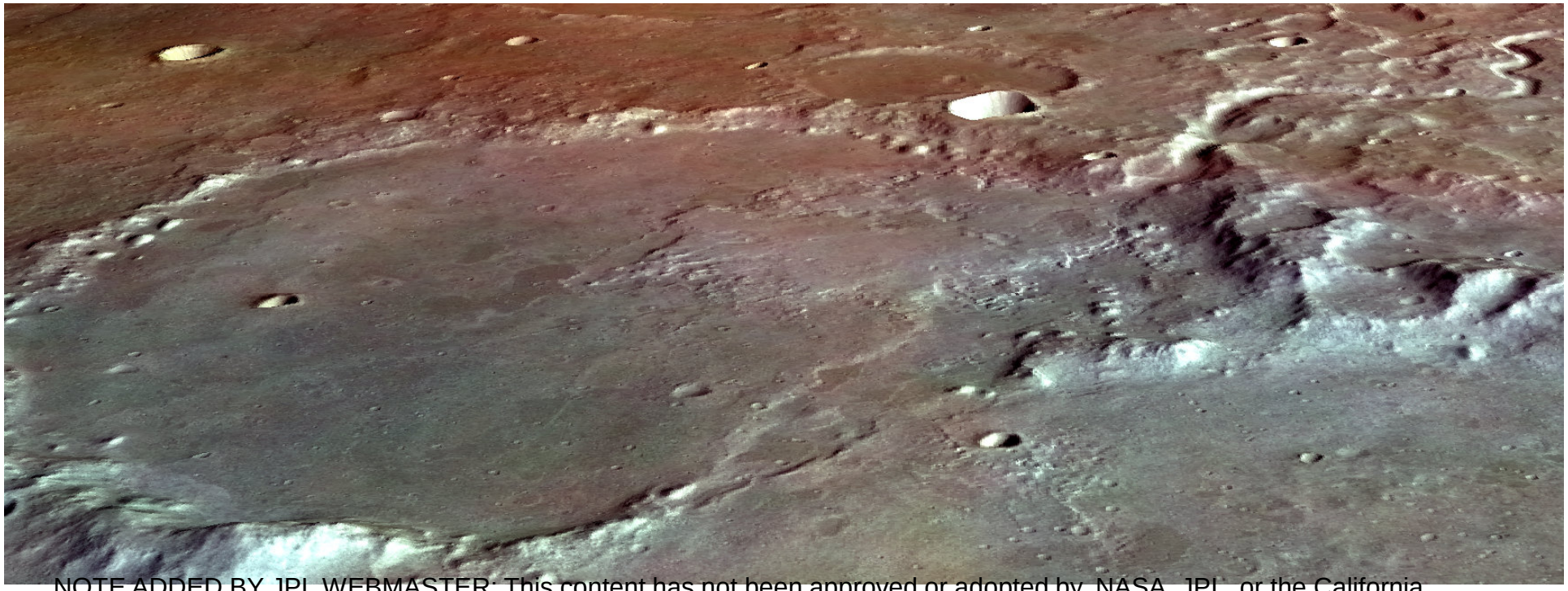
Landing at the Terminus of Sabrina Vallis

Thomas Platz
Ernst Hauber
Laetitia Le Deit
Stephan van Gasselt
Kjartan Kinch
Morten Bo Madsen
Heike Rosenberg



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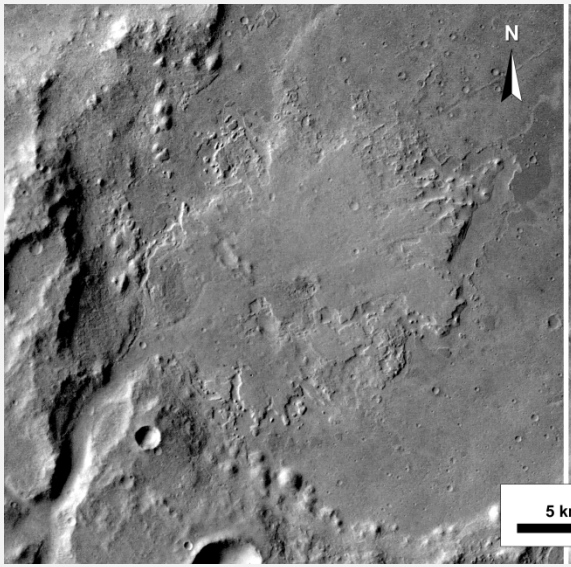
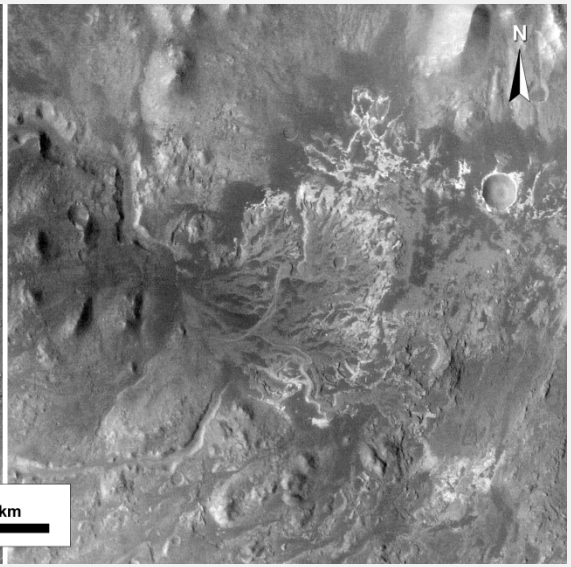
Freie Universität Berlin
PSI Planetary Science Institute
DLR Deutsches Zentrum für Luft- und Raumfahrt
LPG
KØBENHAVNS UNIVERSITET

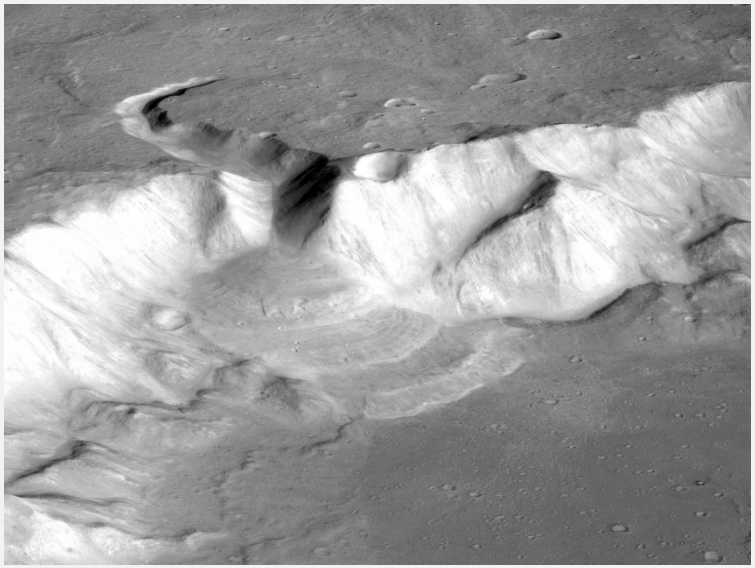
Sabrina delta

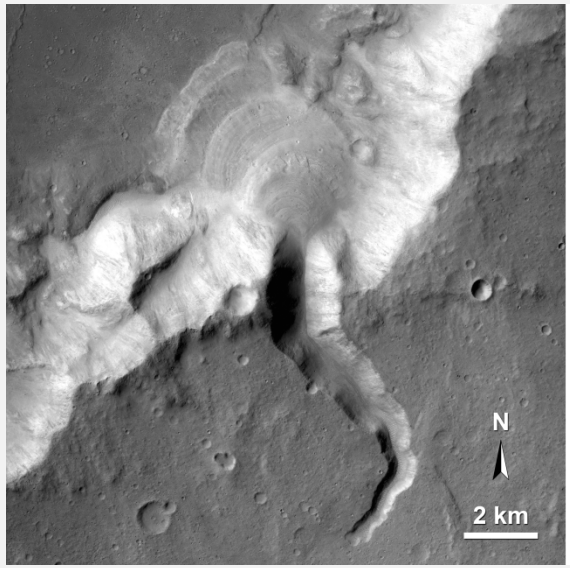


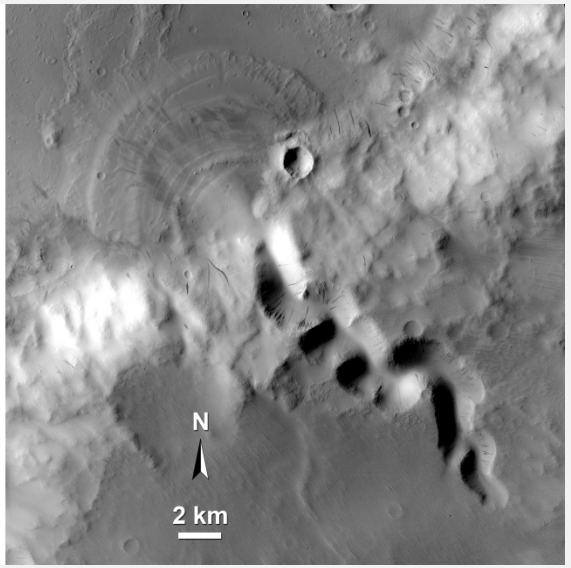


Eberswalde delta

Dukhan

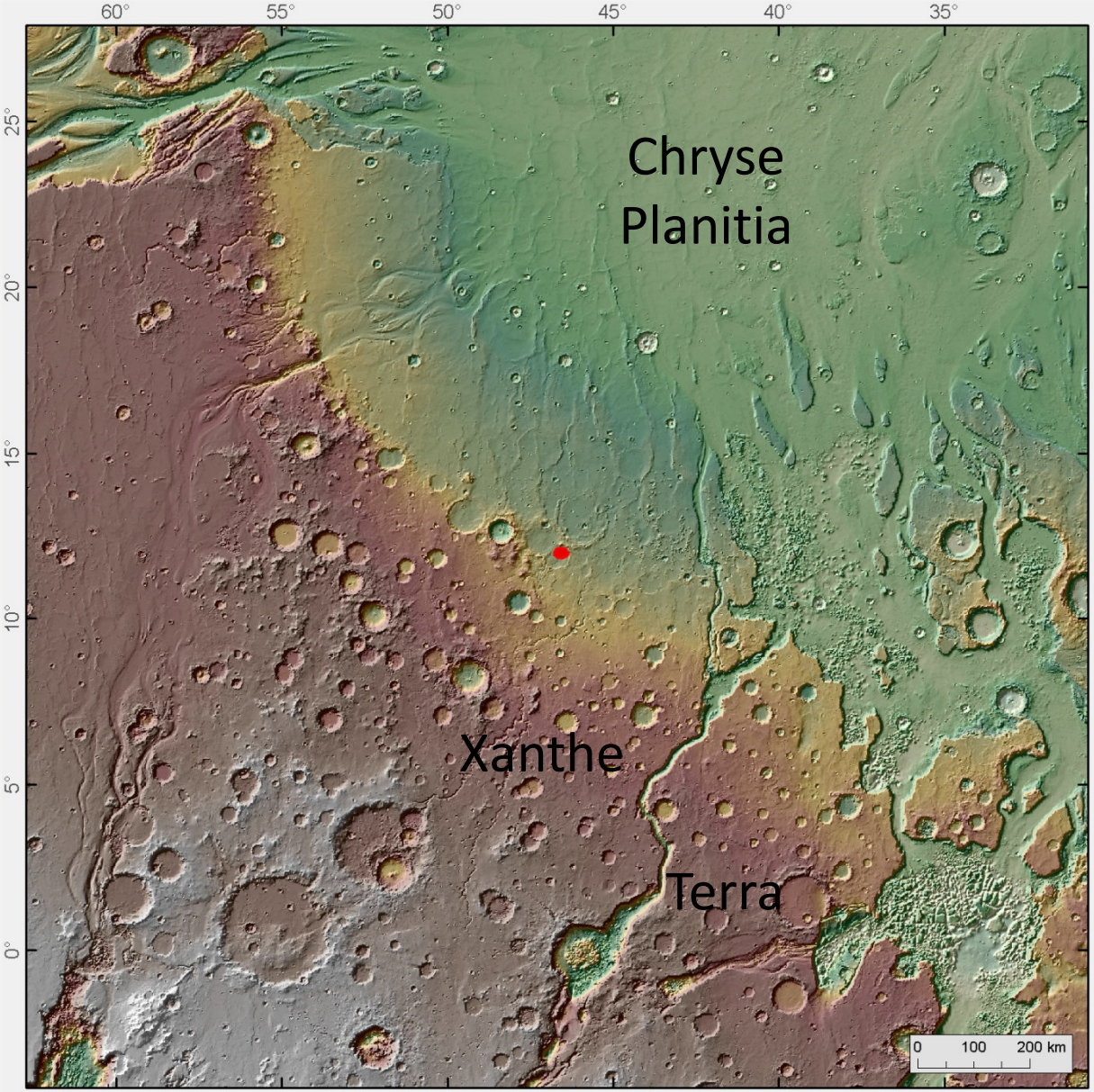


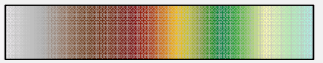




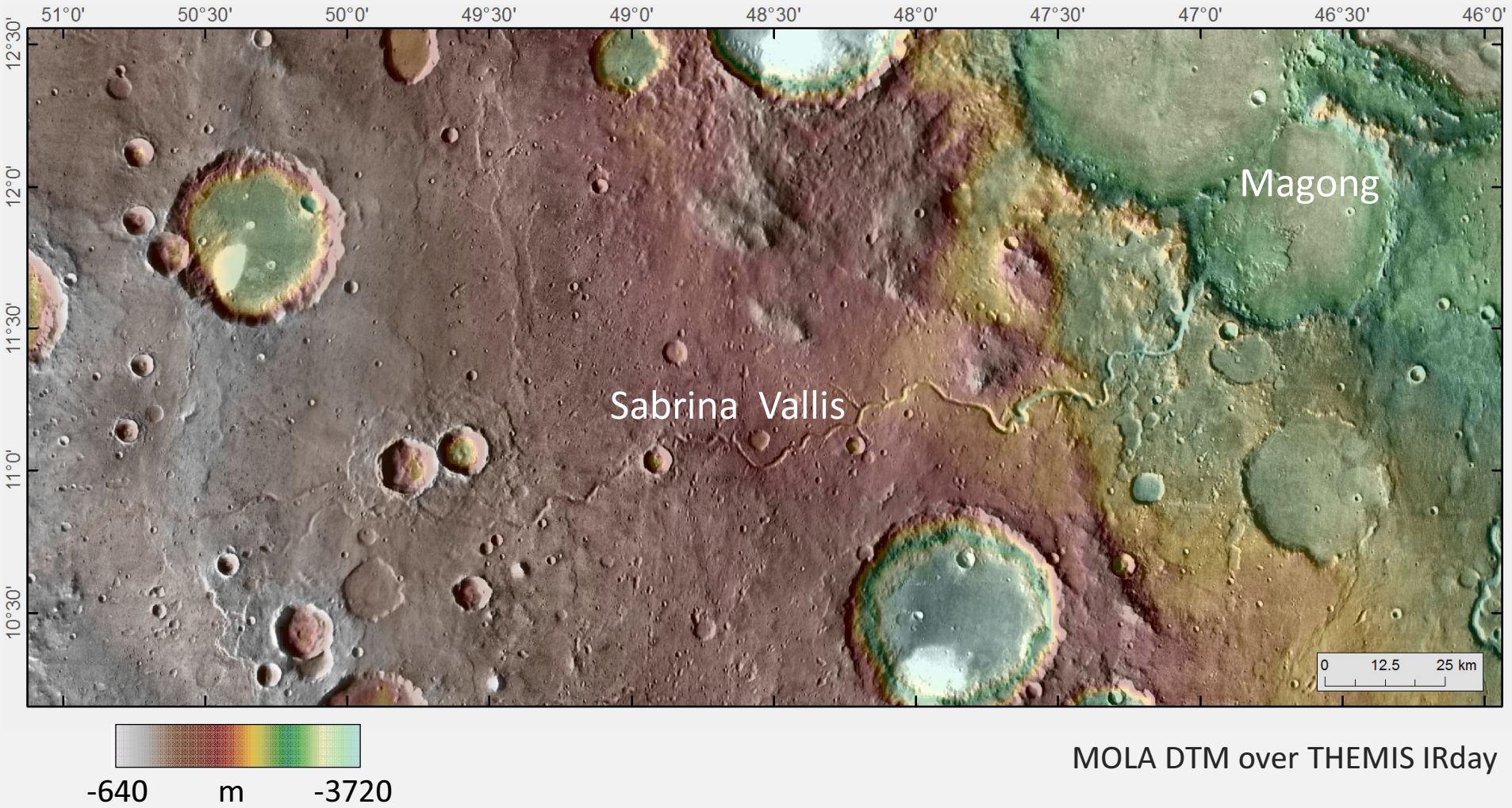
Terra Sirenum

Hauber et al. (2013)

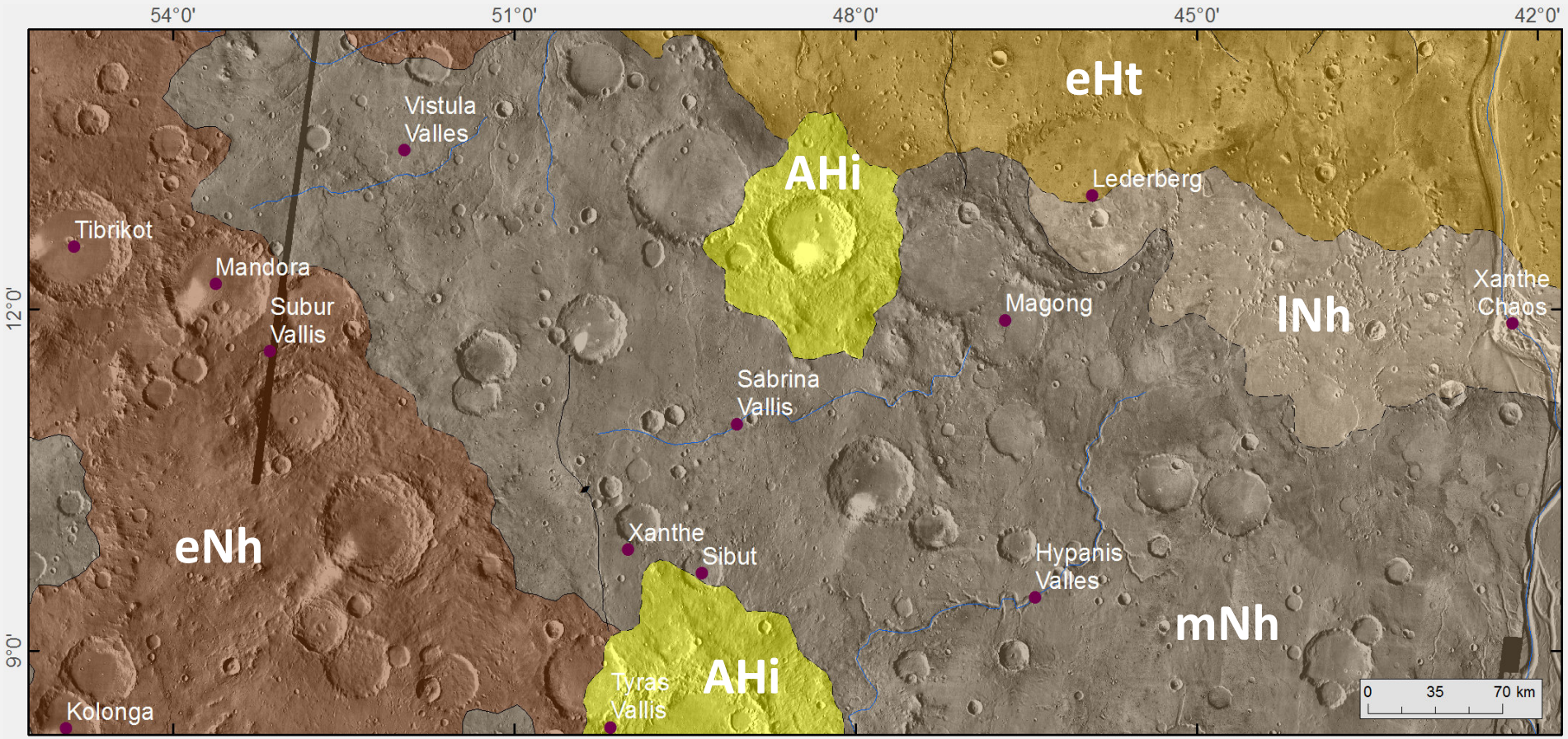




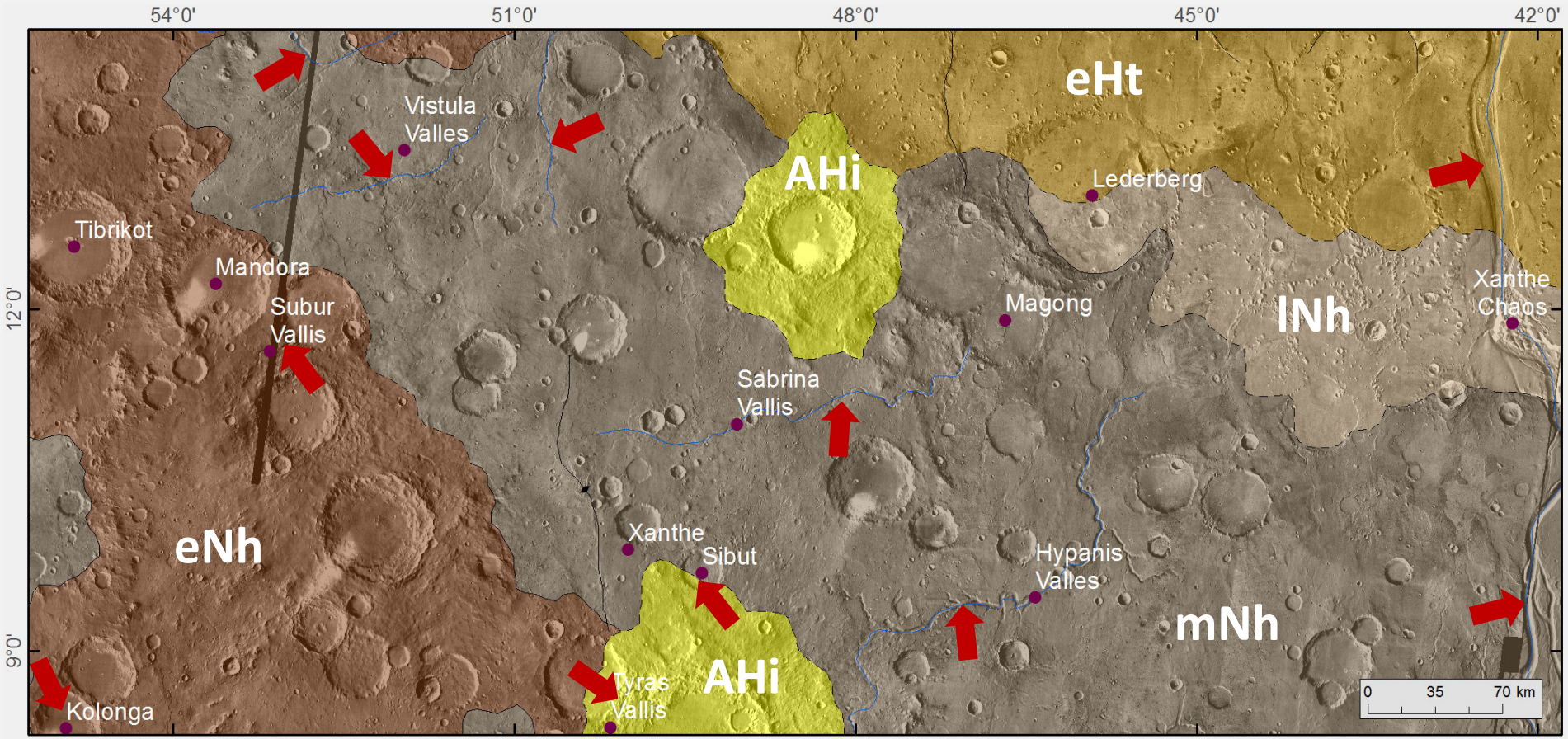
MOLA DTM/hillshade



MOLA DTM over THEMIS IRday



Tanaka et al. (in press)



