

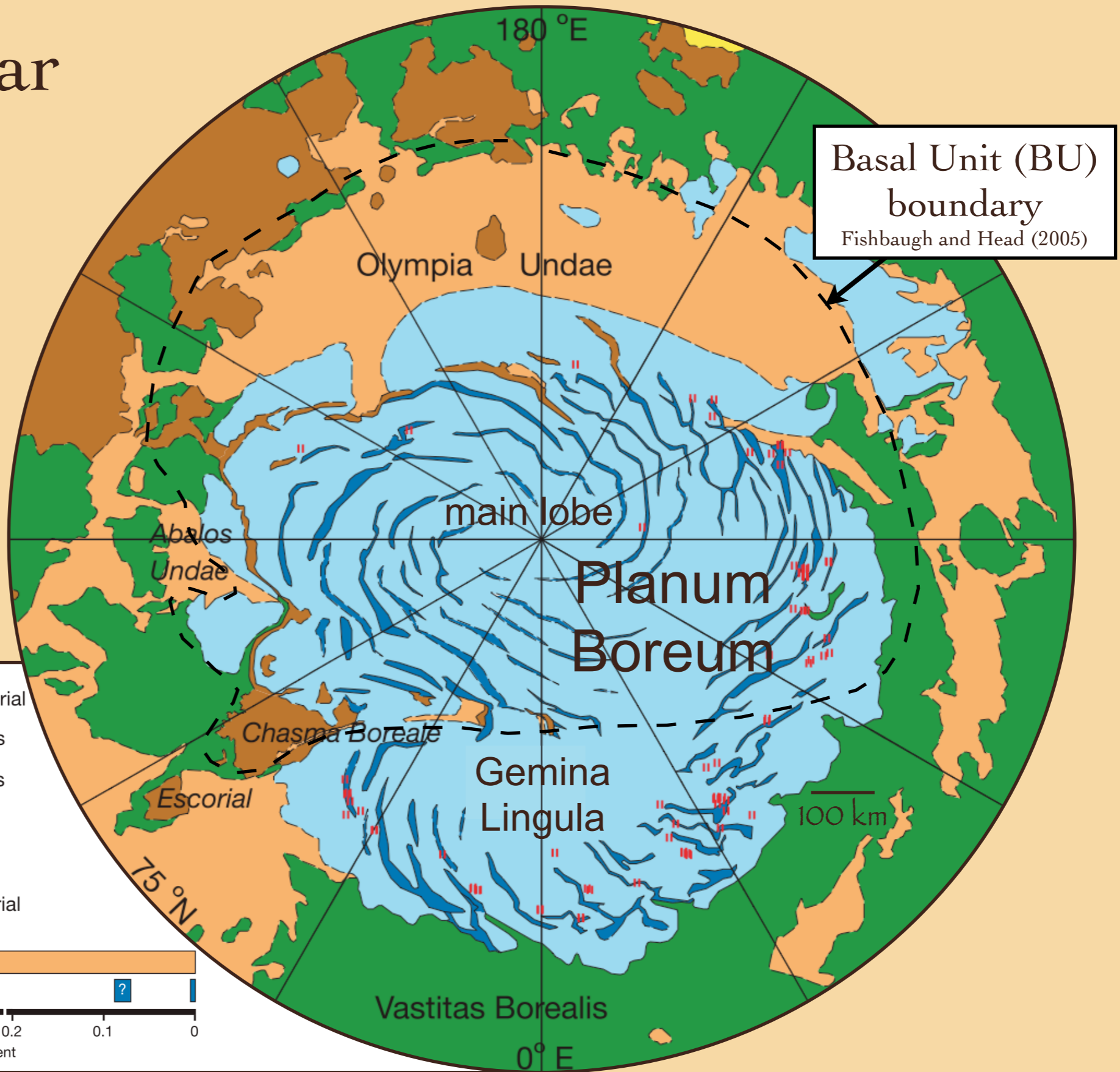
Subsurface Structure of Planum Boreum on Mars from Shallow Radar (SHARAD) Soundings

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Roberto Seu², Daniella Biccari², Ali Safaeinili³,
John W. Holt⁴, Jeffrey J. Plaut³, Athony F. Egan¹
and the SHARAD Team

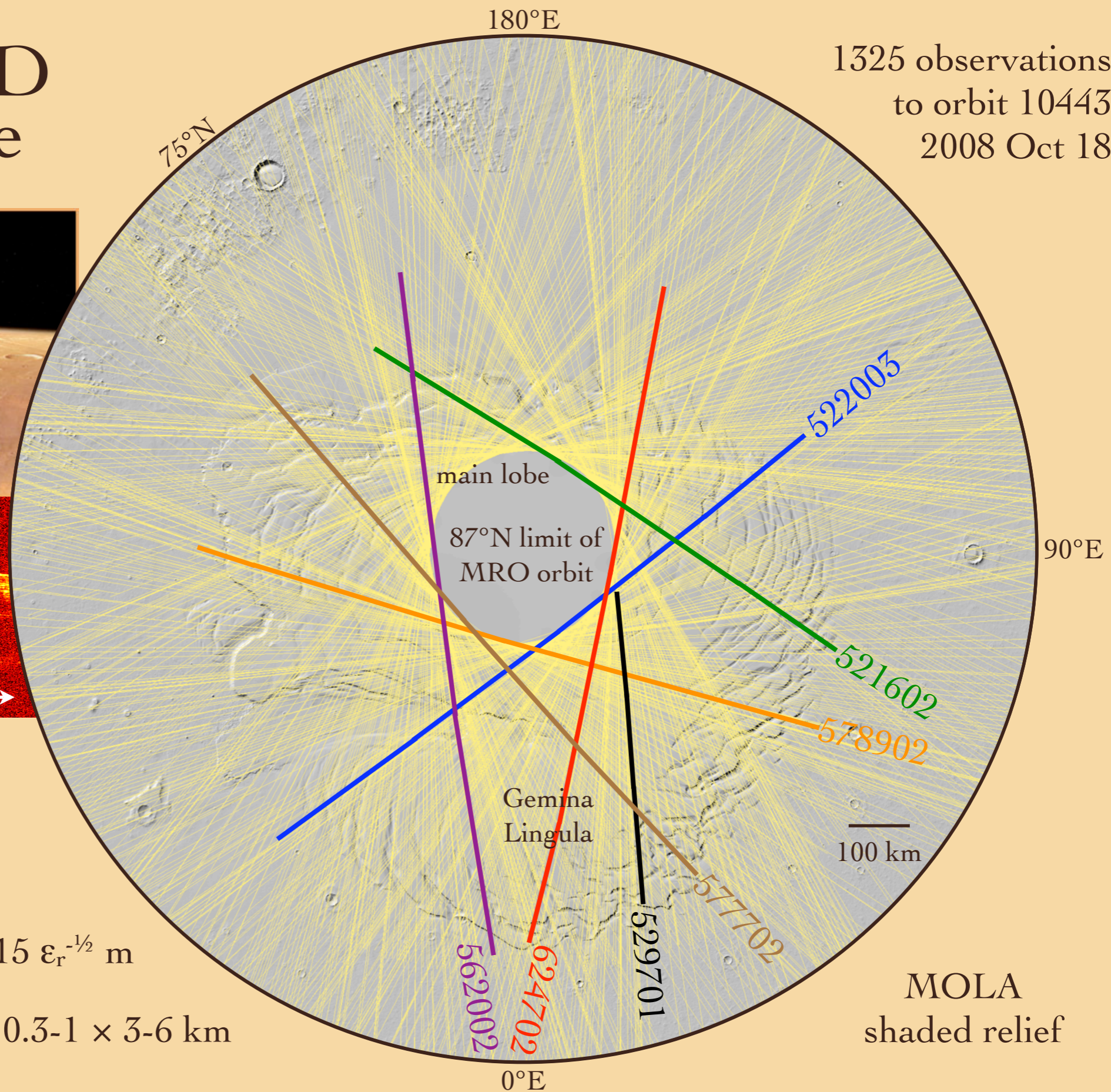
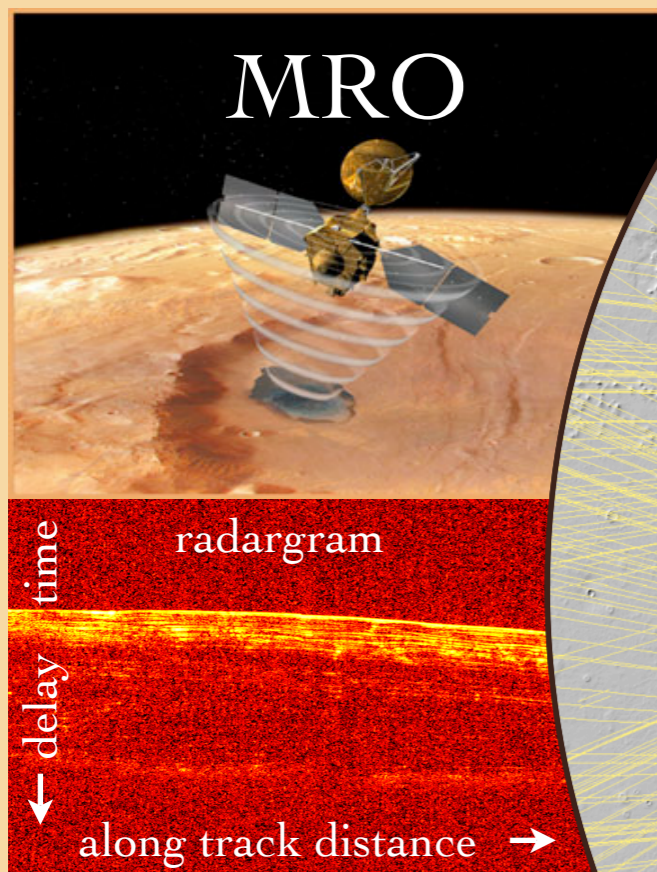
North polar geology

