2022-10-11 Update

Zain Kamal

Outline

I. Data/Code Availability
II. Crater details and global overview
III. Individual craters
    - Images
    - Mag cross-sectional plots
    - Mag shapefiles
IV. Thermal/shock modelling (TODO)

(I) Data/Code Availability

Processed Maven Data

Data:

The processed data (catalogue of crater information and magnetic field shapefiles/cross-section plots) can be downloaded here, with options for maximum satellite altitude of 170 km or 200 km:

- Full catalogue (855 craters in 70km-500km diameter range, 20 GB | 40 GB):
  - https://rutgers.box.com/s/txc7gc3ei1jo8l3yp4wv4hoe0hoq97ku
- Reduced catalogue (17 craters in this study, 70km-500km diameter, ~5 GB):
  - https://rutgers.box.com/s/94qgimzl73a3a0a9p0xc0poap7528ctu

Code:

The code used to process the data can be found here:

- https://github.com/Humboldt-Penguin/Mars-Magnetics-Research

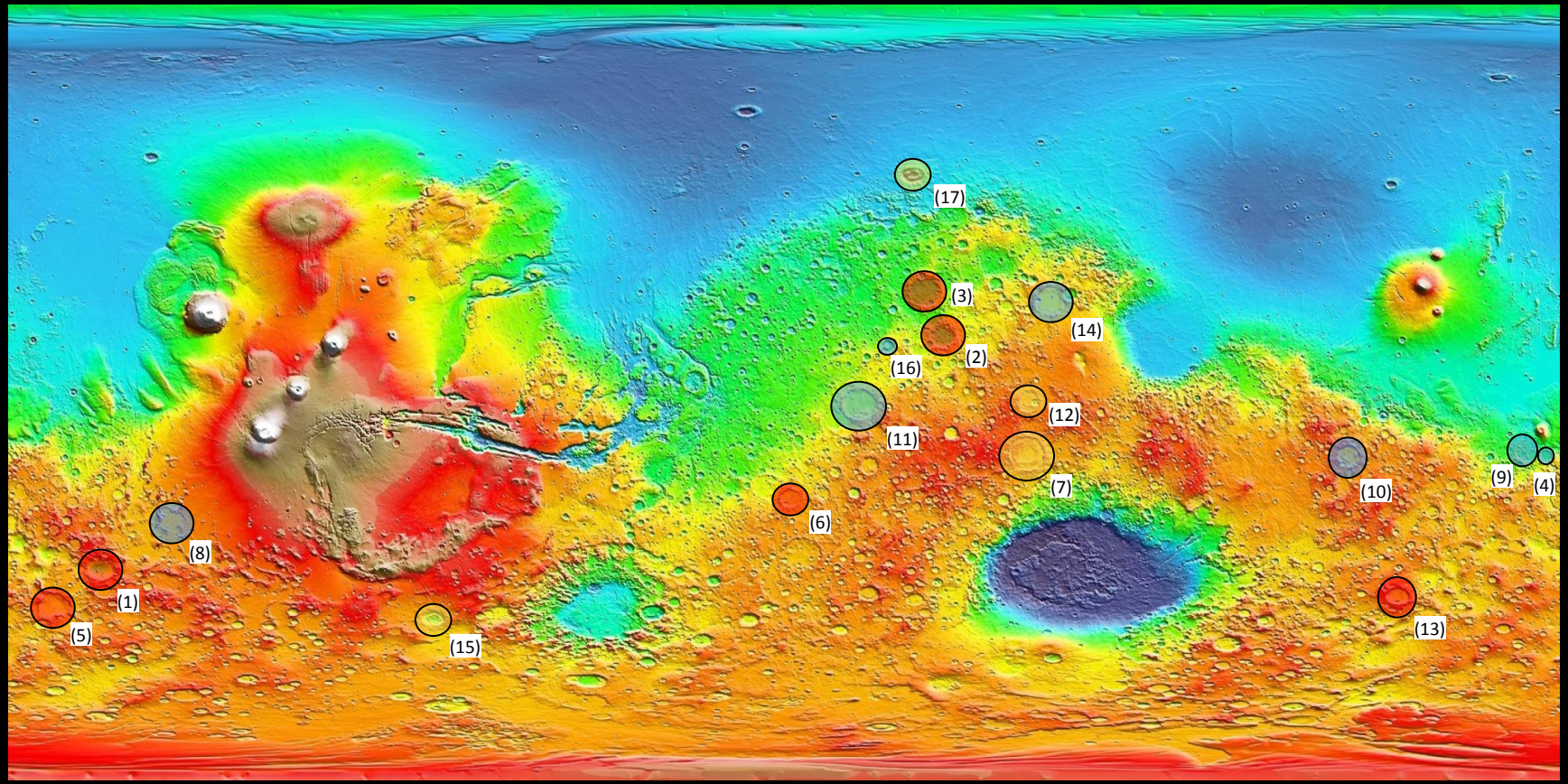
(II) Global Overview

Crater Details + Ages

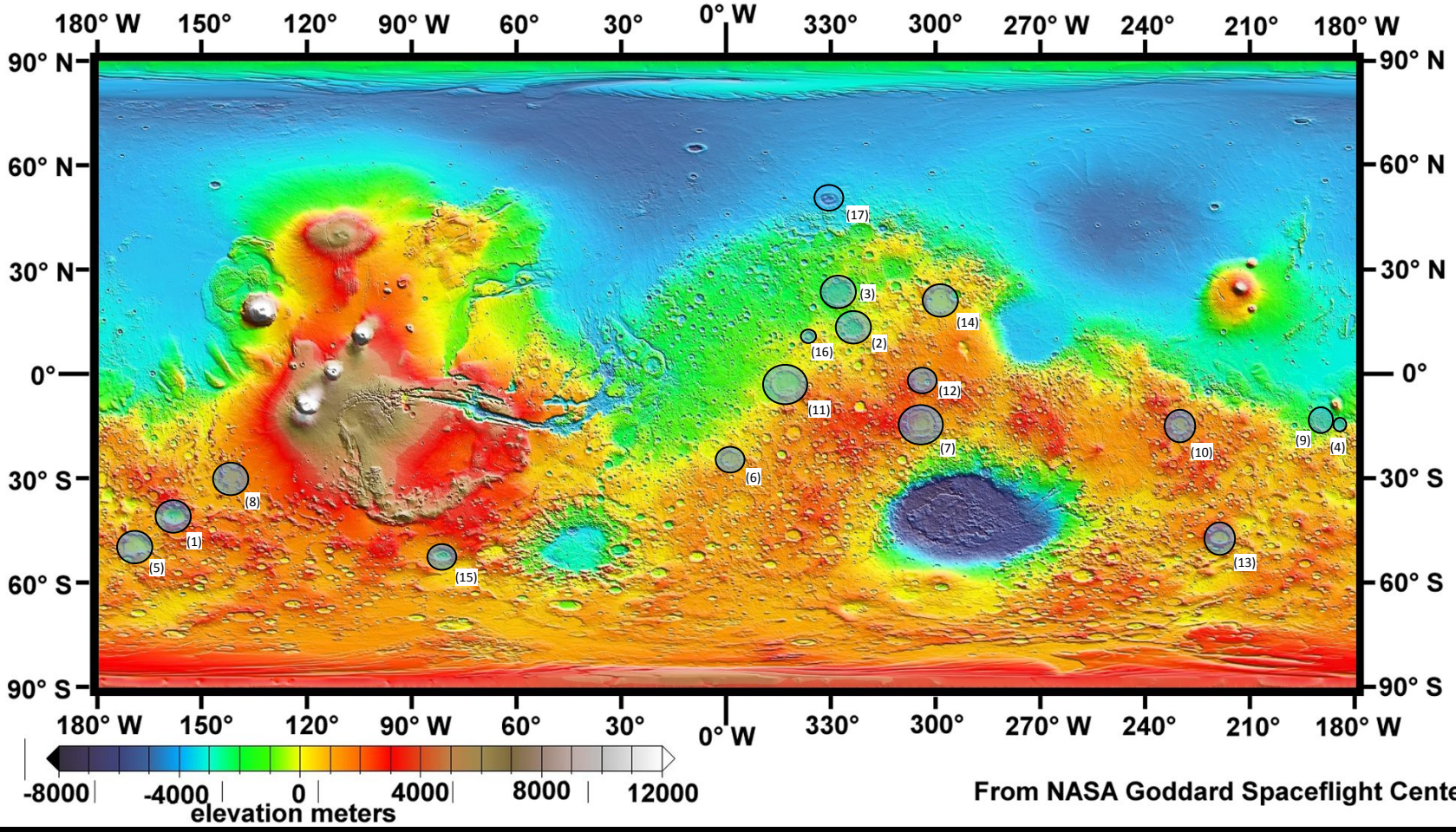
A	B	E	F	H	I	J	K	L