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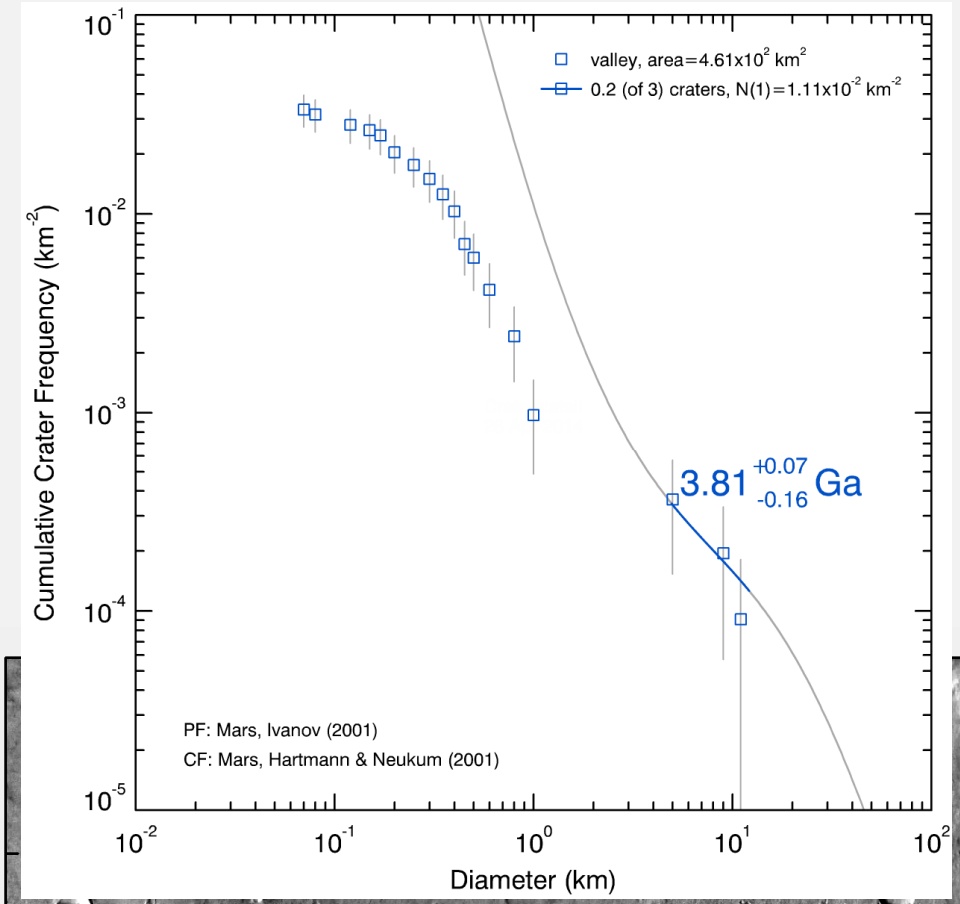
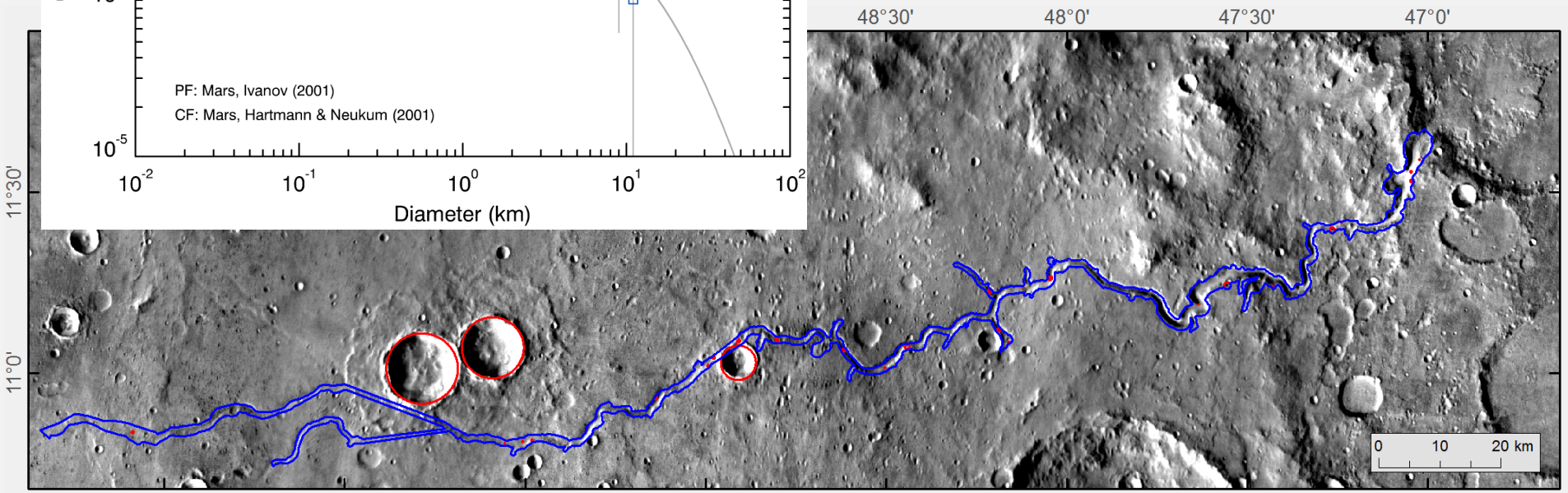
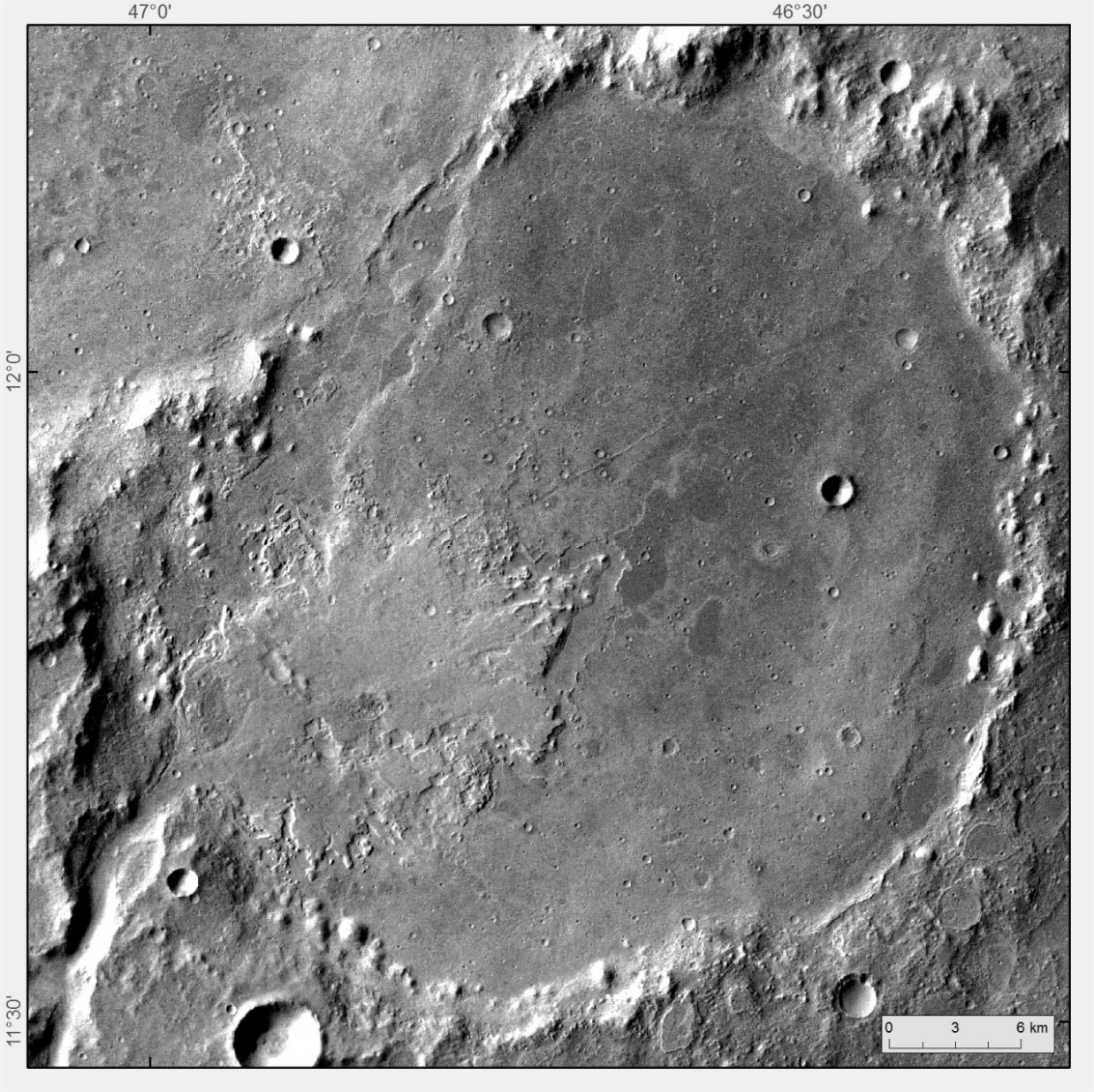