Tanaka (2005)
Nature 437, 992

USGS
nomenclature



SHARAD coverage

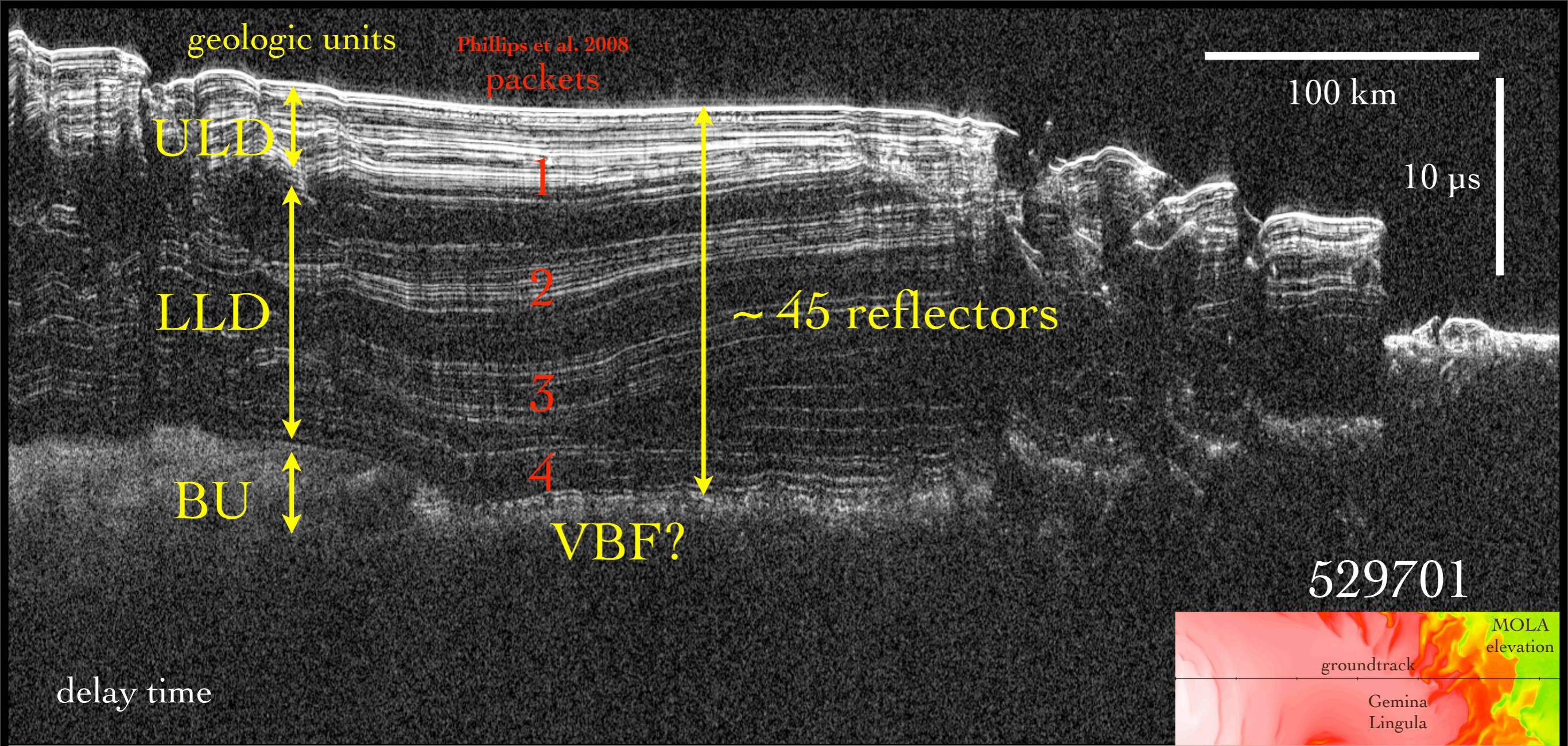


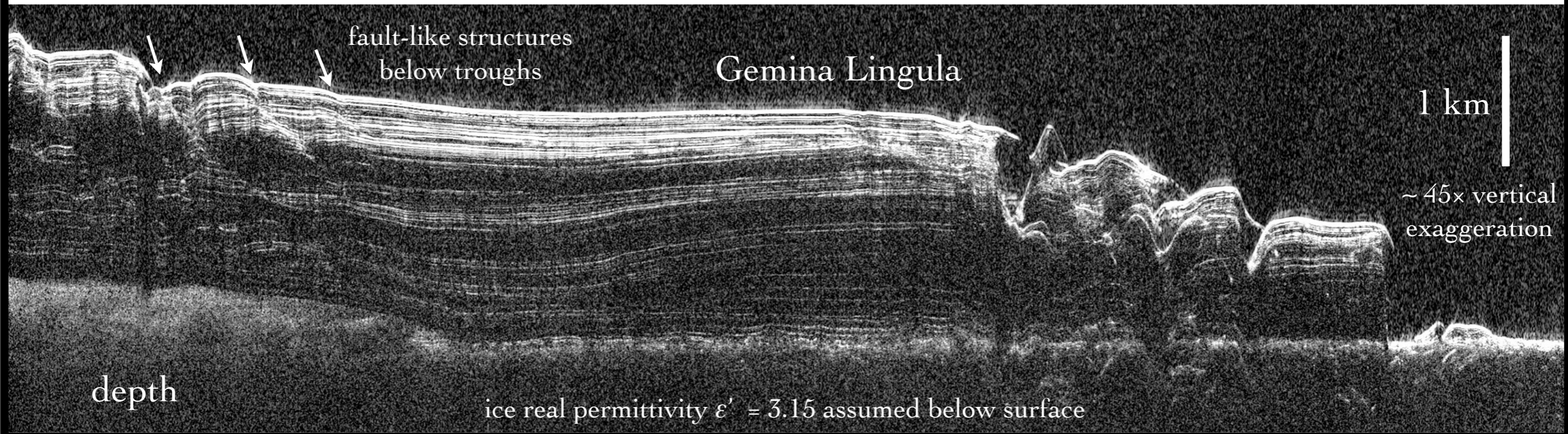
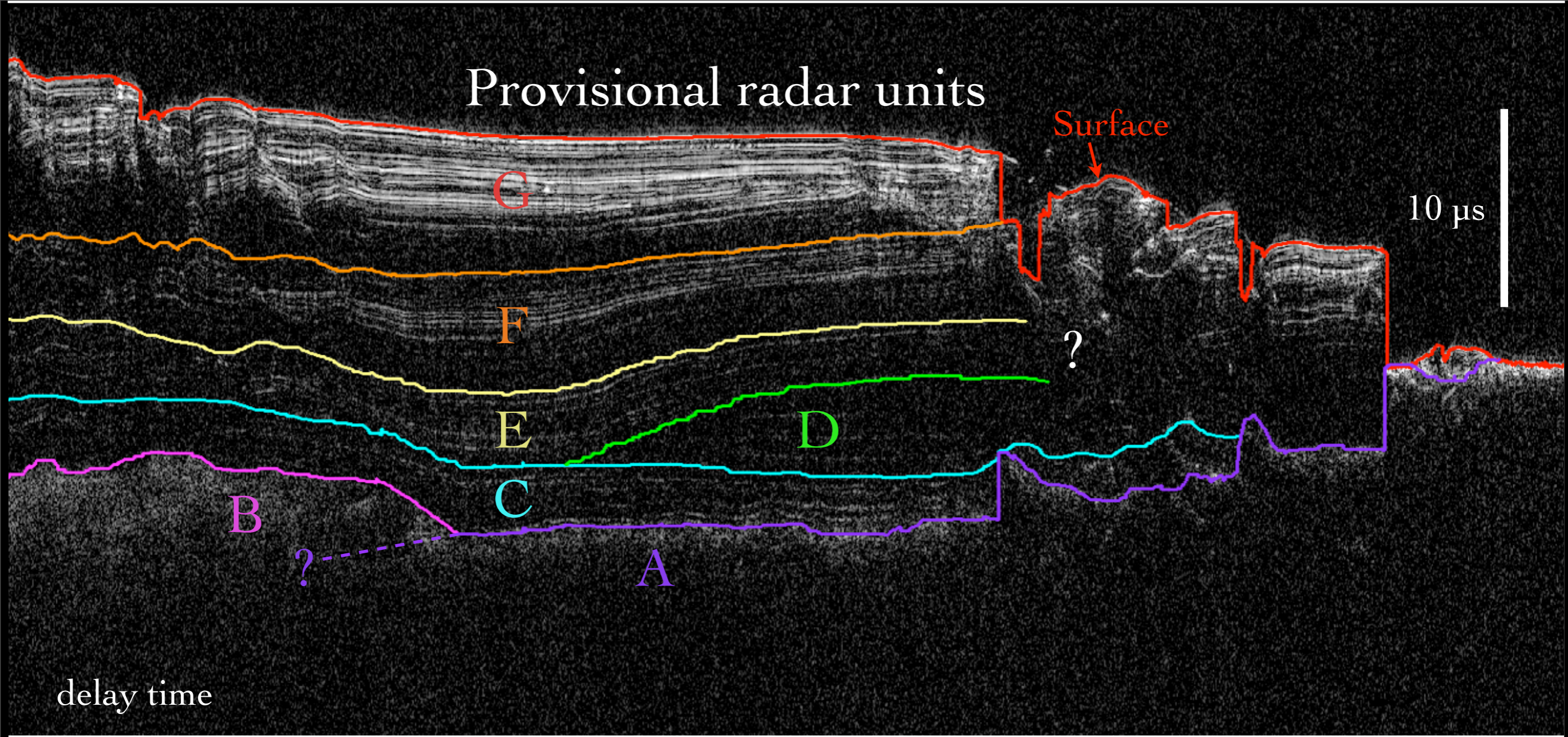
orbit: 255-320 km

band: 15-25 MHz

range resolution: $15 \epsilon_r^{-1/2}$ m

lateral resolution: $0.3-1 \times 3-6$ km





SeisWare interpretation

100 km

Surface

G

F

E

C

B

D

A

?

?

?