ind	name	lon	lat	diam (km)	age (Ga)	error (Ga)	mag_rating	notes
1	Newton	-158.07	-40.44	312.43	4.11	0.05	3	confident
2	Tikhonravov	35.95	13.28	343.77	4.1	0.03	2	not sure, but lillis says likely partial remag
3	Cassini	32.11	23.36	408.31	4.03	0.01	1	luju marked this as remag?
4	Gusev	175.53	-14.51	158.15	4.02	0.02	-1	
5	Newcomb	1.06	-24.24	256.38	4	0.05	1	luju marked this as remag?
6	Copernicus	-168.93	-48.86	302.02	4	0.05	2	
7	Huygens	55.58	-13.89	467.41	3.98	0.02	0	not sure
8	Koval'sky	-141.44	-29.56	285.15	3.96	0.01	-3	
9	Herschel	129.90	-14.48	297.94	3.95	0.01	-2	
10	de Vaucouleurs	171.09	-13.25	311.82	3.95	0.01	-2	double check this
11	Schroeter	55.99	-1.90	291.62	3.92	0.01	-2	
12	Schiaparelli	16.80	-2.51	445.84	3.92	0.05	0	luju marked this as remag?
13	Kepler	141.17	-46.75	222.36	3.92	0.02	1	luju marked this as remag?
14	Antoniadi	60.83	21.39	400.94	3.79	0.01	-2	
15	Lowell	-81.39	-51.96	199.09	3.71	0.01	0	heavily demag region
16	Henry	23.45	10.79	167.58	3.6	0.03	-3	
17	Lyot	29.32	50.47	220.31	3.4	0.05	0	unsure, look at lower altitude

