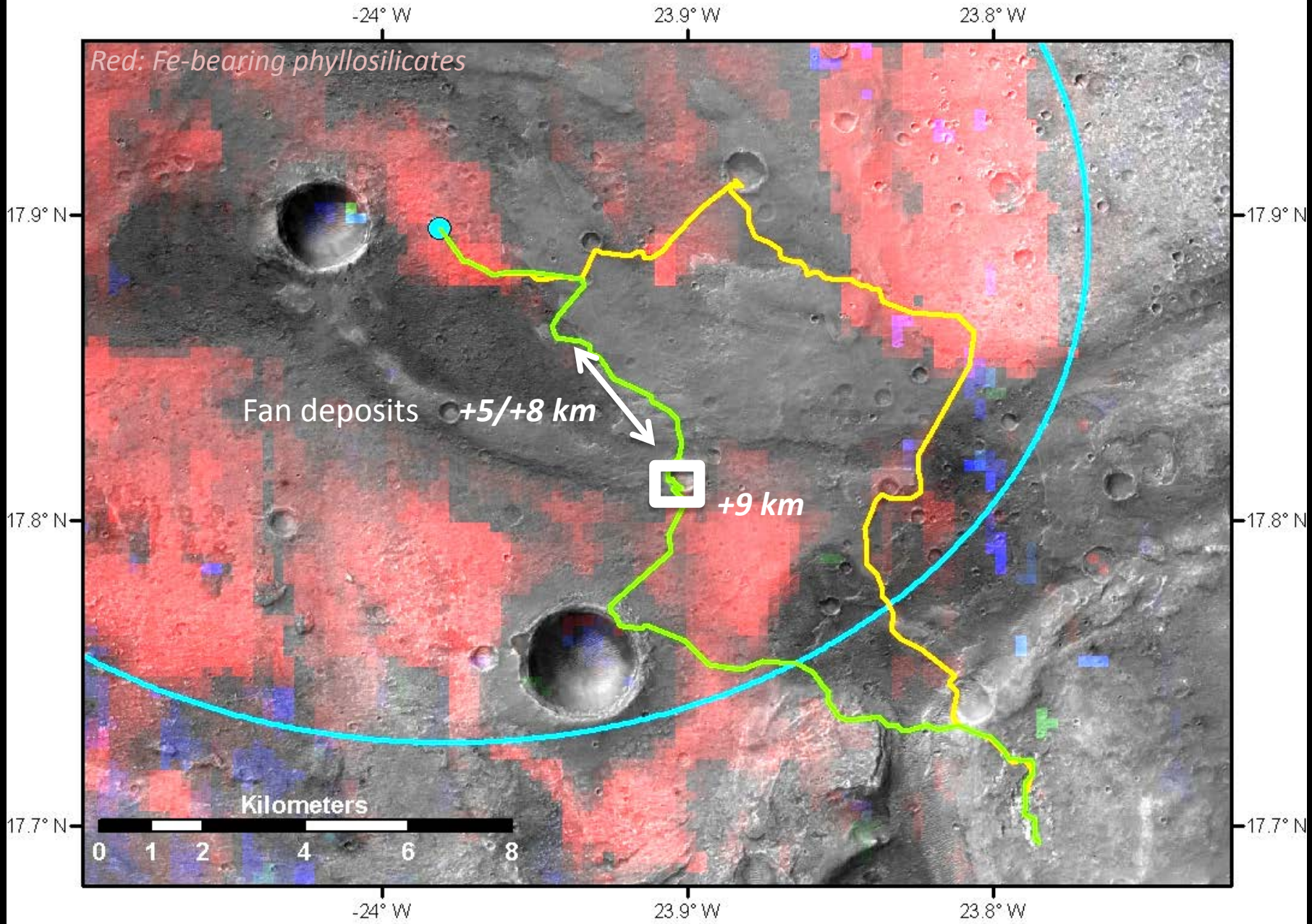


Land on Fe/Mg-Phyllo bearing unit: morphology

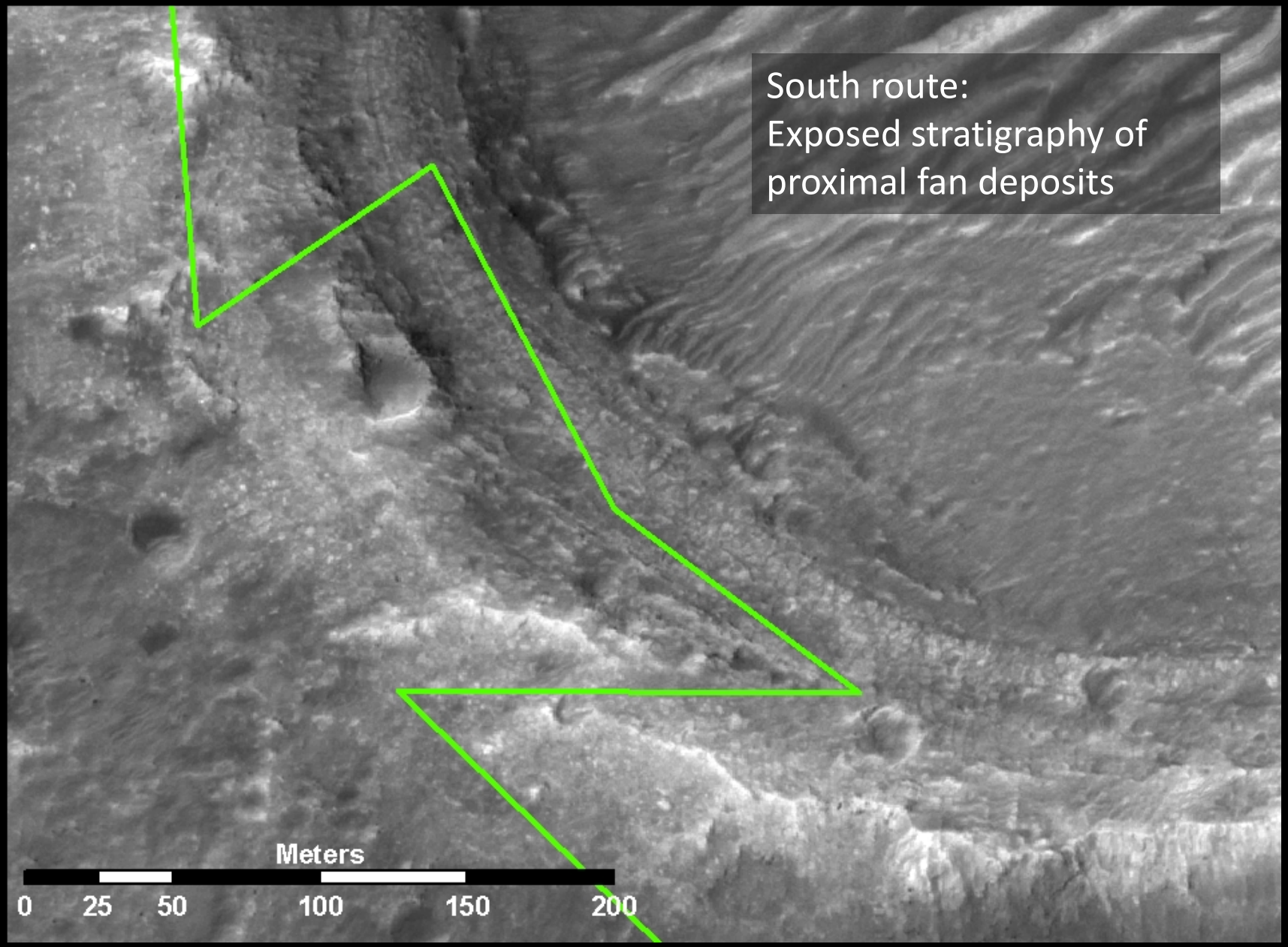