delay time

624702

main lobe

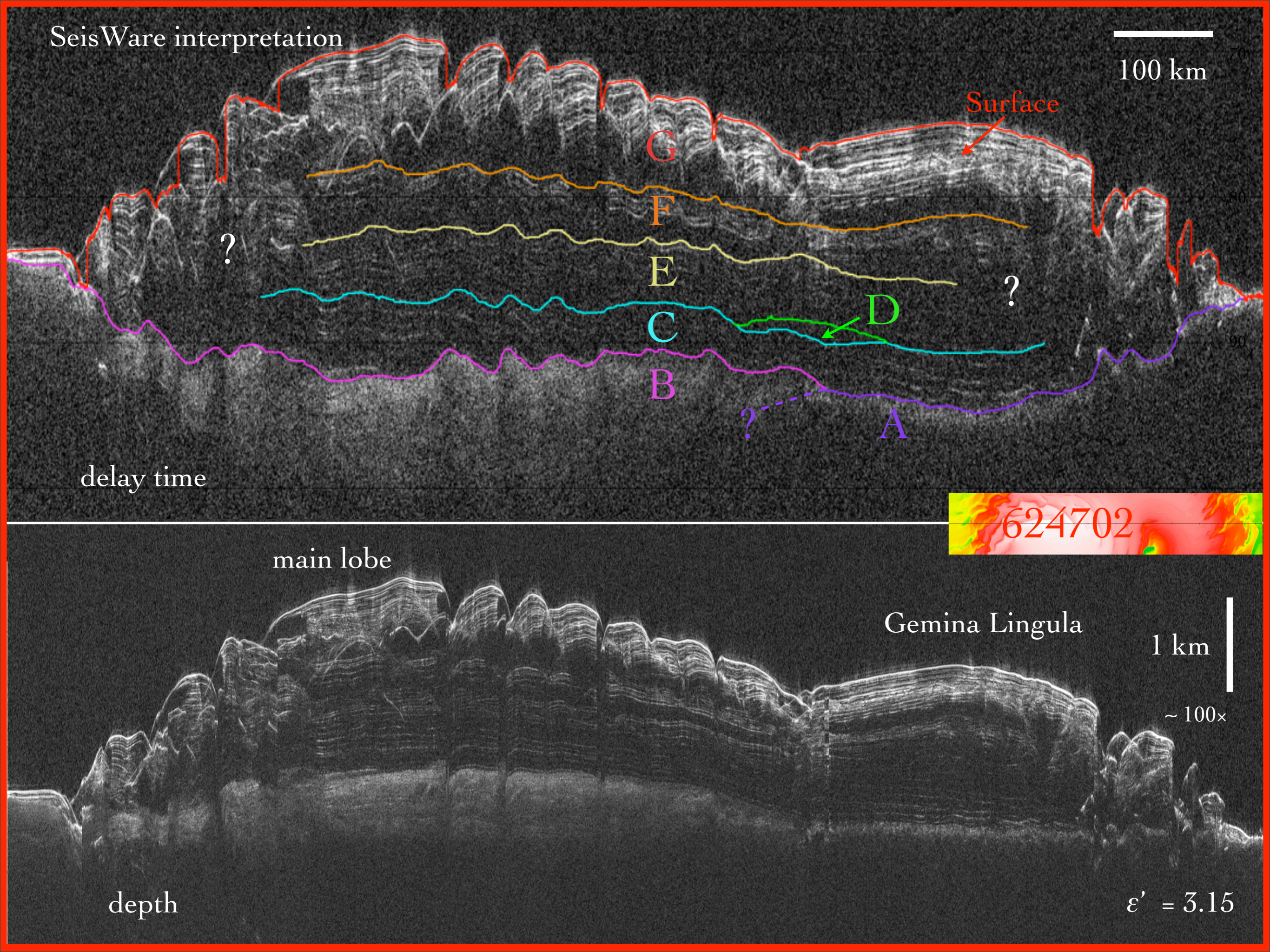
Gemina Lingula

1 km

~ 100x

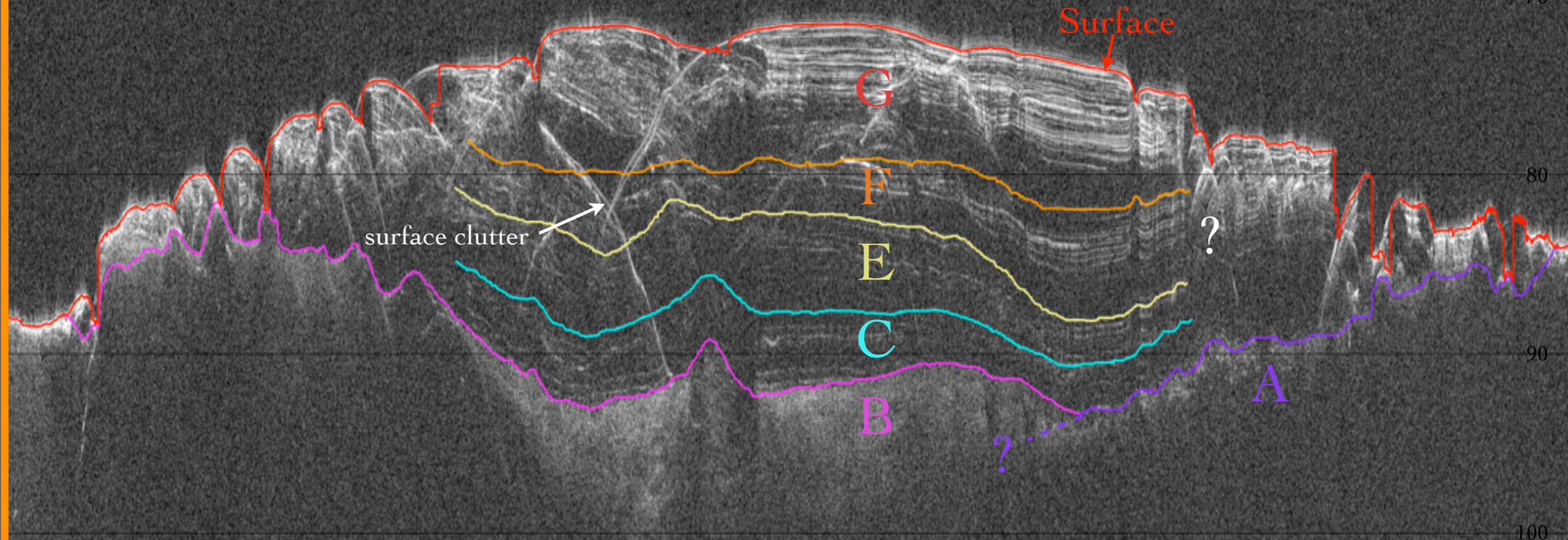
depth

$\epsilon' = 3.15$



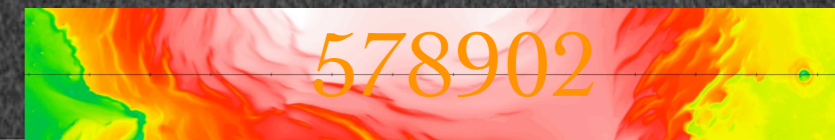
SeisWare interpretation

100 km



delay time

surface clutter



main lobe

1 km

~ 100x

depth

$\epsilon' = 3.15$

This panel shows a detailed view of the 'main lobe' of the seismic data. The vertical axis is labeled 'depth'. A scale bar indicates 1 km, and the magnification is noted as ~ 100x. The parameter $\epsilon' = 3.15$ is displayed in the bottom right corner.

SeisWare interpretation

surface clutter

Surface

100 km

70

80

90

100

A

?

?

G

F

E

C

B

A

?

?

A

?

?

delay time

522003

main lobe

Gemina Lingula

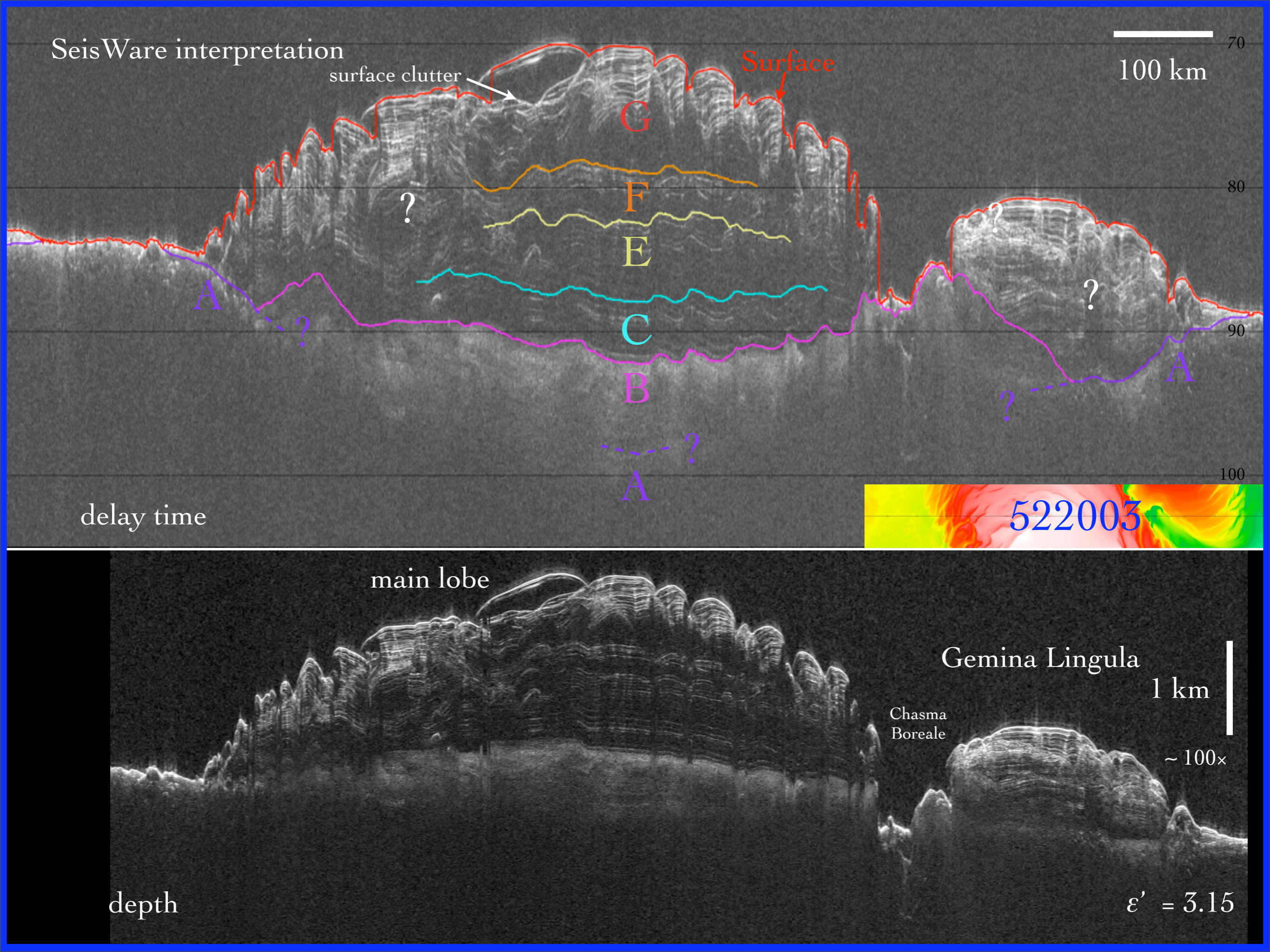
Chasma Boreale

1 km

~ 100x

depth

$\epsilon' = 3.15$



SeisWare interpretation

100 km

70

80

90

Surface

G

F

E

C

B

A

?

?

