



Southern Isidis Planitia

Scientific Requirements:

- General site presentation
- Description of site's geological context
- Geomorphologic description
- Mineralogy
- Sedimentary outcrops
- Target accessibility and dust distribution

Planetary Protection Requirements:

Engineering Requirements:

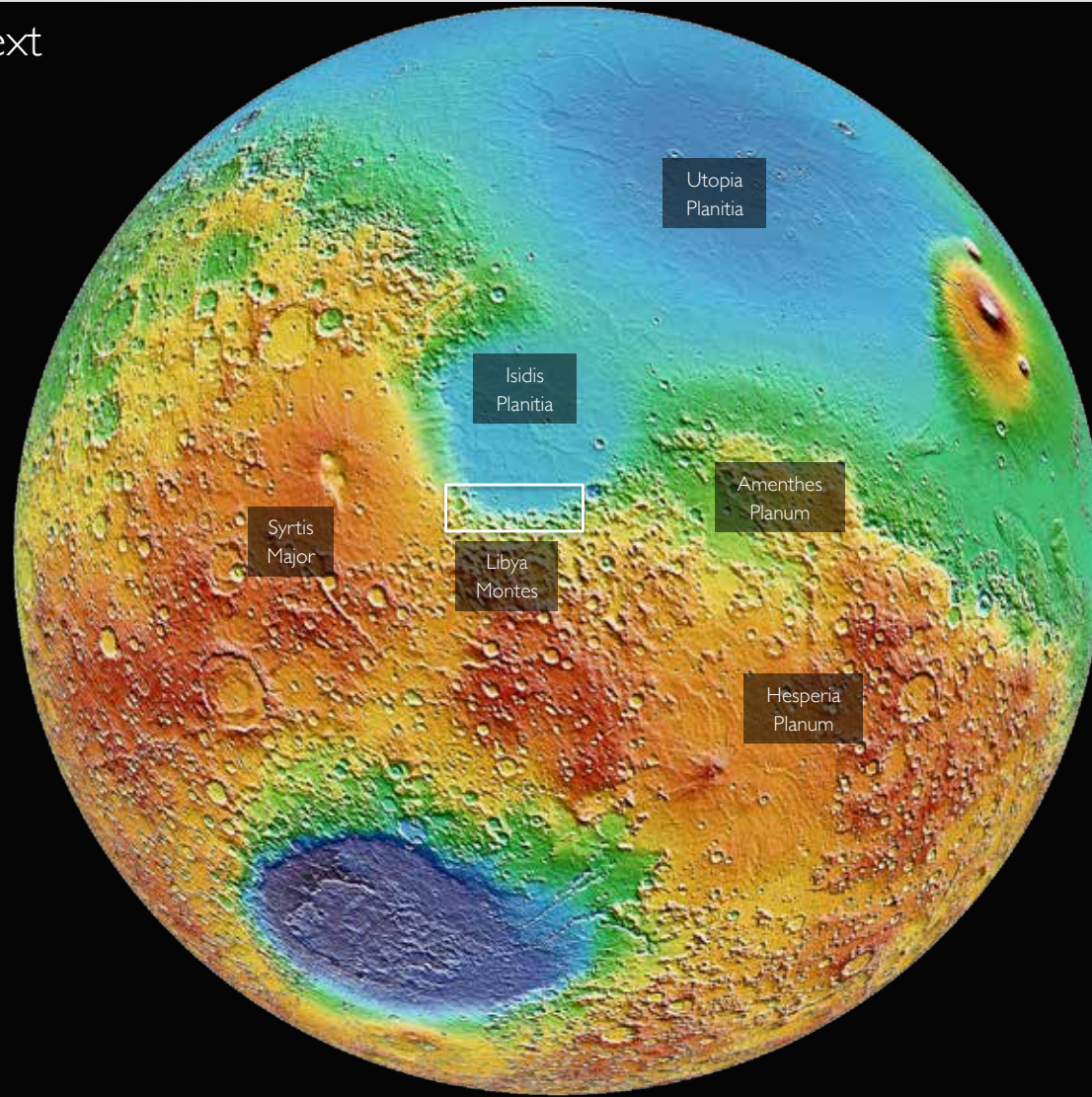
- Ellipse's latitude, dimensions, orientation, and elevation compliance
- Ellipse's slopes compliance
- Ellipse's rock abundance, thermal inertia, albedo, and wind compliance
- Ellipse's HiRISE, CTX, CRISM, HRSC, OMEGA coverage
- Prioritised proposals for new MRO, MEX pointings

Summary

General Site Presentation

E X O M A R S

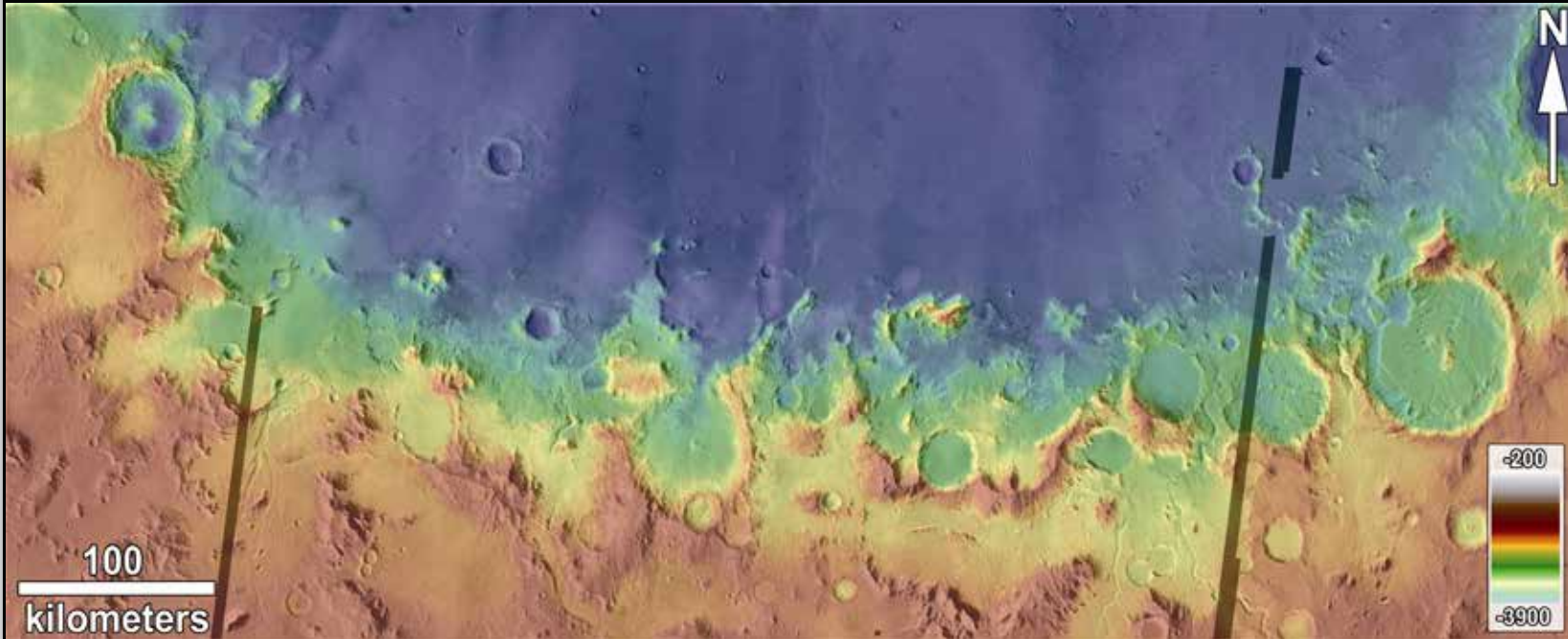
Global Context



General Site Presentation

E X O M A R S

Regional Context



IR_DAY / MOLA

General Site Presentation

Regional Context



IR_DAY / MOLA

Erkeling et al., 2010, 2014 (Icarus, submitted); Ivanov et al., 2012

General Site Presentation

E X O M A R S

Regional Context

Isidis interior plains

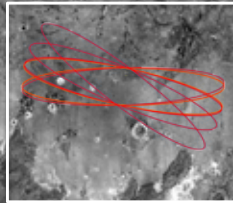
Isidis terminal plains

Libya Montes

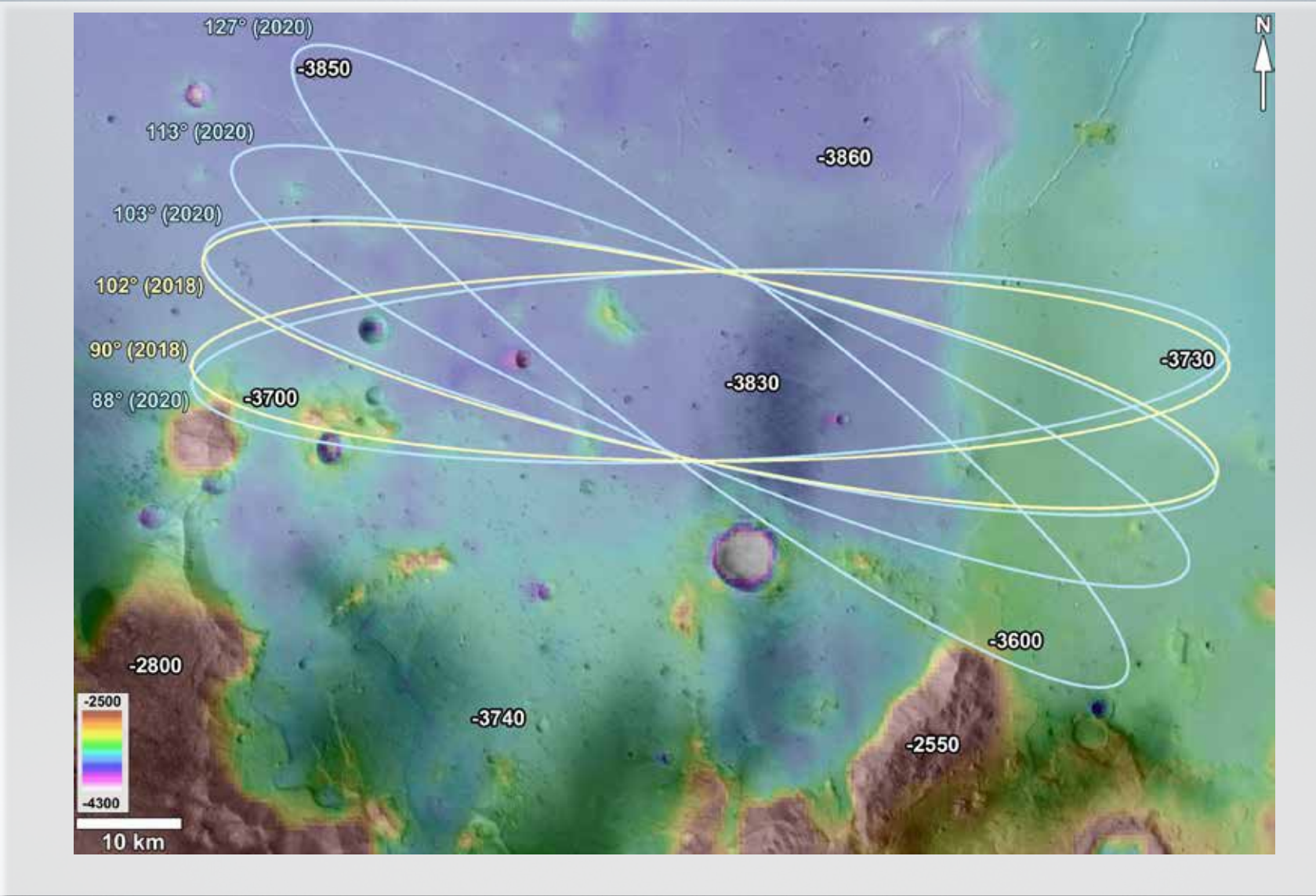
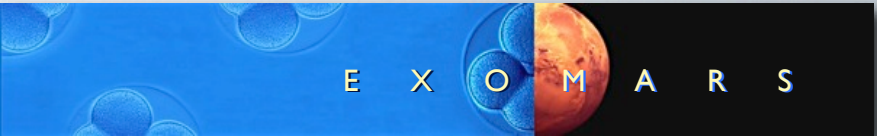
100