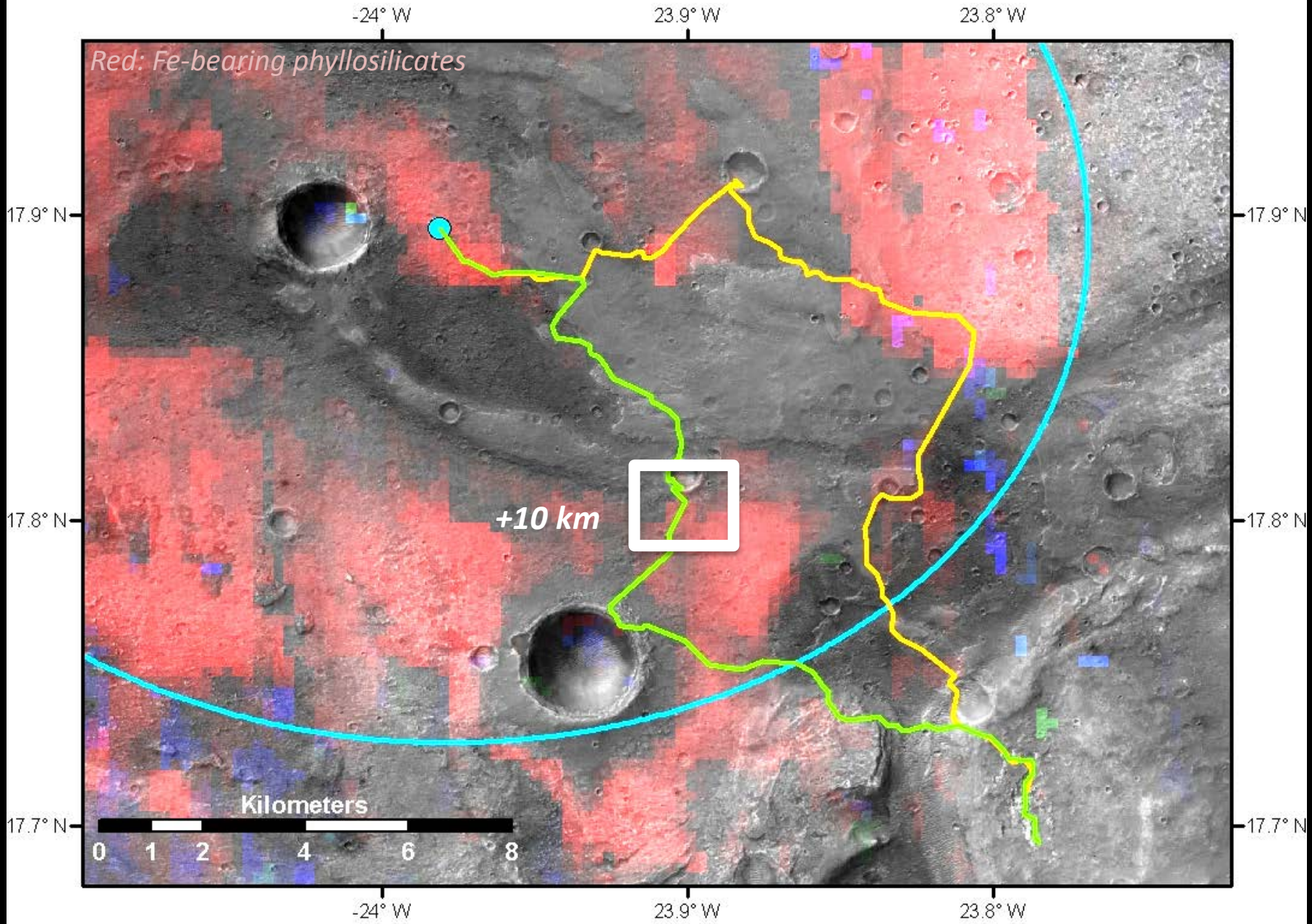
Capping unit: prob. lava flows *currently* eroding away: young exposure age