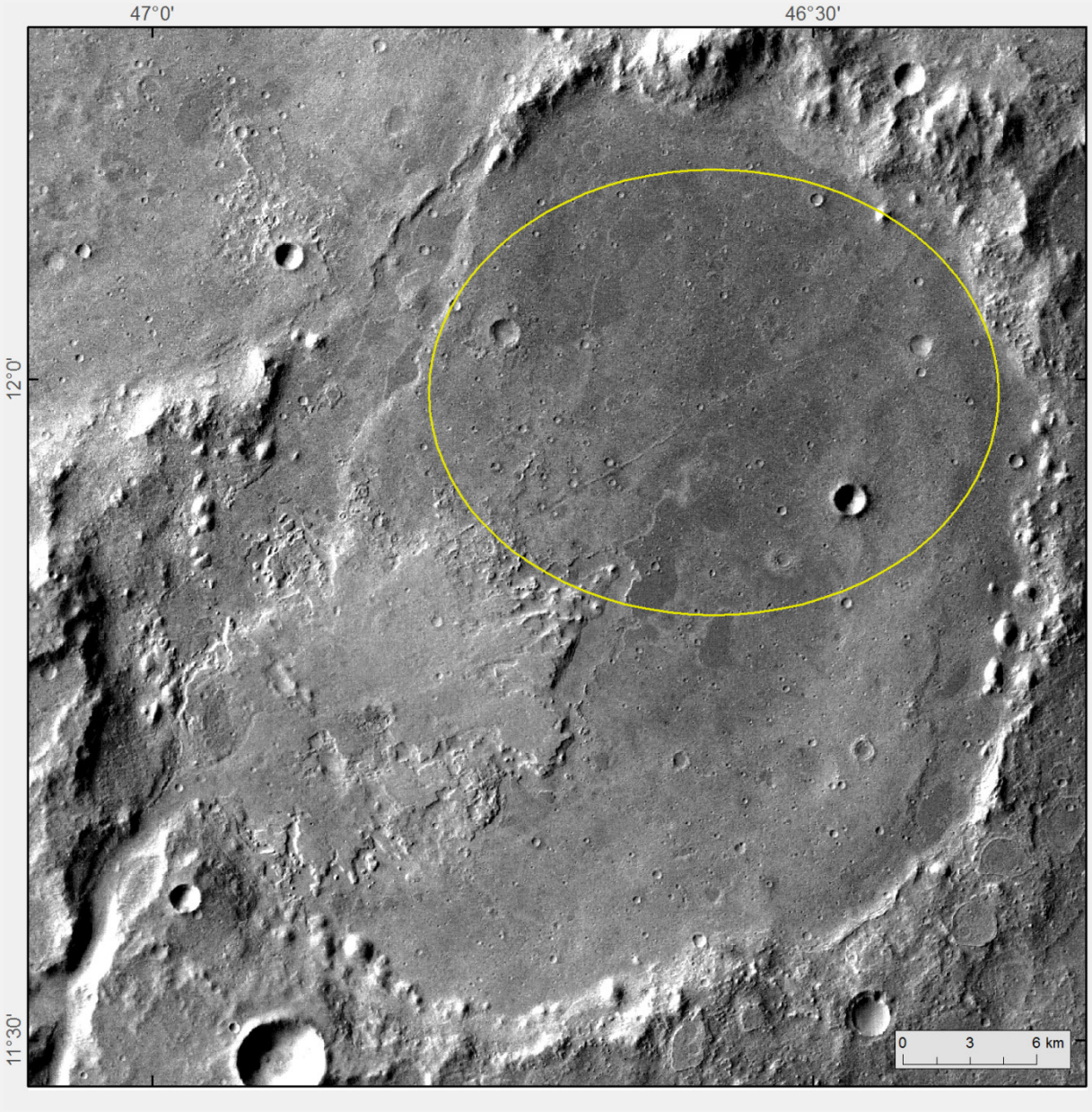
Late Noachian Epoch
3.71-3.83 Ga

Middle Noachian Epoch
3.83-3.94 Ga



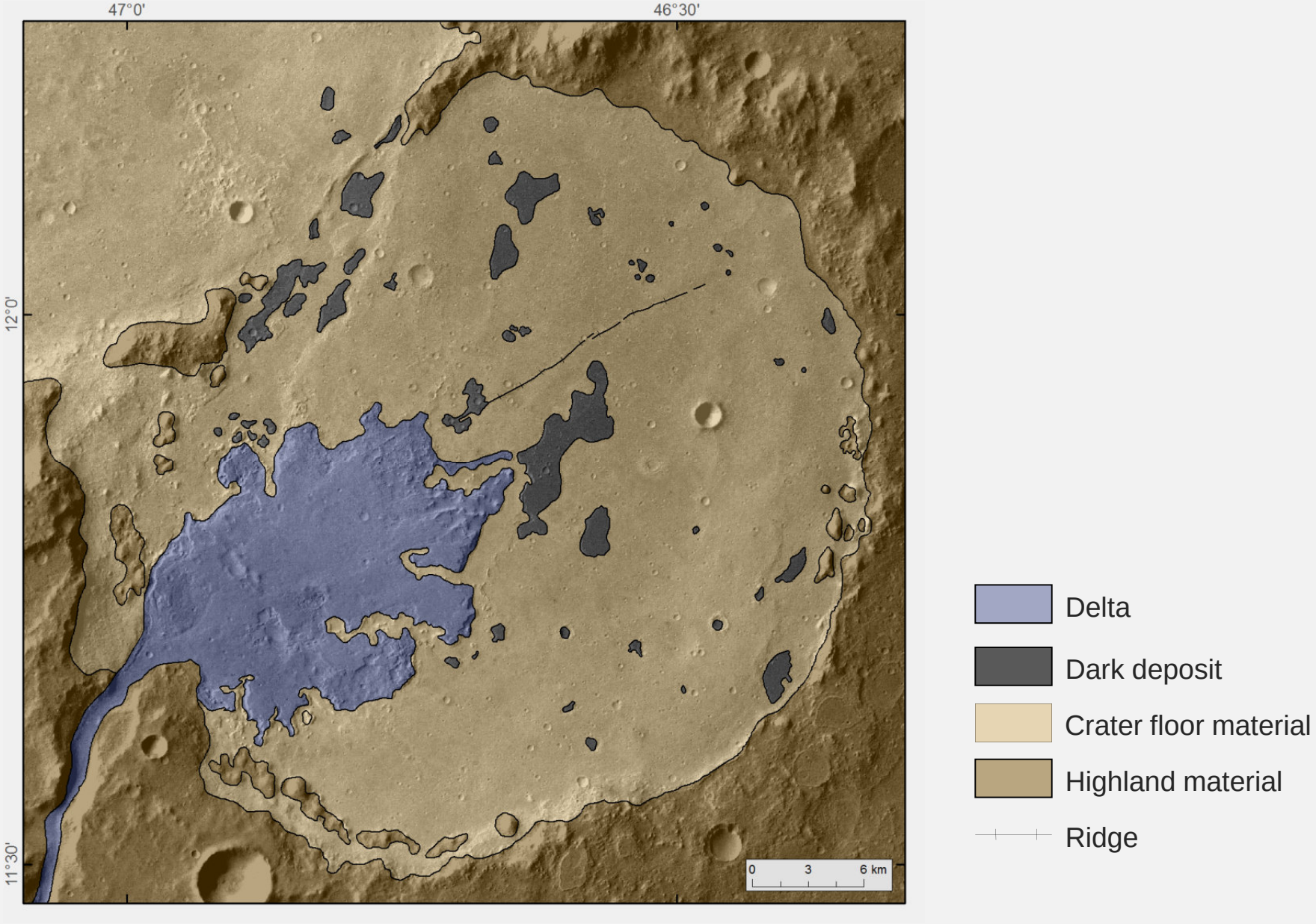


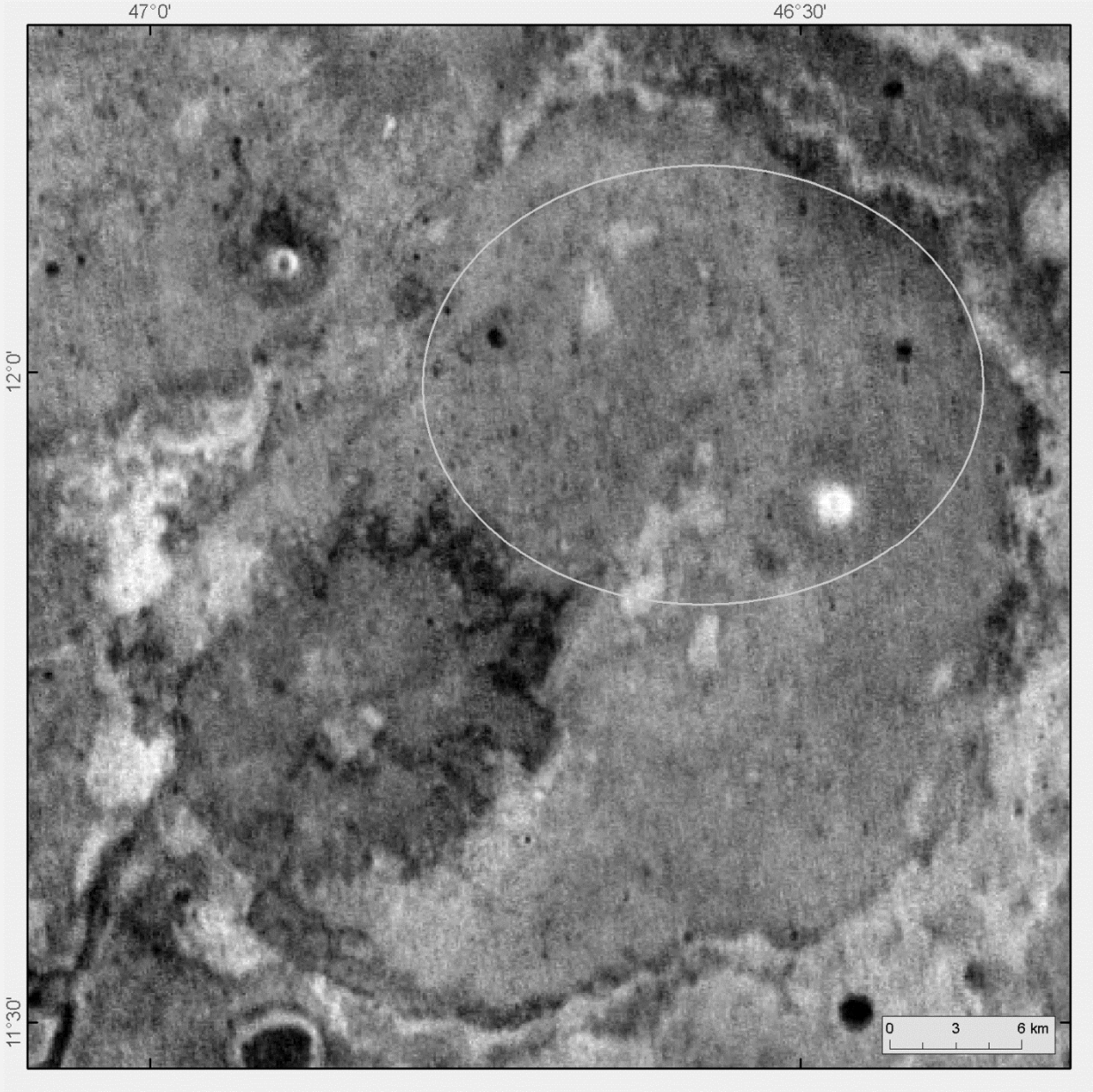
HRSC orbit
h0894_0000



20 km × 25 km landing ellipse

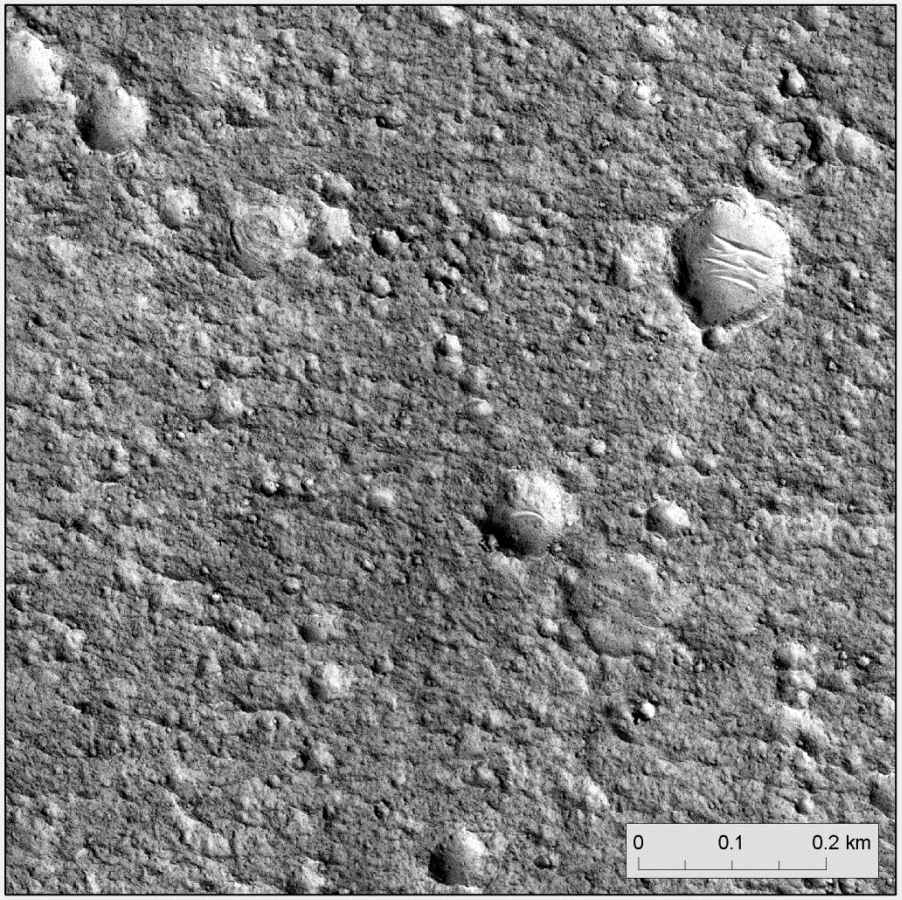
HRSC orbit
h0894_0000


47°0'
46°30'
12°0'
11°30'
0 3 6 km
Delta
Dark deposit
Crater floor material
Highland material
Ridge



THEMIS IRnight

Crater floor material



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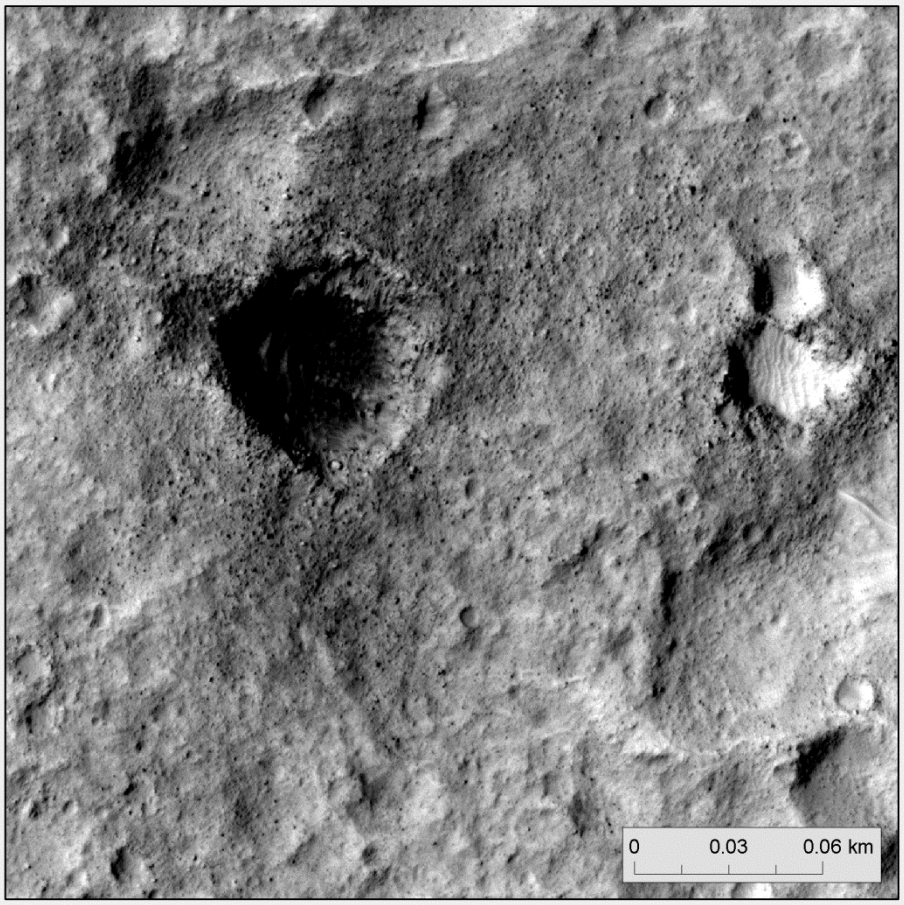
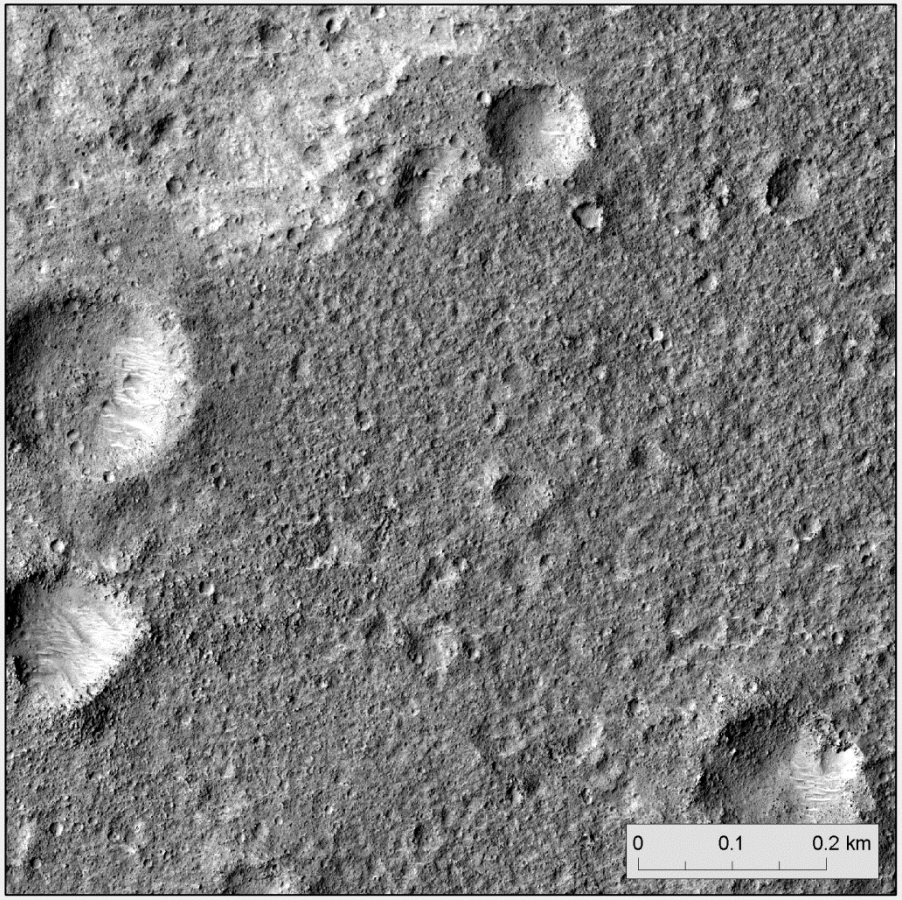


ESP_027656_1920

Dark deposit



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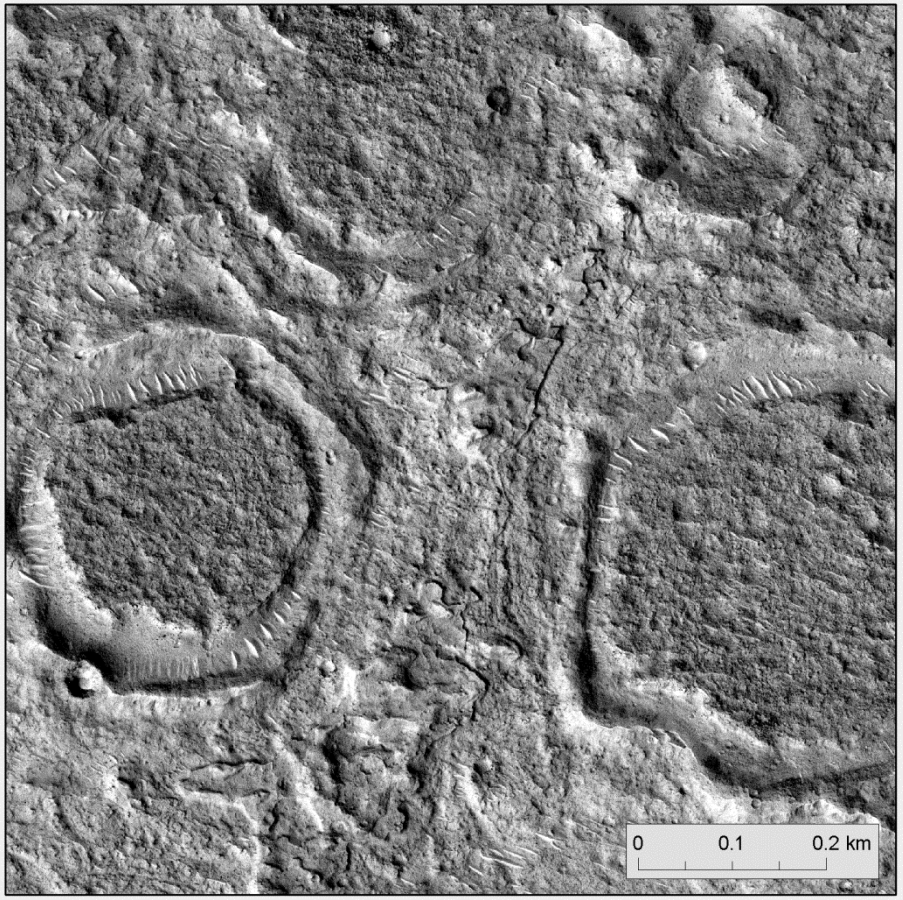

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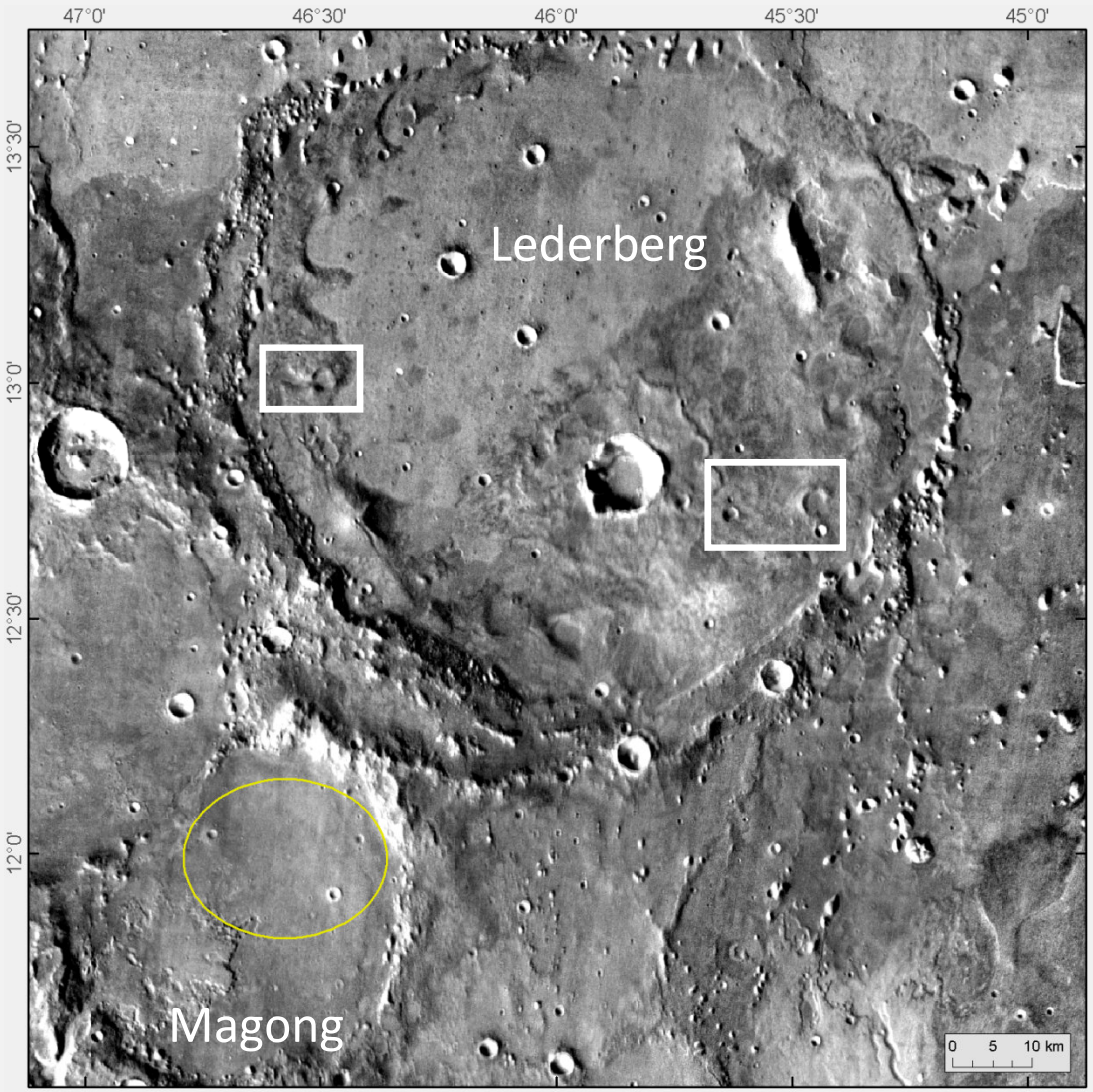
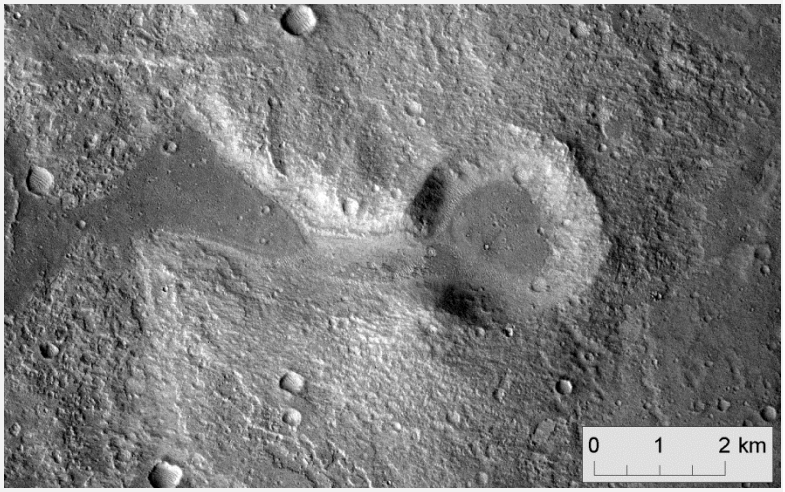
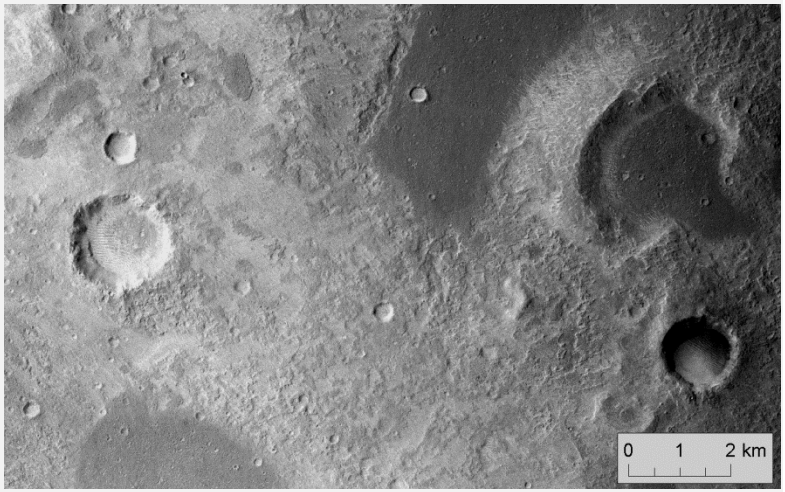


THEMIS IRday

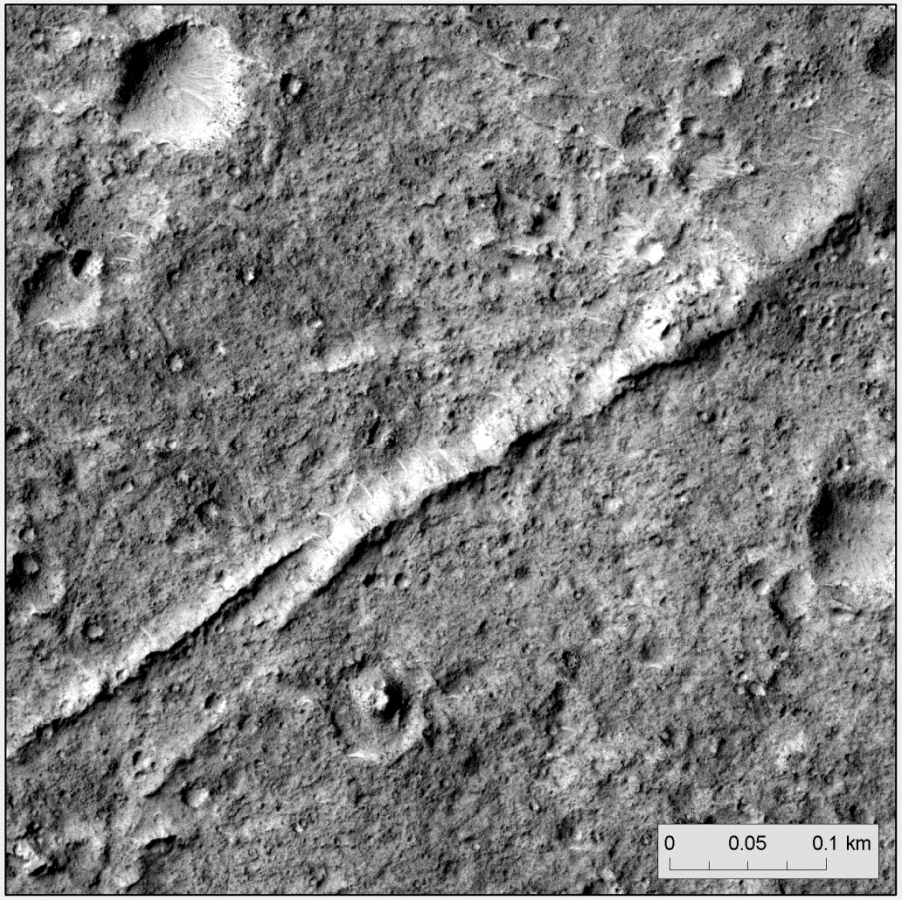




CTX P05_003130_1937, P17_007534_1916

Brož and Hauber (2013)