kilometers

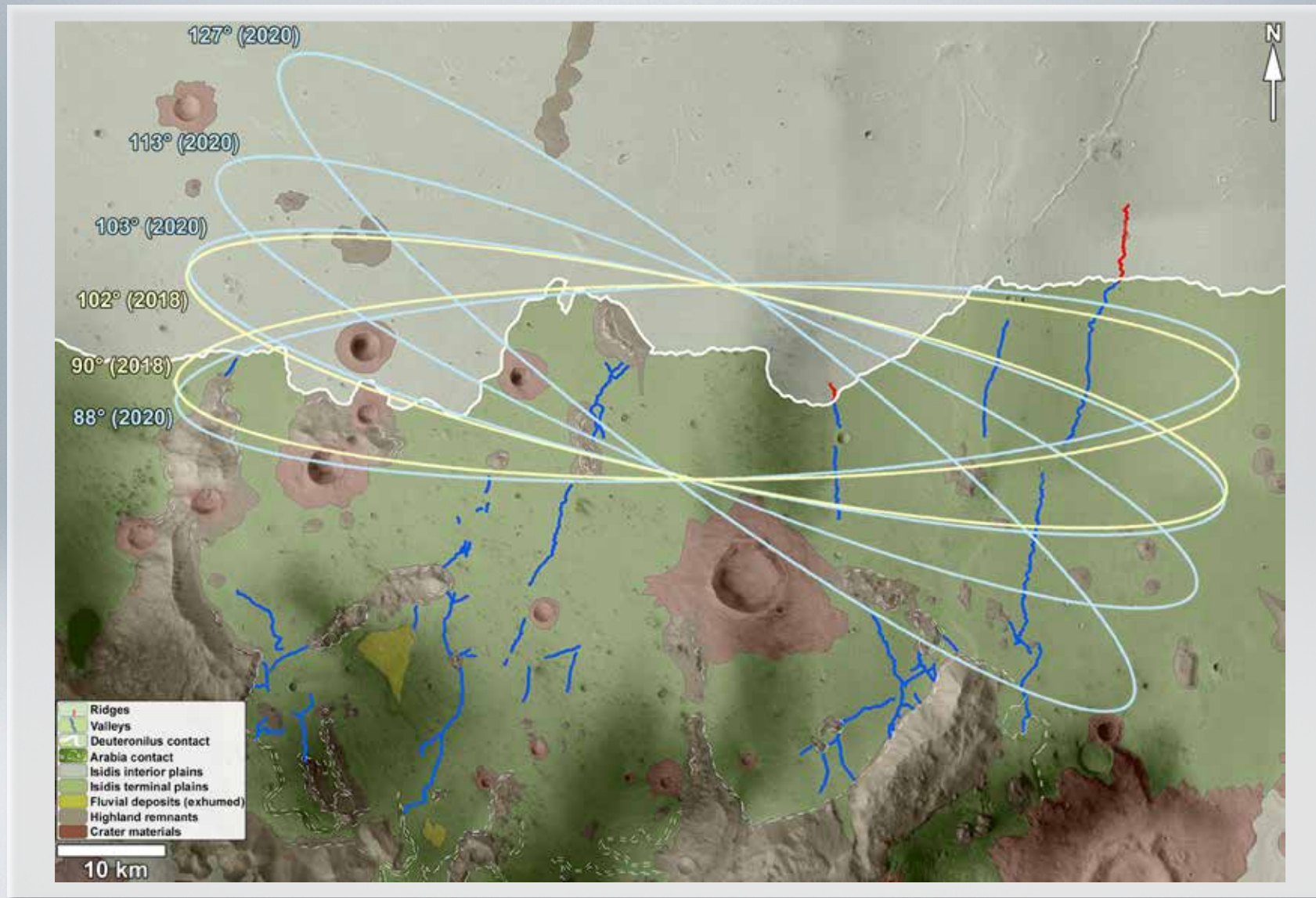
IR_DAY / MOLA



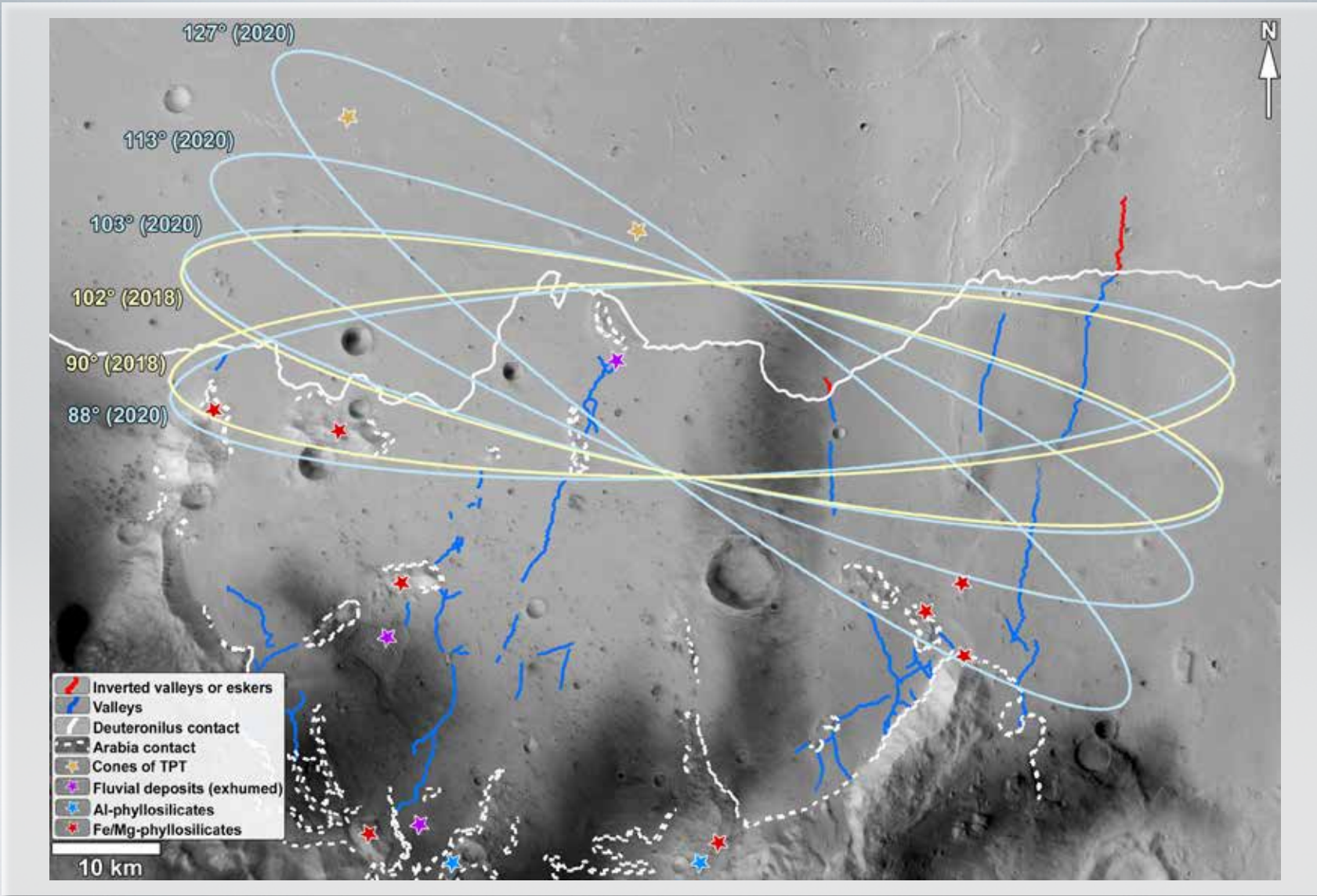
Landing Ellipse Properties



Site's Geological Context

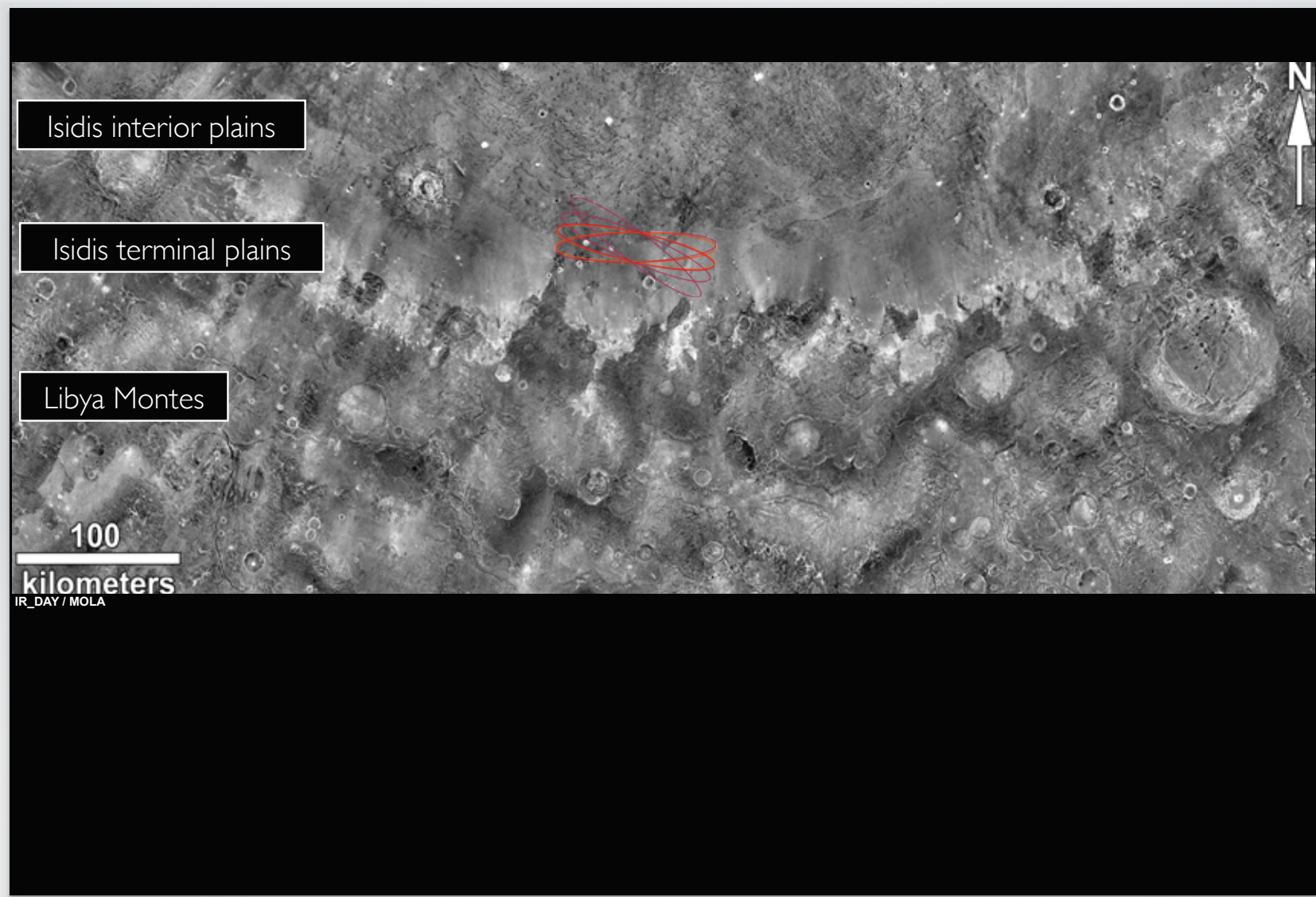


Scientific targets



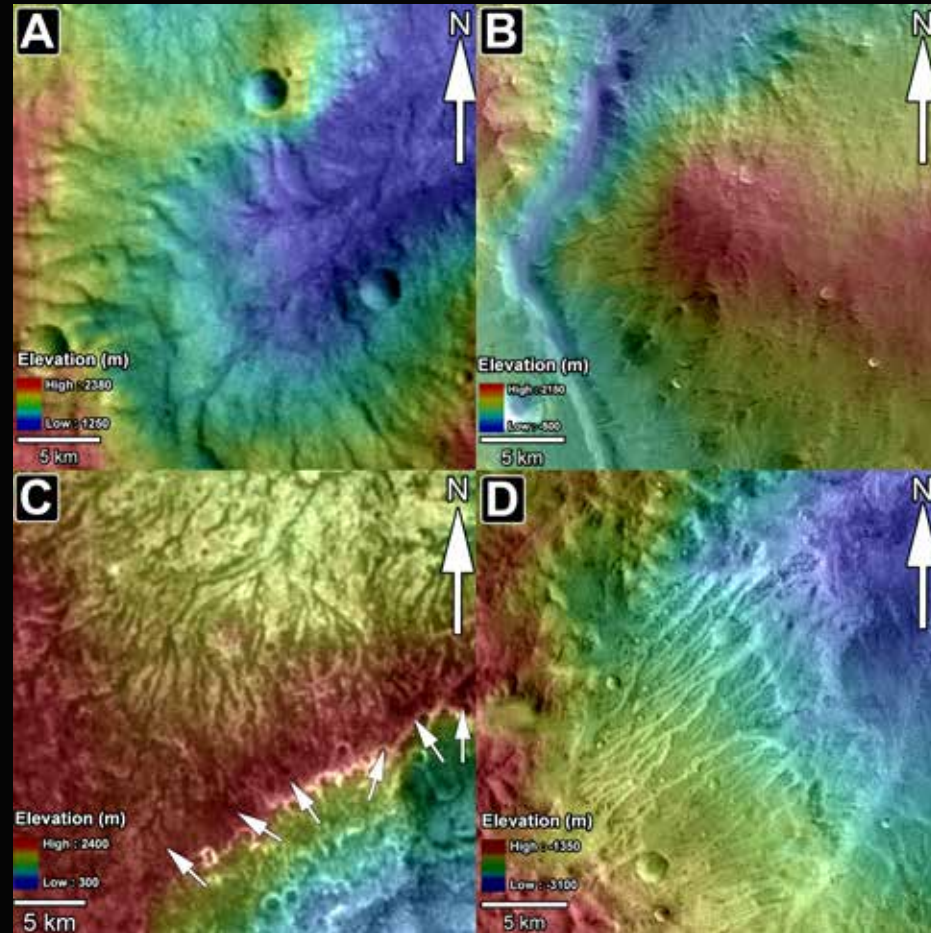
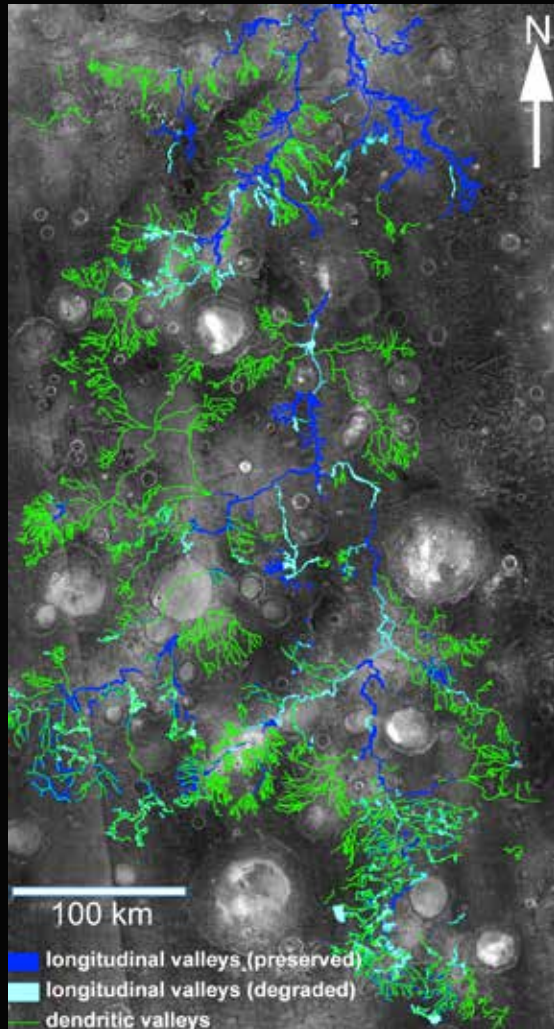
Site's Geological Context

E X O M A R S



Site's Geological Context

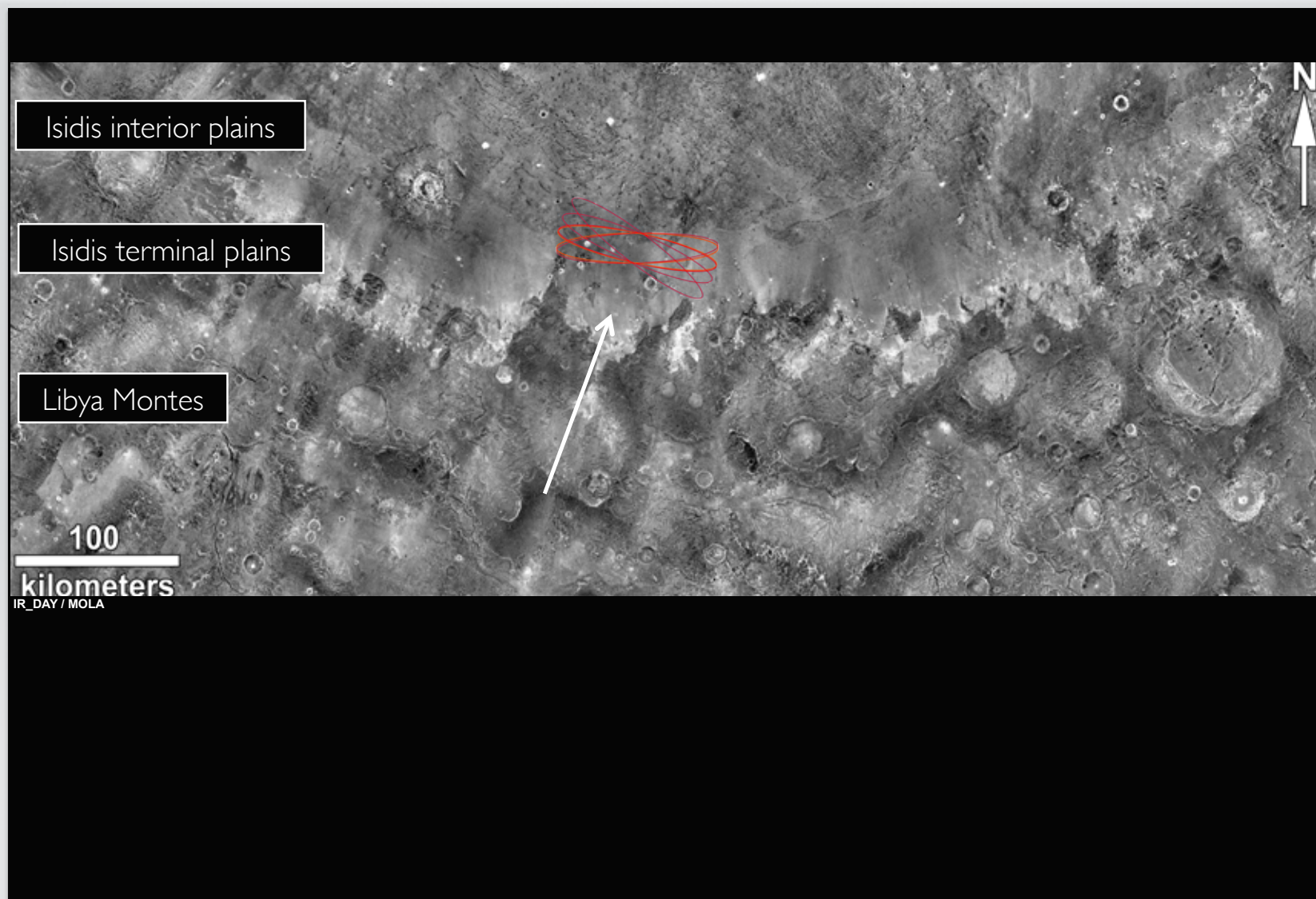
Regional Context – Libya Montes



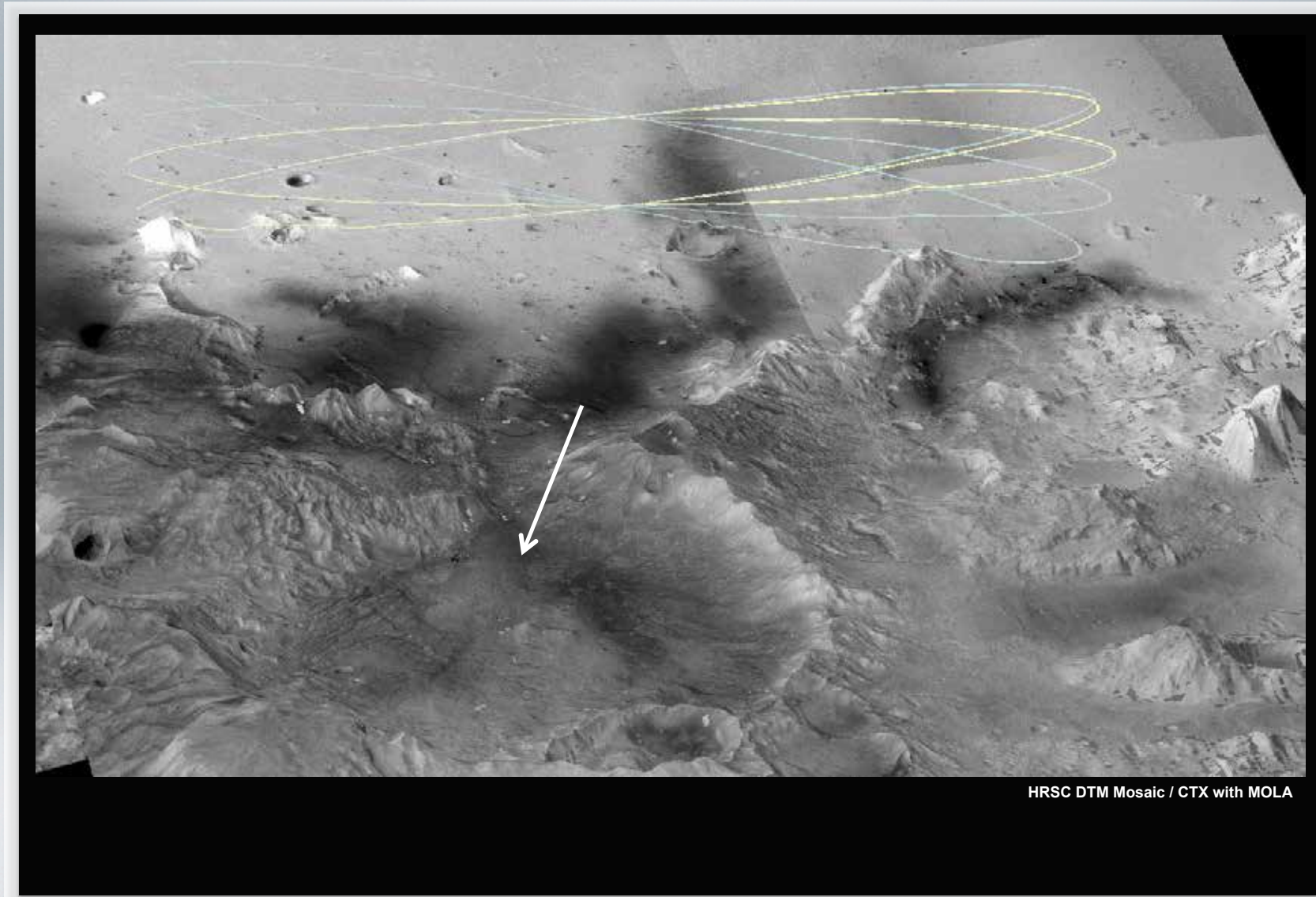
MOLA elevation; HRSC / THEMIS Night IR background, Erkeling et al. (2010)