?

delay time

562002

main lobe

Gemina Lingula

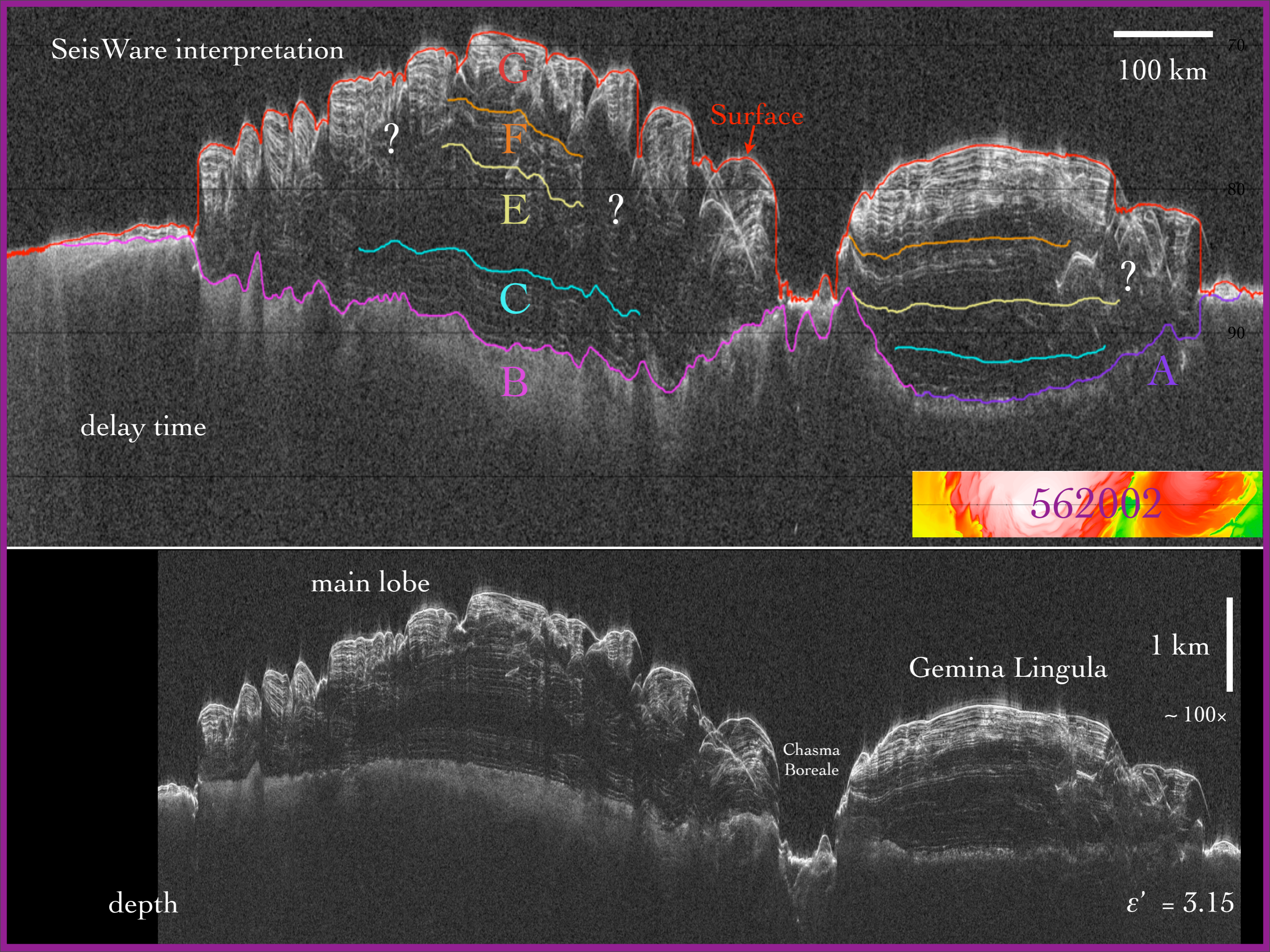
1 km

~ 100x

Chasma Boreale

depth

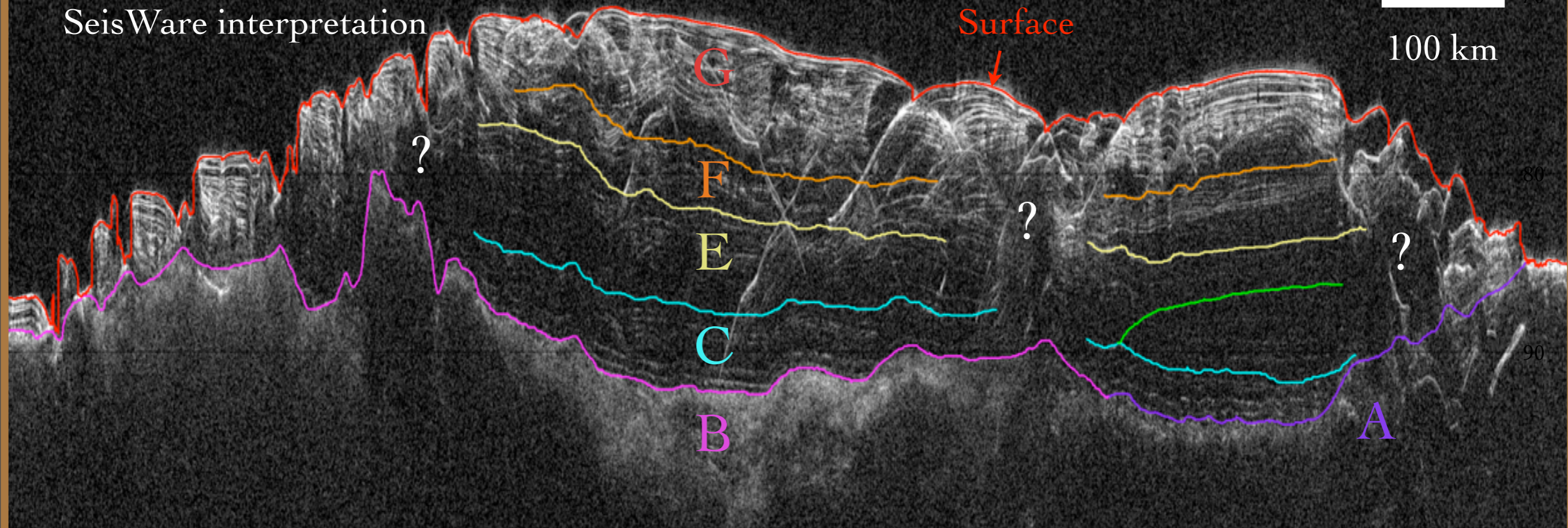
$\epsilon' = 3.15$



SeisWare interpretation

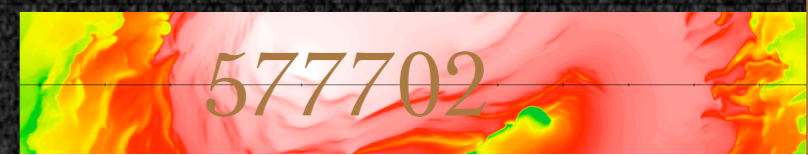
Surface

100 km



delay time

577702



main lobe

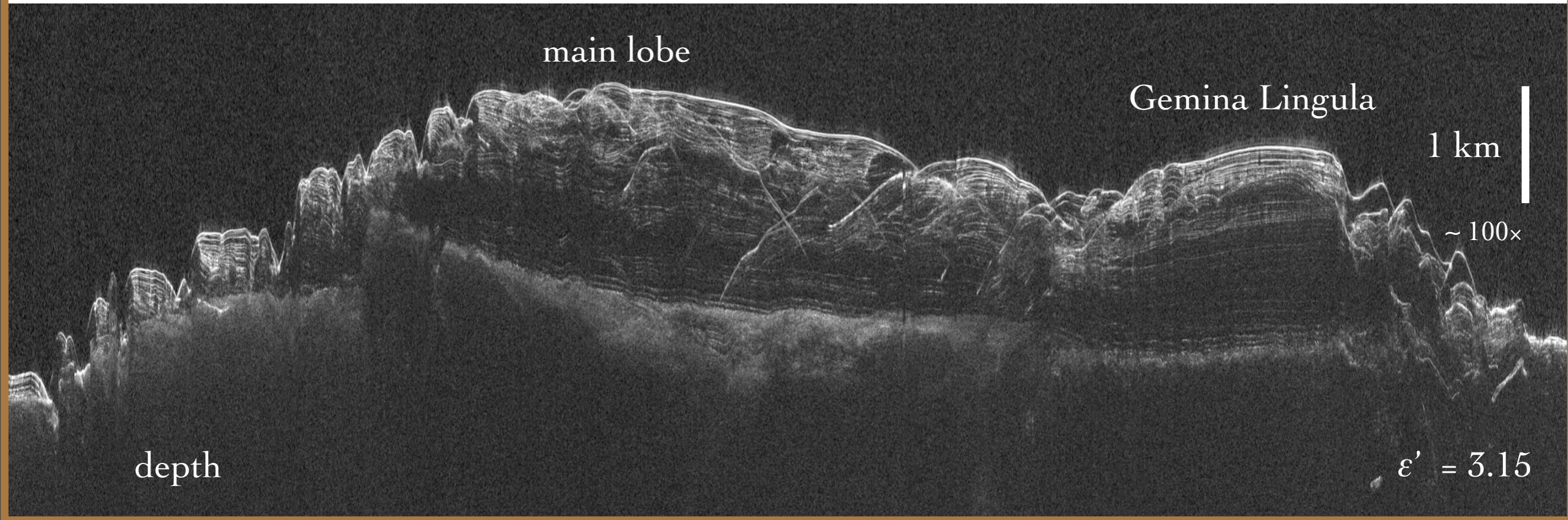
Gemina Lingula

1 km

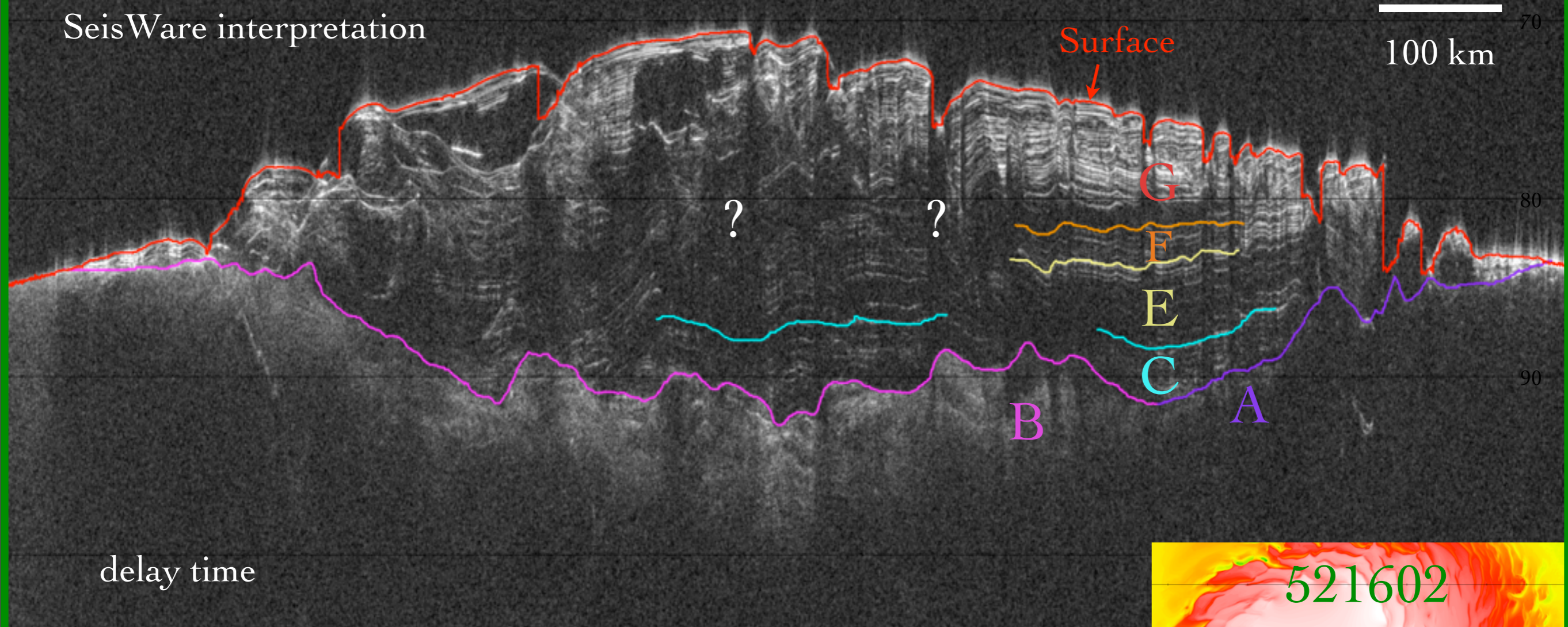