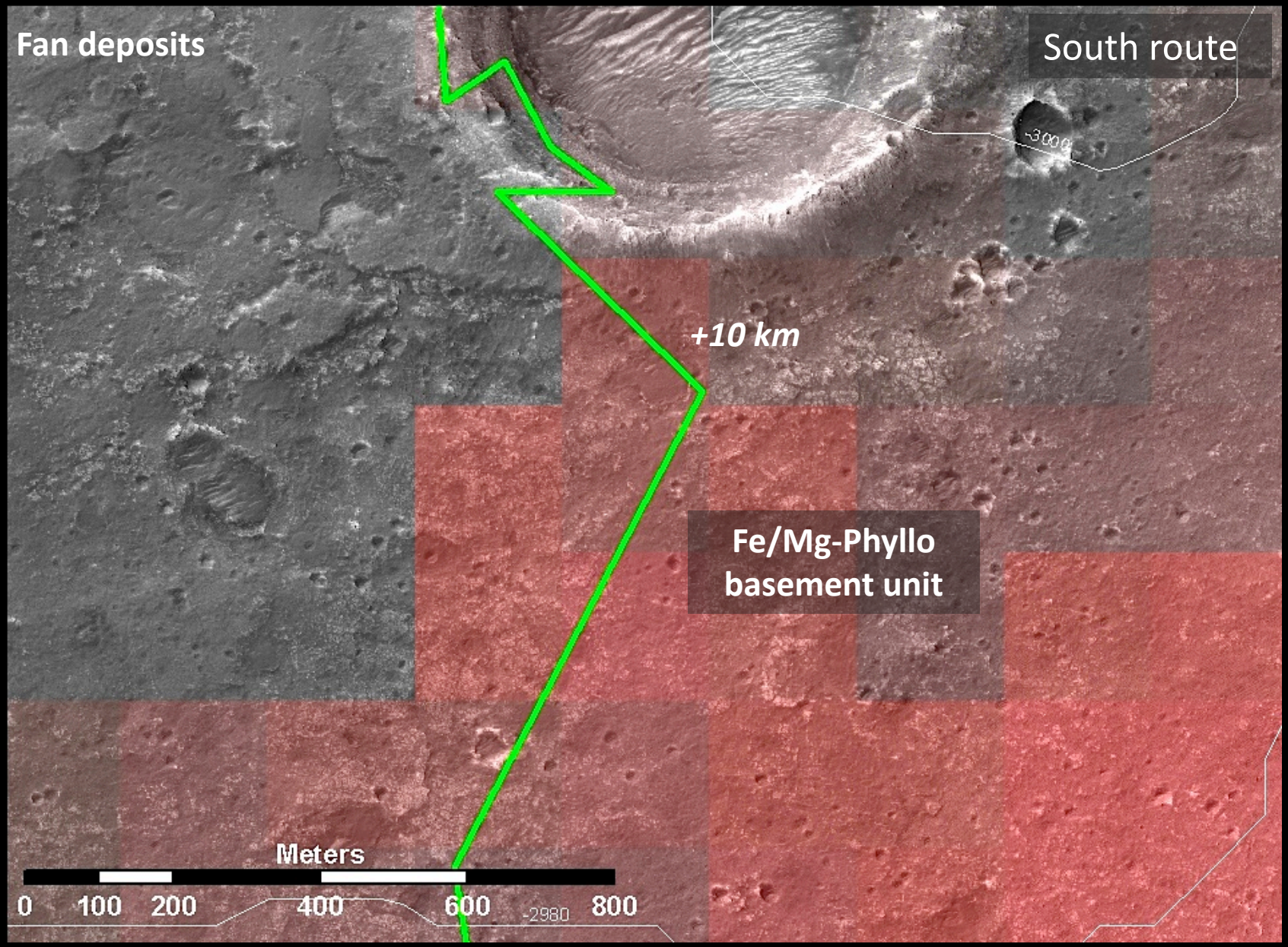

-24° W
23.9° W
23.8° W
Red: Fe-bearing phyllosilicates
17.9° N
17.8° N
17.7° N
Fan deposits
+5/+8 km
+9 km
Kilometers
0 1 2 4 6 8