Site's Geological Context

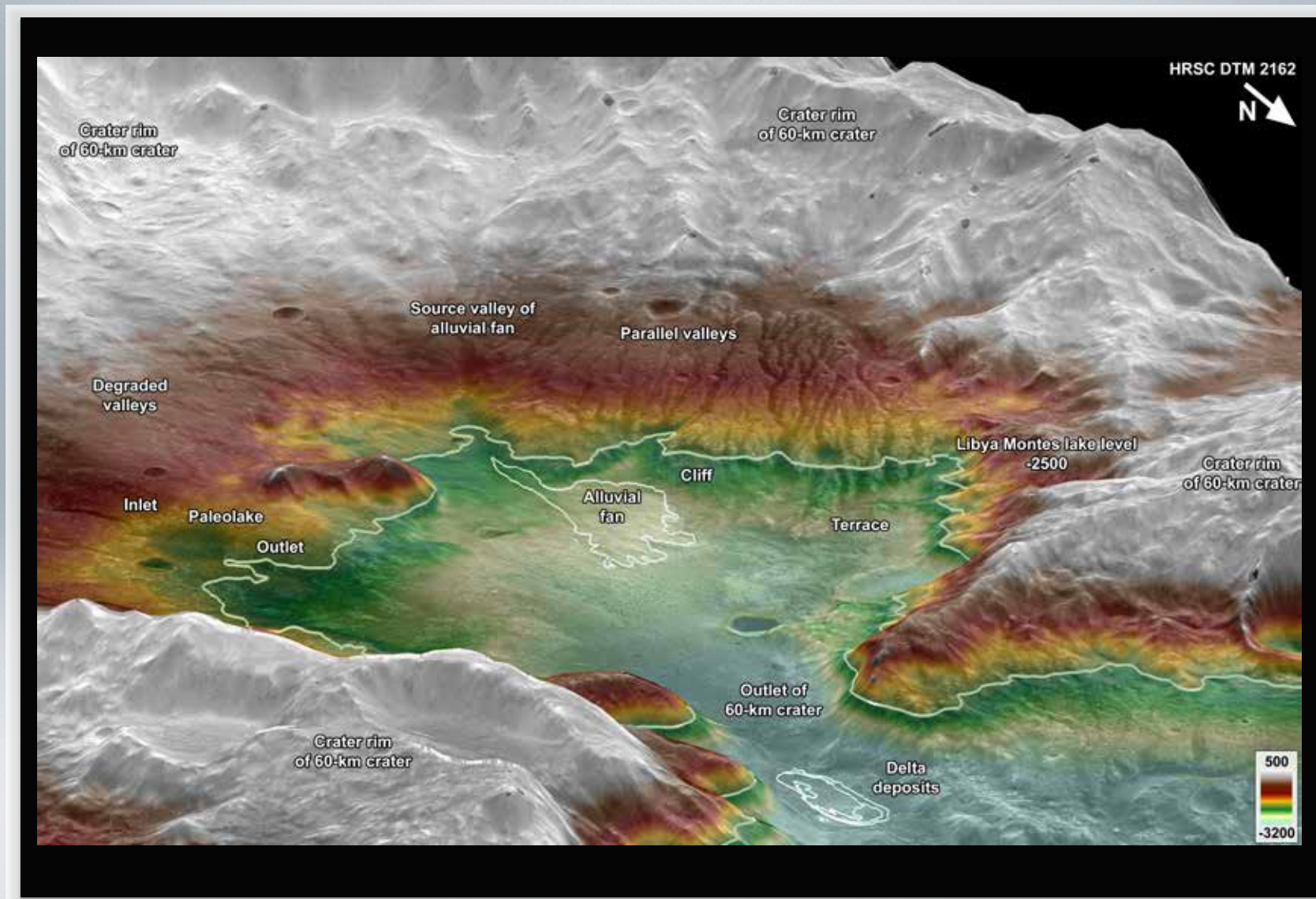
E X O M A R S



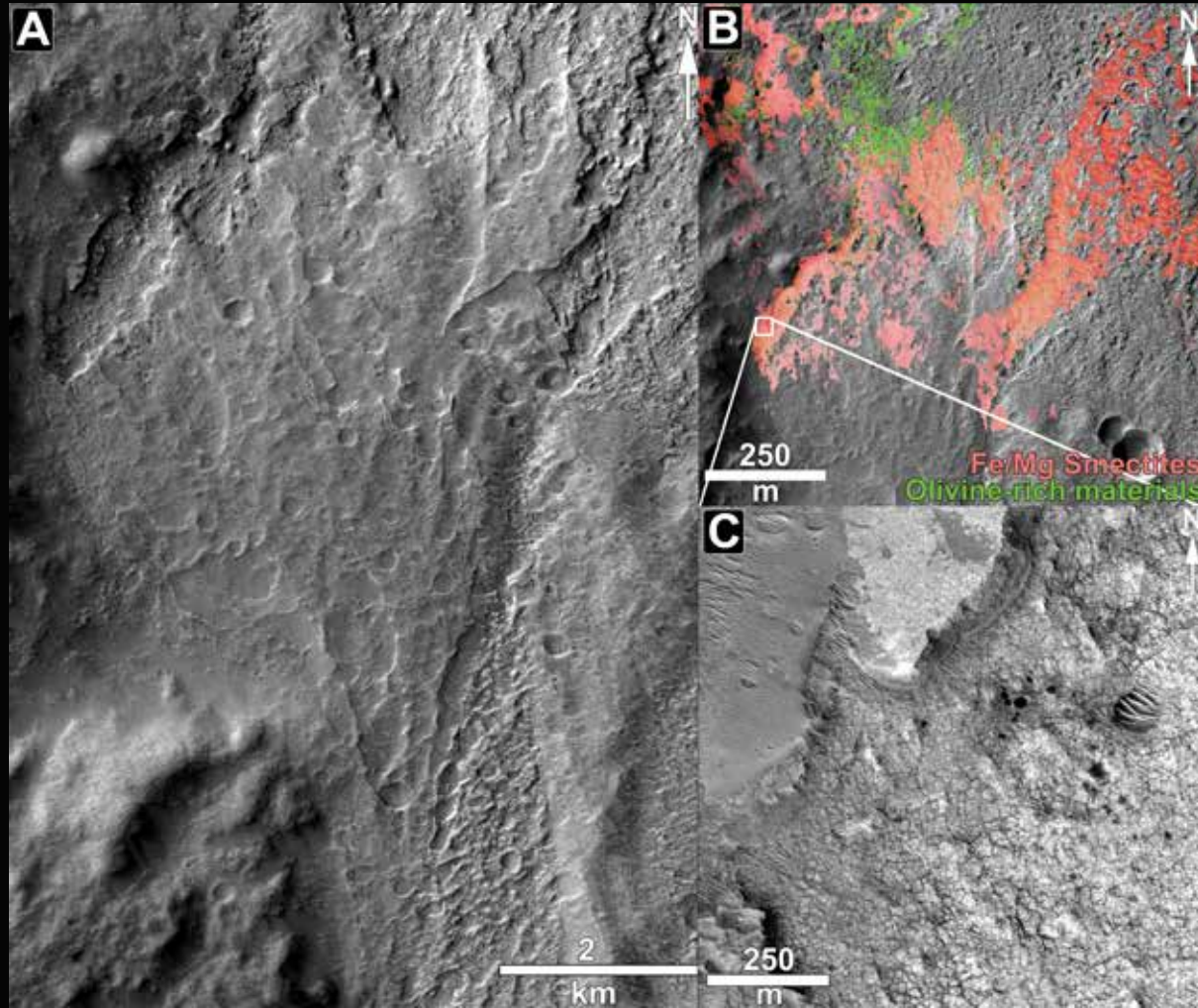
Site's Geological Context



Site's Geological Context

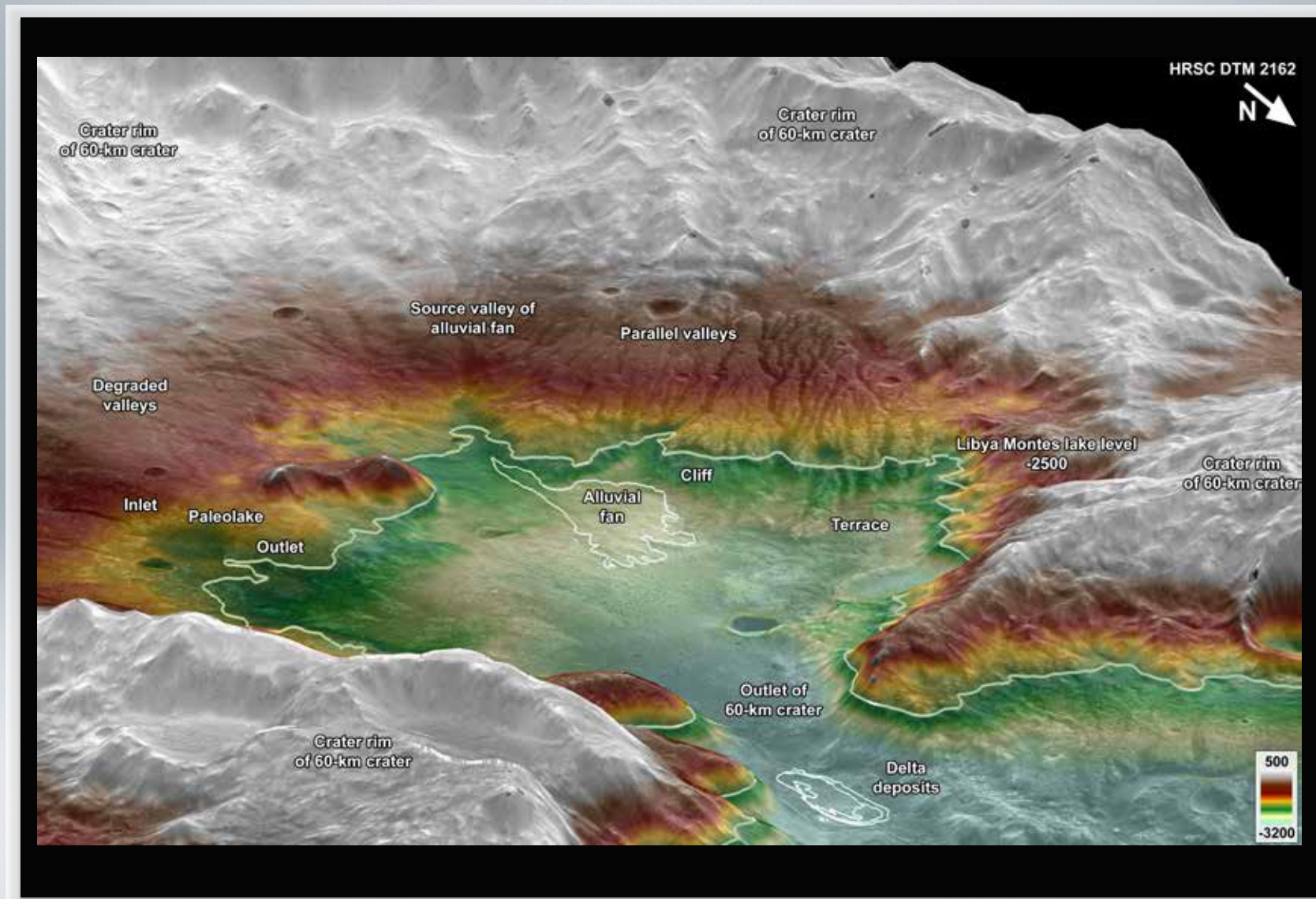


Regional Context – Libya Montes

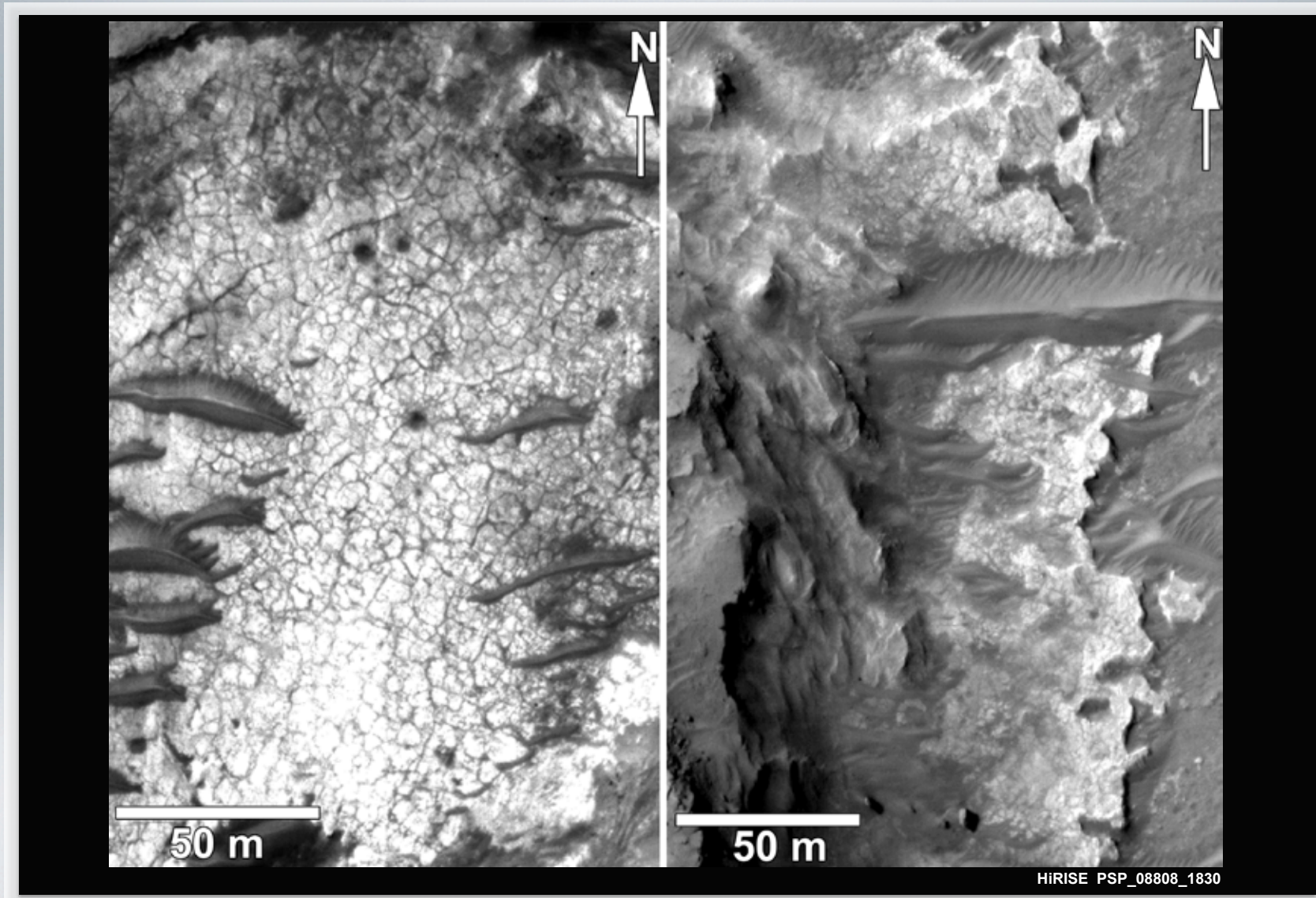


CTX / CRISM / HiRISE; Erkeling et al. (2013)