Ridge



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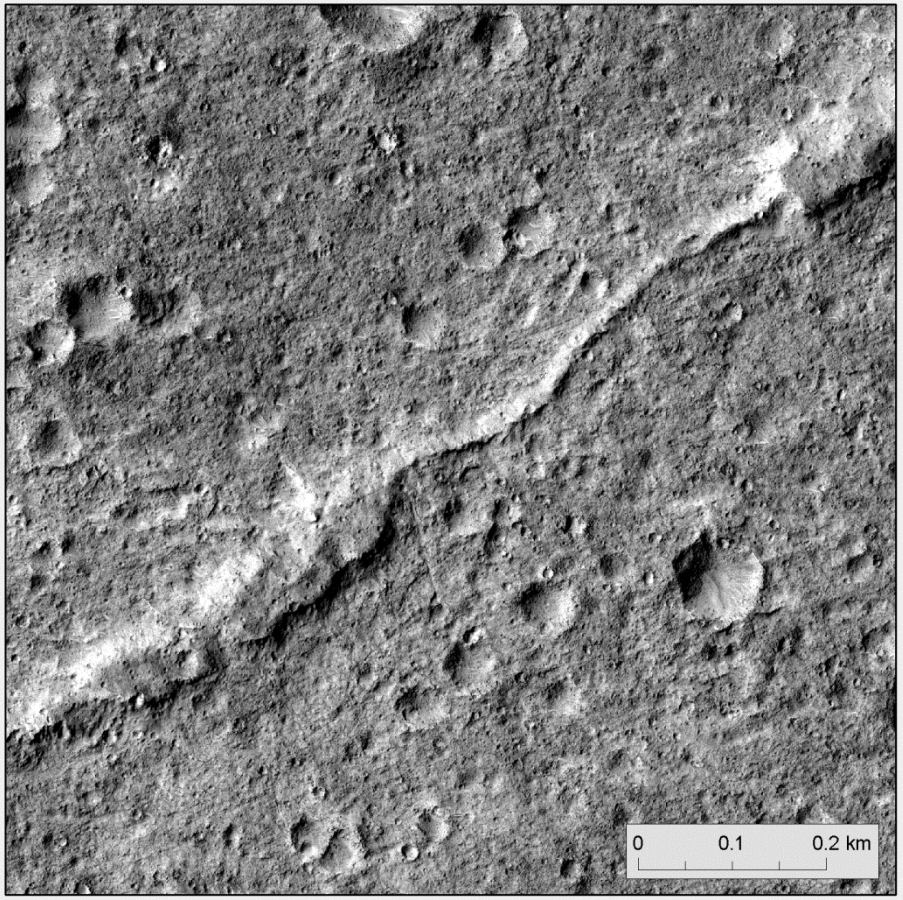

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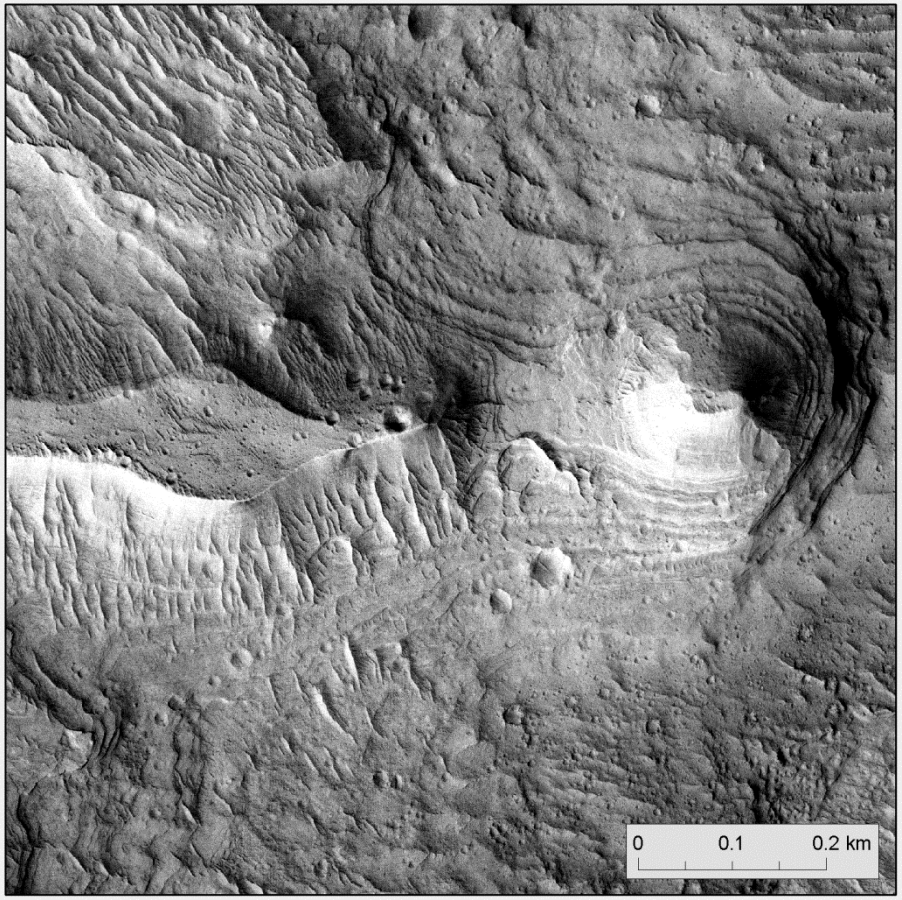
Delta



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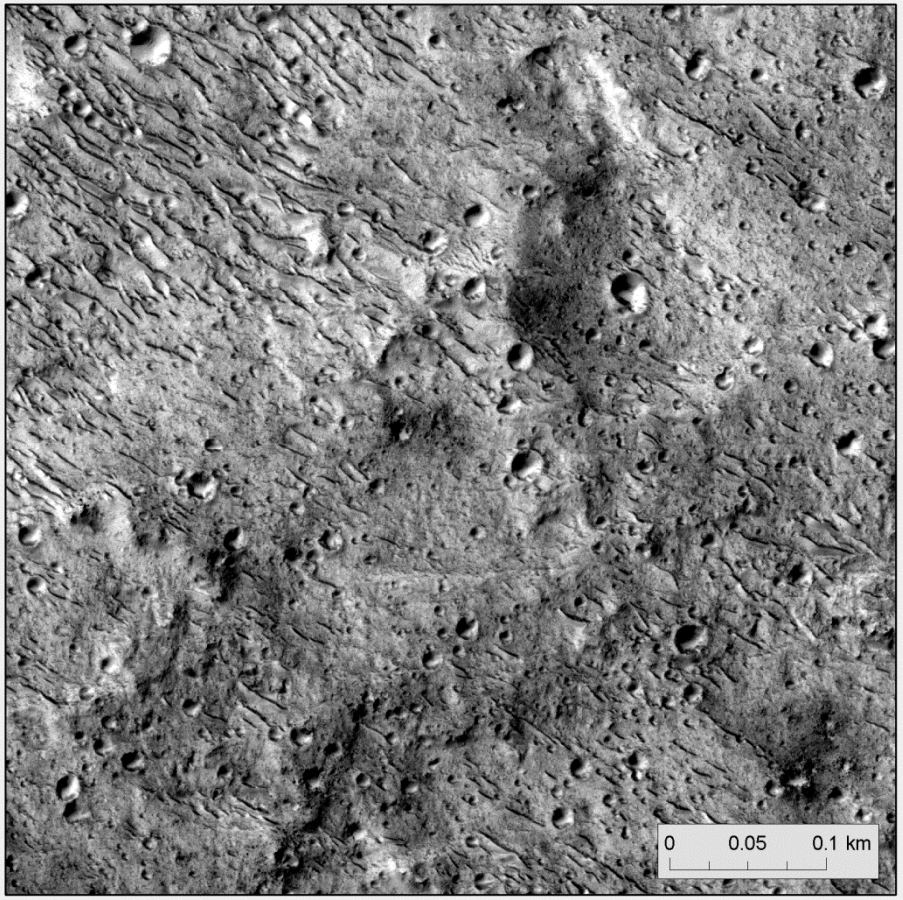

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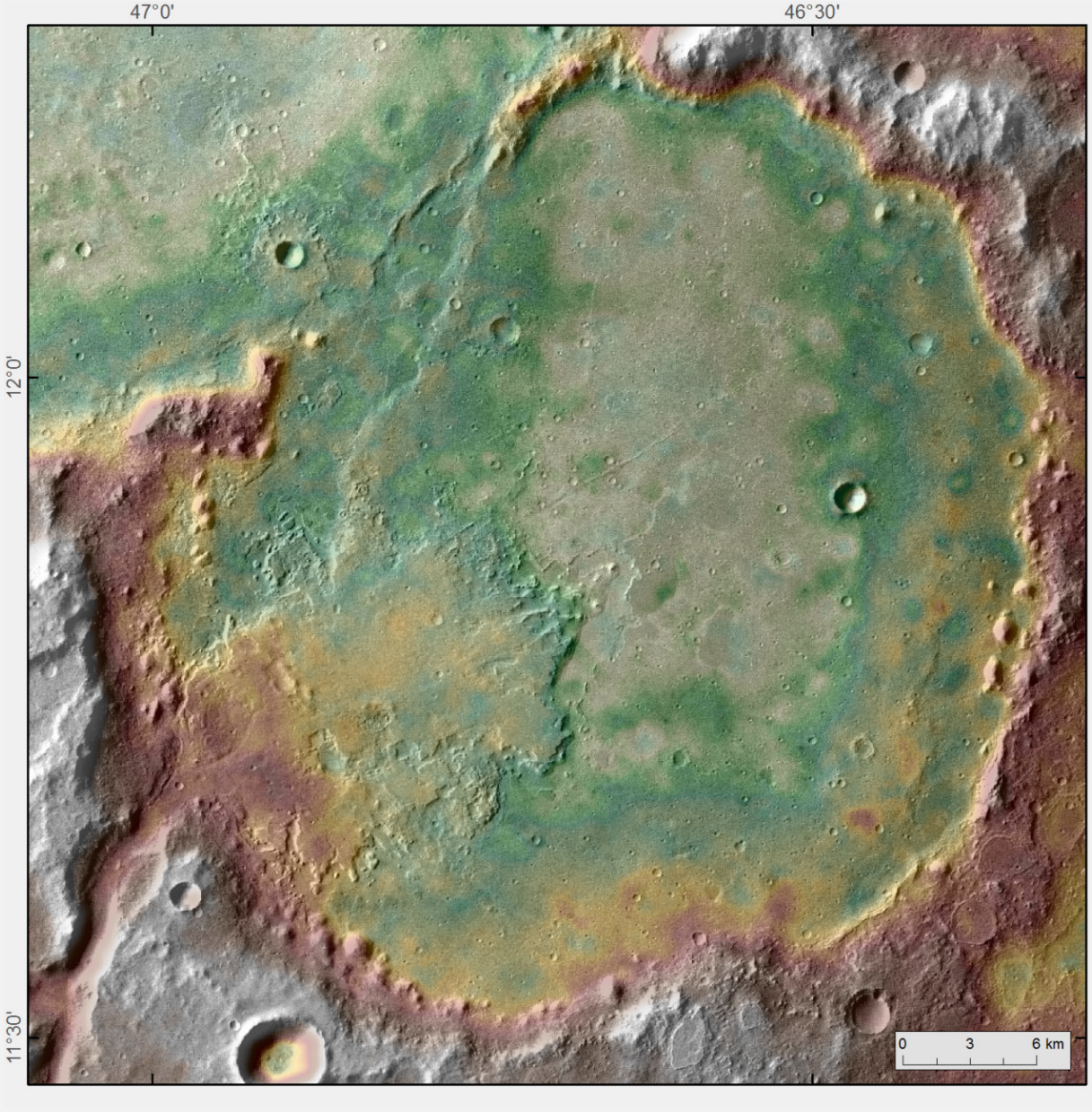
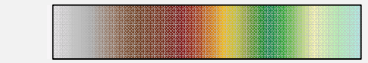
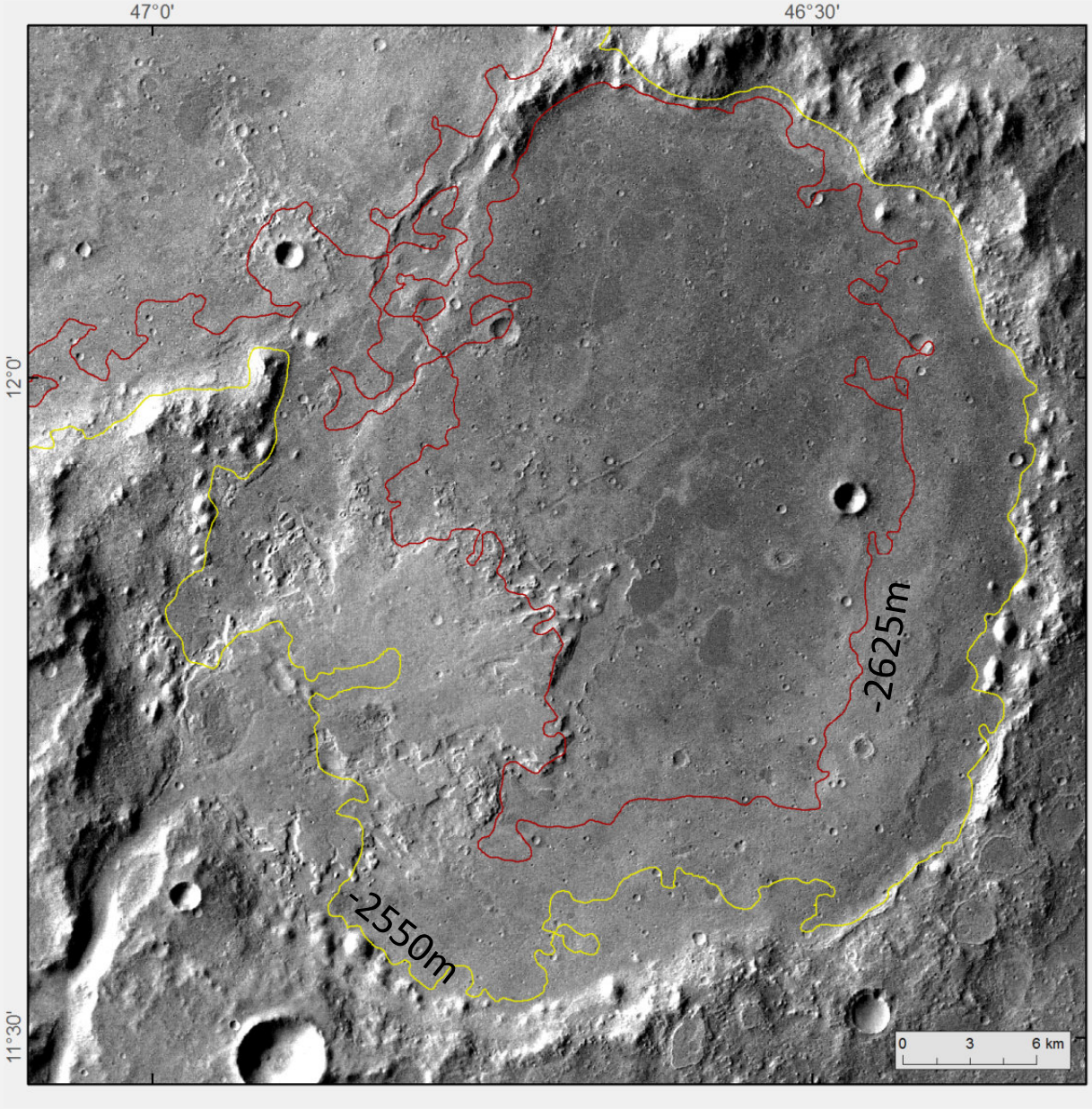


HRSC DTM on nadir



HRSC orbit
h0894_0000

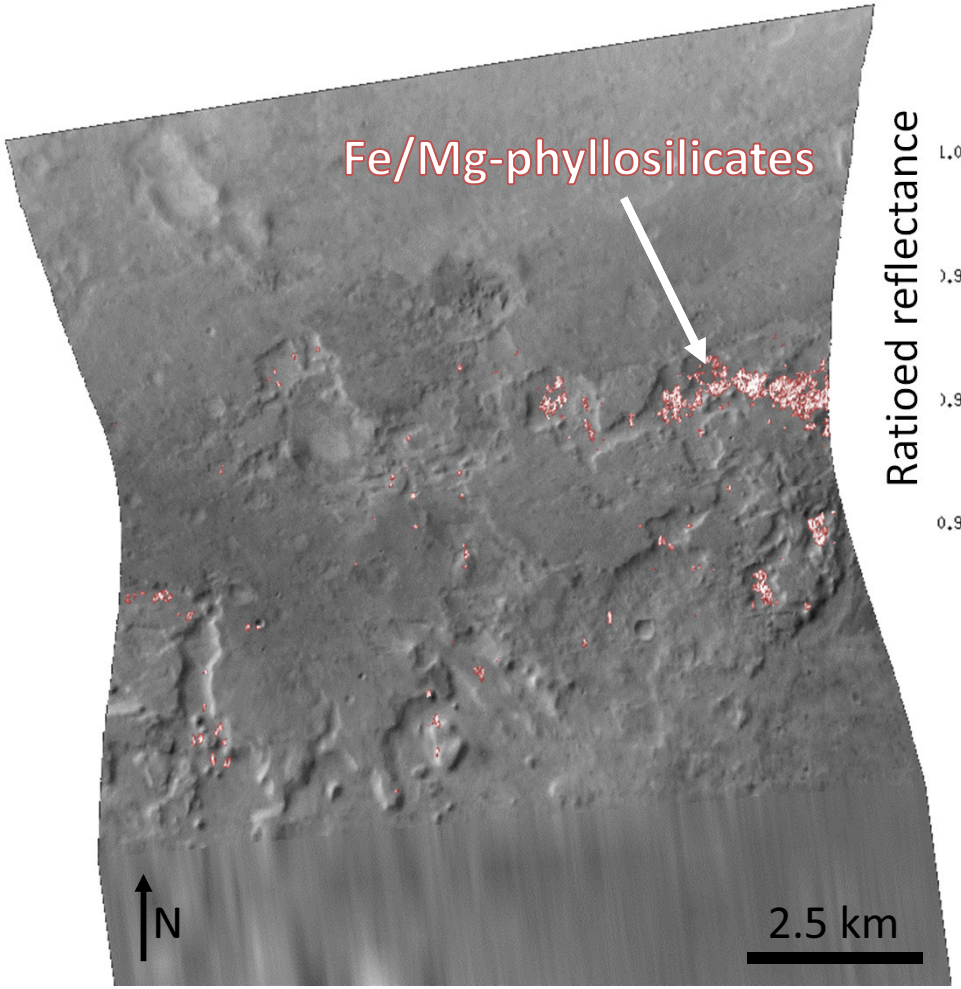


Red contour: -2625 m
Yellow contour: -2550 m

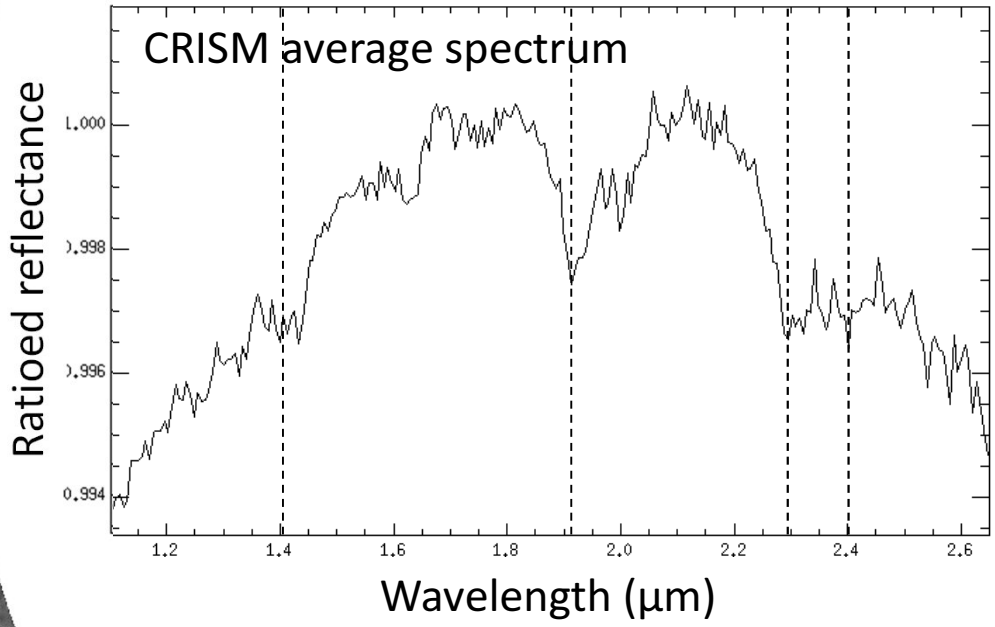
Putative ocean level
-2540 ± 177m
Di Achille and Hynek (2010)