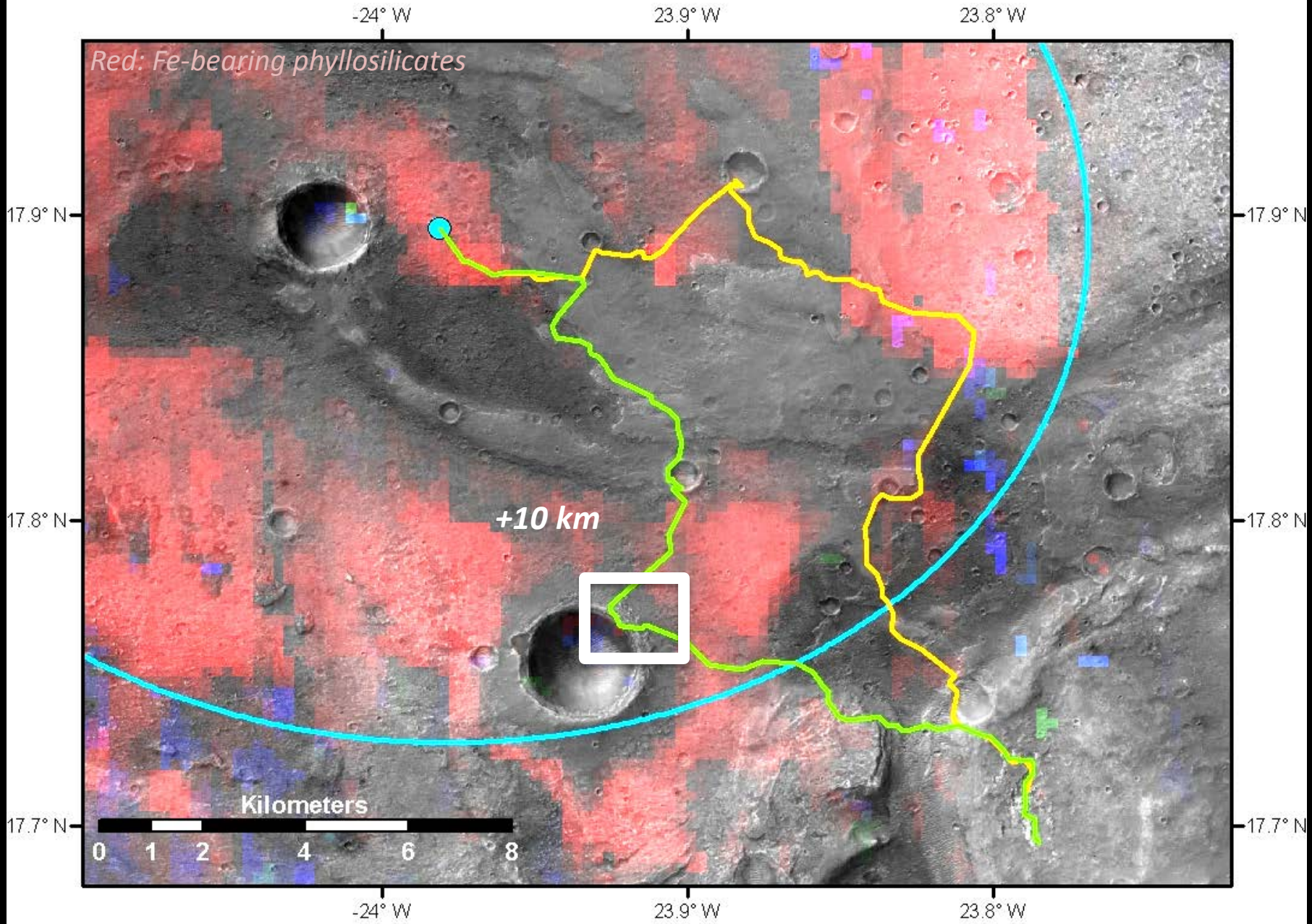
Fan deposits stratigraphy exposed in craters