~ 100x

depth

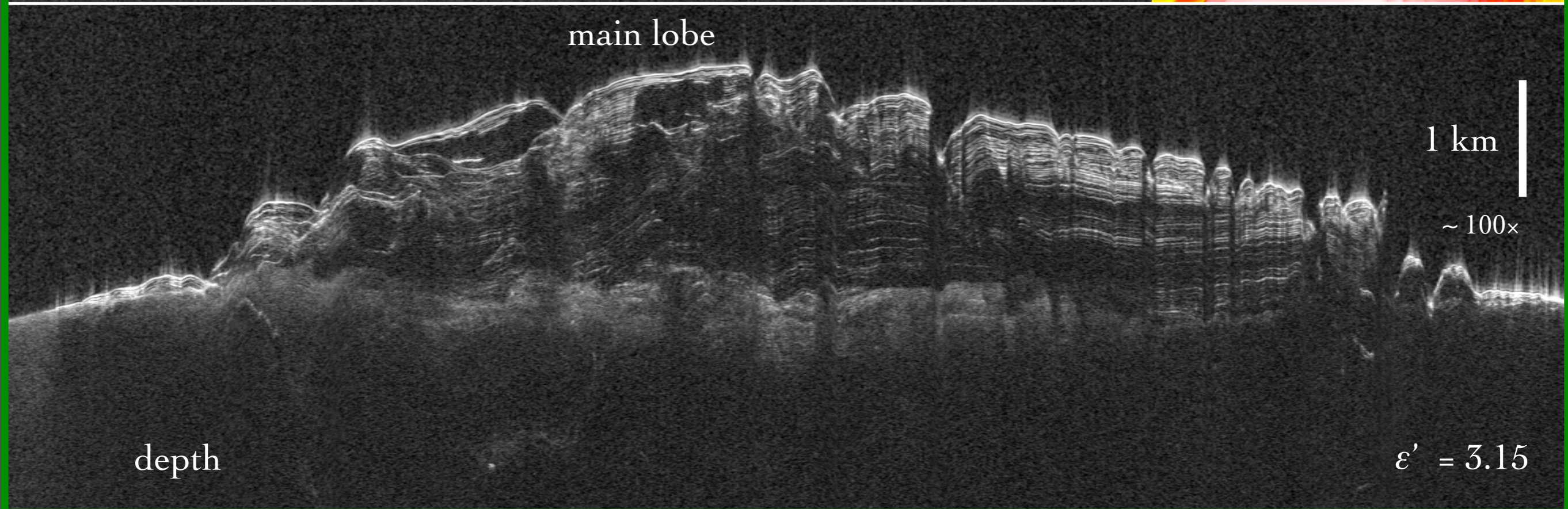
$\epsilon' = 3.15$



SeisWare interpretation



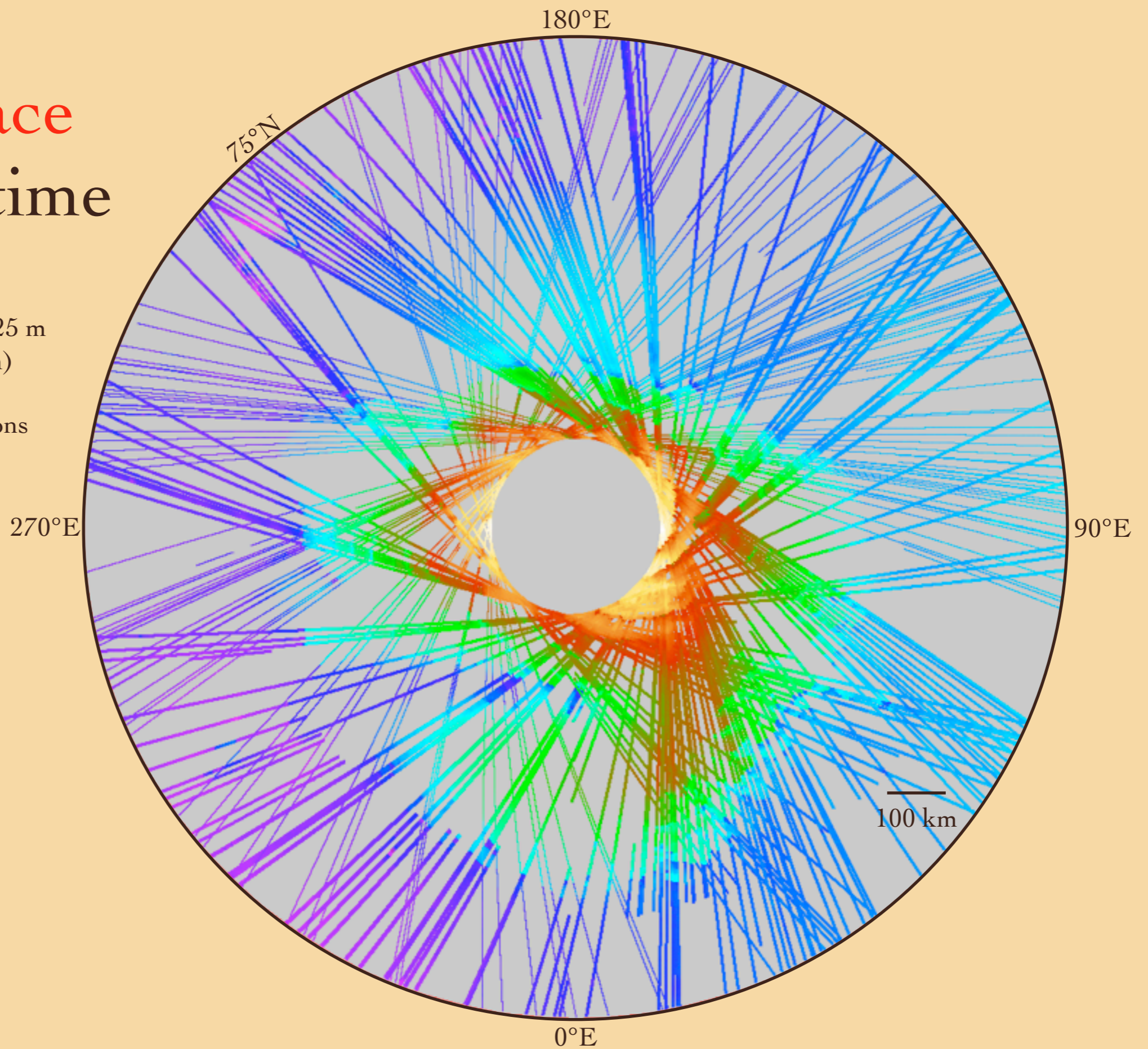
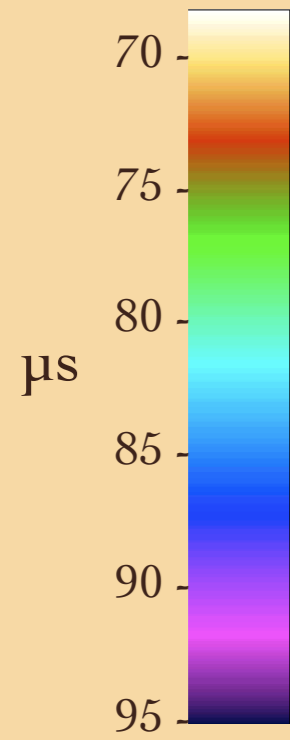
main lobe



Surface delay time

adjusted to
ellipsoid + 10125 m
($r \approx 3386$ km)

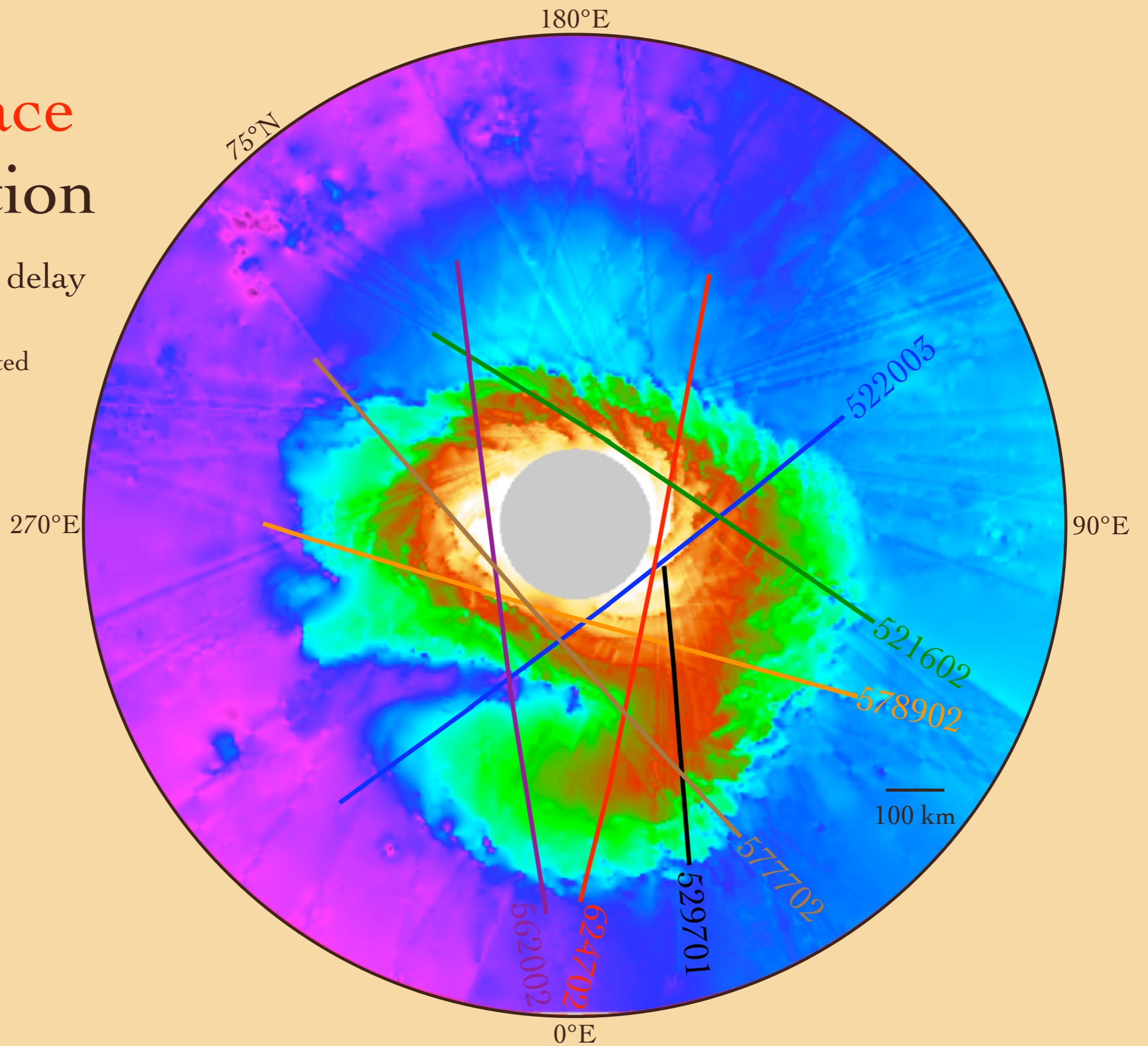
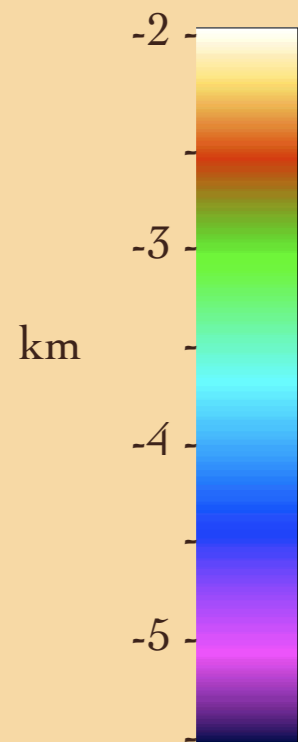
234 observations