HRSC orbit
h0894_0000

Weak signature of Fe/Mg-phyllosilicates

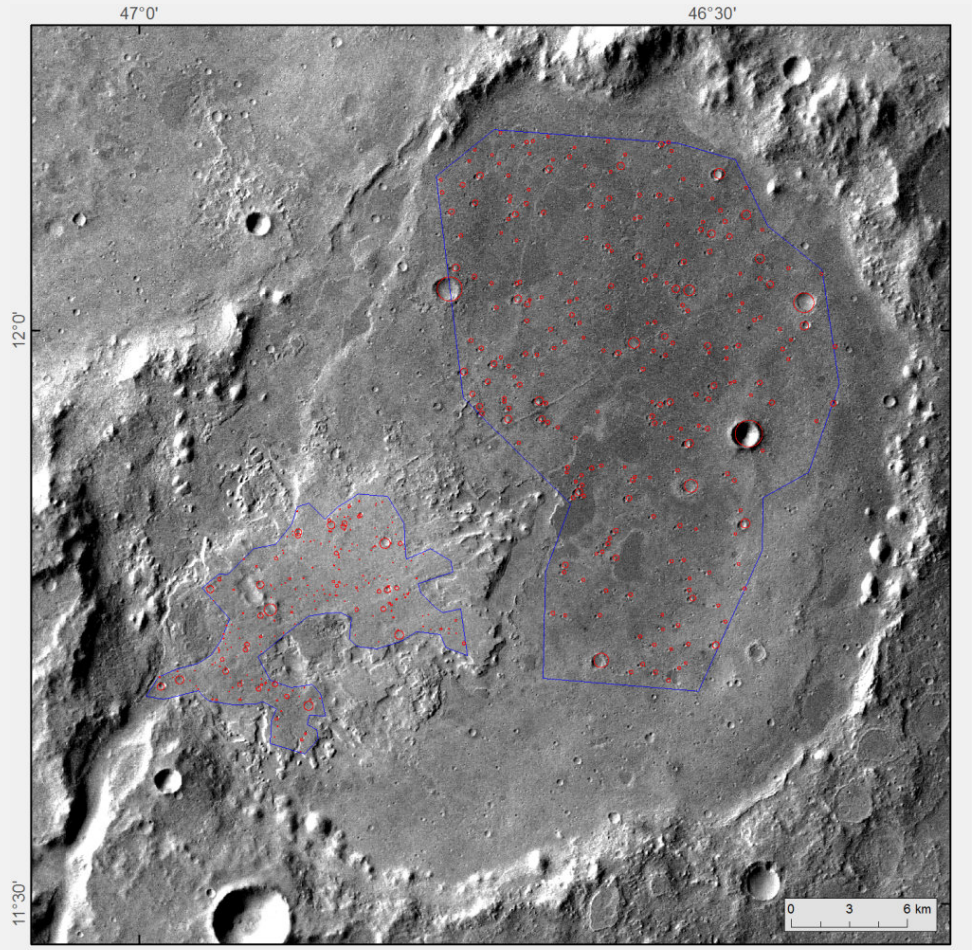


CRISM FRT 24155

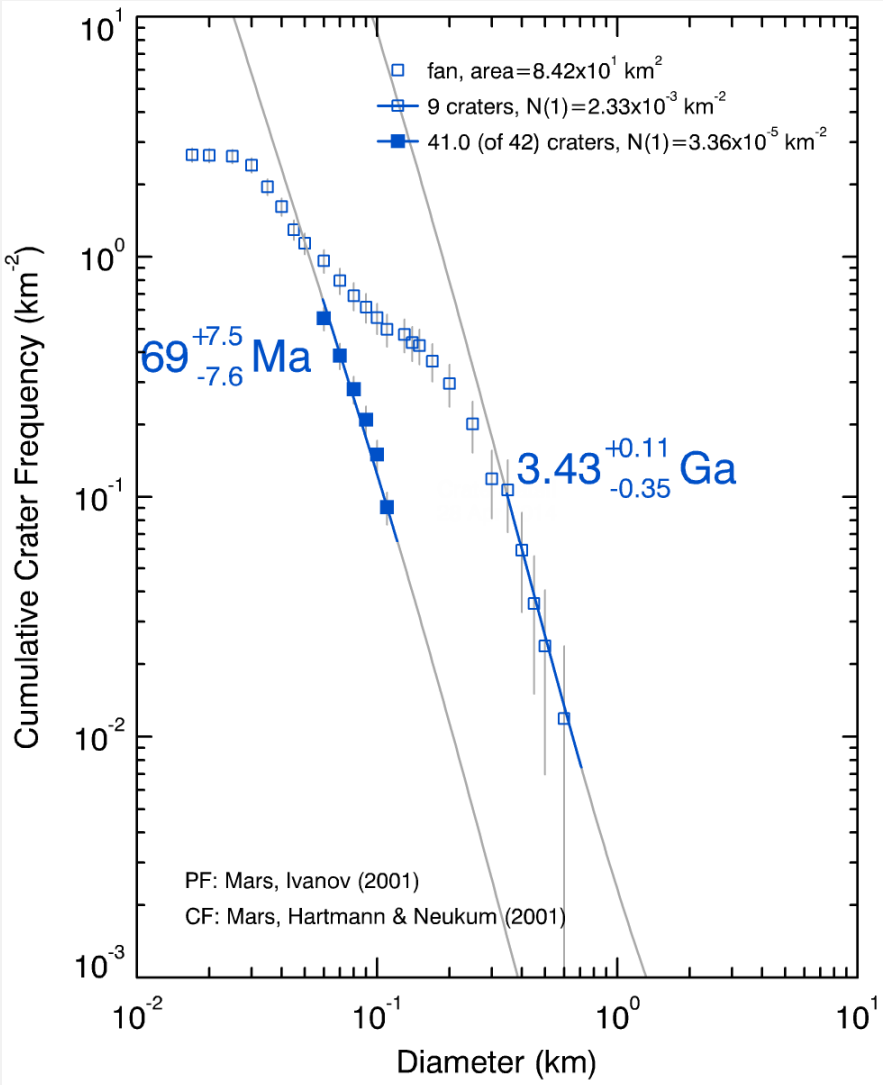


Possible Fe/Mg-phyllosilicates include nontronite, vermiculite, and saponite

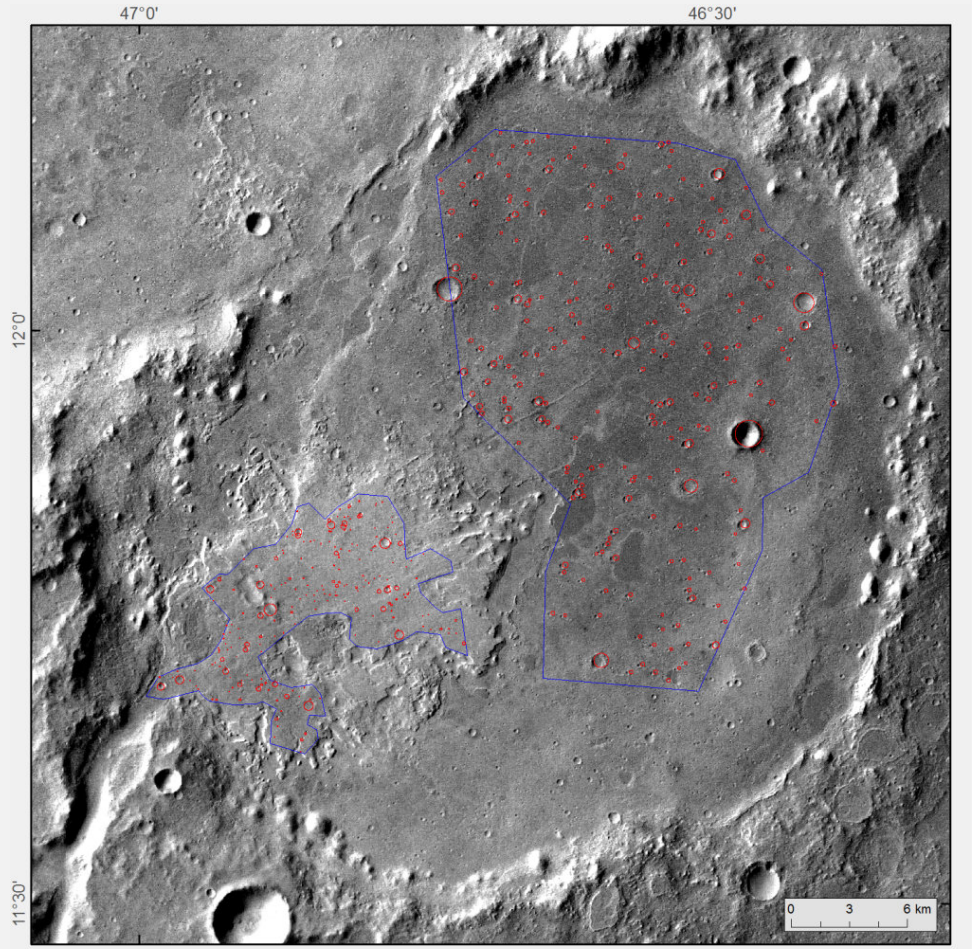
Data provided by John Carter

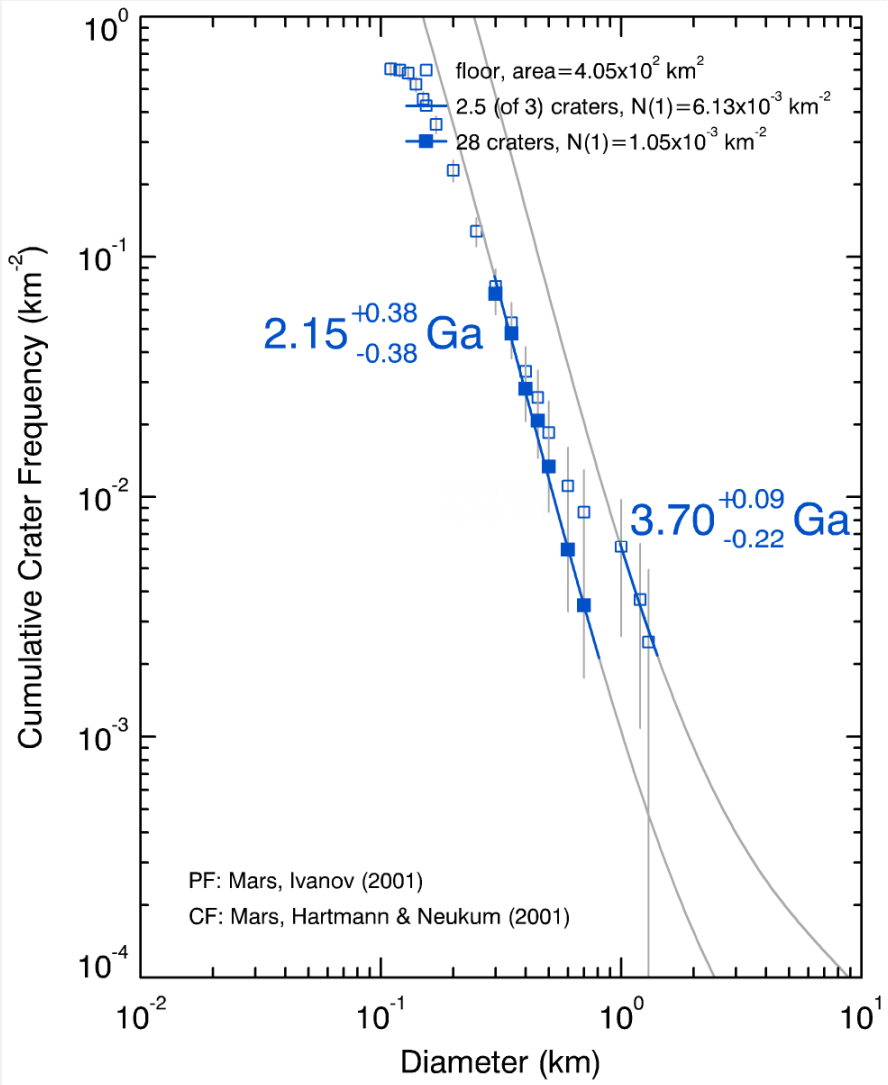


HRSC orbit
h0894_0000

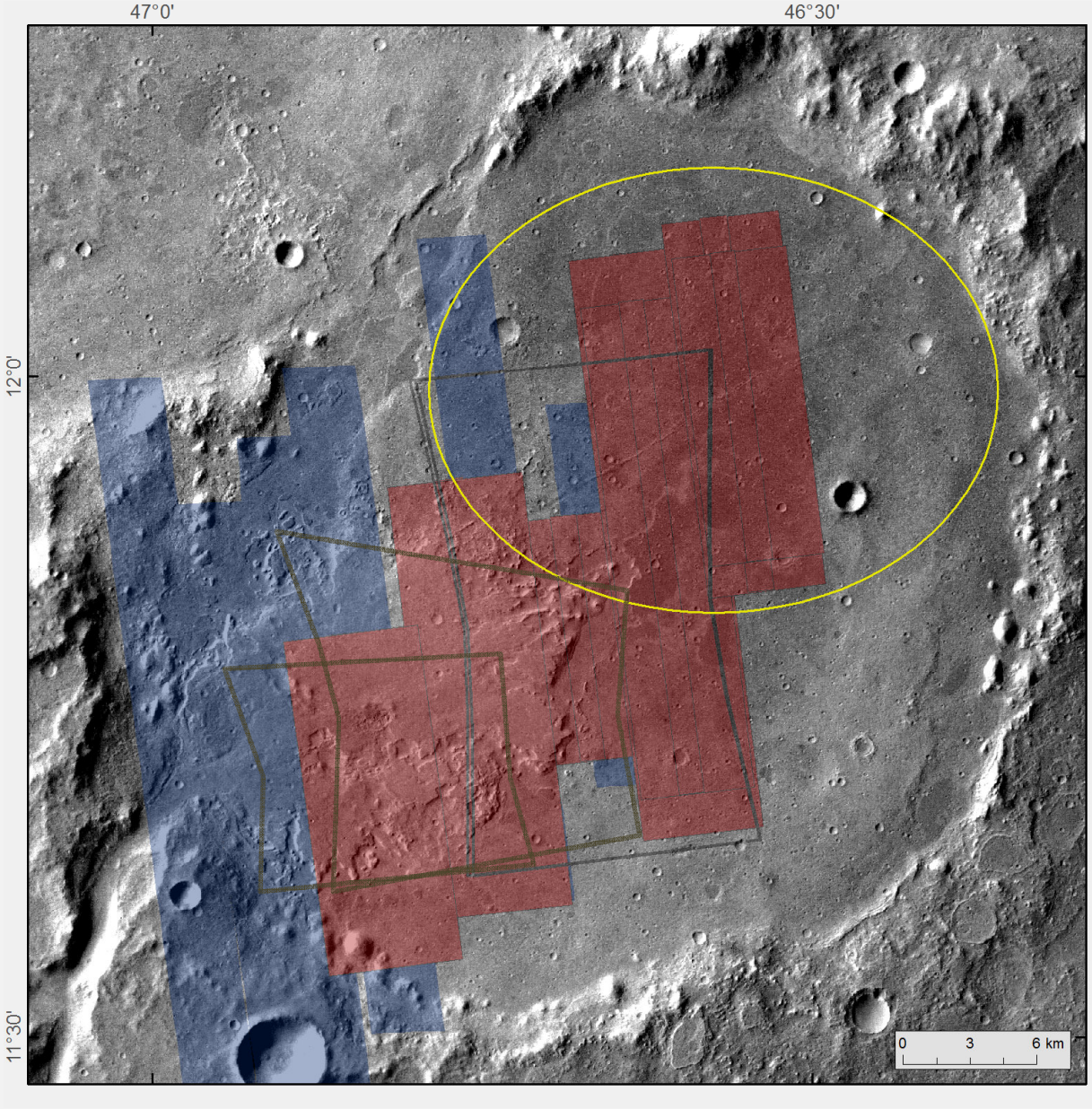


Hauber et al. (2013)