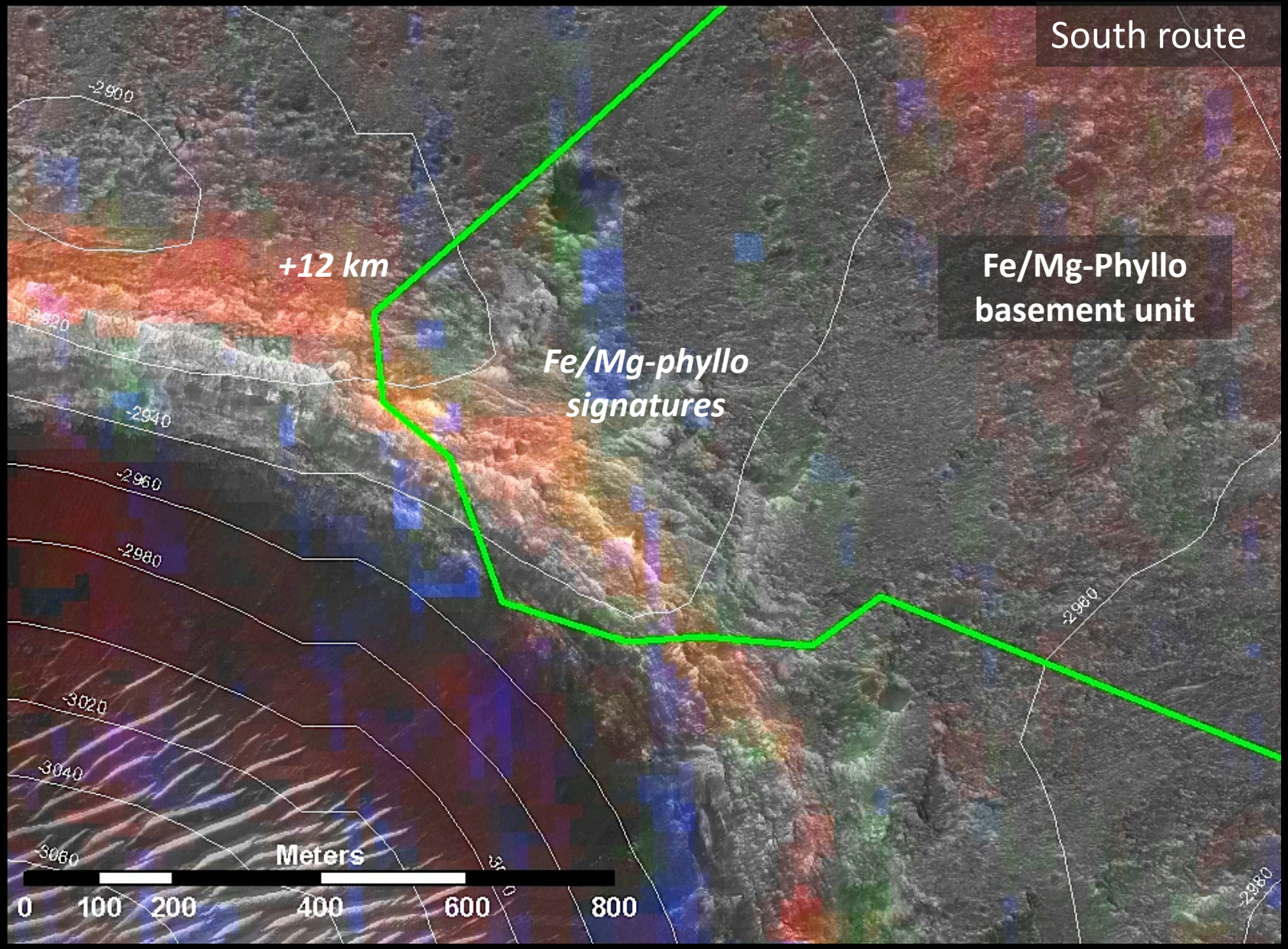

-24° W
23.9° W
23.8° W
17.9° N
17.8° N
17.7° N
Red: Fe-bearing phyllosilicates
+10 km
Kilometers
0 1 2 4 6 8