Surface elevation

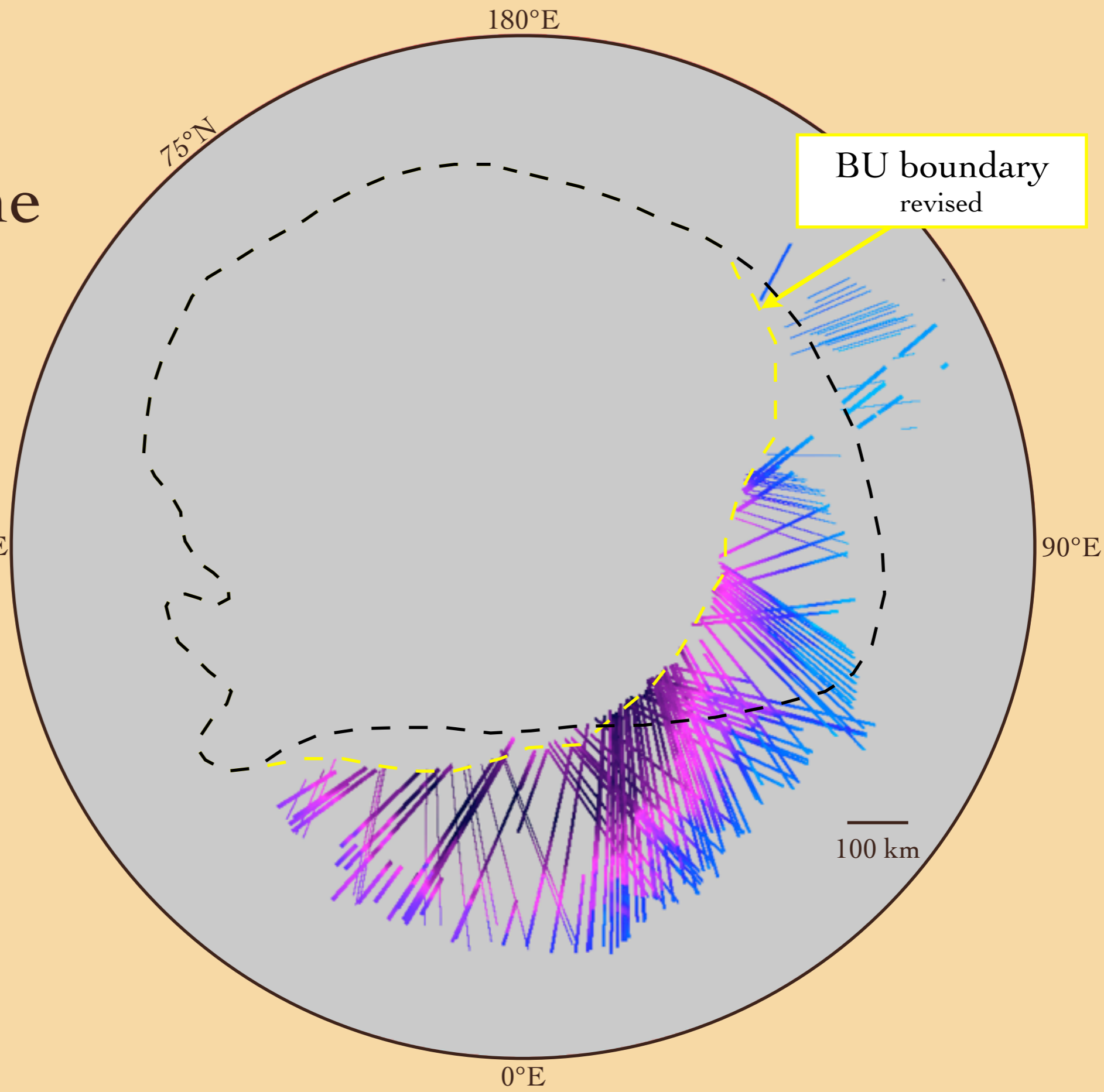
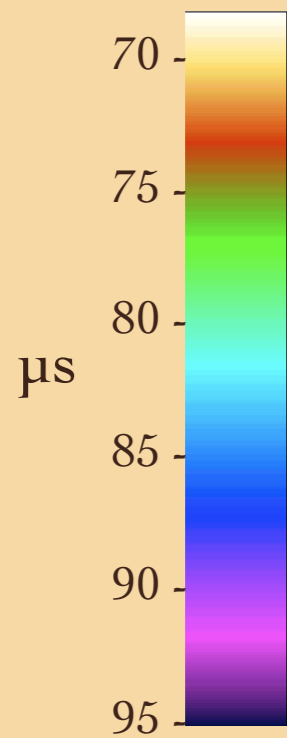
from radar delay

Interpolated



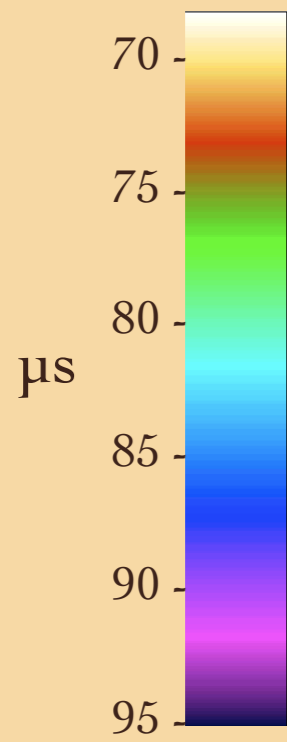
Top A delay time

adjusted to
ellipsoid + 10125 m
($r \approx 3386$ km)



Top **B** delay time

adjusted to
ellipsoid + 10125 m
($r \approx 3386$ km)