HRSC orbit
h0894_0000

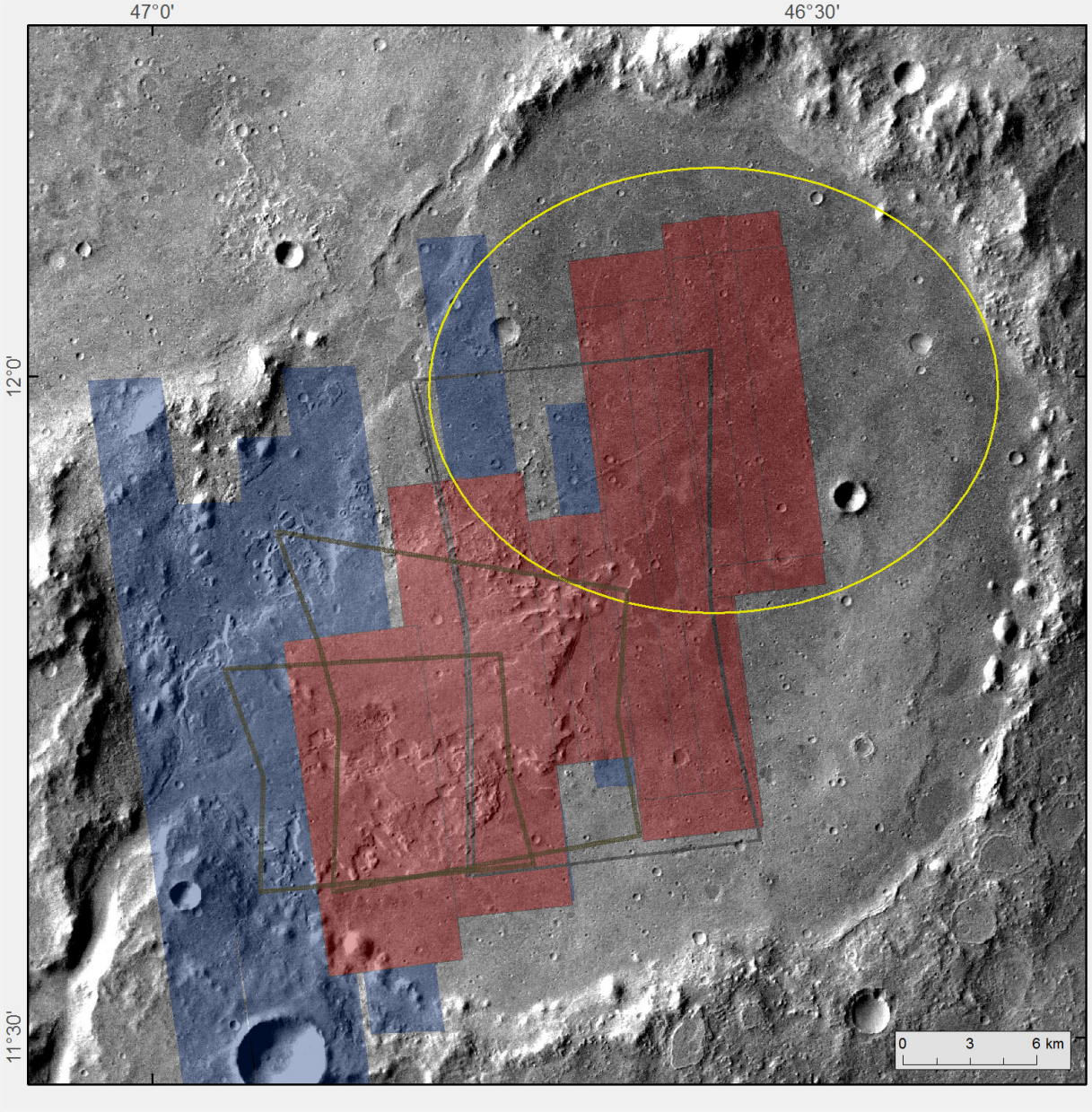


Coordinates of landing ellipse

11.990°N, 313.425°E
20 km × 25 km

HRSC orbit
h0894_0000

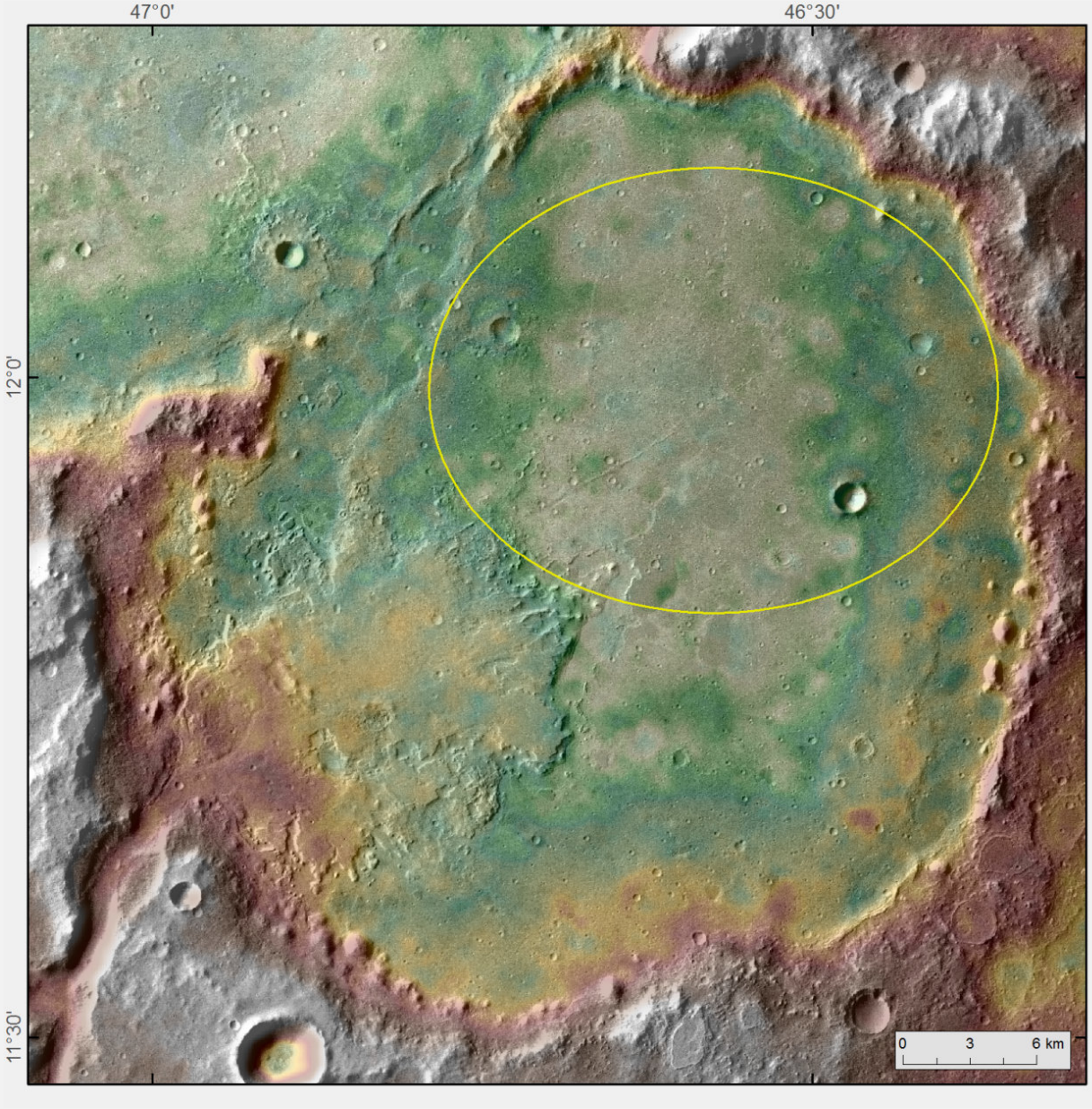
Data coverage



Full HRSC and CTX coverage

- CRISM
- HiRISE
- MOC-NA

HRSC orbit
h0894_0000



Elevation

HRSC DTM 75 m/px

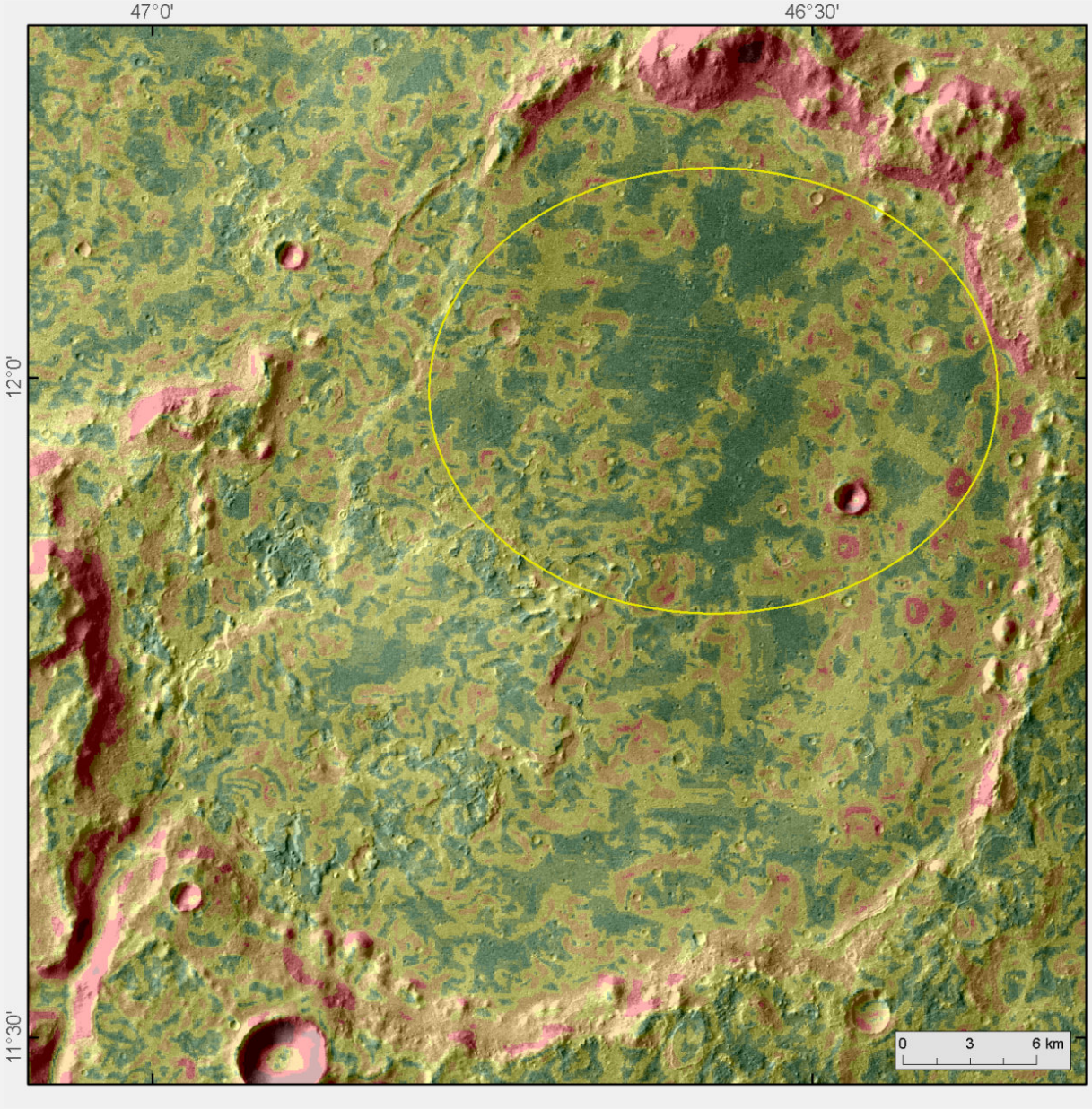
-2536 m

-2681 m
± 48 m

-2797 m

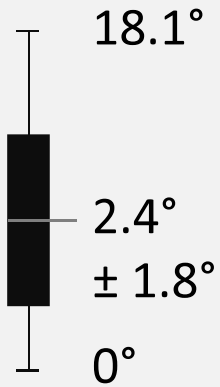
-1951 m -2808

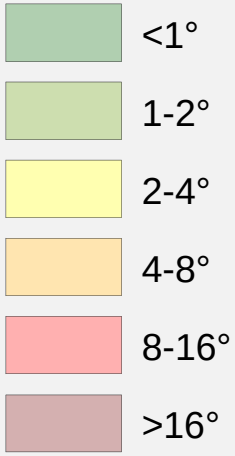
HRSC orbit
h0894_0000



Slope

HRSC DTM 75 m/px





HRSC orbit
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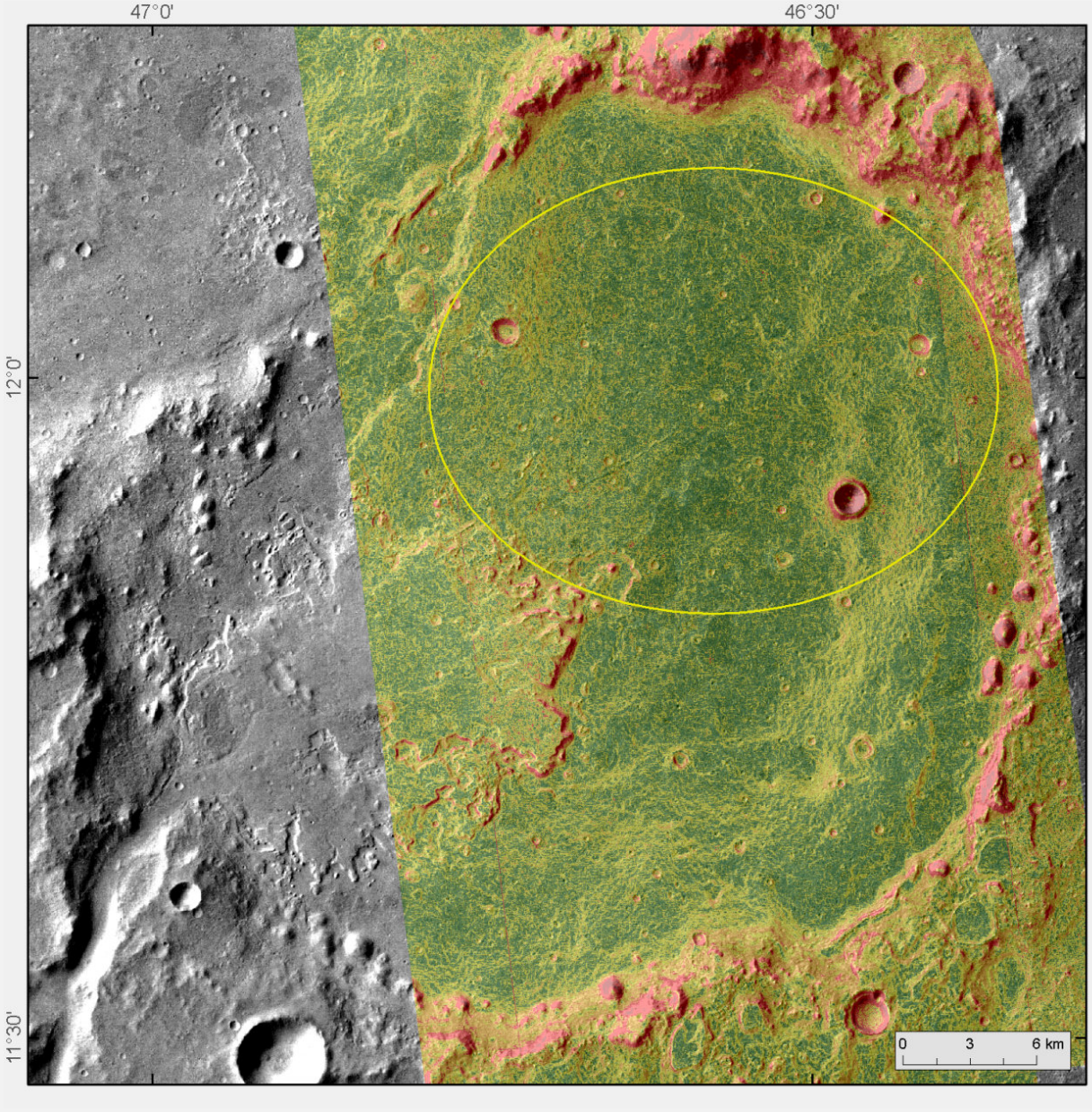
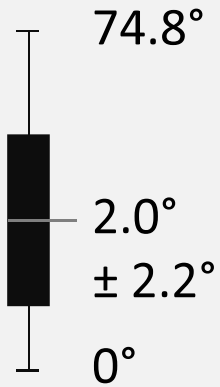
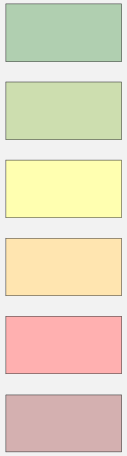