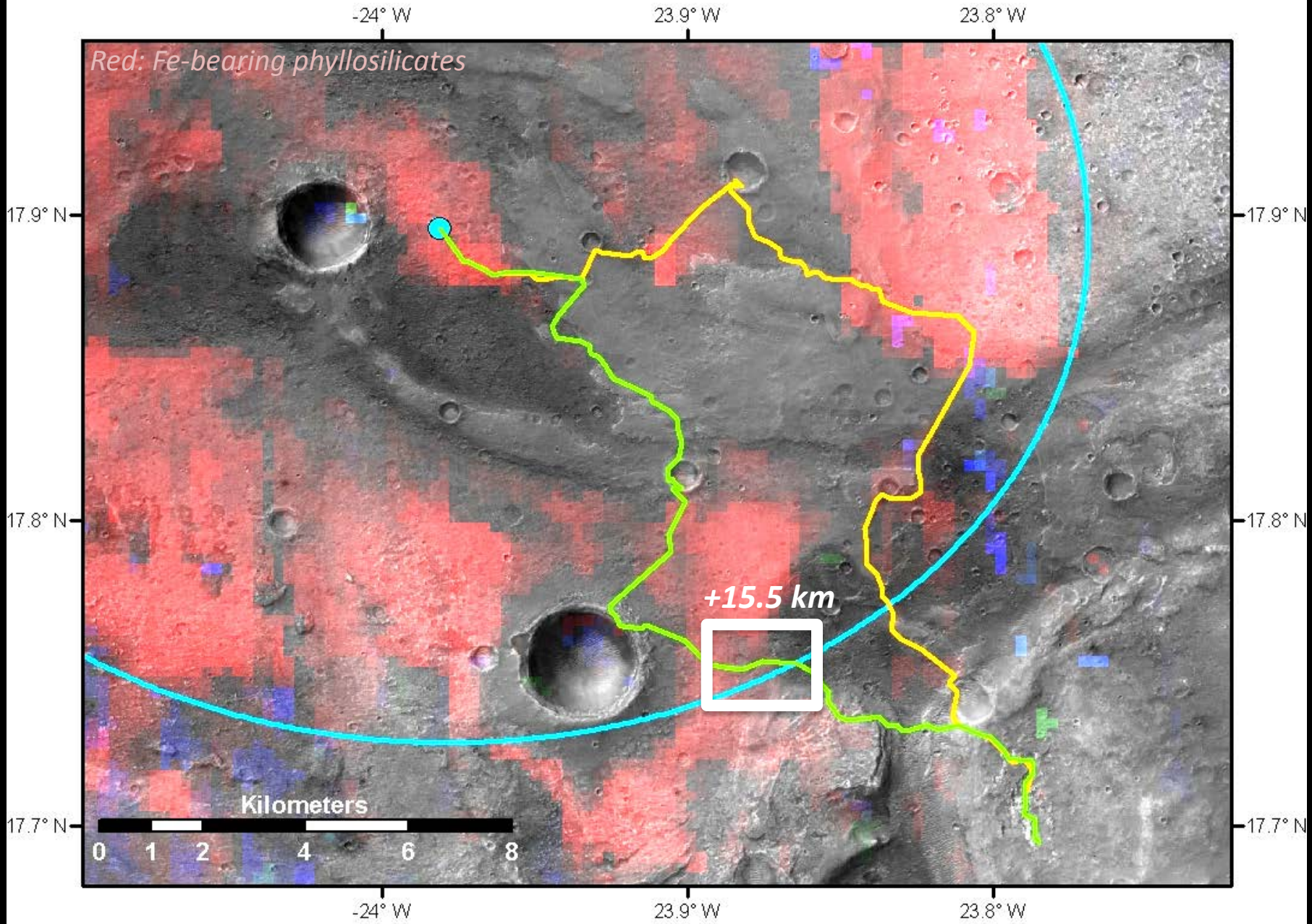
Basement unit: Fe/Mg-phyllo bearing



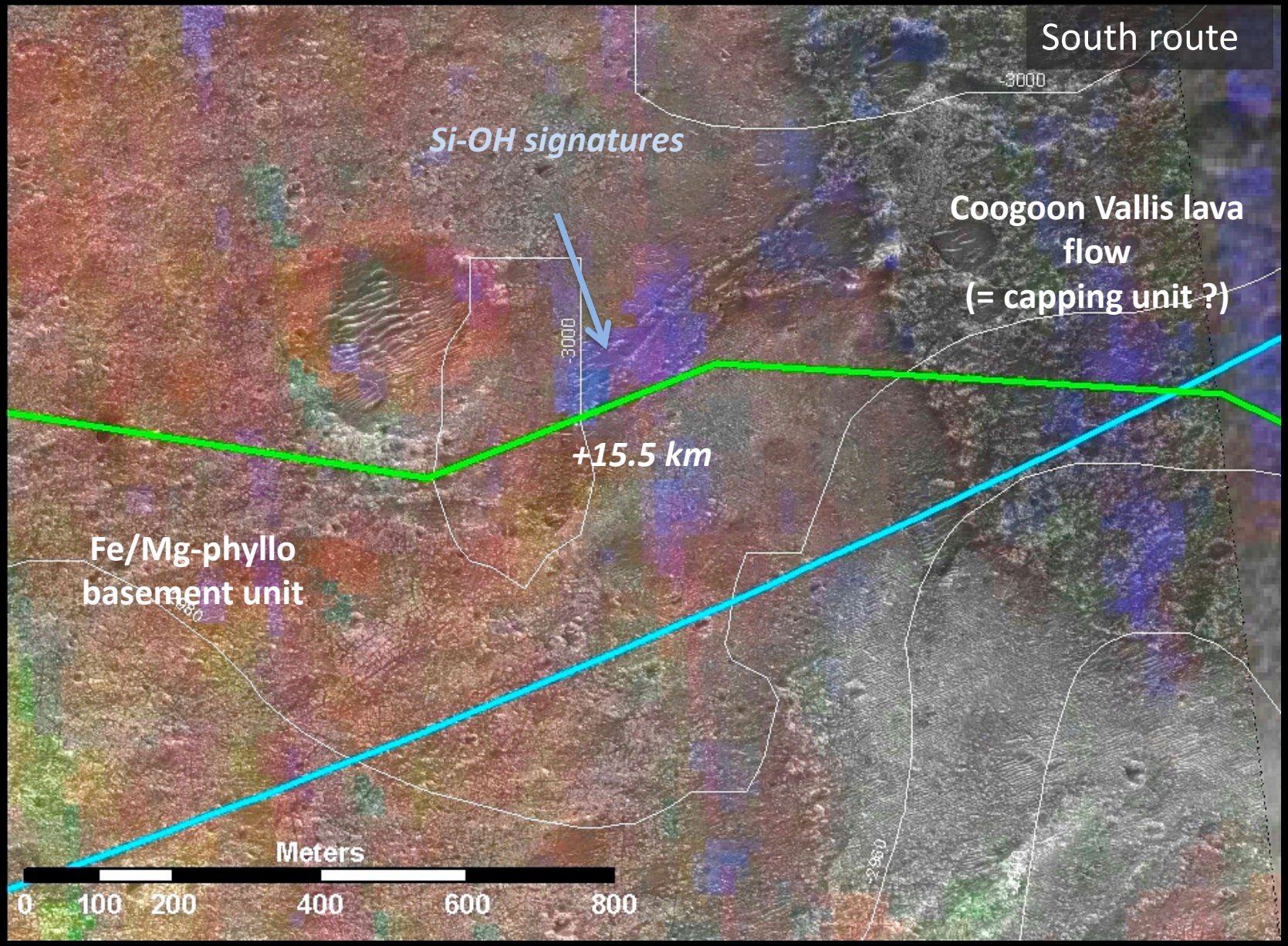

-24° W
23.9° W
23.8° W
Red: Fe-bearing phyllosilicates
17.9° N
17.8° N
17.7° N
+10 km
Kilometers
0 1 2 4 6 8