270°E

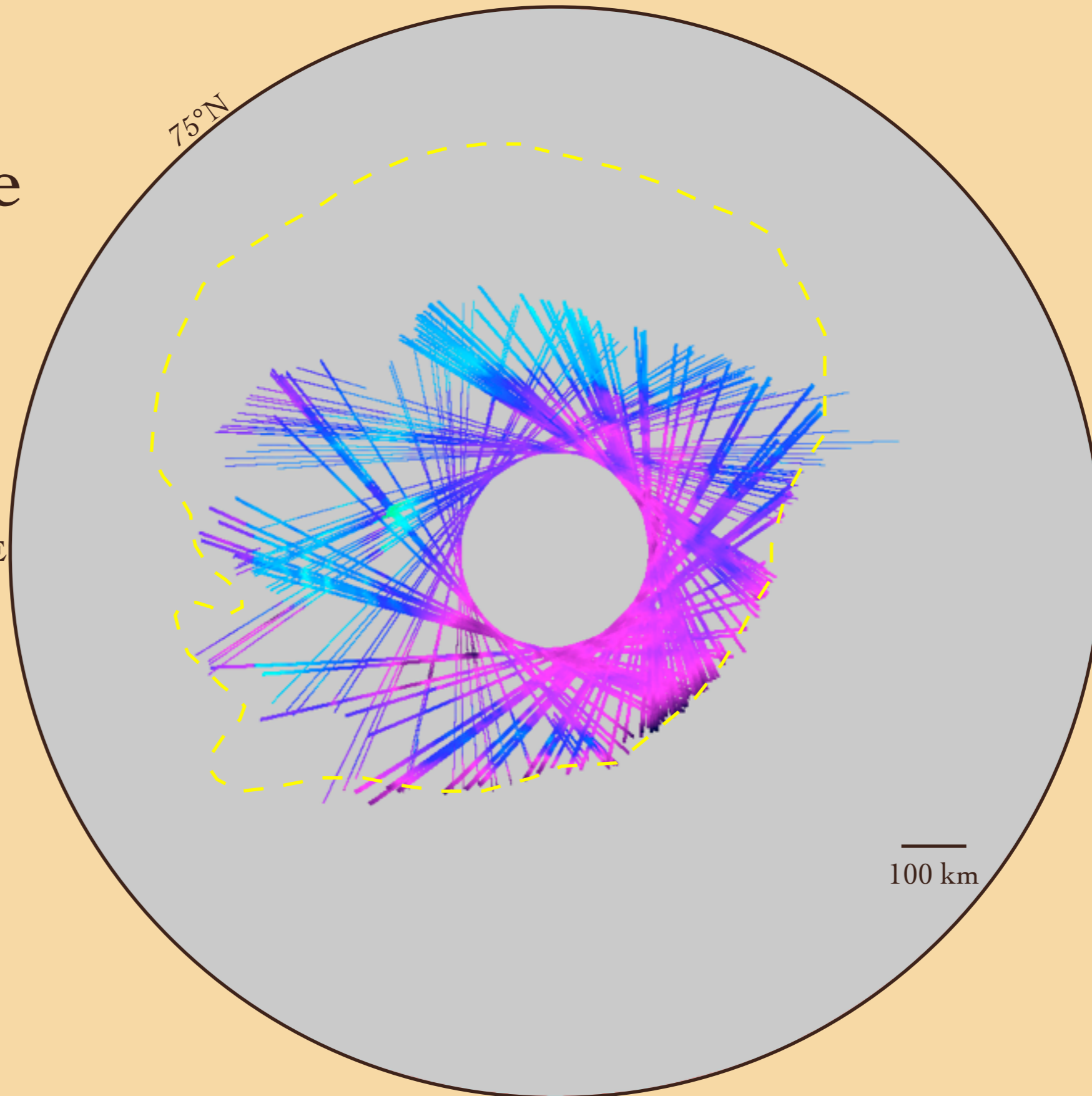
180°E

75°N

90°E

0°E

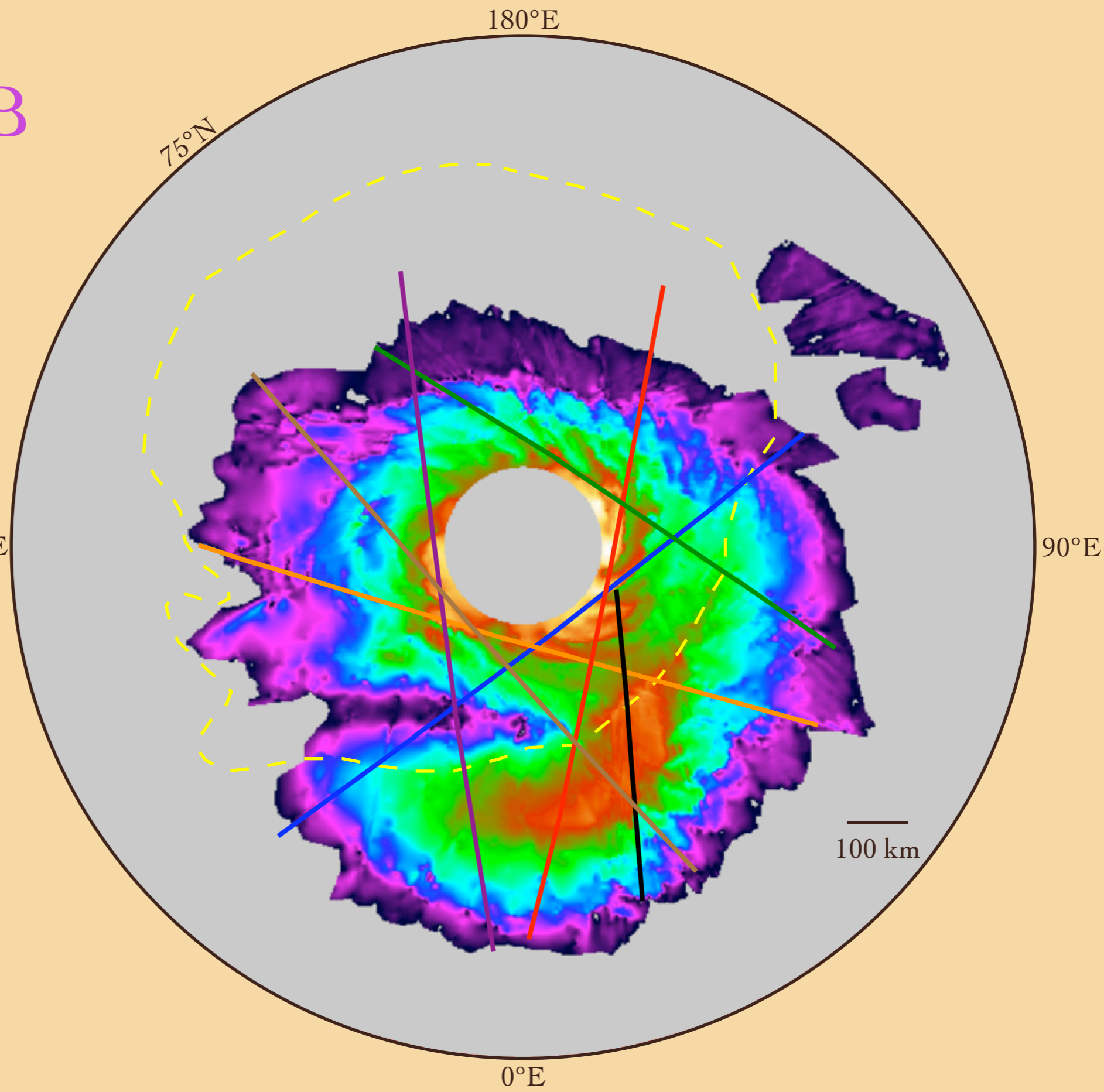
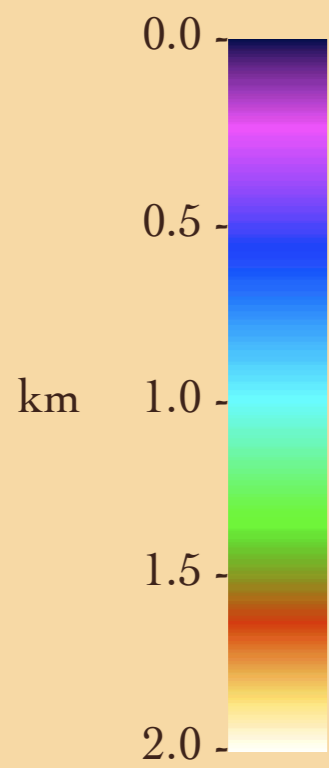
100 km



Top A & B depth

Interpolated

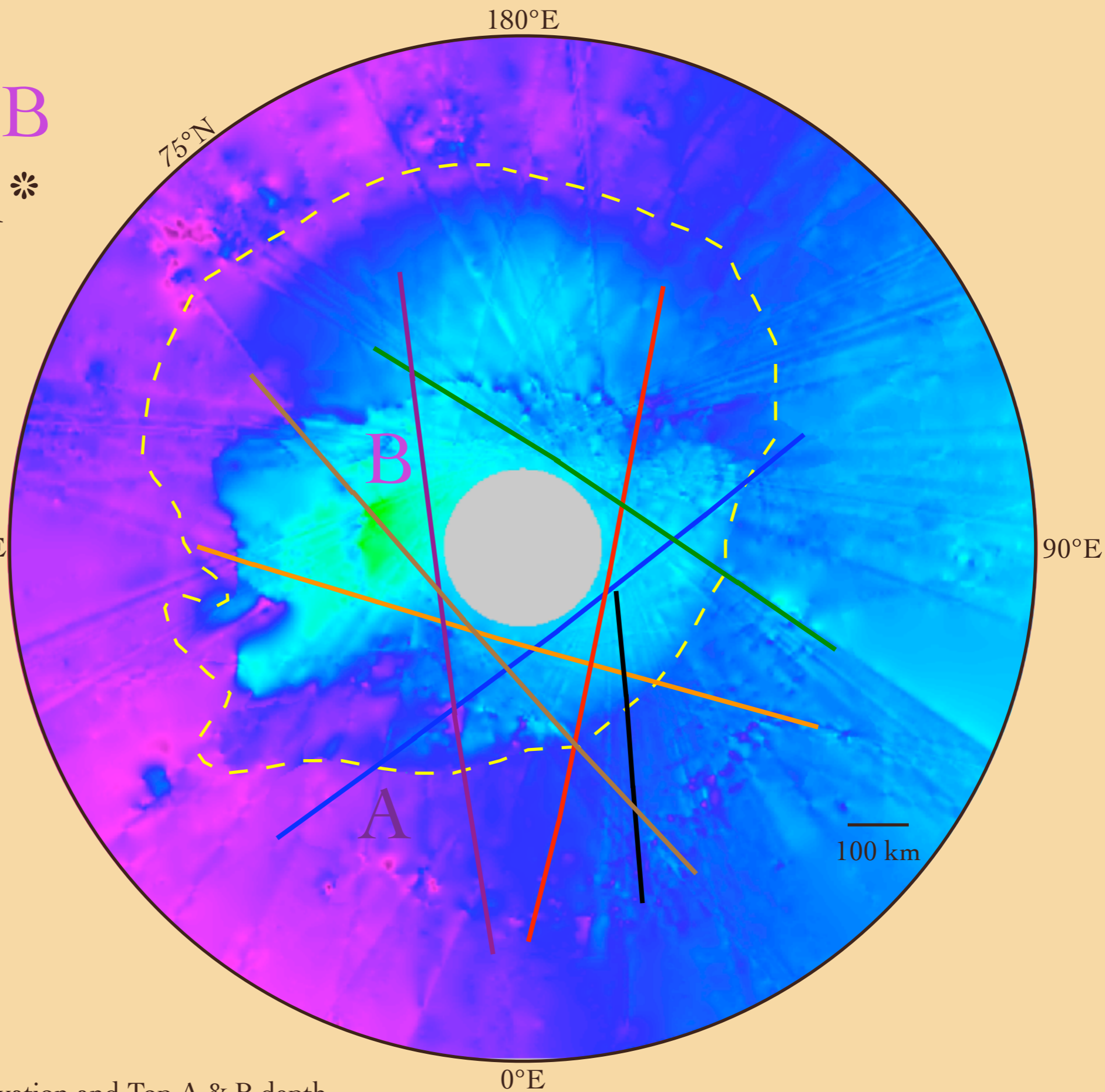
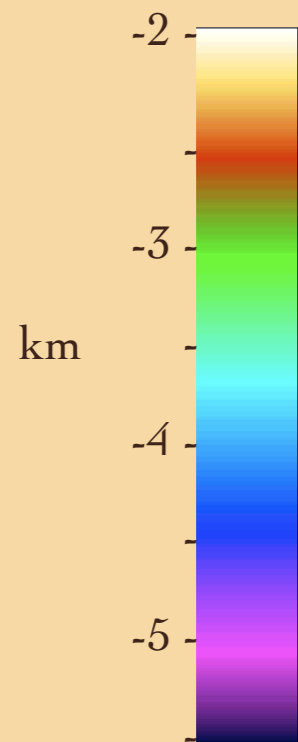
Assumes ice real
permittivity of
3.15