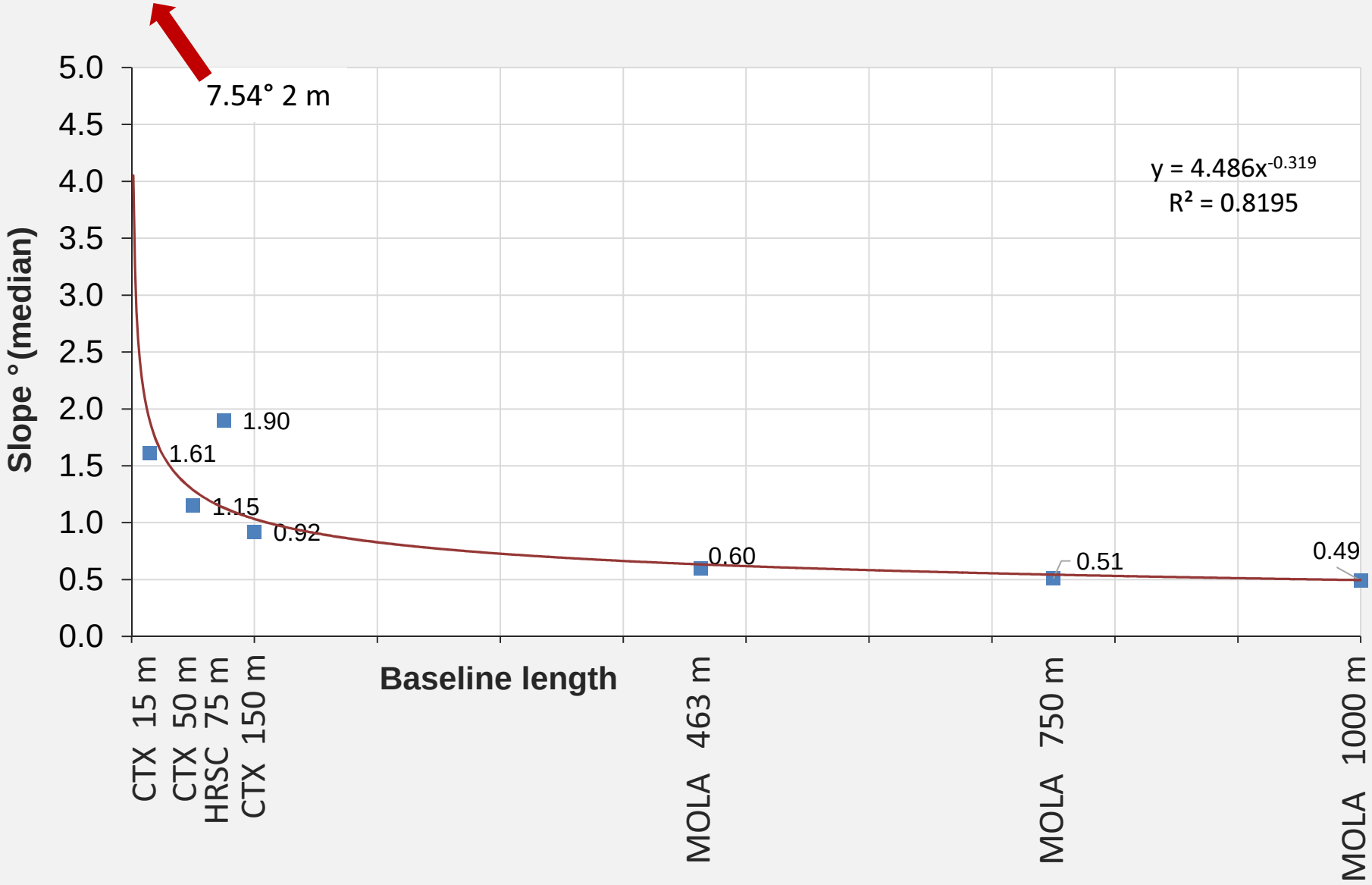
Slope

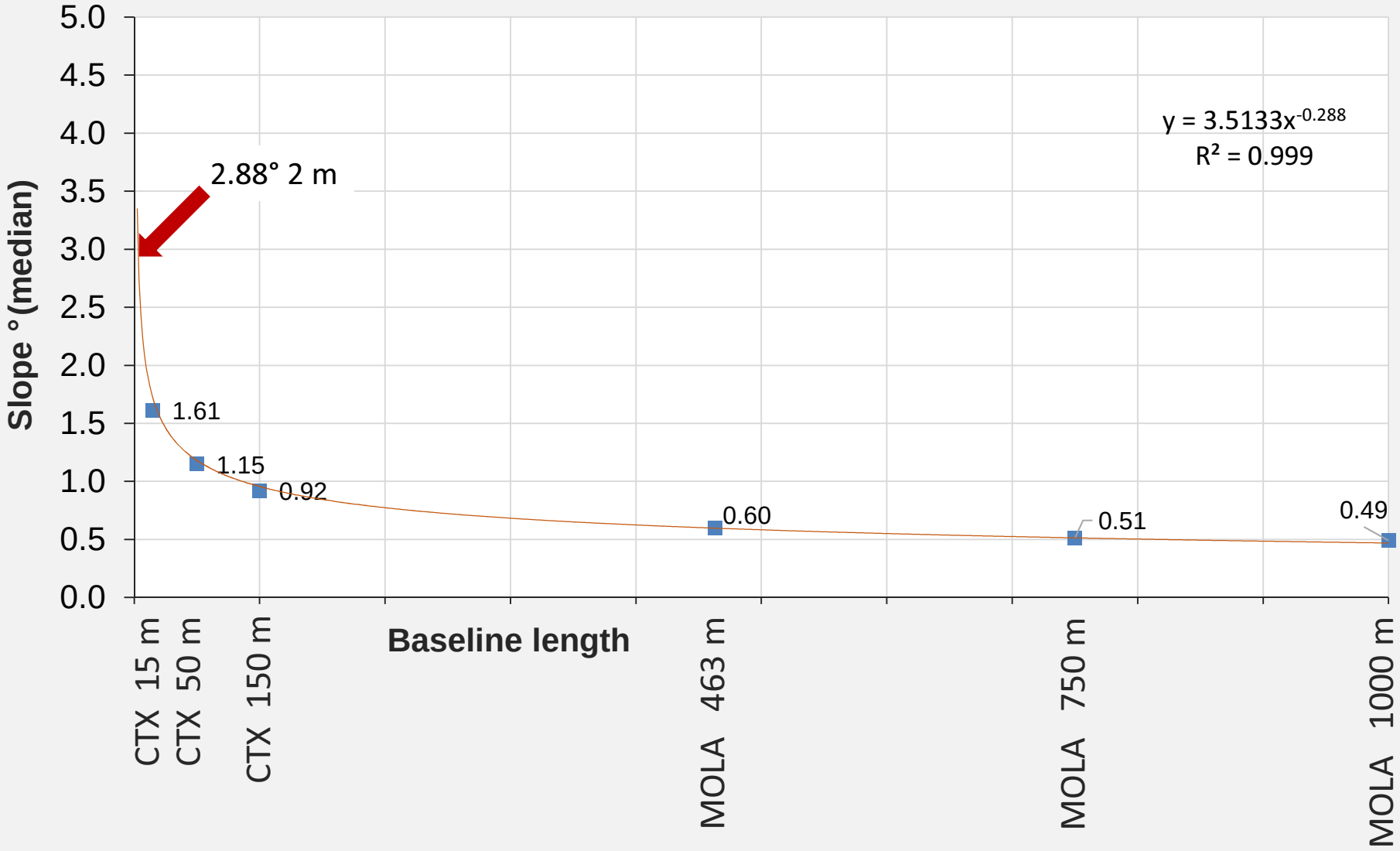
CTX DTM 15 m/px

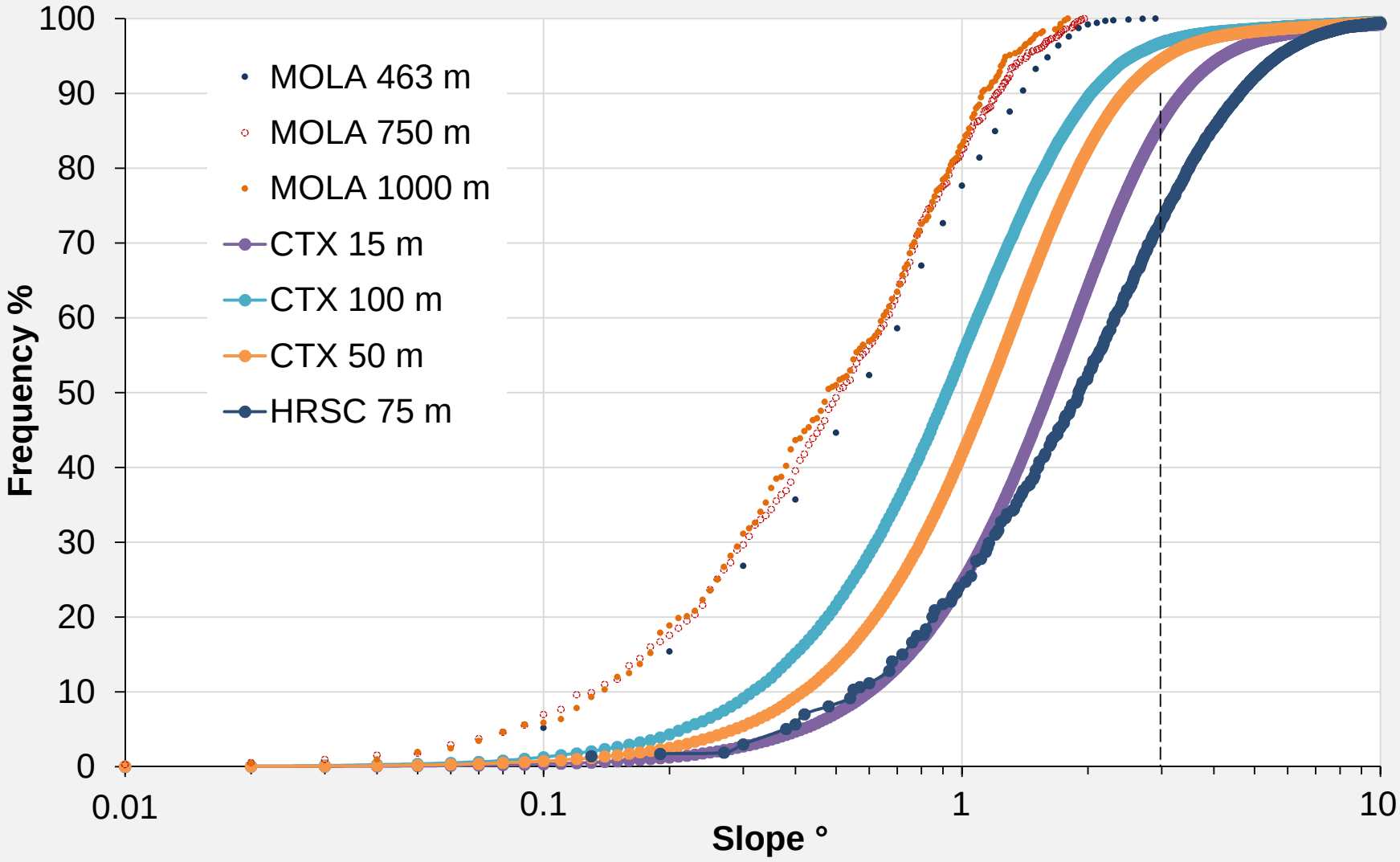


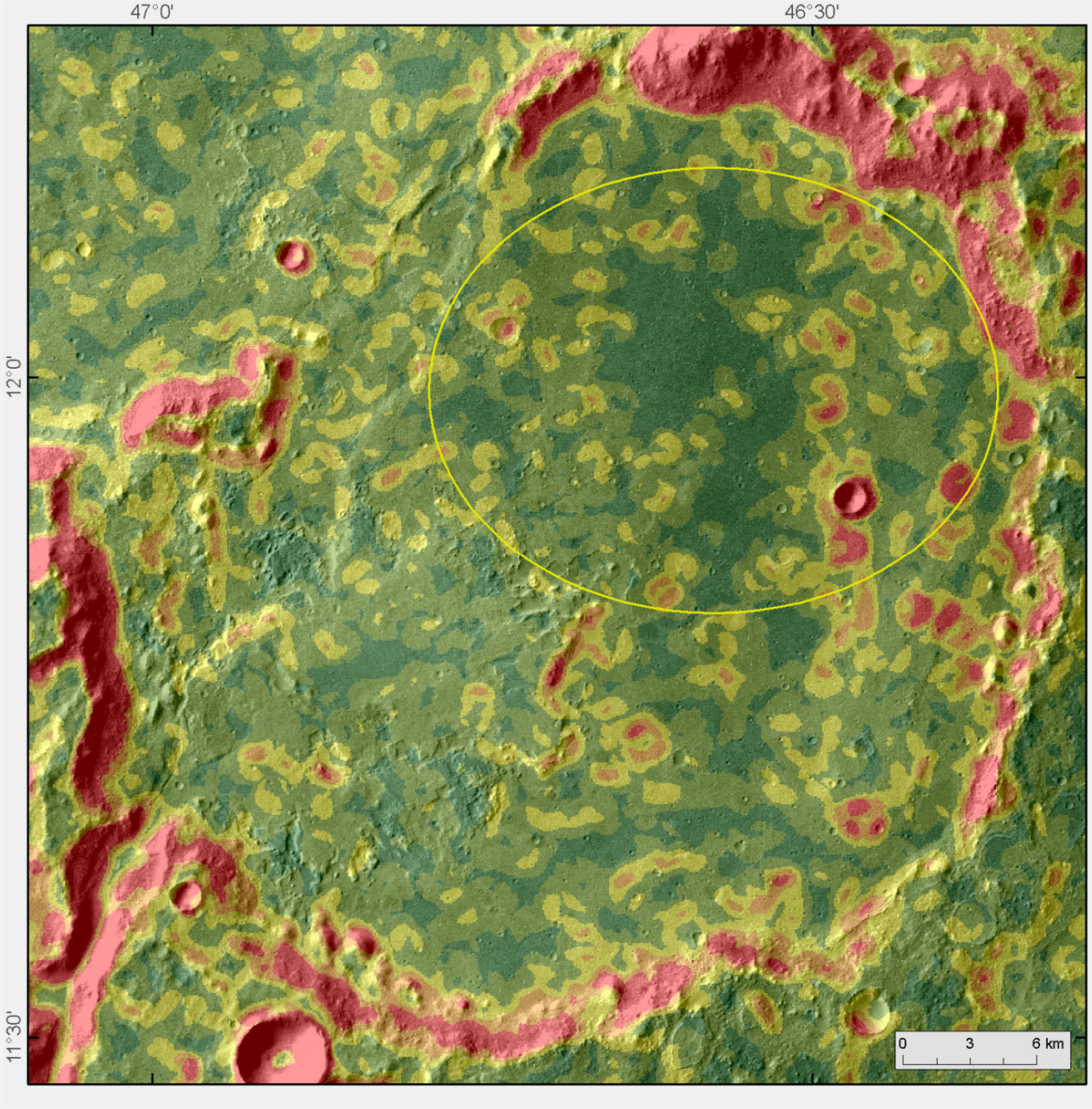


CTX DTM
D01_027656_1920
D07_029845_1921
D07_029990_1921
G23_027168_1920


7.54° 2 m
y = 4.486x-0.319
R² = 0.8195
Slope °(median)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1.90
1.61
1.15
0.92
0.60
0.51
0.49
Baseline length
CTX 15 m
CTX 50 m
HRSC 75 m
CTX 150 m
MOLA 463 m
MOLA 750 m
MOLA 1000 m


5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Slope °(median)
2.88° 2 m
y = 3.5133x-0.288
R² = 0.999
1.61
1.15
0.92
0.60
0.51
0.49
CTX 15 m
CTX 50 m
CTX 150 m
MOLA 463 m
MOLA 750 m
MOLA 1000 m
Baseline length


MOLA 463 m
MOLA 750 m
MOLA 1000 m
CTX 15 m
CTX 100 m
CTX 50 m
HRSC 75 m
Frequency %
Slope °
100
90
80
70
60
50
40
30
20
10
0
0.01
0.1
1
10



Relief (500 m radius)
HRSC DTM 75 m/px

208 m

39.3 m
± 22.8 m

3 m

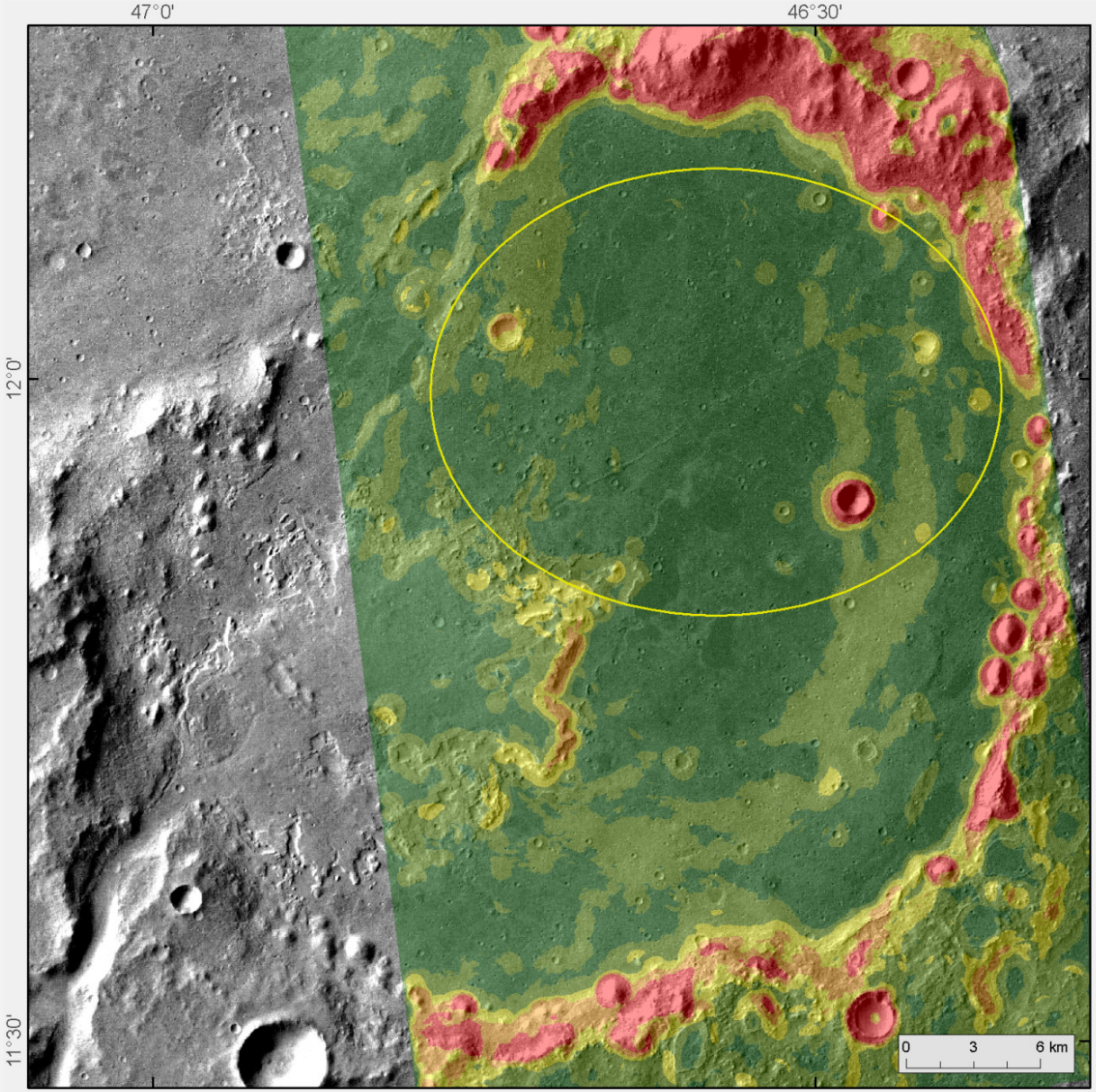
<25 m

25-50 m

50-75 m

75-100 m

>100 m

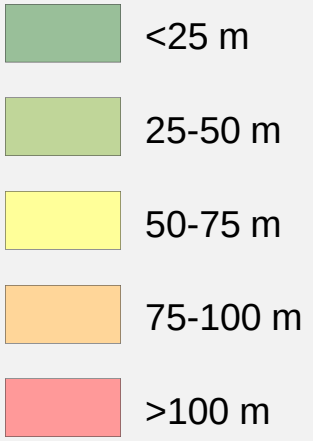


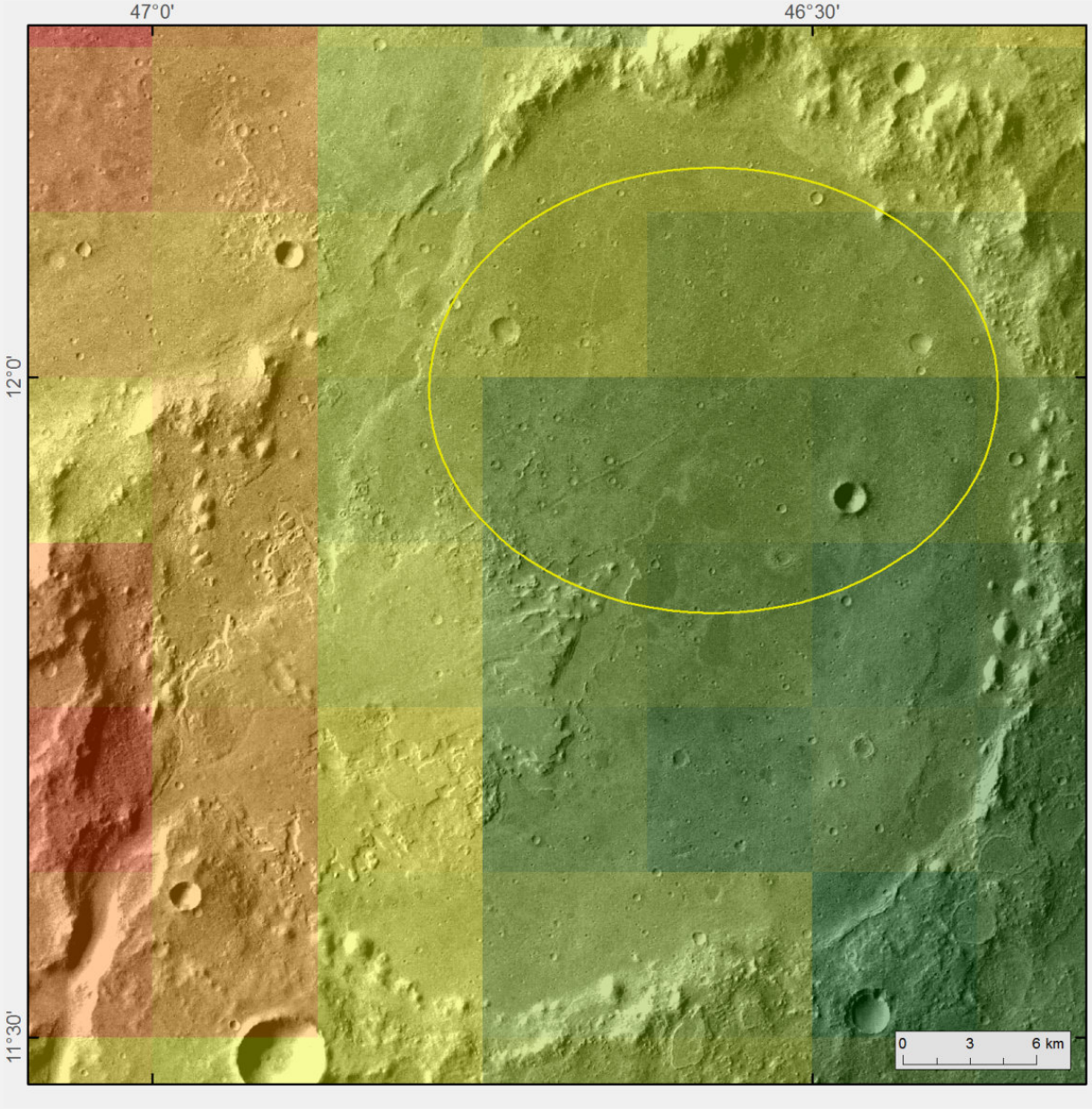
Relief (500 m radius)
CTX DTM 15 m/px

319 m

22.8 m
± 22.9 m

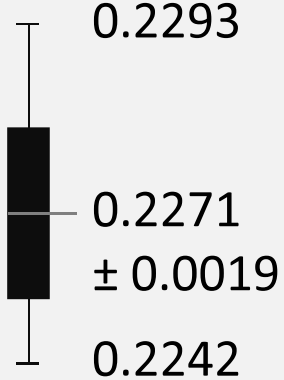
4.8 m



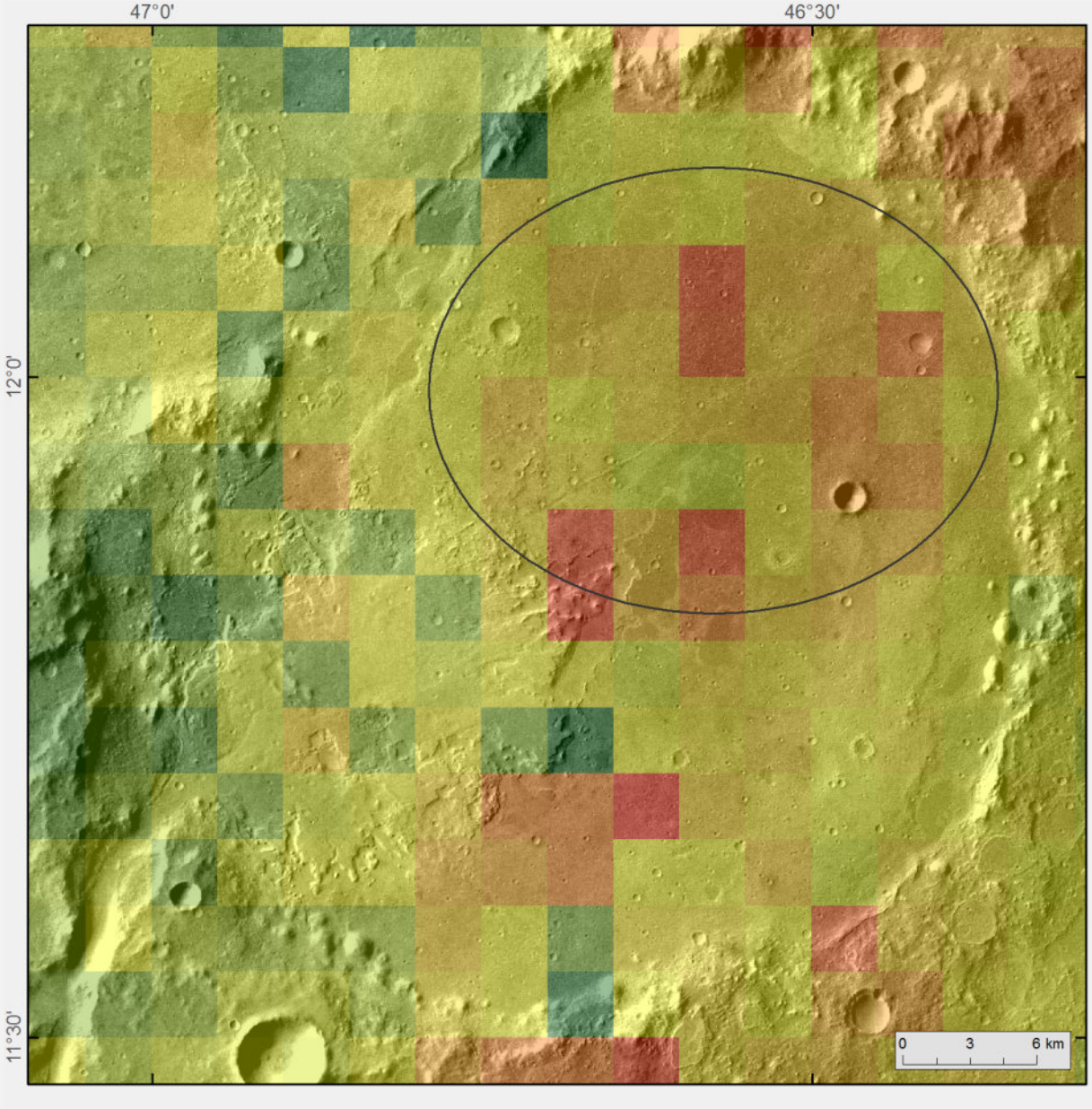


Albedo

TES 7.4 km/px



Christensen et al. (2001)



Thermal inertia

TES nighttime 2.96 km/px

338

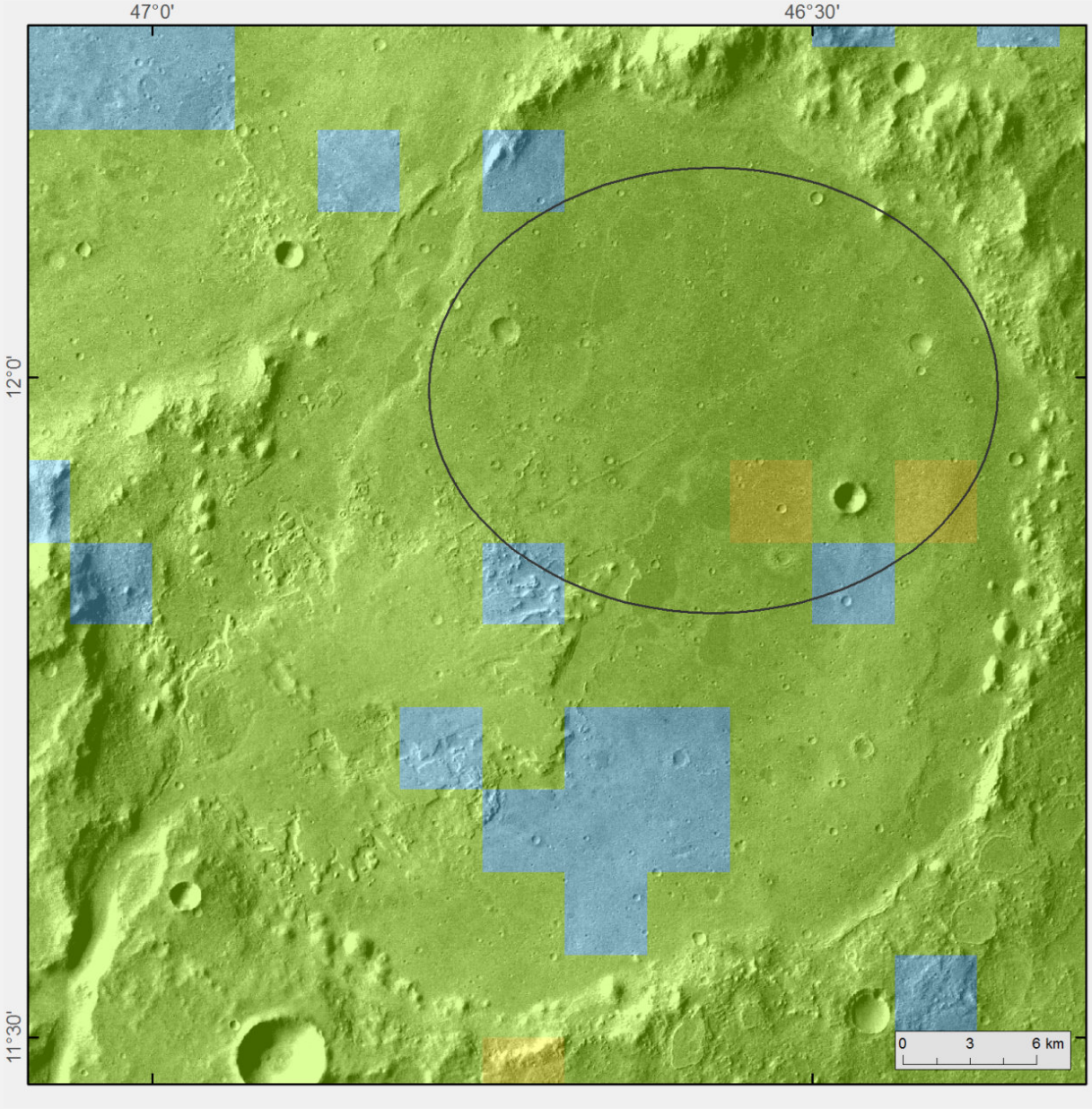
294 J m^{-2} K^{-1} $s^{-0.5}$

± 19

259

159 J m^{-2} K^{-1} $s^{-0.5}$ 347

Putzig et al. (2007)