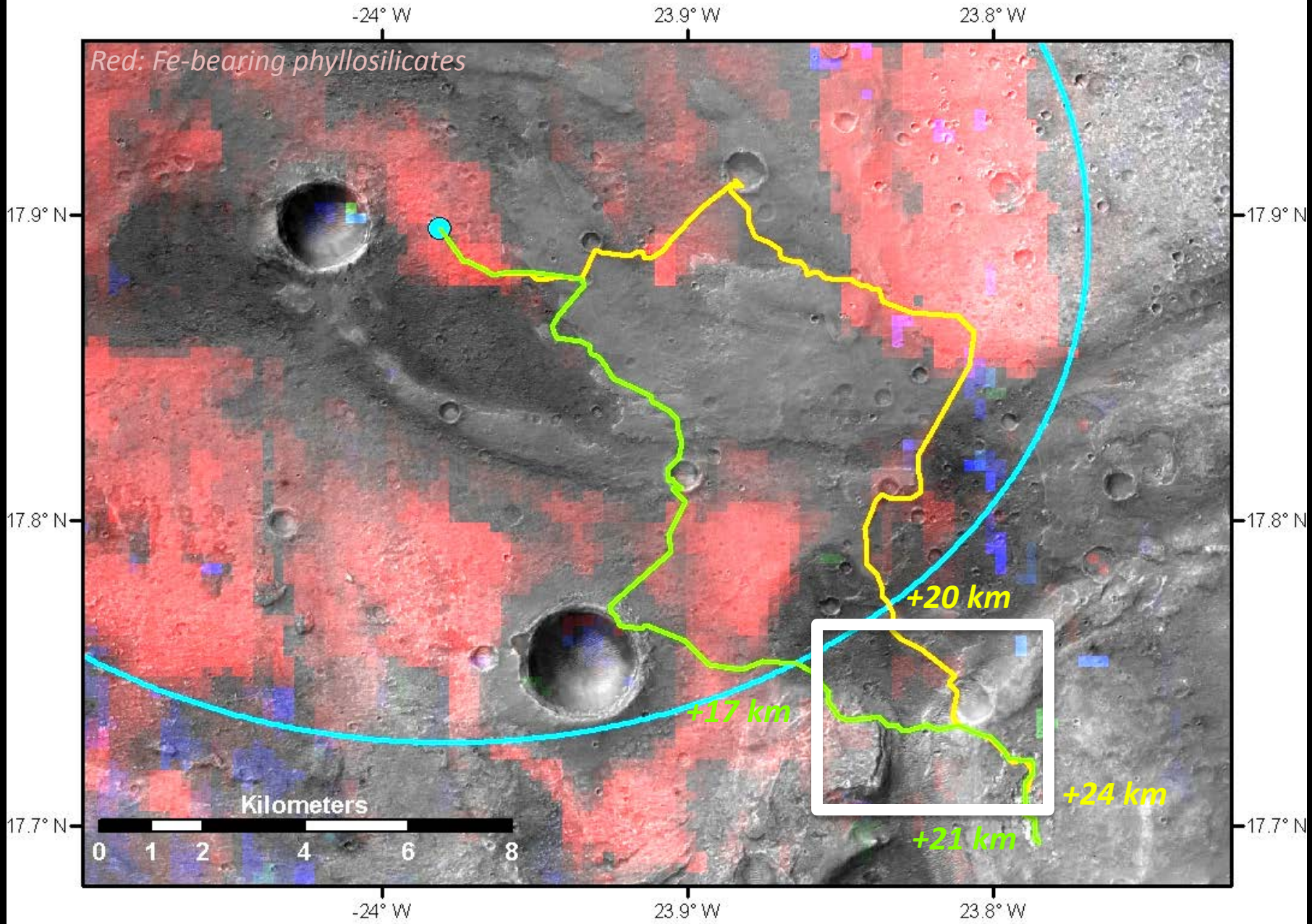
Basement unit: Fe/Mg-phyllo bearing



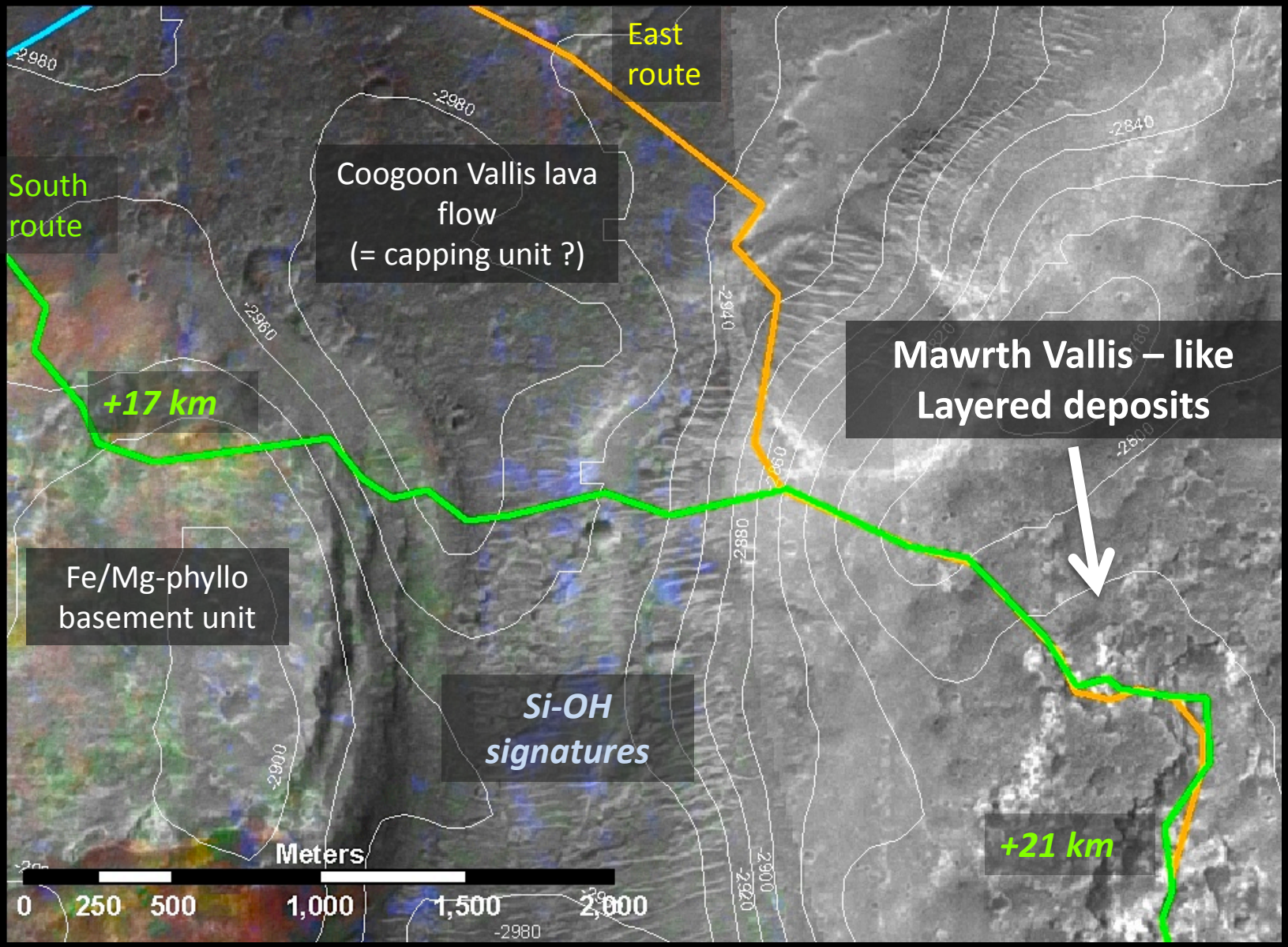

-24° W
23.9° W
23.8° W
17.9° N
17.8° N
17.7° N
Red: Fe-bearing phyllosilicates
+15.5 km
Kilometers
0 1 2 4 6 8