Site's Geological Context

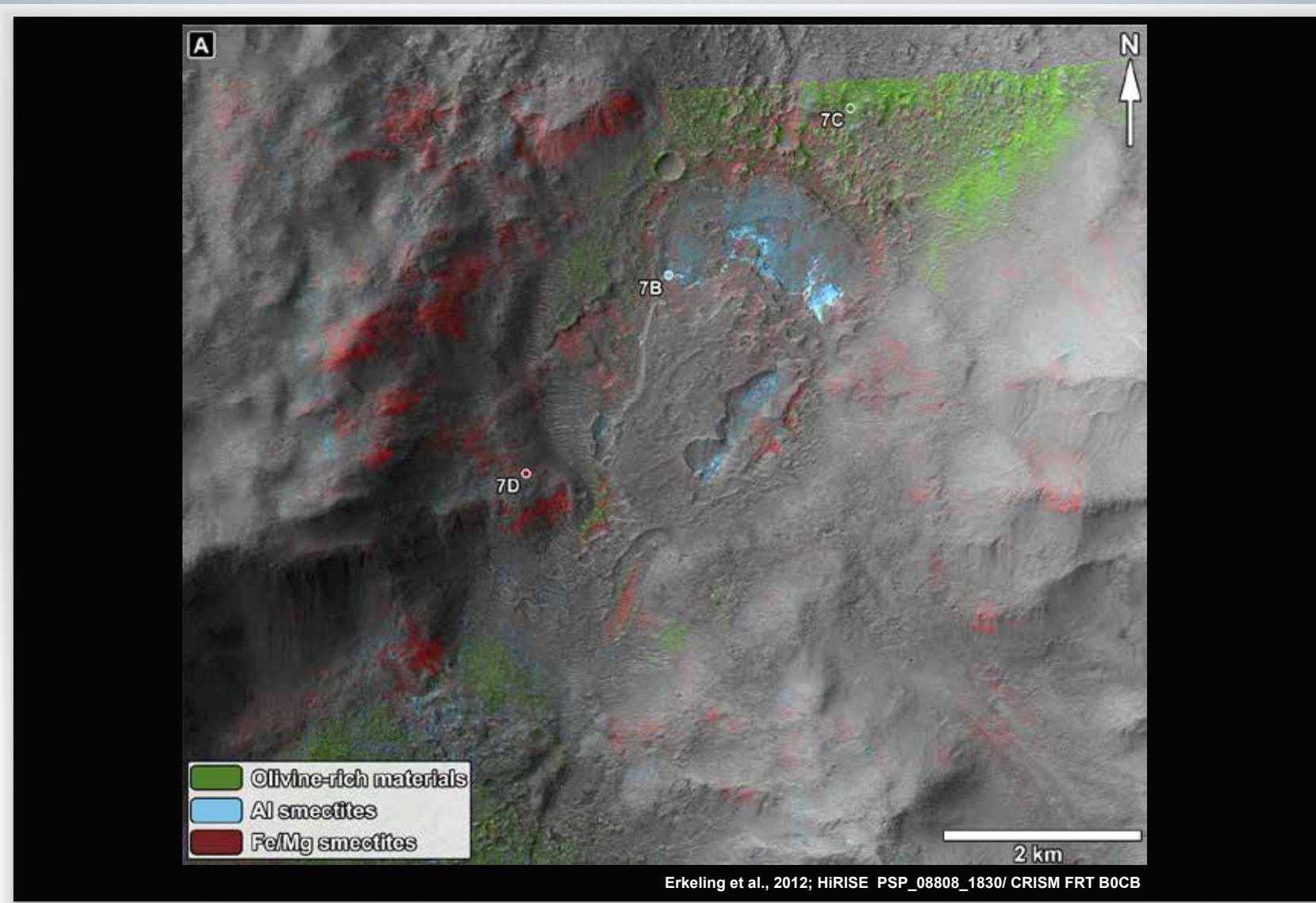


Site's Geological Context

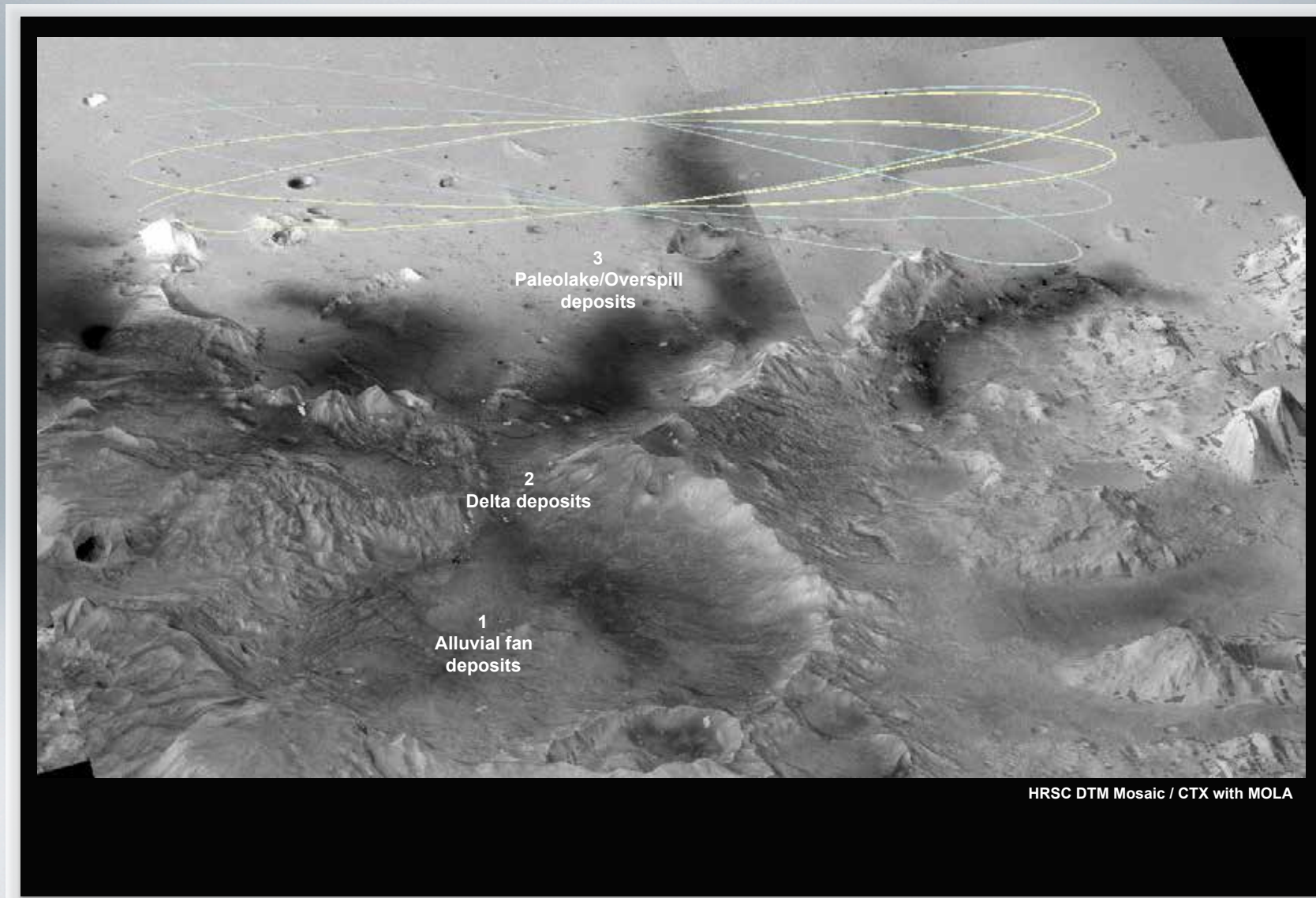


Site's Geological Context

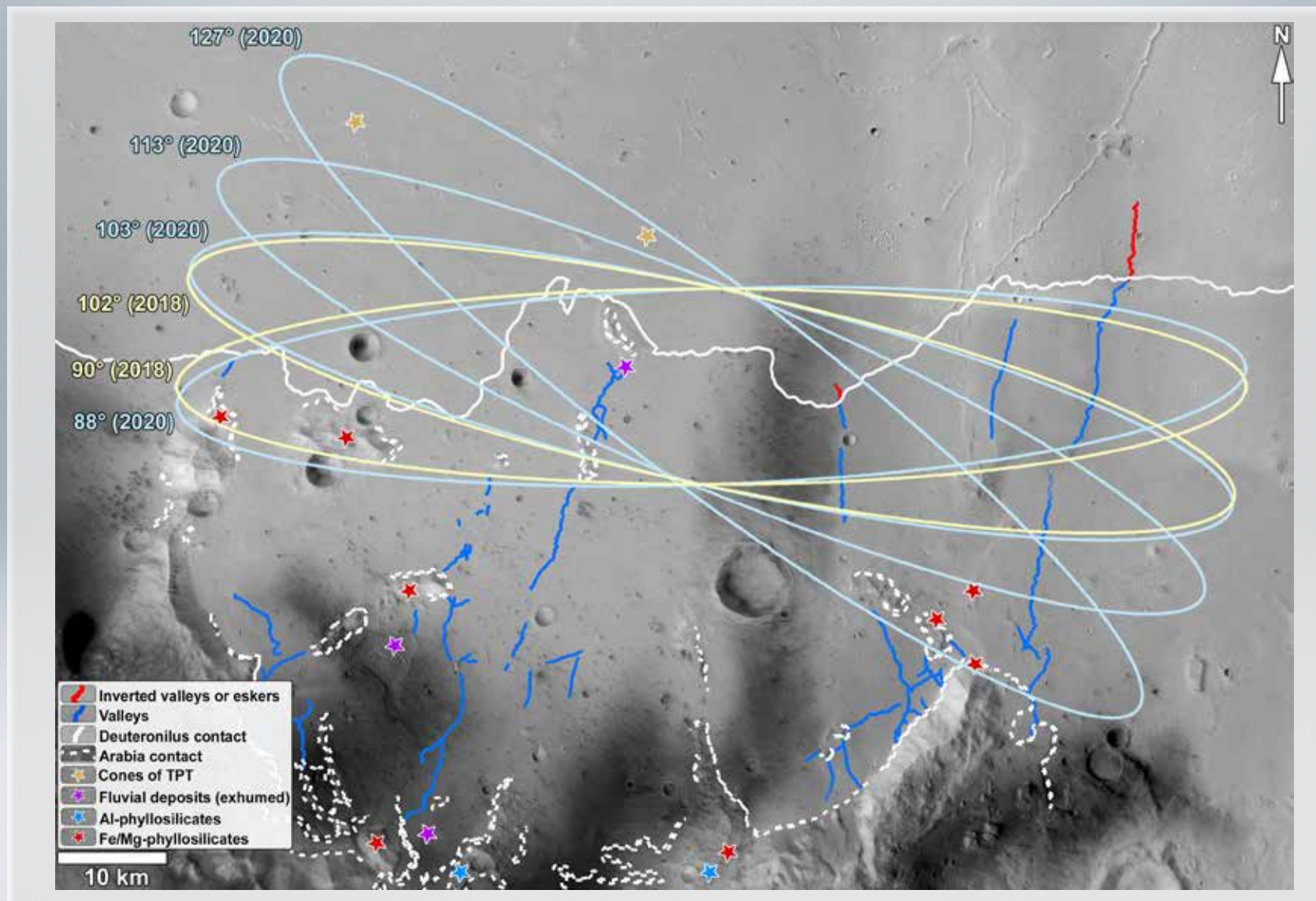
E X O M A R S



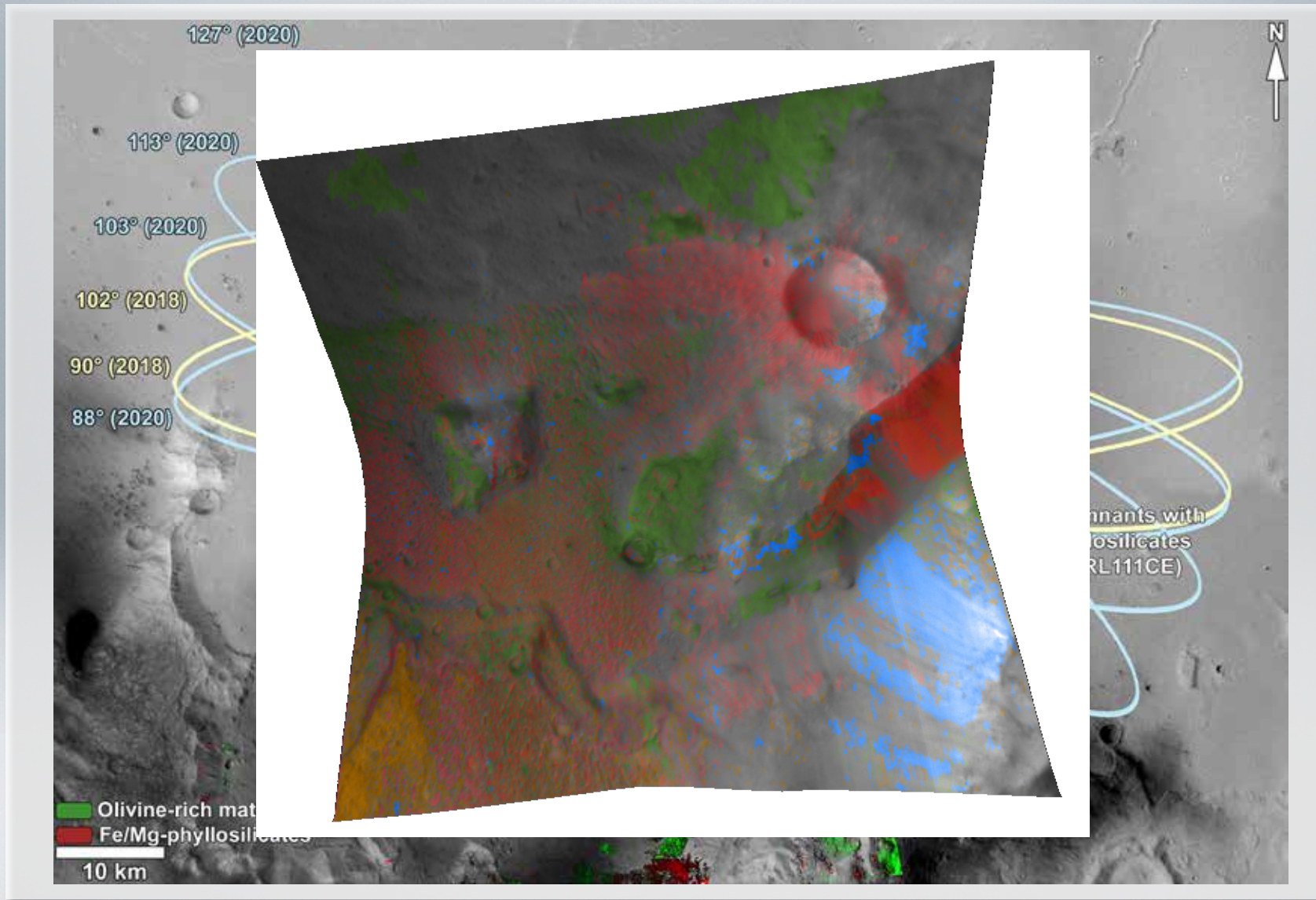
Site's Geological Context



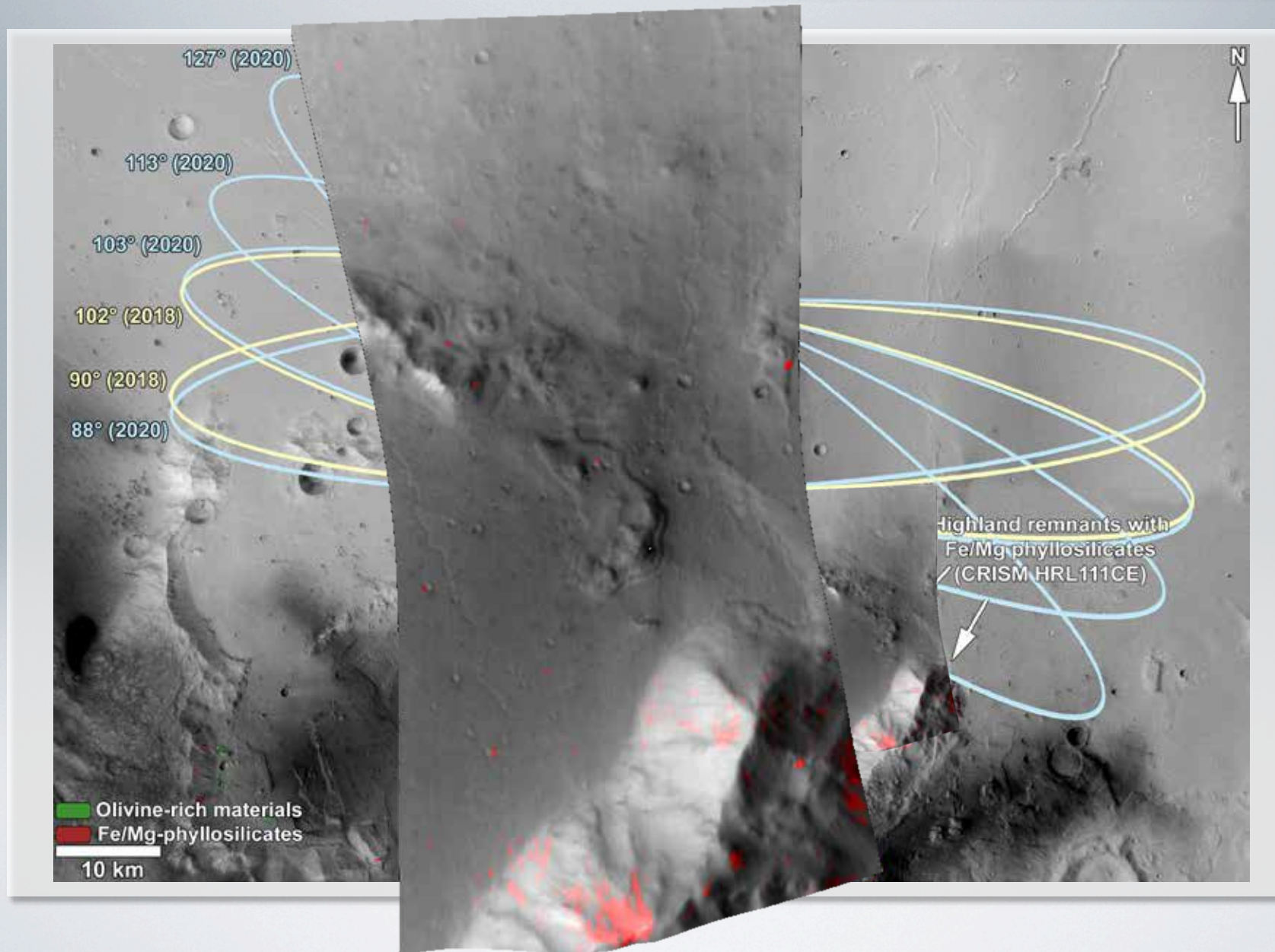
Scientific targets - clays



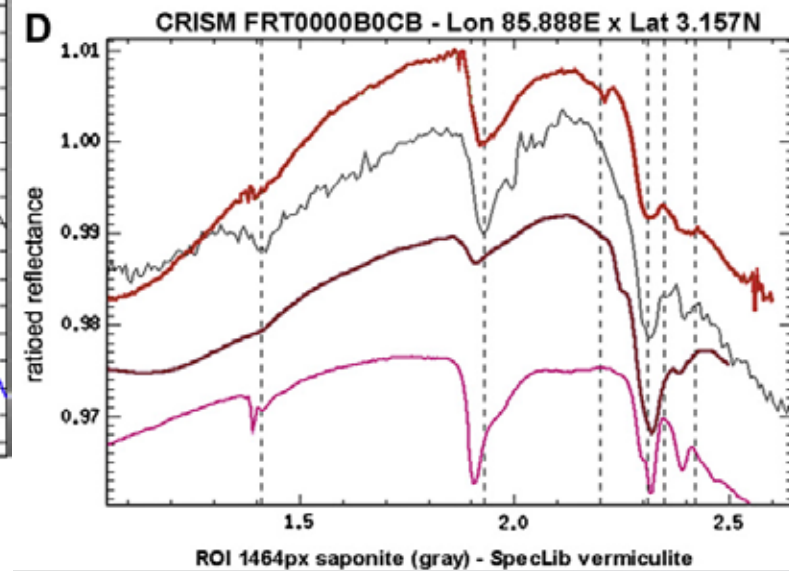
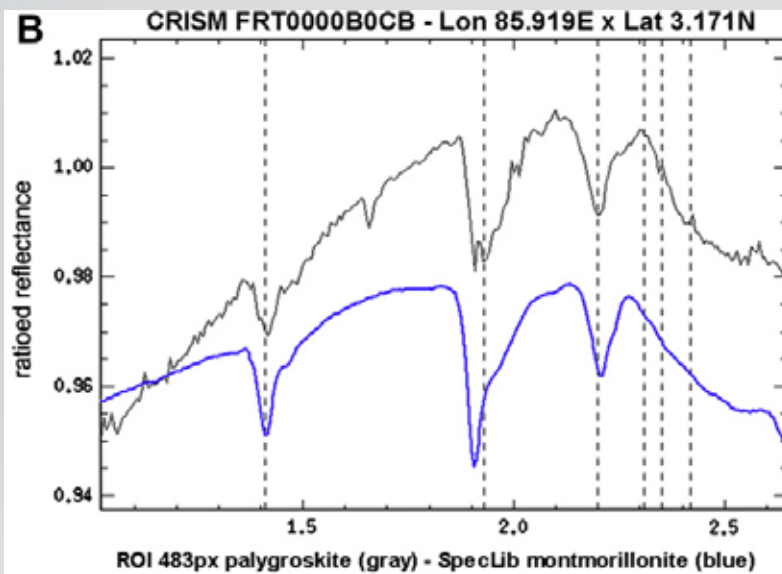
Mineralogical Description