Dust Cover Index

TES 2.96 km/px

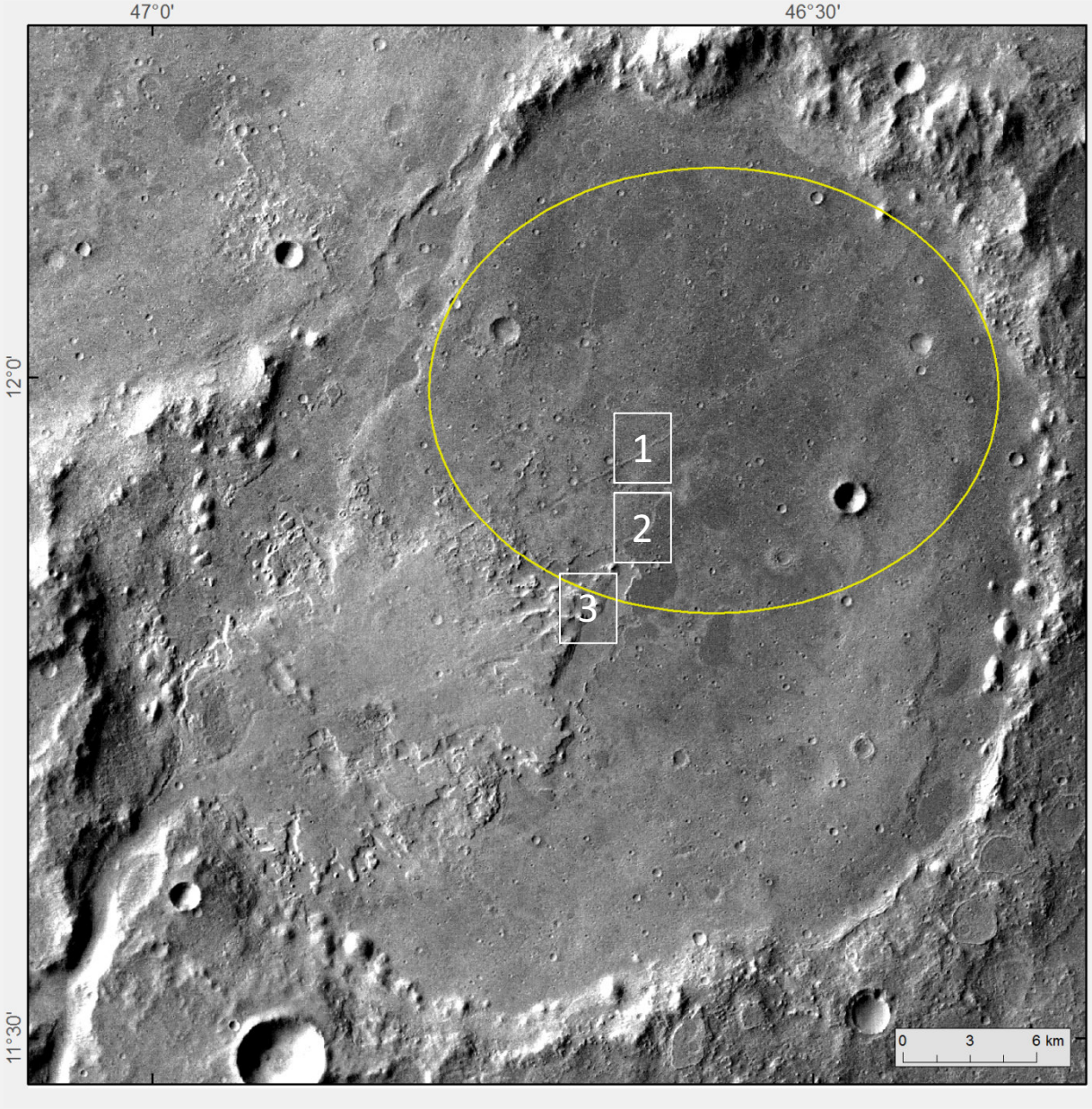
0.9646

0.9511
± 0.0066

0.9272

- 0.85-0.90
- 0.90-0.92
- 0.92-0.94
- 0.94-0.96
- 0.96-0.98
- 0.98 - 1

Ruff and Christensen (2002)



Regions of Interest

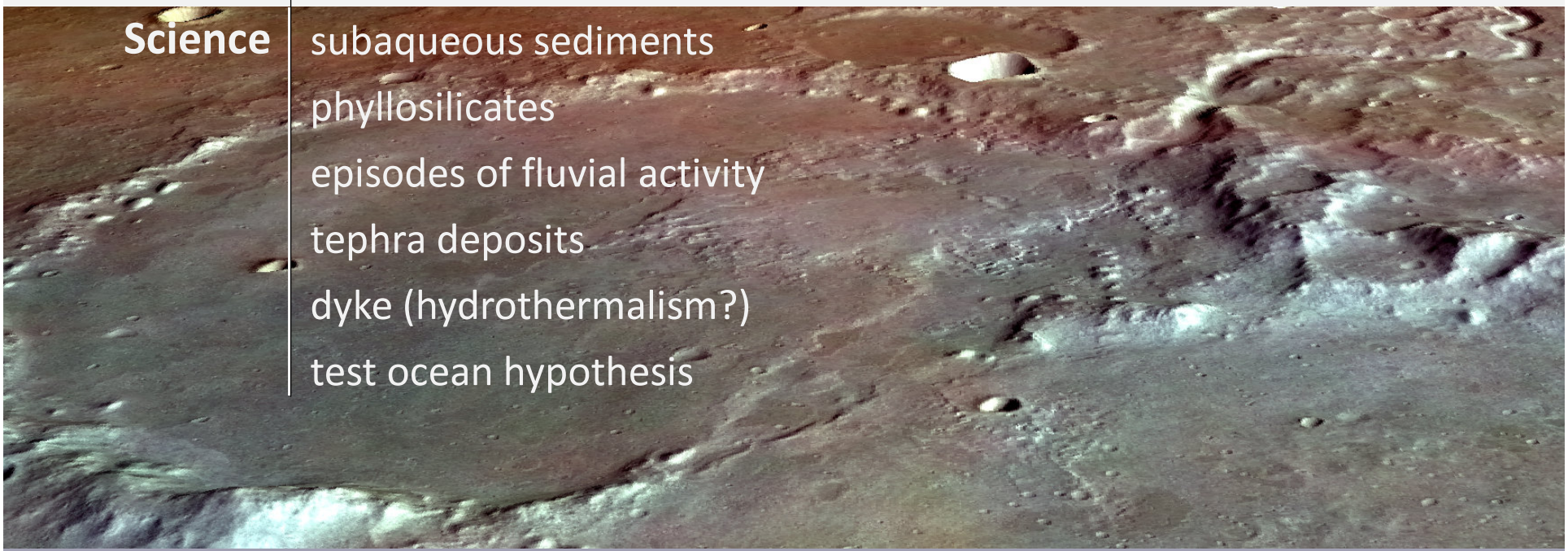
(1) Dyke/floor material

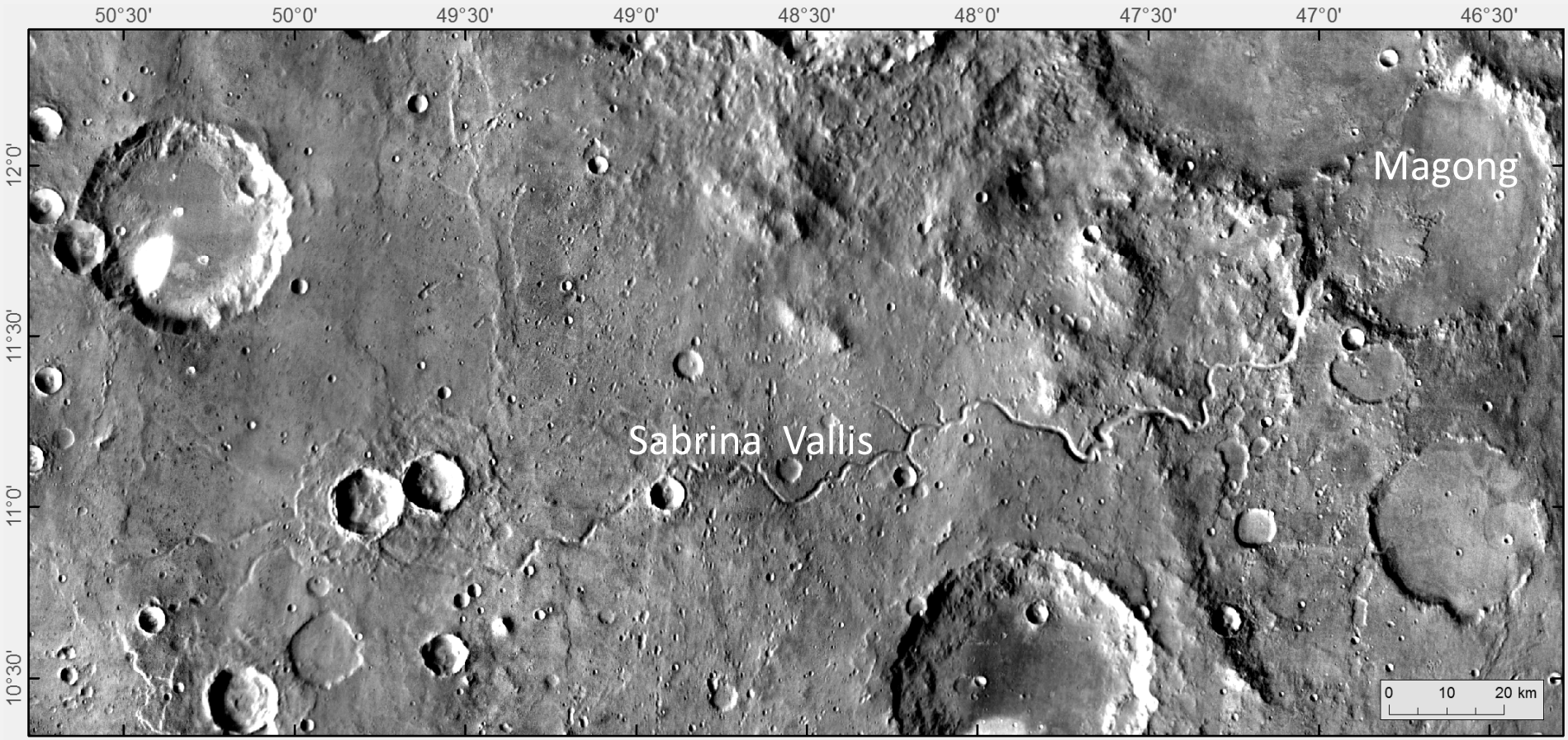
(2) Tephra/floor material

(3) Delta

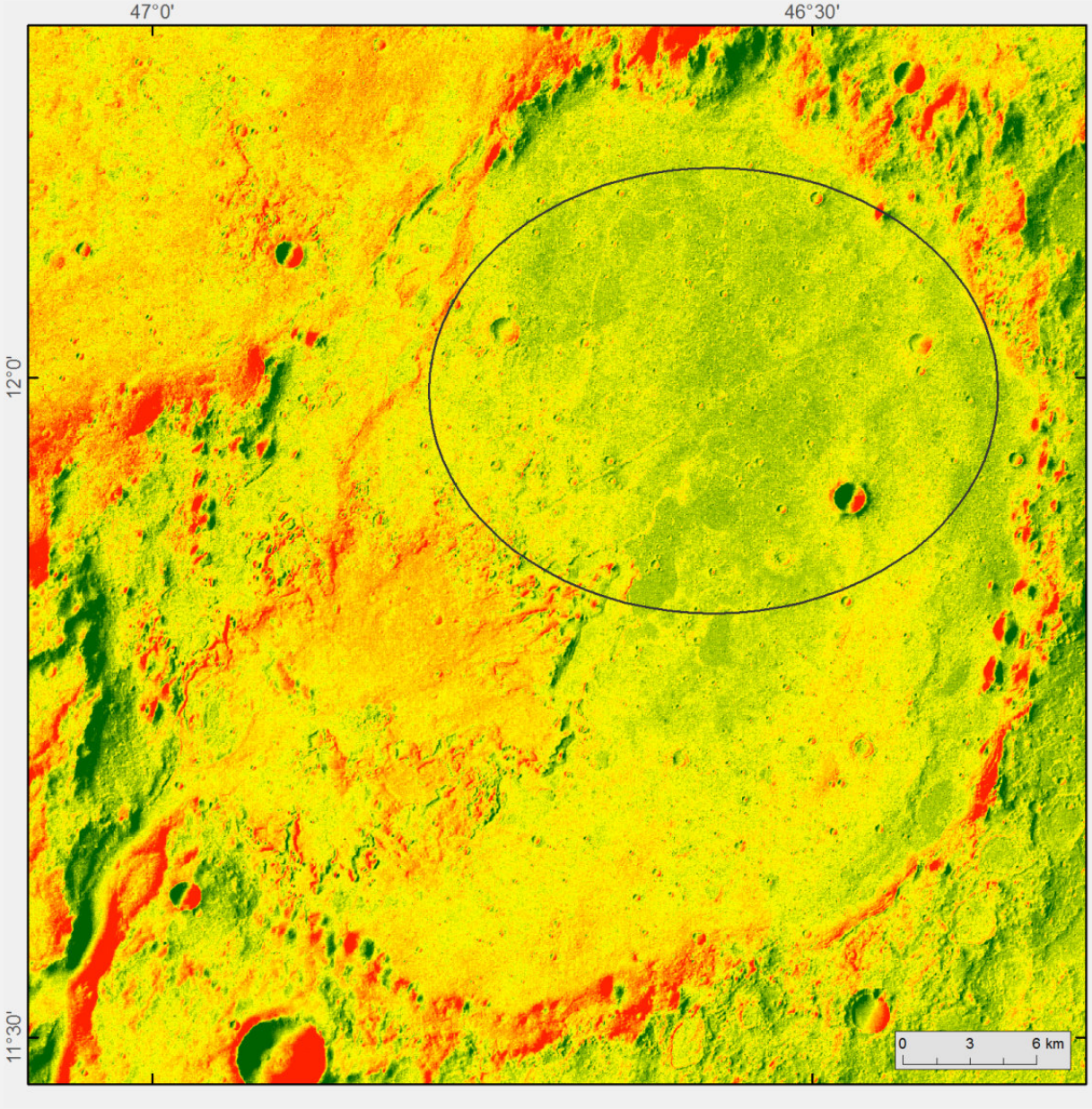
HRSC orbit
h0894_0000

Site name	Sabrina delta (Magong crater)
Coordinates	11.990°N, 313.425°E
Elevation	-2681 m ± 48 m (wrt MOLA areoid)
Slope	2.4° ± 1.8°
Relief	39.3 m ± 22.8 m (1 km baseline length)
Albedo	0.2271 ± 0.0019 (TES)
Thermal inertia	>259 J m^{-2} K^{-1} $s^{-0.5}$ (TES)
Science	subaqueous sediments phyllosilicates episodes of fluvial activity tephra deposits dyke (hydrothermalism?) test ocean hypothesis





THEMIS IRday



TOA albedo
HRSC h0894_0000

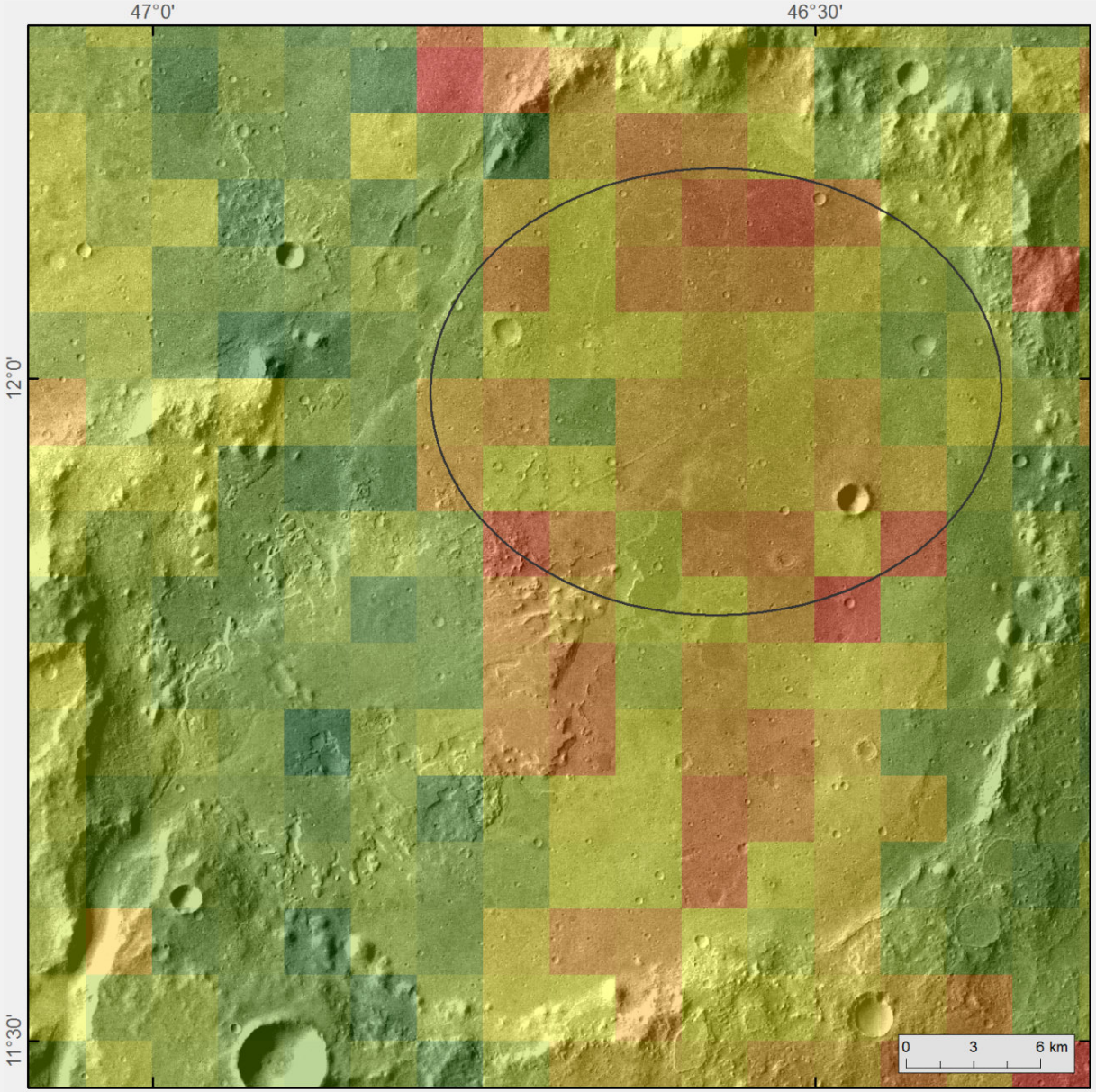
0.1377

0.1035
± 0.0033

0.0646

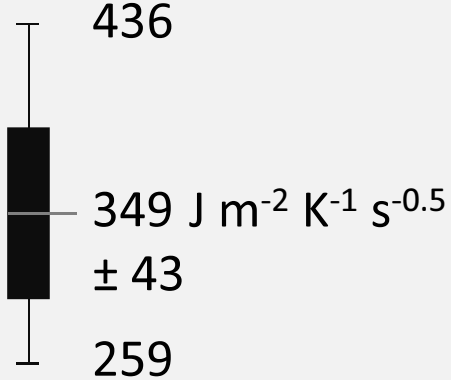
0.067 0.156

HRSC orbit
h0894_0000



Thermal inertia

TES daytime 2.96 km/px



Putzig et al. (2007)