Late lava flow, associated aqueous alteration, stratigraphic relationship w/ Fe/Mg-phyllo unit

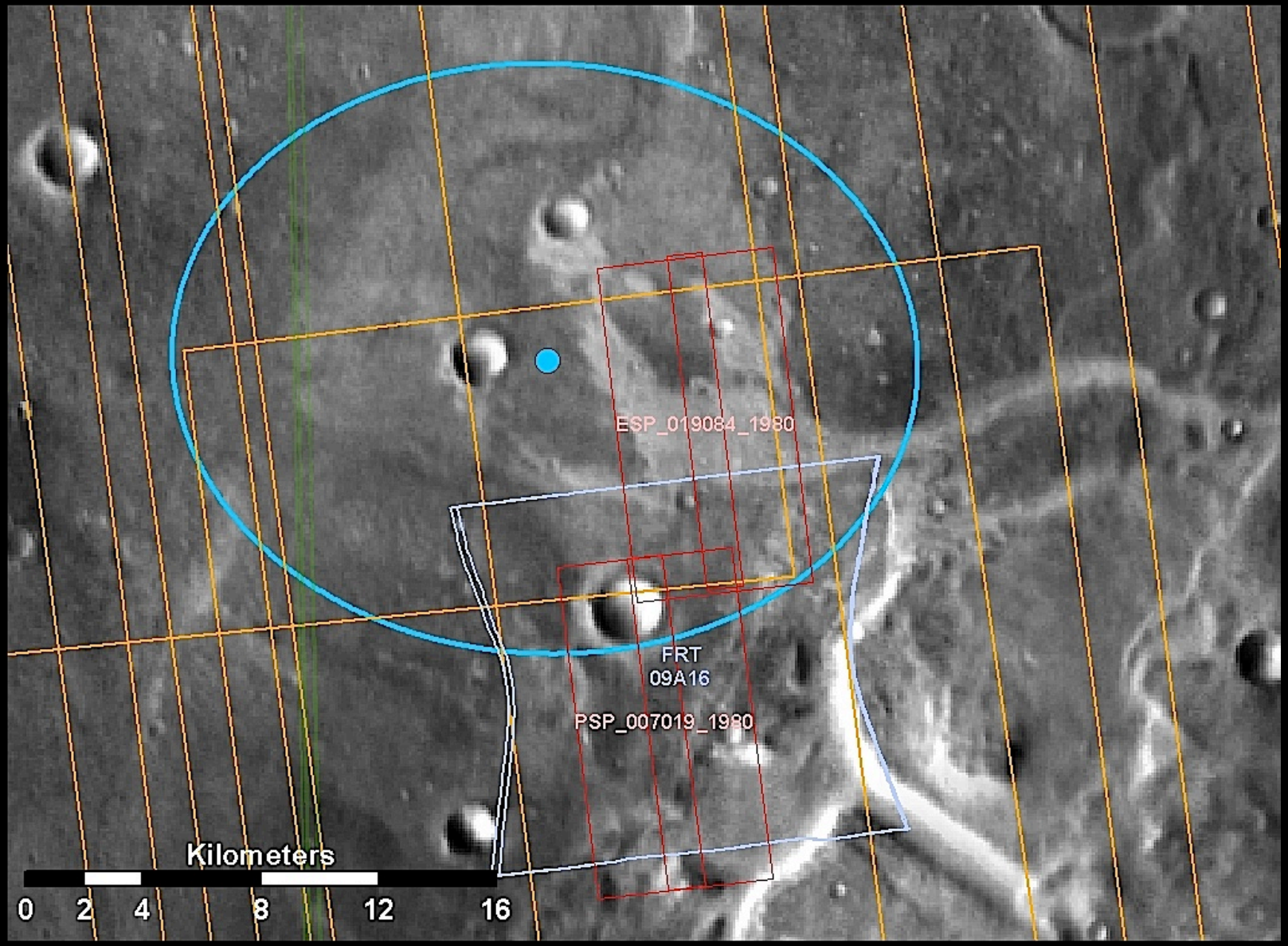



-24° W
23.9° W
23.8° W
17.9° N
17.8° N
17.7° N
Red: Fe-bearing phyllosilicates
+20 km
+17 km
+24 km
+21 km
Kilometers
0 1 2 4 6 8

Possible long term target: bright layered deposits with similar stratigraphy as Mawrth Vallis



Current datasets coverage



HRSC

CTX

HiRISE

CRISM

Target requests

Oxia Planum Essentials

- Surface aqueous alteration of basement unit: Fe/Mg-Phyllosilicates
- Noachian age: ~4 Ga; units overlain by Hesperian Ridged plains
- Noachian fan-shaped sedimentary deposits in paleobasin: delta ? fossil river channels in basement unit
- Igneous units, Noachian and/or Hesperian (lava flows, caldeiras)
- Ancient capping unit: altered basement and deposits shielded from later alteration
- Recent erosion of capping unit exposing preserved older units
- Prob. Mawrth-Vallis-like stratigraphy on basement, as close as 4 km from ellipse
- Exomars candidate landing site (potential exploration synergy)