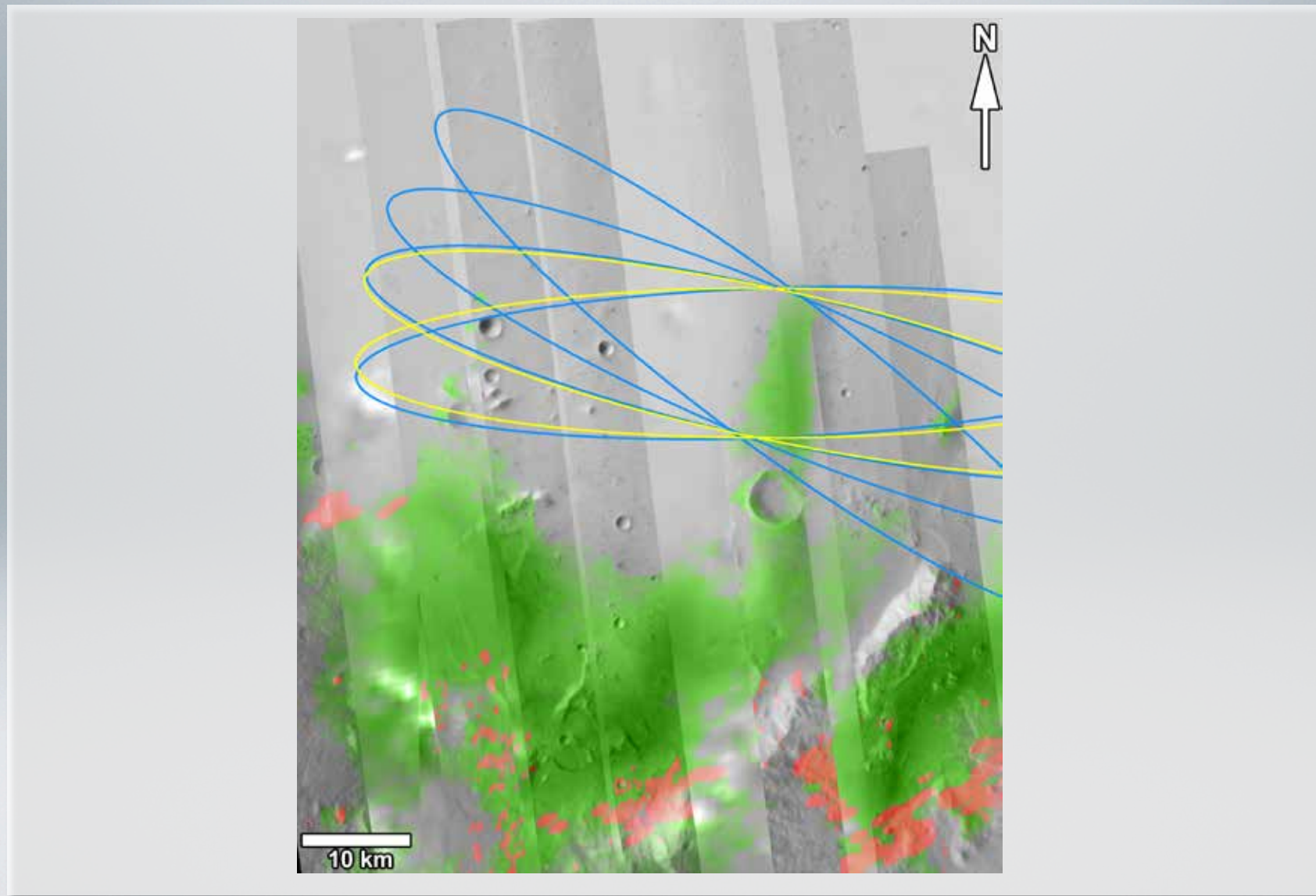
Mineralogical Description



Mineralogical Description

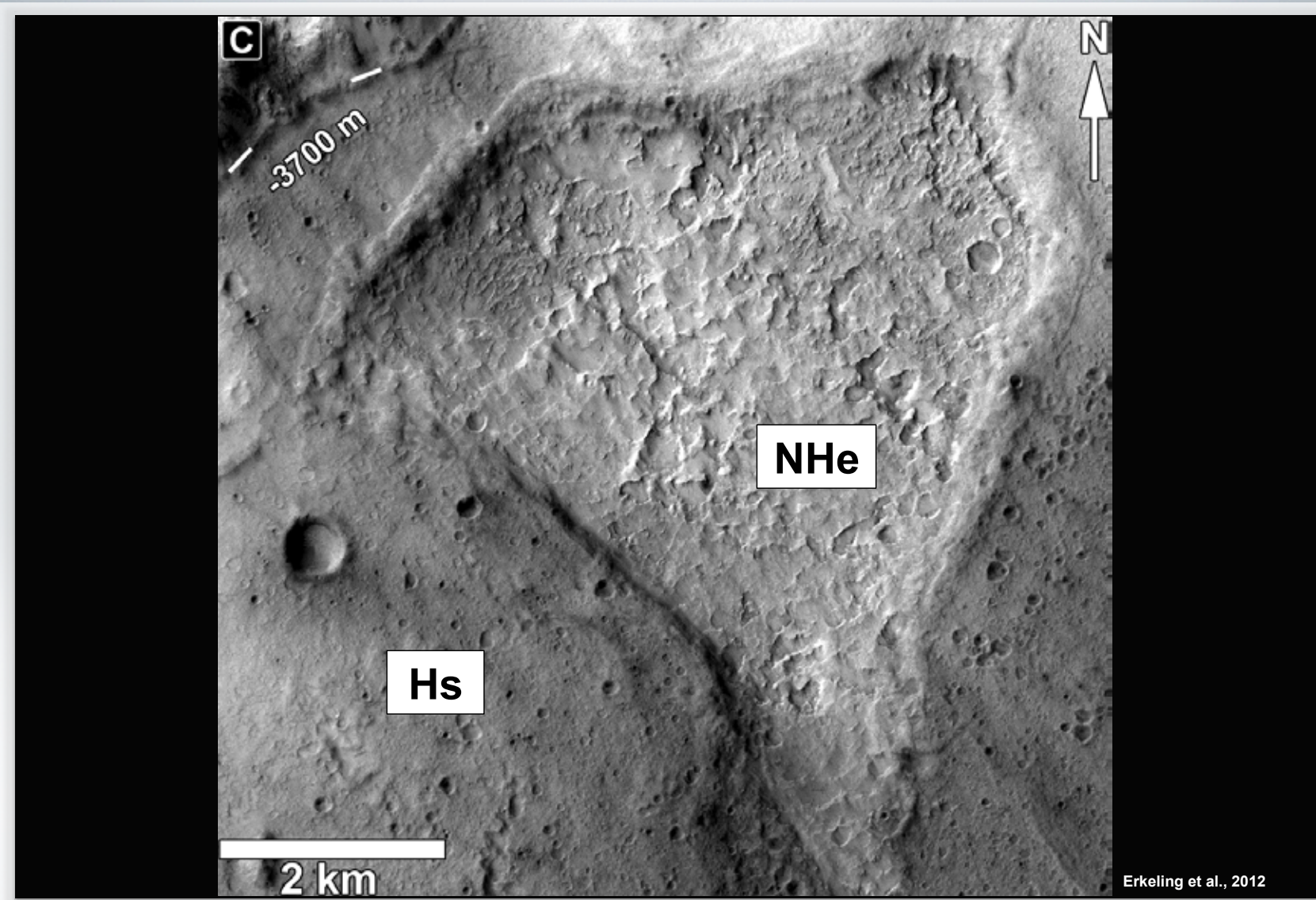


Mineralogical Description

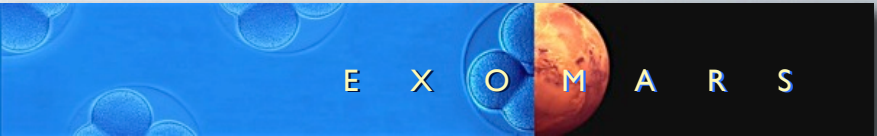


Geomorphologic description

E X O M A R S

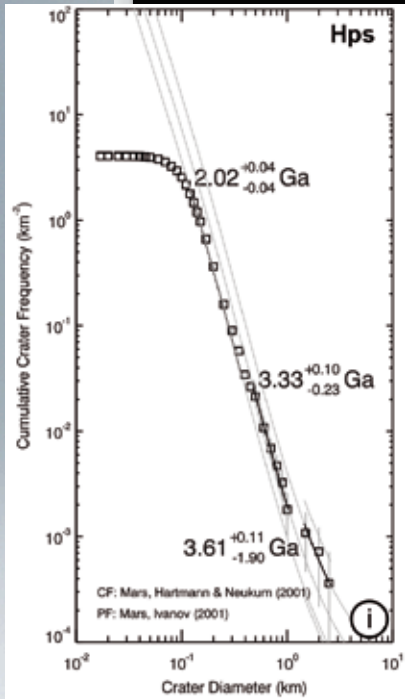


Site's Geological Context

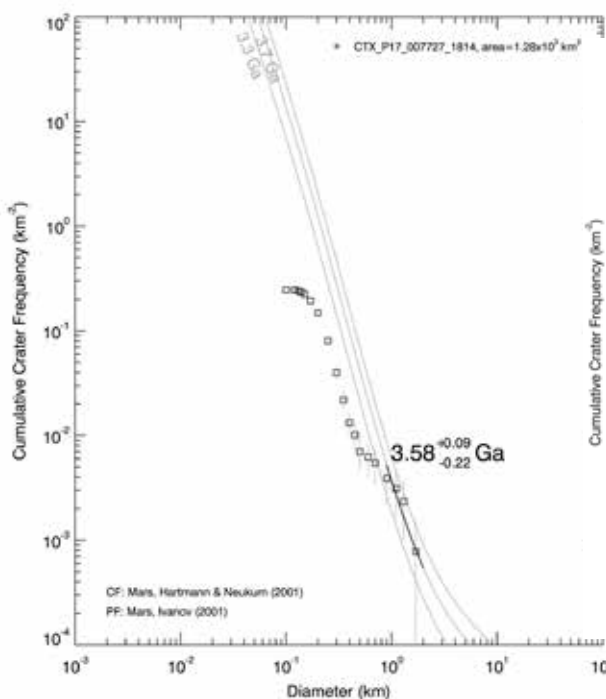


CSFD

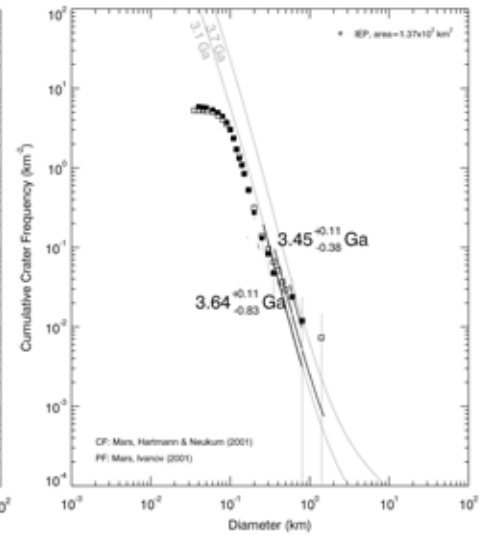
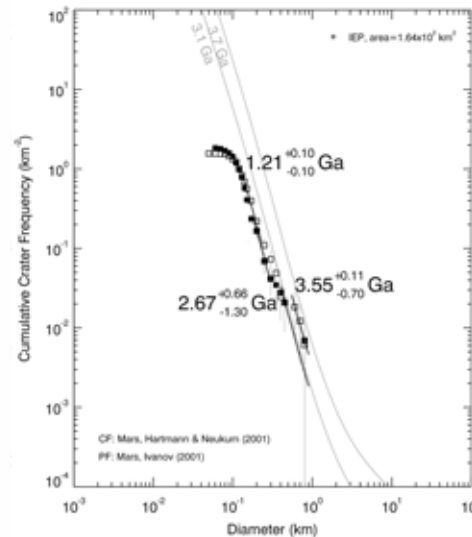
Ivanov et al., 2012