Top A & B elevation*

Interpolated

NPLD removed

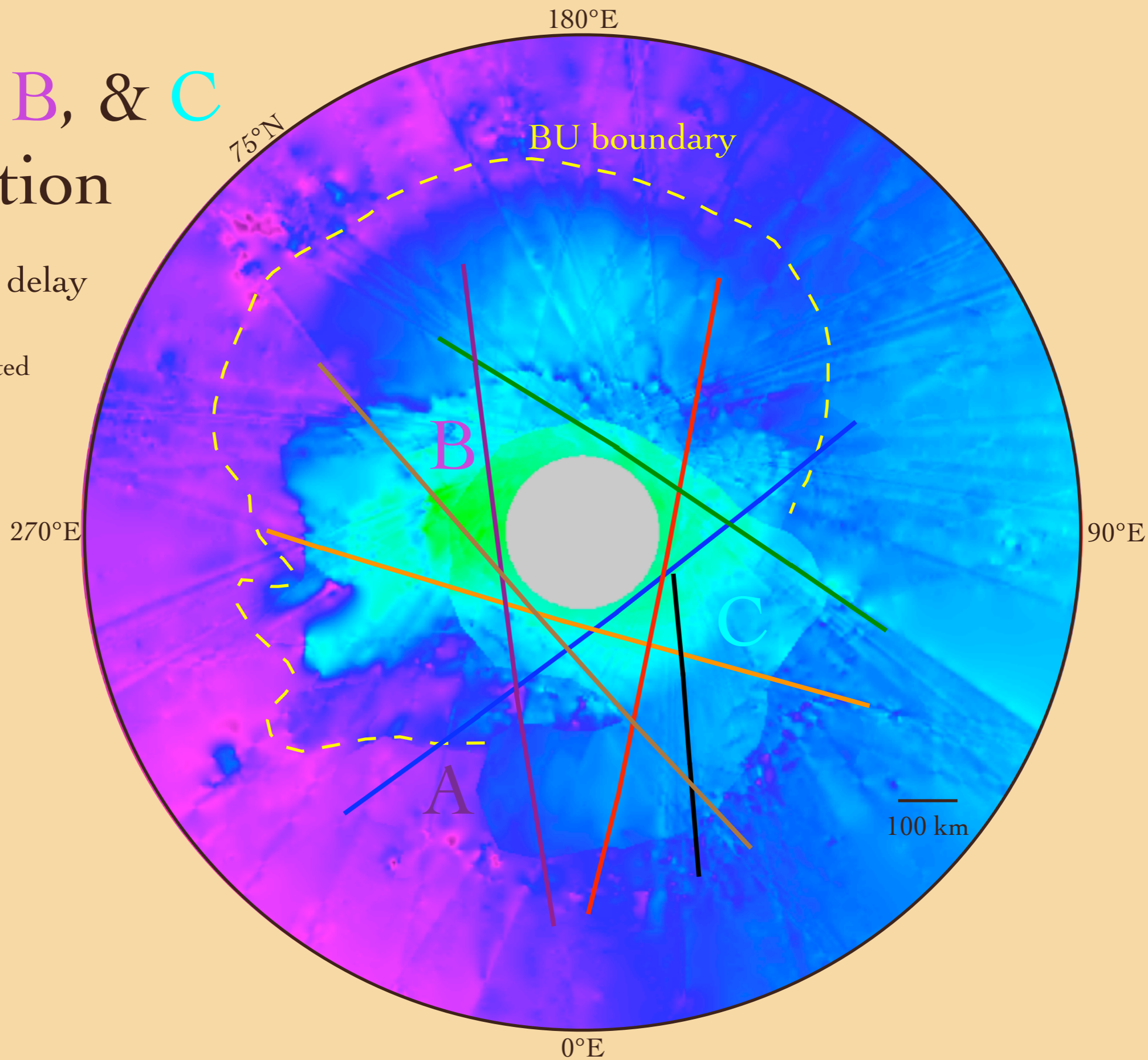
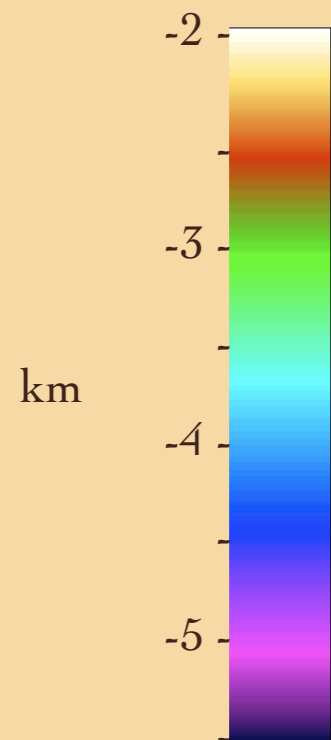


* Difference of Surface elevation and Top A & B depth

Top A, B, & C elevation

from radar delay

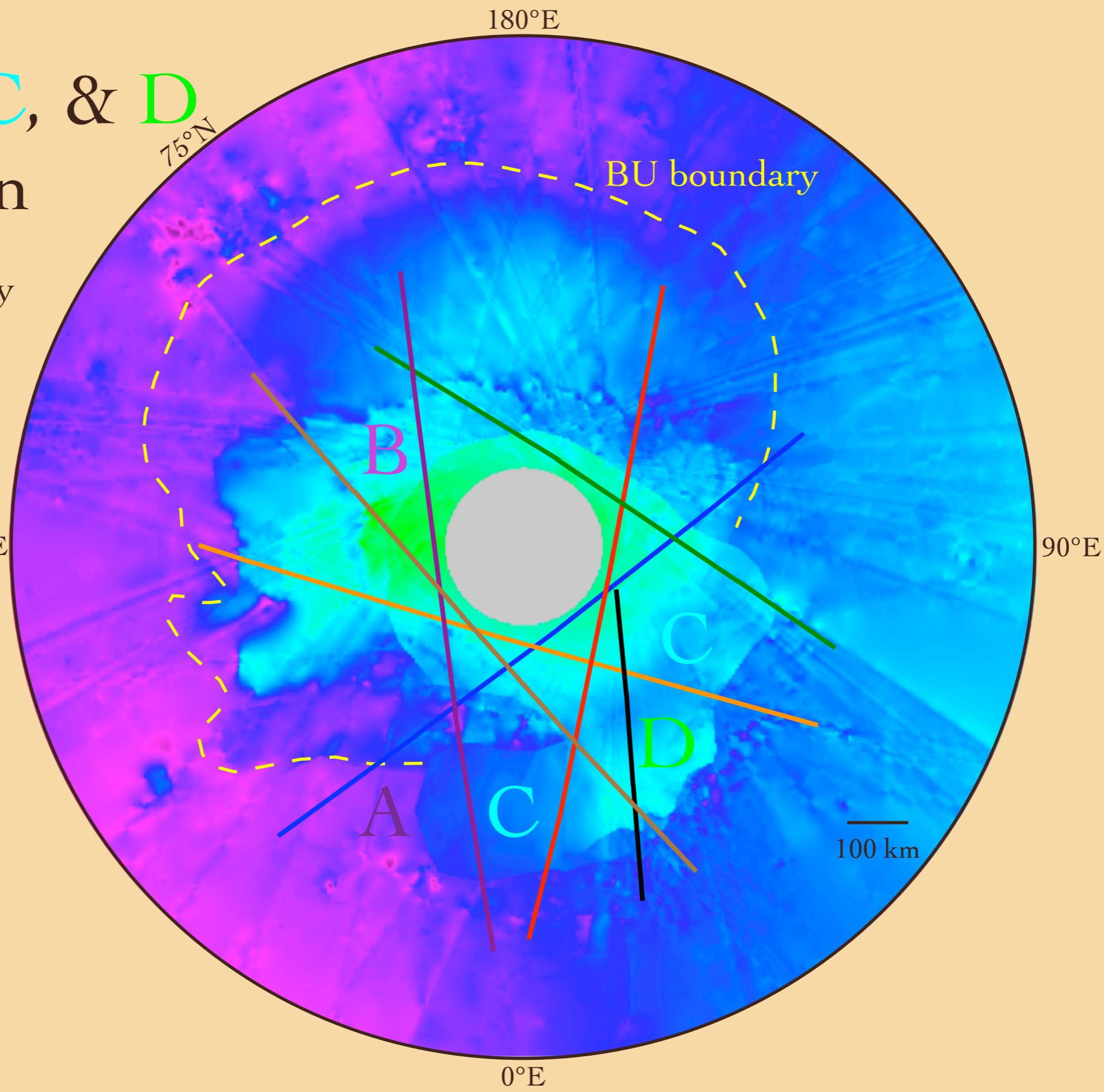
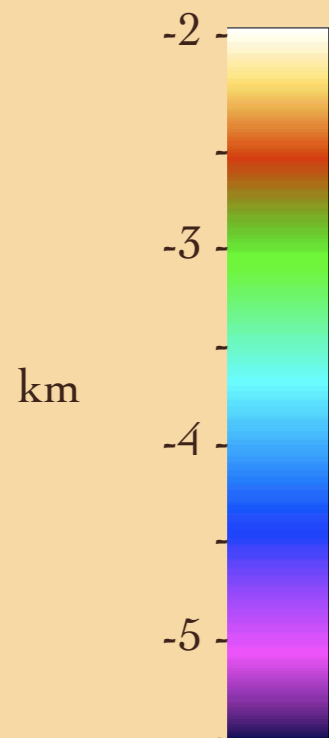
Interpolated



Top A, B, C, & D elevation

from radar delay

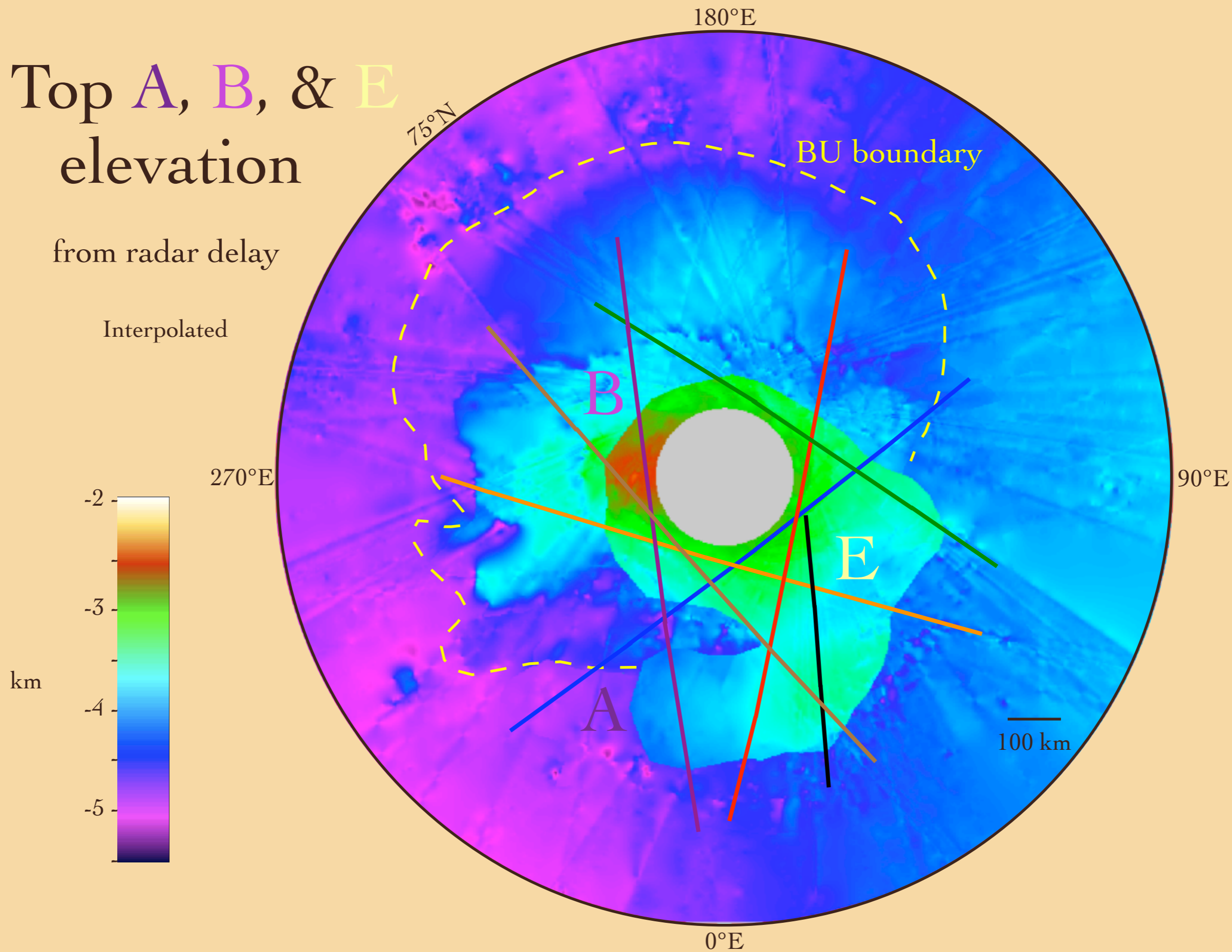
Interpolated



Top A, B, & E elevation

from radar delay

Interpolated



Top A, B, & F elevation

from radar delay

Interpolated