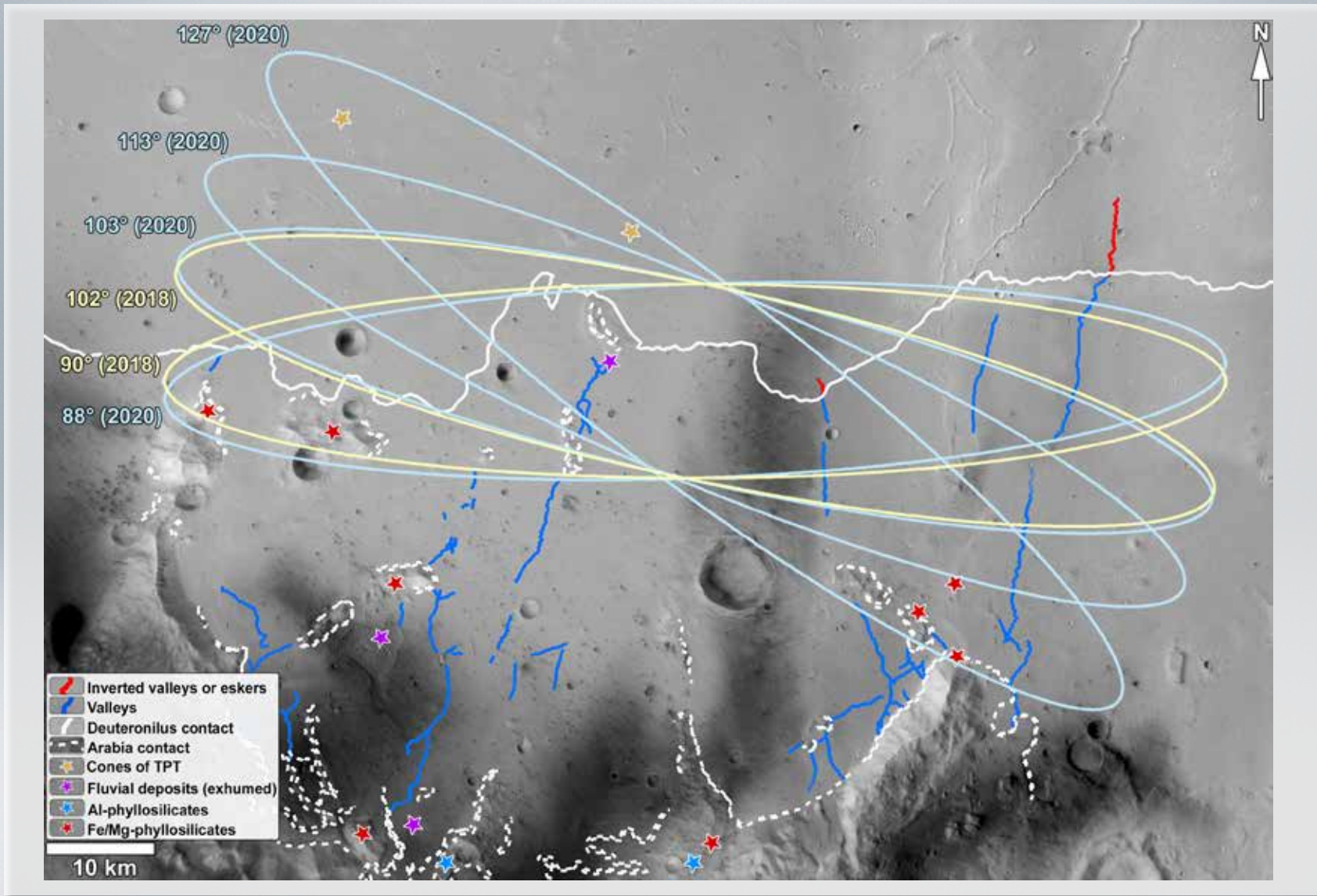
Erkeling et al., 2012



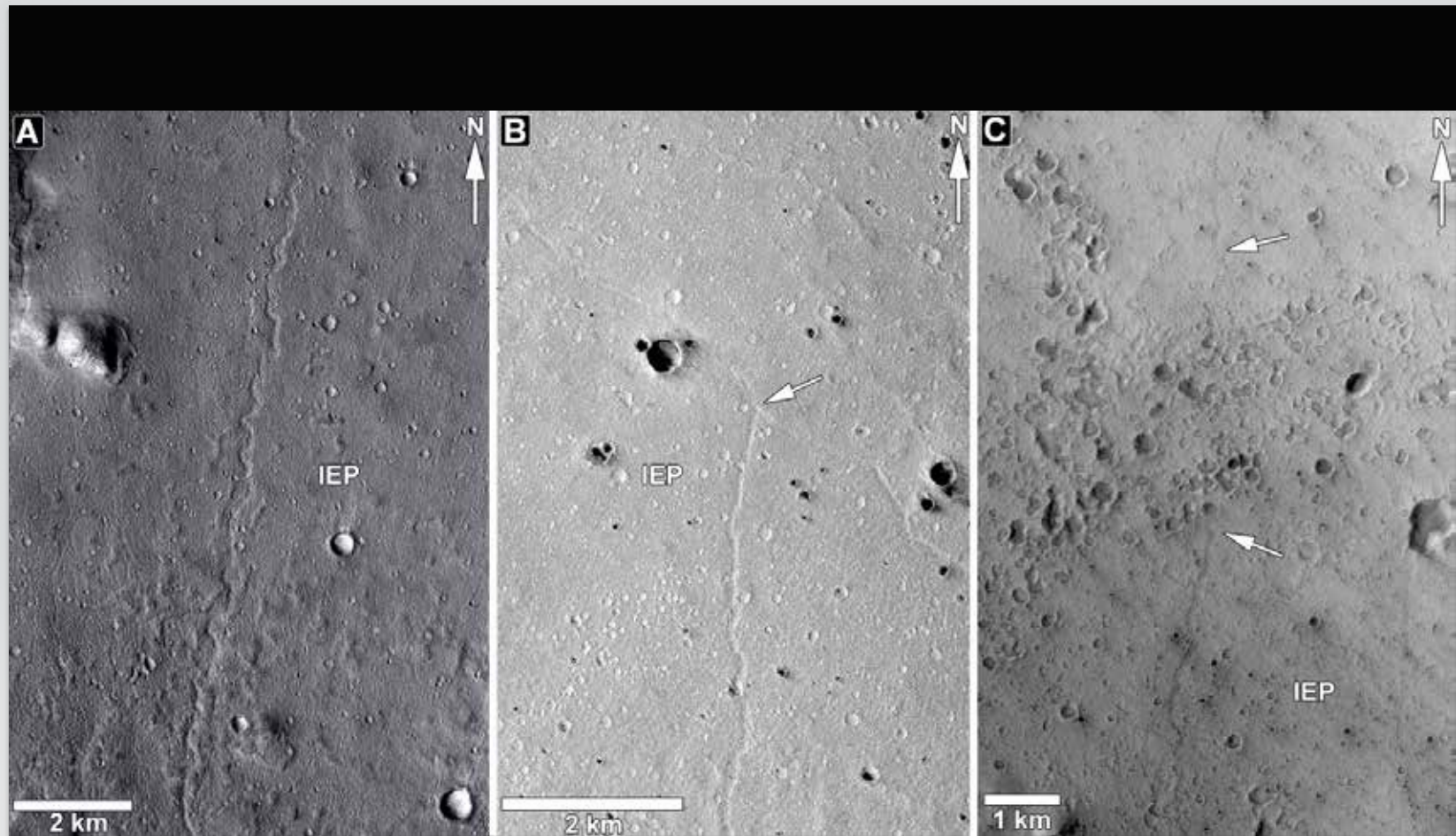
Erkeling et al., 2014



Scientific targets – valleys/ridges

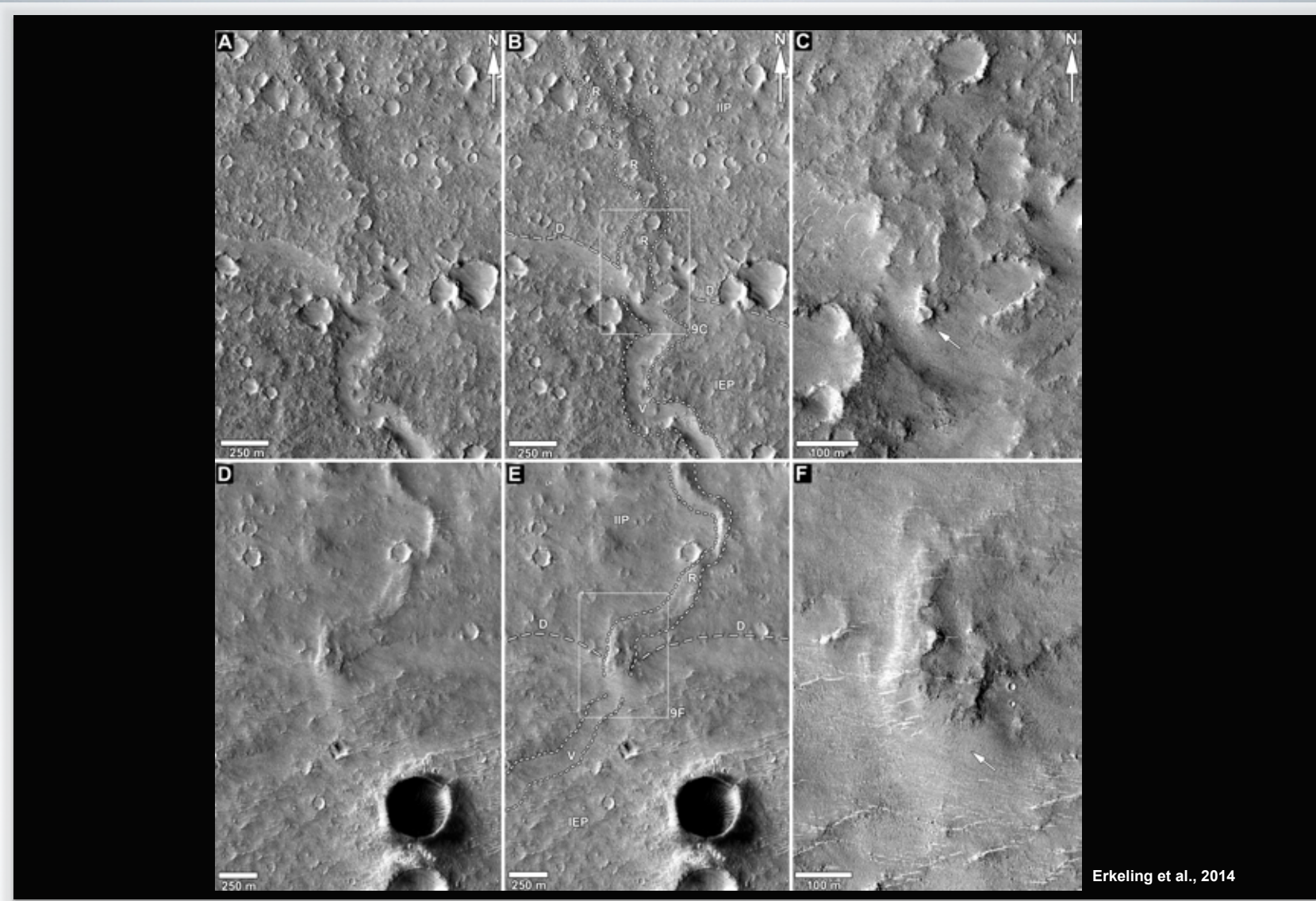


Geomorphologic description



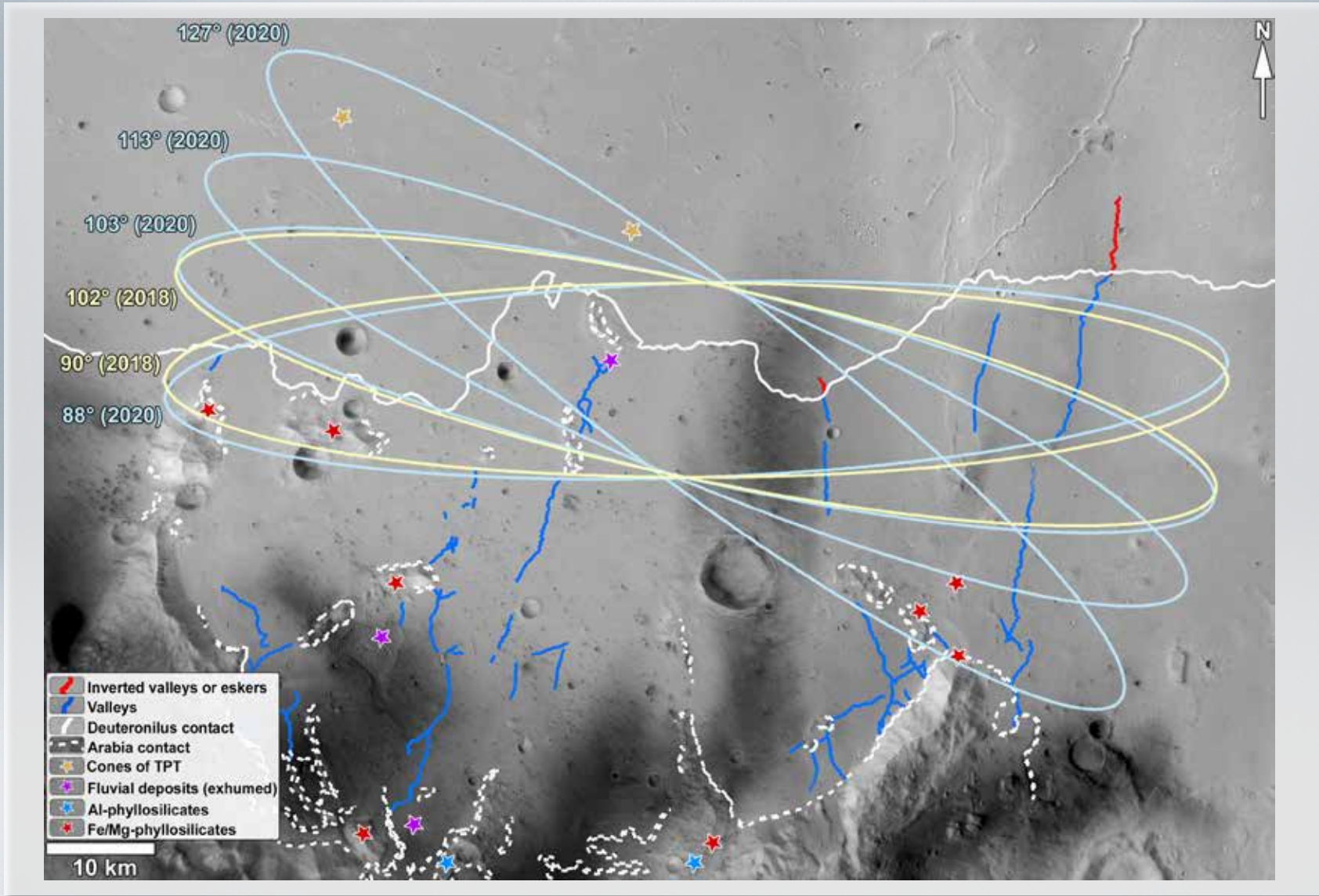
Erkeling et al., 2014

Geomorphologic description

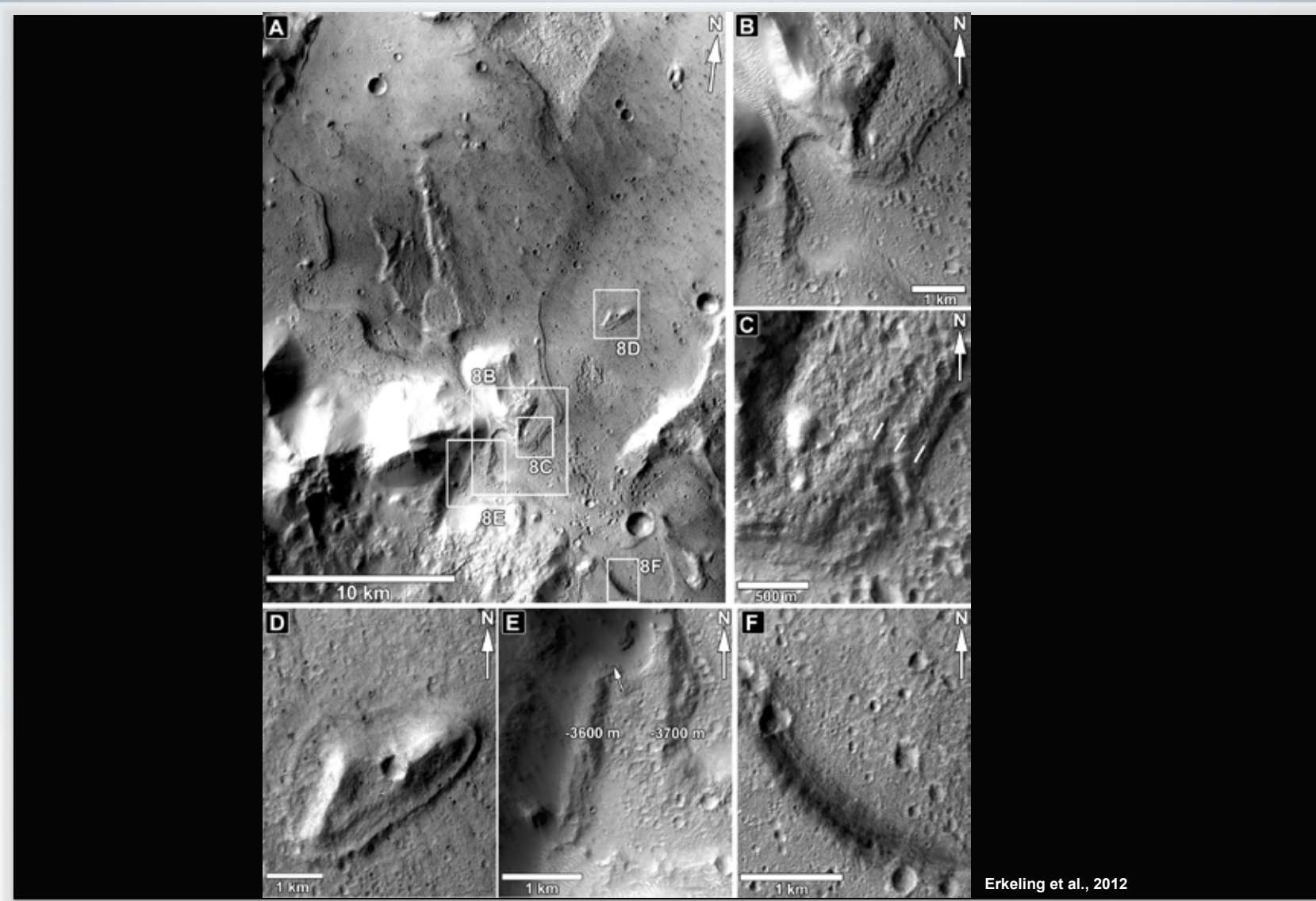


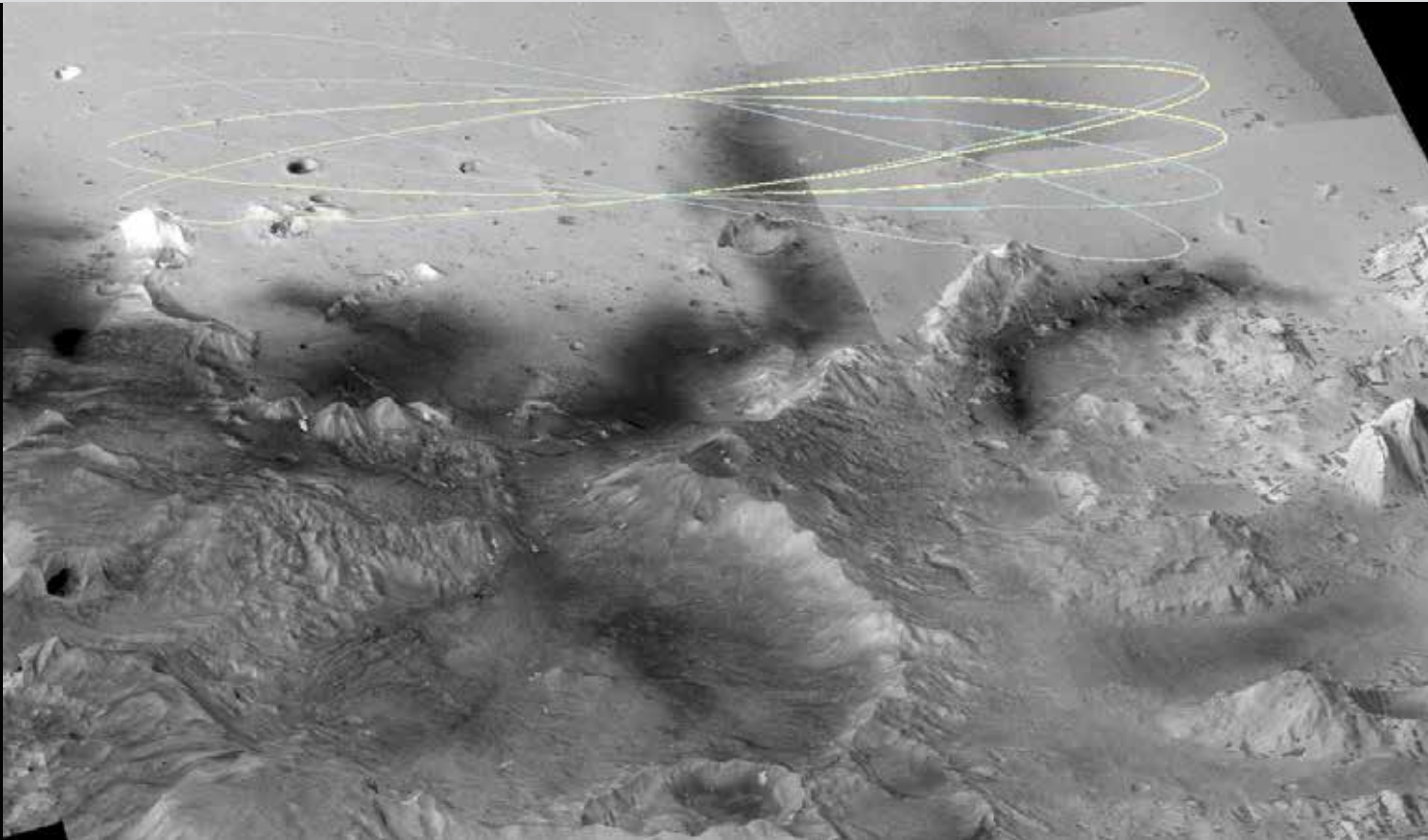
Erkeling et al., 2014

Scientific targets – coastal landforms



Geomorphologic description

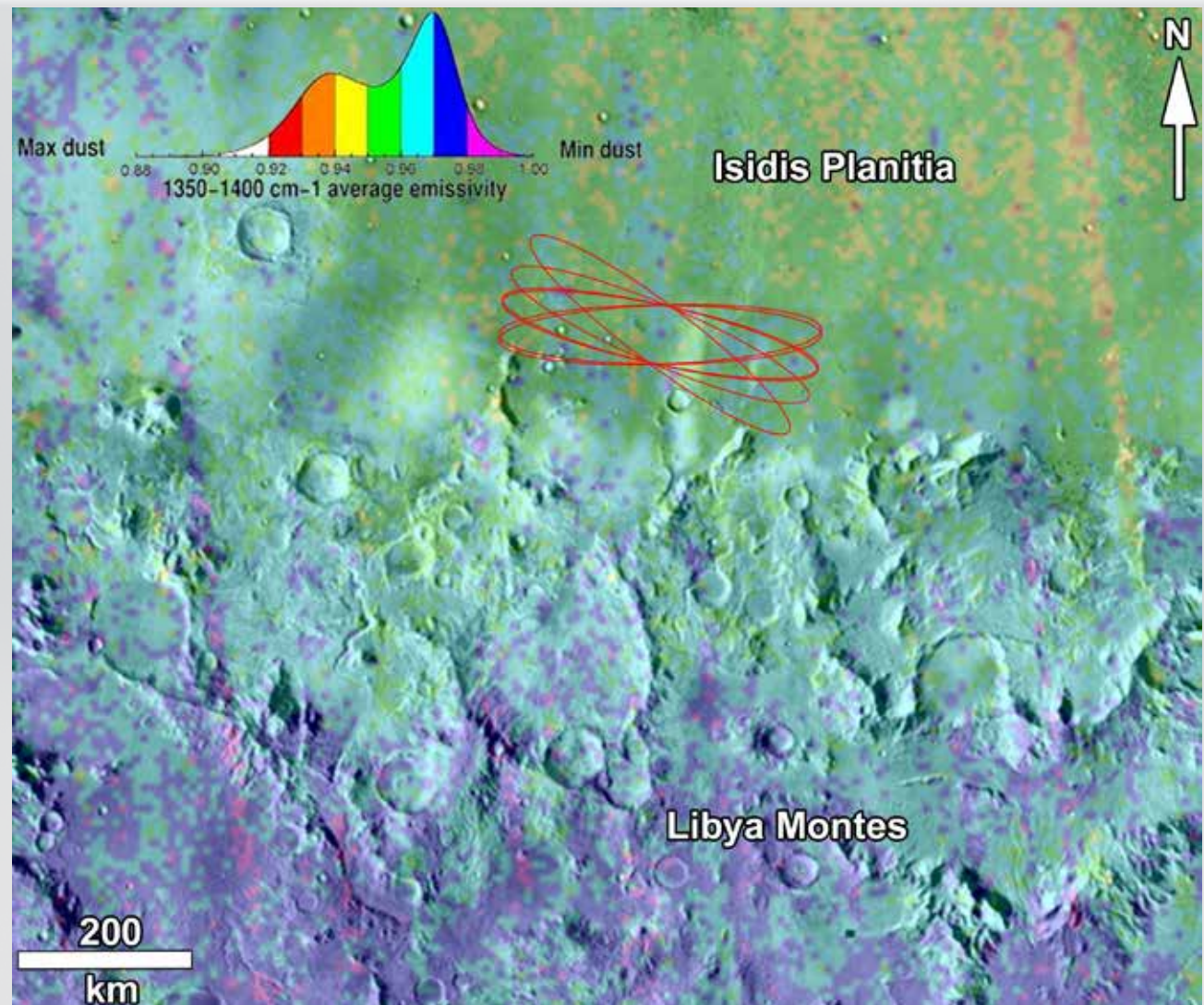




Candidate landing site located ...

- ... downstream of dense fluvial landforms that terminate in deposits rich in hydrated materials**
- ... near two putative paleoshorelines**
- ... on flat terminal plains incised by numerous valleys**

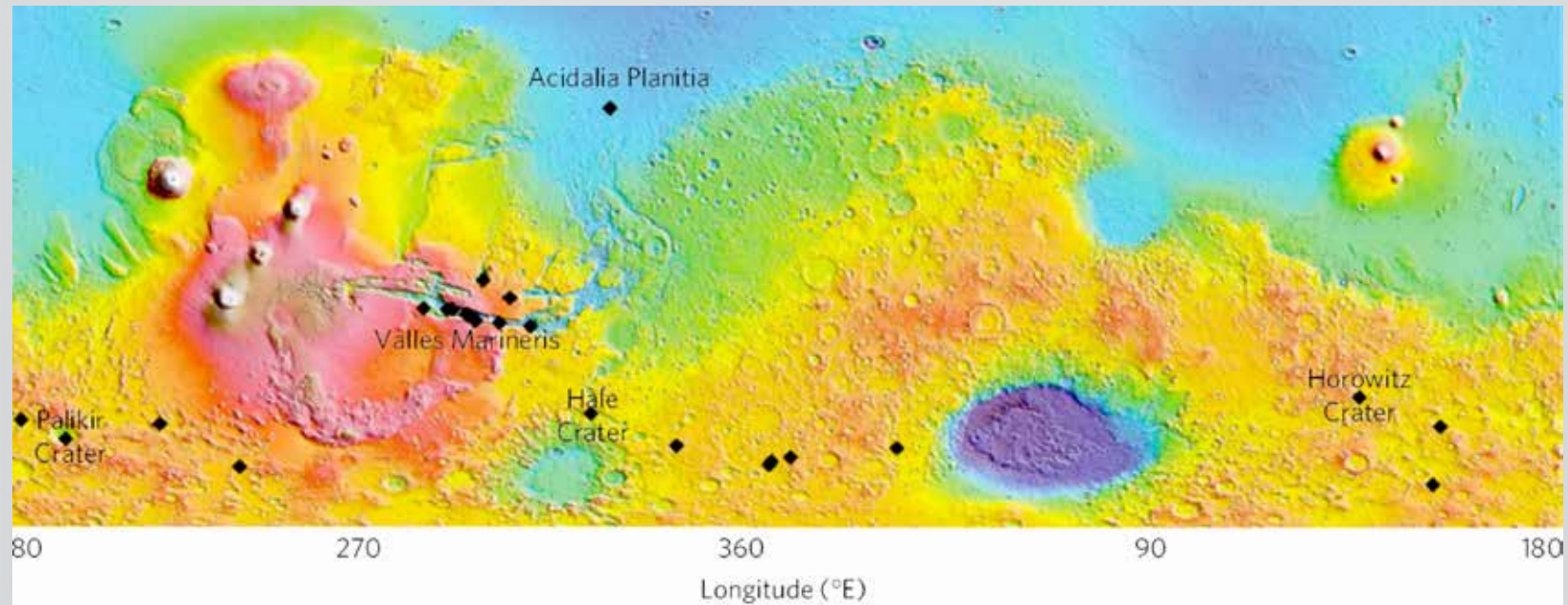
TES Dust cover



TEST Dust Cover Index, Ruff and Christensen, 2002

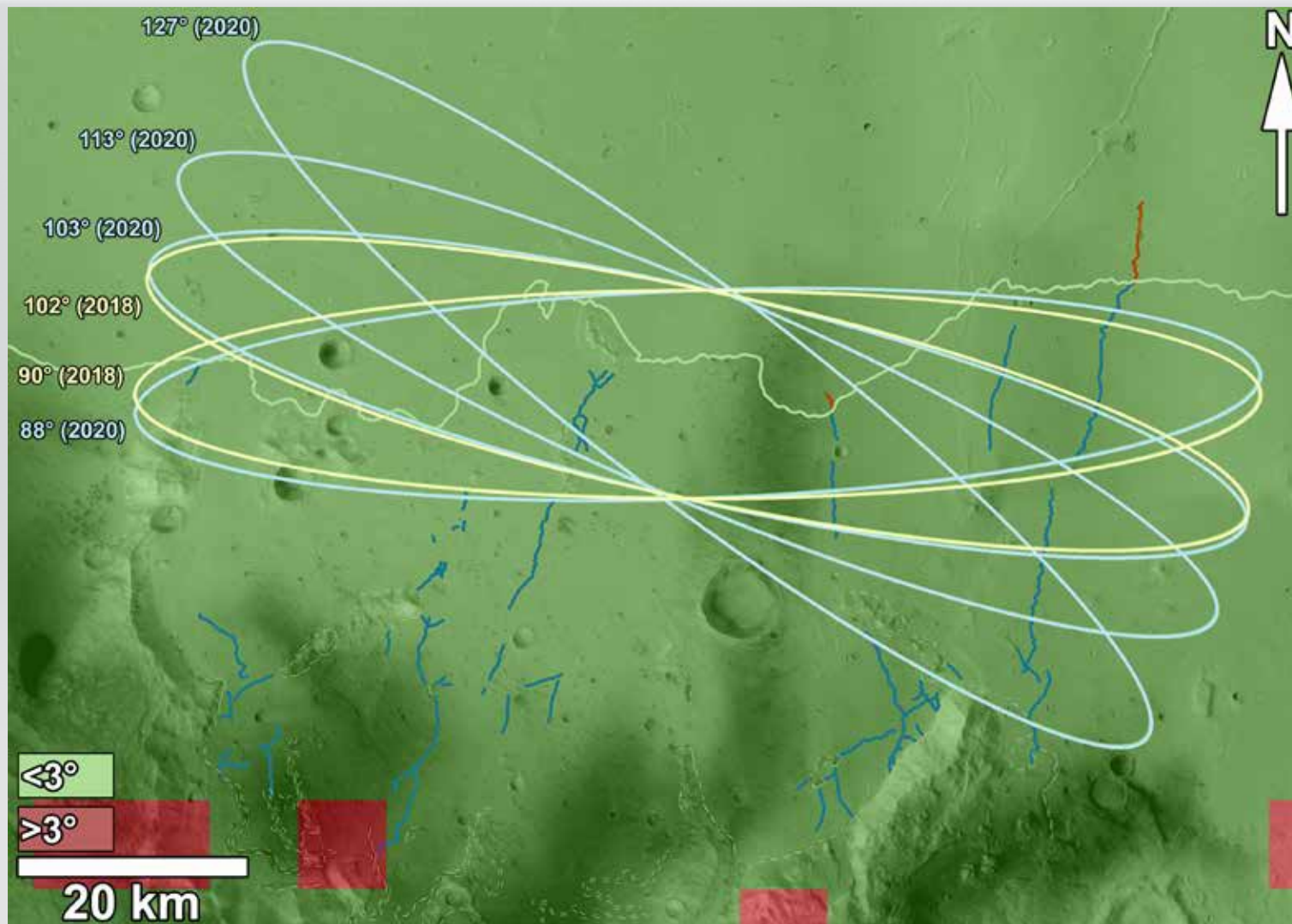
Planetary Protection

E X O M A R S



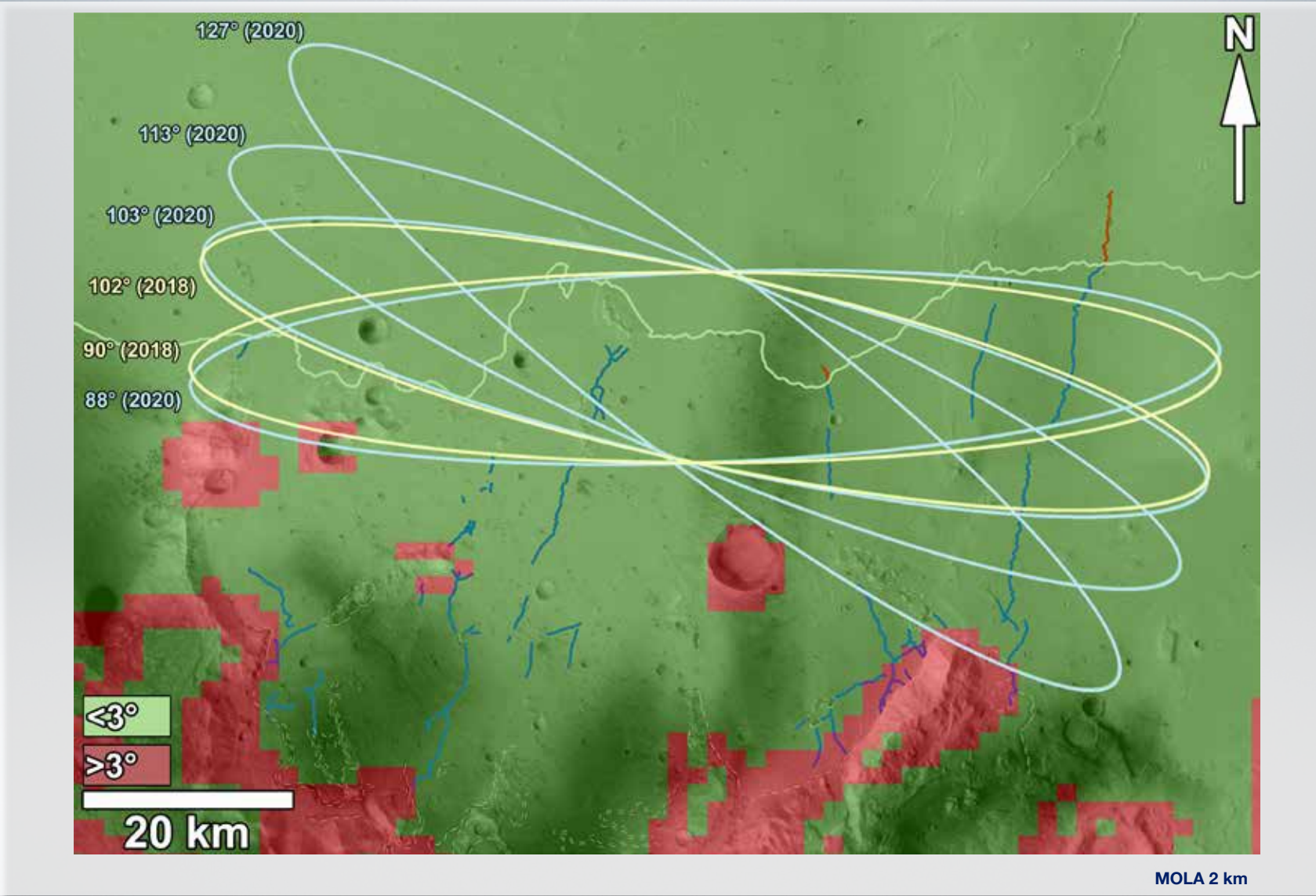
Equatorial RSL; McEwen et al., 2014

Landing Ellipse Slopes

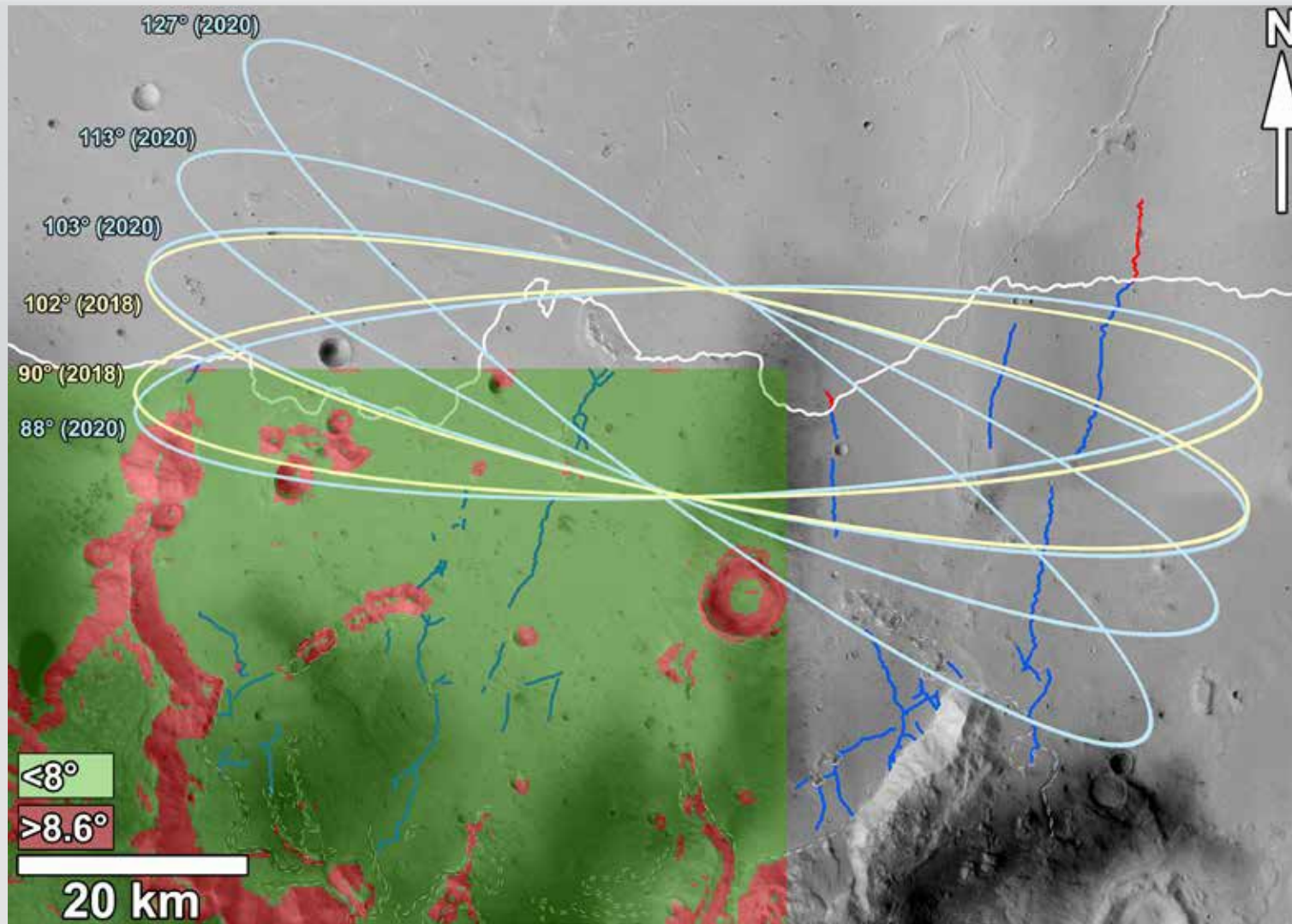


MOLA 10 km

Landing Ellipse Slopes

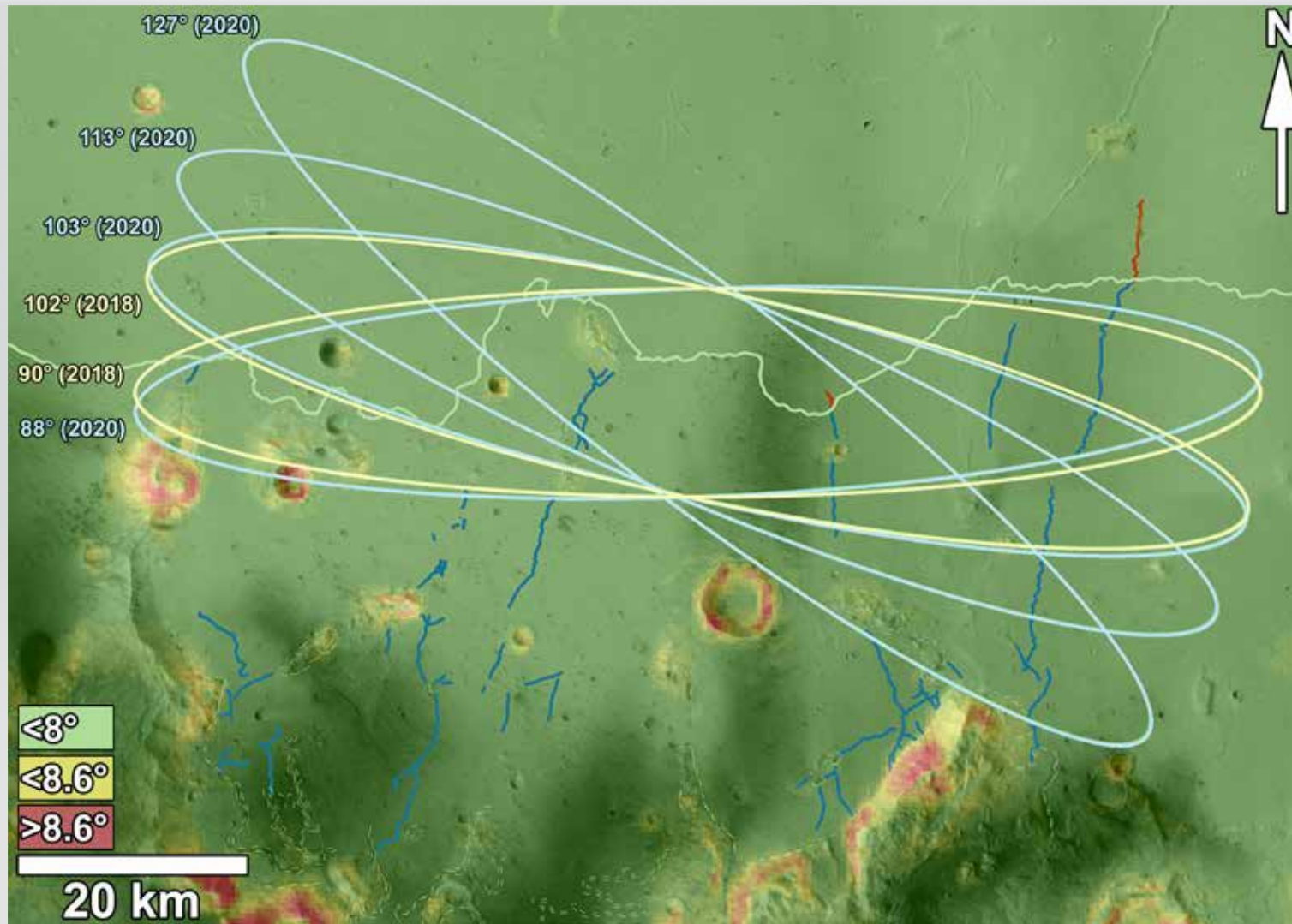


Landing Ellipse Slopes

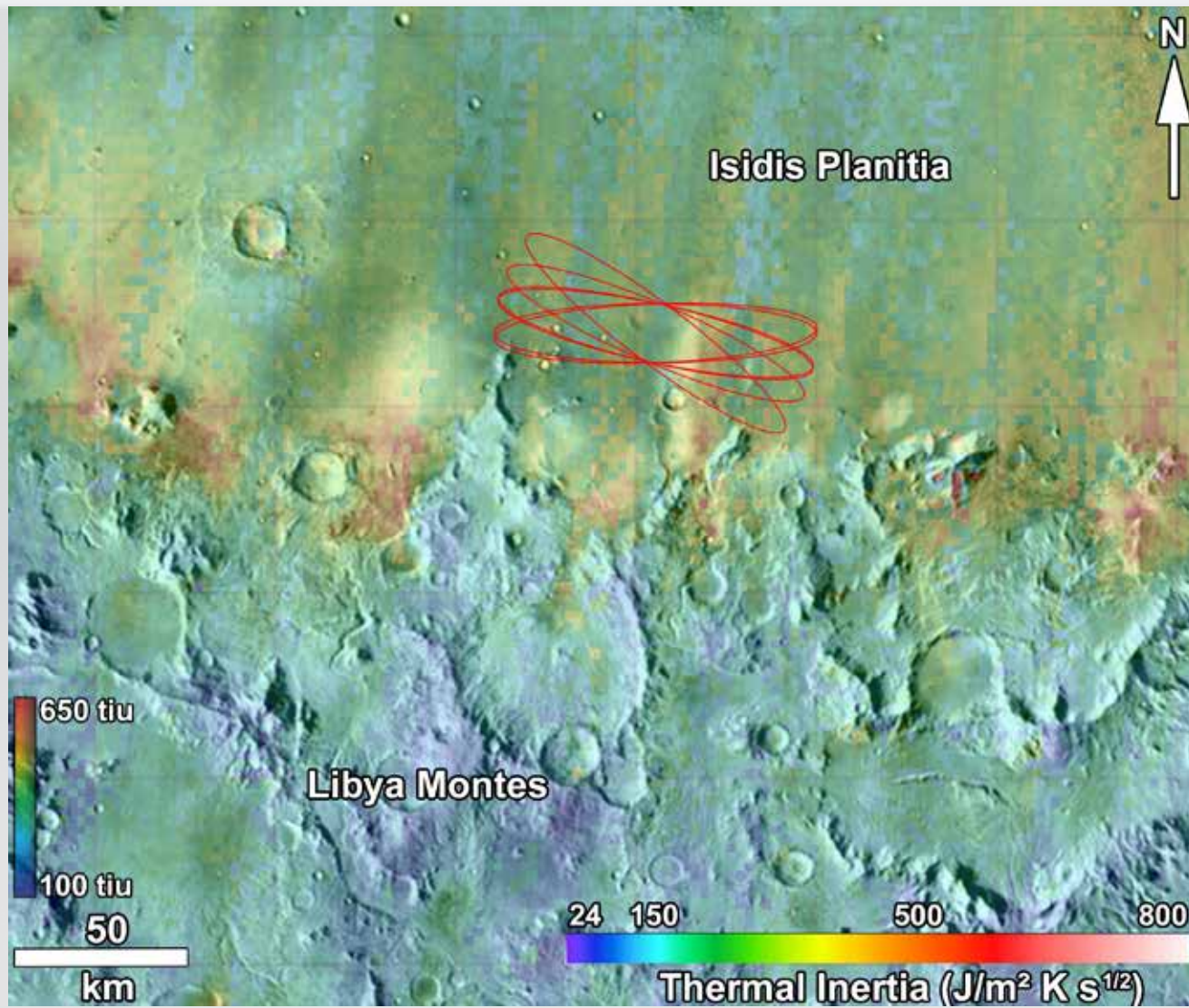


HRSC 330 m

Landing Ellipse Slopes

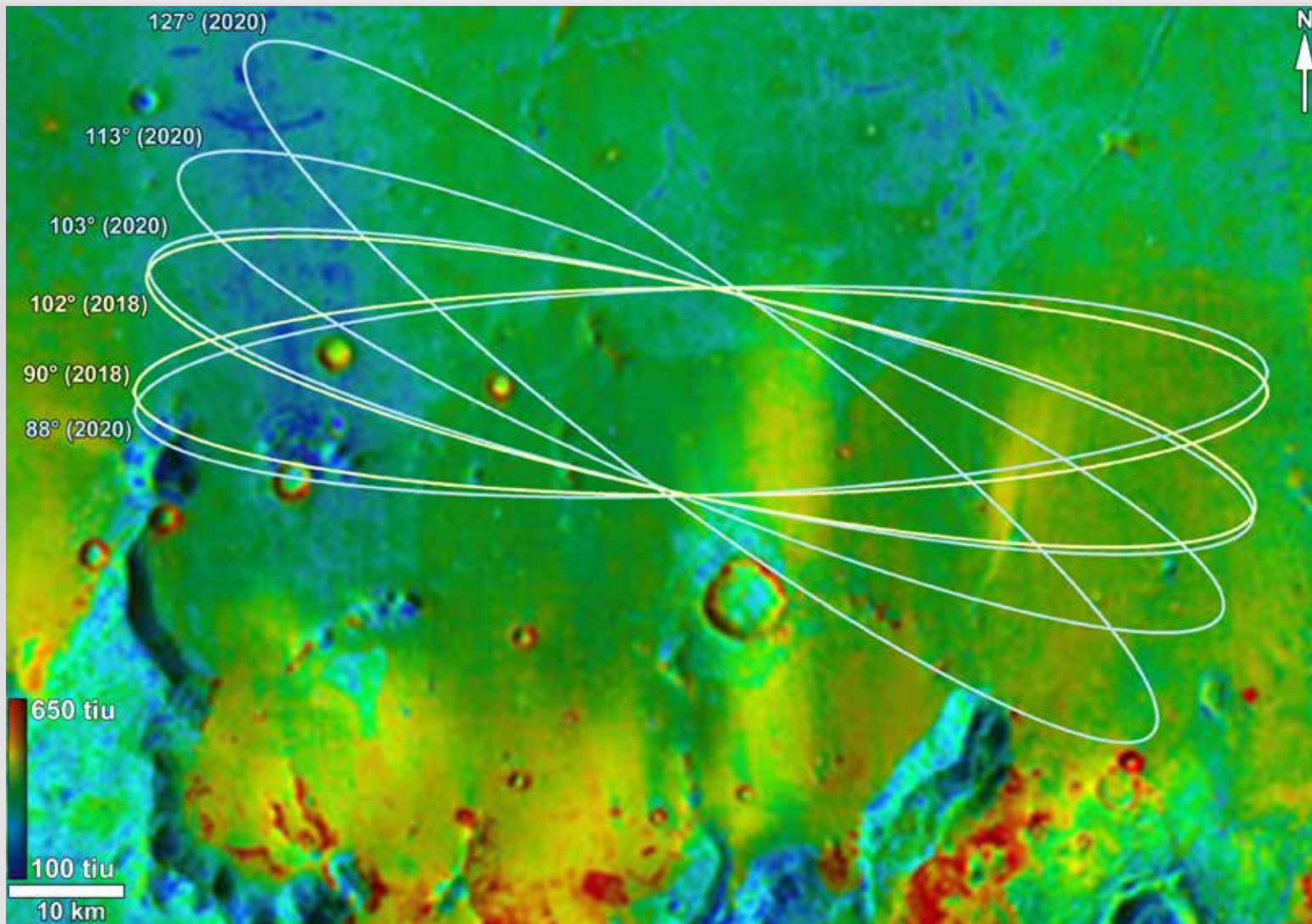


Thermal Inertia



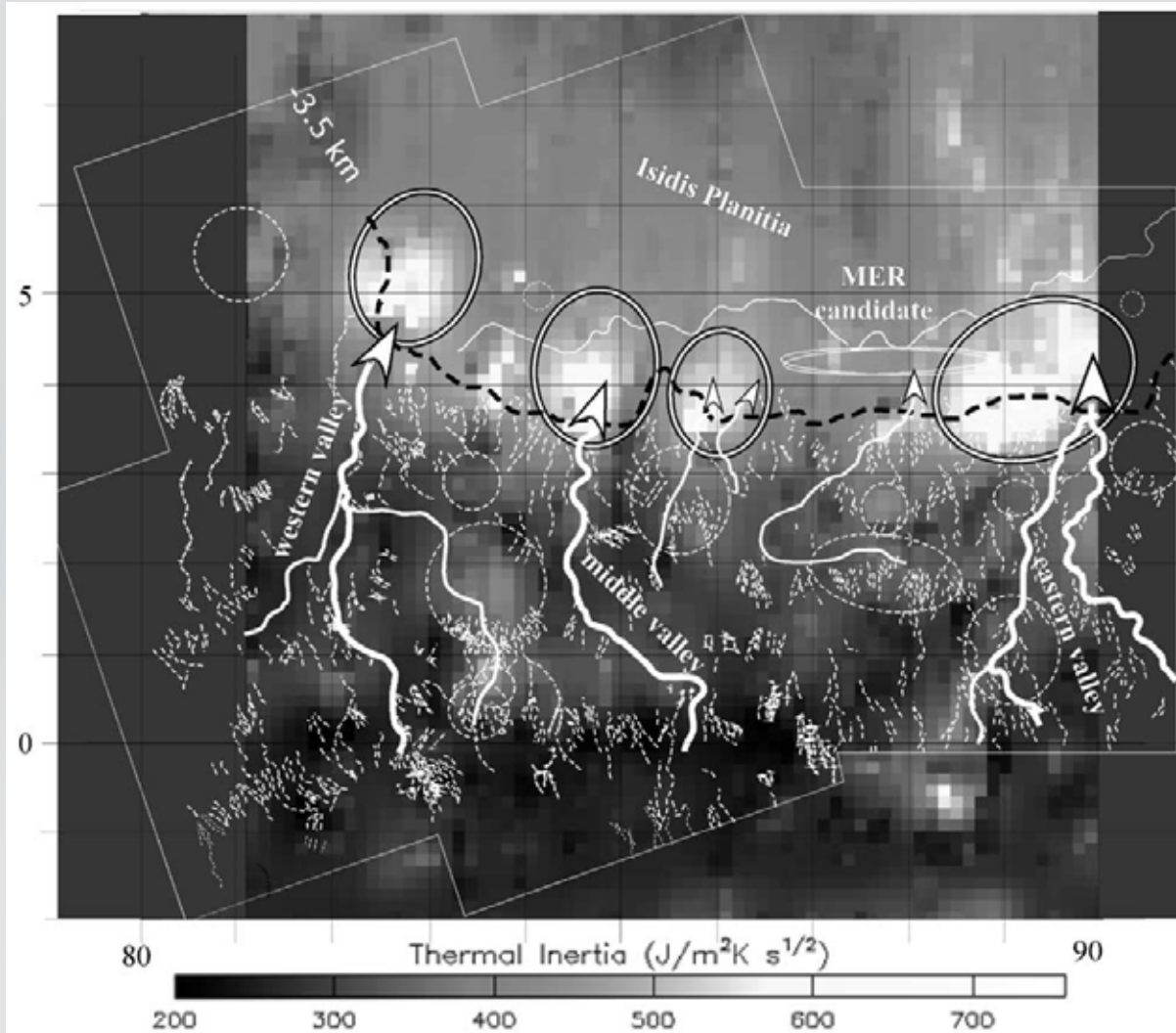
TES TI, 3 km/px; Putzig et al. 2005

Thermal Inertia



Bandfield et al., 2011, THEMIS band 9

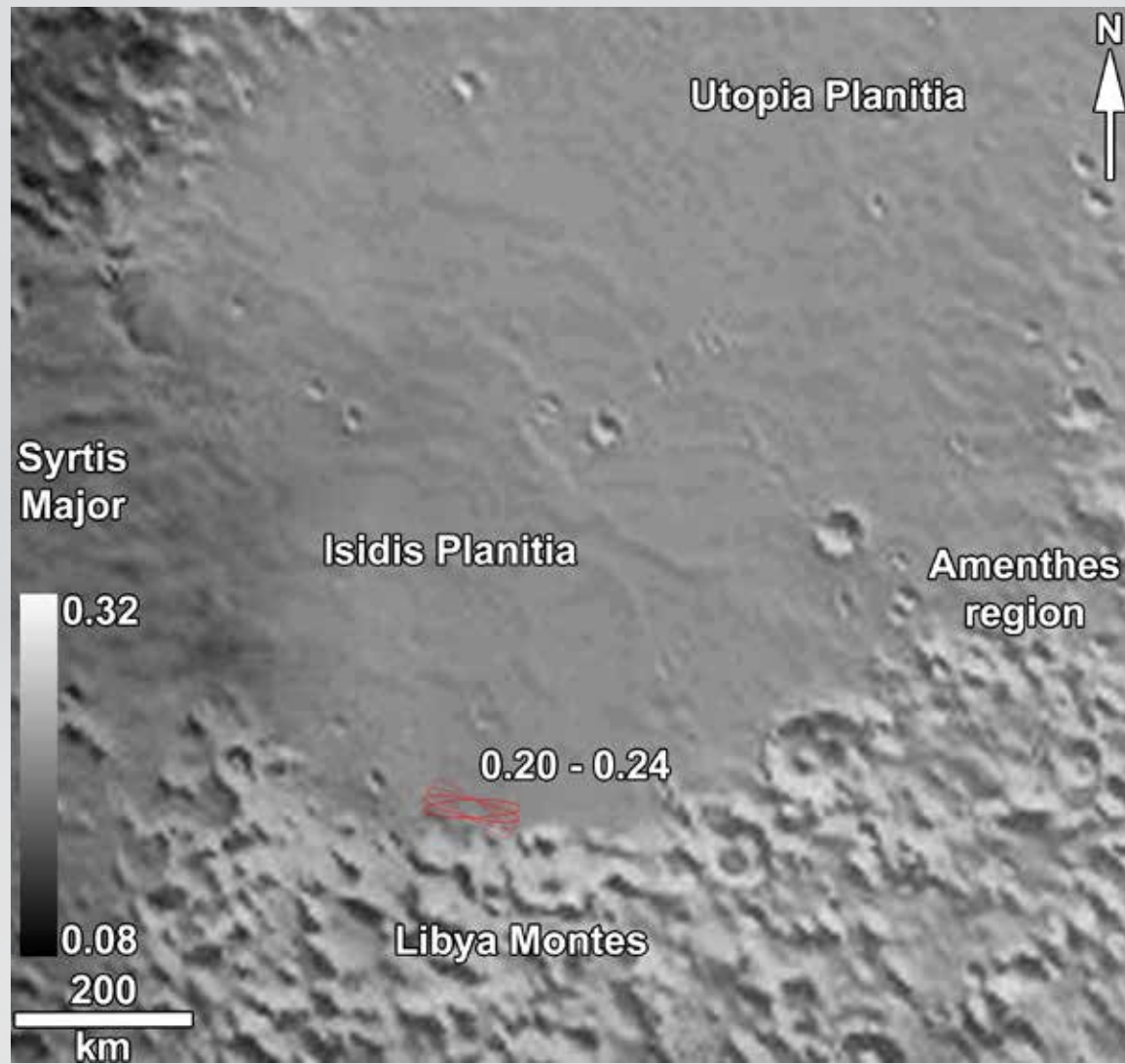
Thermal Inertia



Crumpler and Tanaka, 2003

TES Albedo

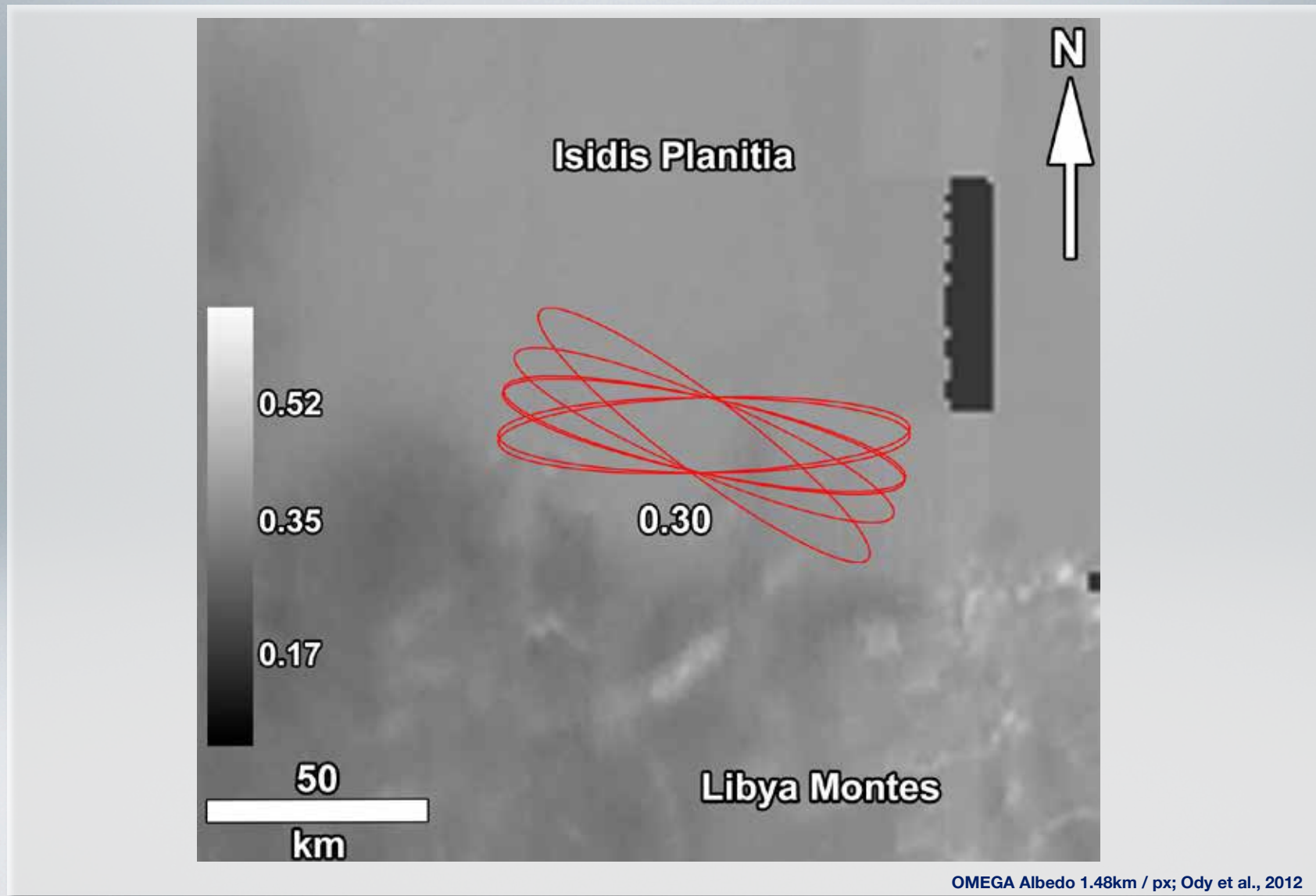
E X O M A R S



TES Albedo 7.5 km / px; Christensen et al., 2001

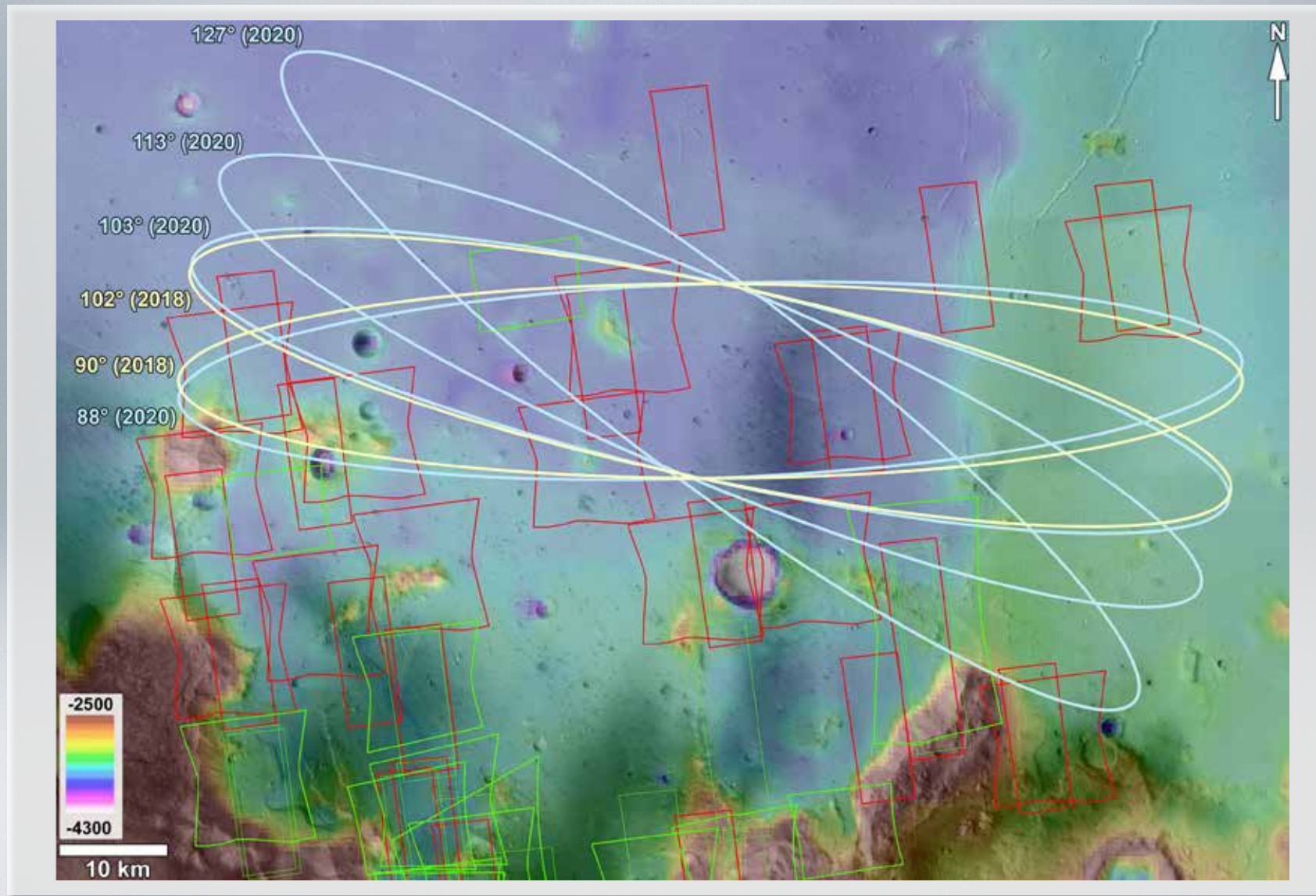
OMEGA Albedo

E X O M A R S



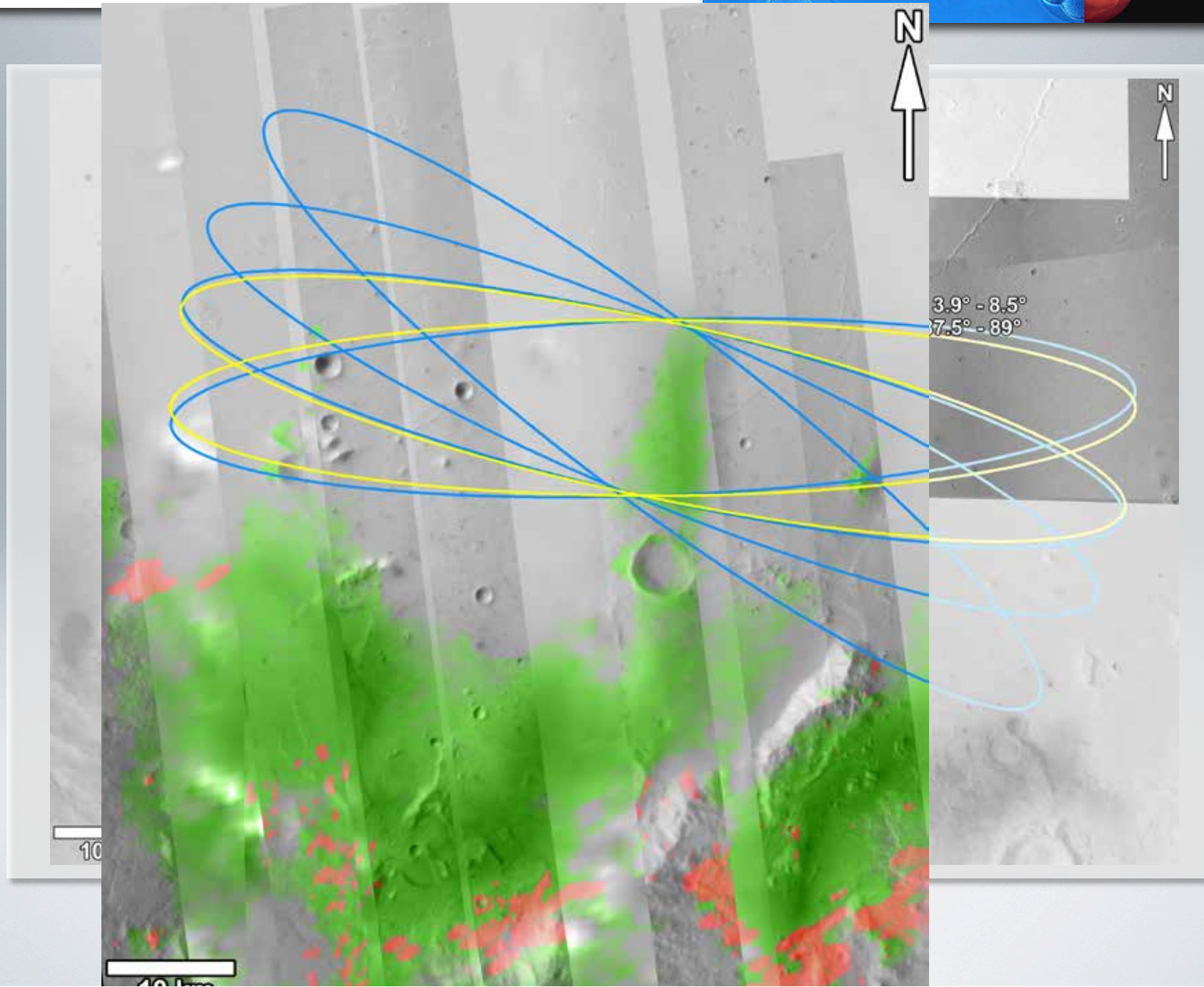
HiRISE, CTX, CRISM, OMEGA, HRSC

E X O M A R S



HiRISE, CTX, CRISM, OMEGA, HRSC

E X O M A R S



- Prime science targets:

- 1) Exhumed fluvial deposits and sinuous valleys
- 2) Highland remnants rich in Fe/Mg-phyllosilicates
- 3) Deuteronilus contact and its unusual valley / ridge geometry
- 4) Layered cliffs of Arabia contact
- 5) Isolated outcrops with Al-phyllosilicates

- Observed landforms:

- 1) suggest long-term and repeated aqueous activity.
- 2) provide significant insights into water-related record of local and global scales.
- 3) bear evidence for hydrologically active ancient Mars.
- 4) are results of environmental changes over time toward decreasing water availability and can help to reconstruct the climatic evolution of Mars.

... collectively indicate a great potential of the proposed landing site for unraveling past environmental conditions that may have been favorable for maintaining life.

Summary 2

Criterion	Specification	Data Used	This Landing Site
Latitude	5 S to 25 N	MOLA	4.35° N, 86.2° E
Elevation	Below -2 km	MOLA	100 % of ellipse is below -3.5km!
Slopes (10 km)	$\leq 3.0^\circ$	MOLA	At 10 km, 100% of ellipse is below 3.0°
Slopes (2 km)	$\leq 3.0^\circ$	MOLA	At 2 km, 100 % of ellipse is below 3.0°
Slopes (330 m)	$\leq 8.6^\circ$	HRSC/MOLA	>99% of ellipse is below 8.6° (MOLA!)
Slopes (330 m)	$\leq 8.6^\circ$	CTX	In preparation
Slopes (7 m)	$\leq 12.5^\circ$	HiRISE	No Data
Slopes (2 m)	$\leq 15.0^\circ$	No Data	No Data
Rock abundance	$\leq 7\%$	IRTM	9% (4-11% range) <small>(13-15% Crumpler and Tanaka, 2003)</small>
Rock abundance	$\leq 7\%$	HiRISE	In preparation
Thermal Inertia	$\geq 150 \text{ J m}^{-2} \text{ s}^{-0.5} \text{ K}^{-1}$	TES	100 % of ellipse is above (night time data)
Albedo	$0.1 \leq \text{albedo} \leq 0.26$	TES/OMEGA	0.20-0.24 mean range <small>(Crumpler and Tanaka, 2003)</small> / 0.30
Radar Reflectivity	-15 dB \leq Ka band backscatter cross section at nadir ≤ 27.5 dB	No Data	No Data
Horizontal Wind (1 m–10 km agl)	(25m/s) ≤ 0.25 m/s?	GCM	Max speed: 5-7 m/s (Ls324, 10am)
Horizontal Wind (1 m above ground)	(25m/s) ≤ 0.30 m/s?	GCM	Max speed: 5 m/s (Ls324, 10am)

• THANK YOU.