Link to spreadsheet: https://docs.google.com/spreadsheets/d/1eEG4Rj6uaGbf2rWM00f_v2G8dZ4QmsjOXBKnVIx_Jwo/edit?usp=sharing

Global Positions of All Craters (17) in our Study



Color-coded Elevations on Mars, MOLA Altimeter, MGS Mission



From NASA Goddard Spaceflight Center

(III) Individual Craters

(Preface 1: Cross-Section Plot Structure)

$|B|$ $||B||$ Altitude

B_r B_θ B_ϕ

(Preface 2: Crater Overview)

A	B	E	F	H	I	J	K	L
ind	name	lon	lat	diam (km)	age (Ga)	error (Ga)	mag_rating	notes
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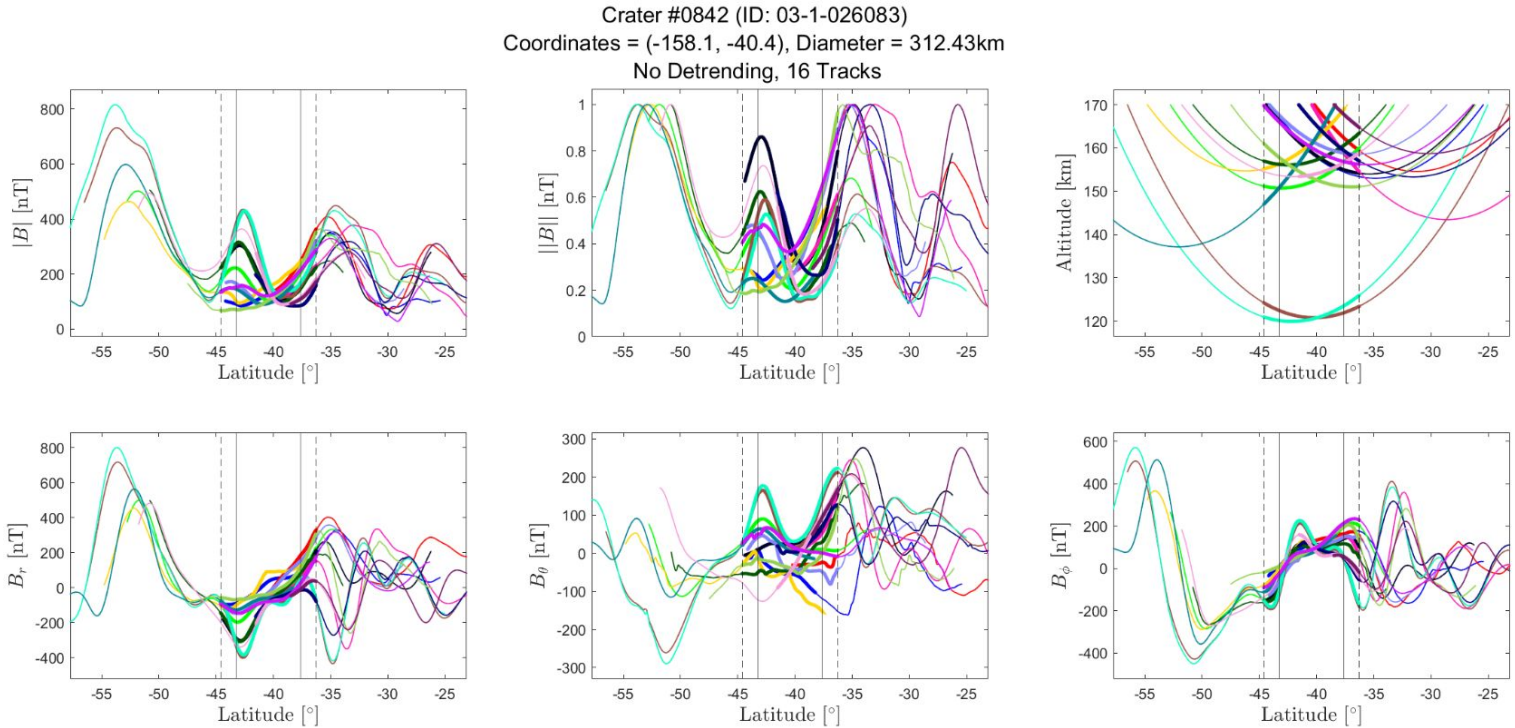
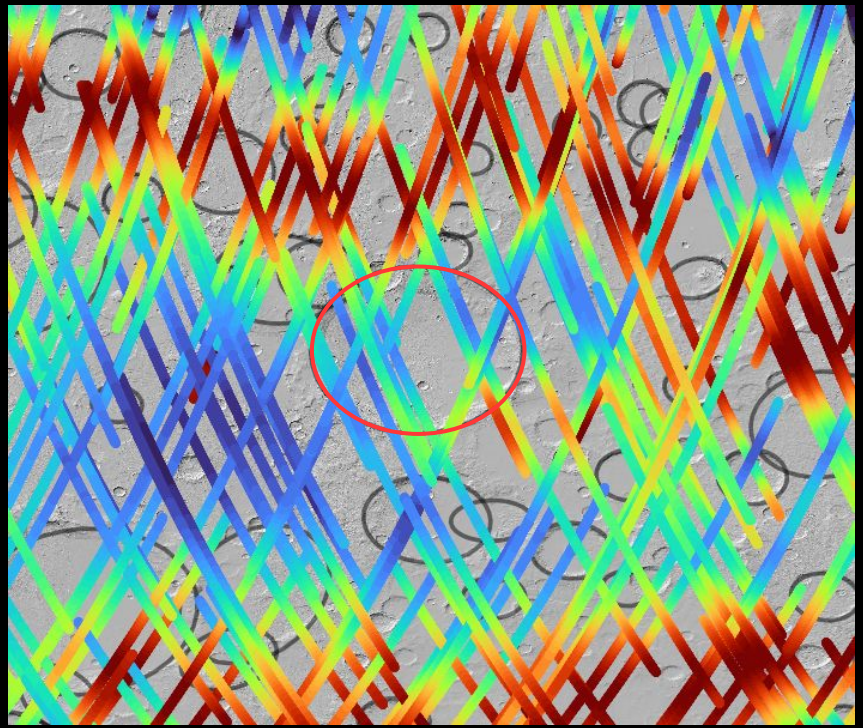
Link to spreadsheet: https://docs.google.com/spreadsheets/d/1eEG4Rj6uaGbf2rWM00f_v2G8dZ4QmsjOXBKnVIx_Jwo/edit?usp=sharing

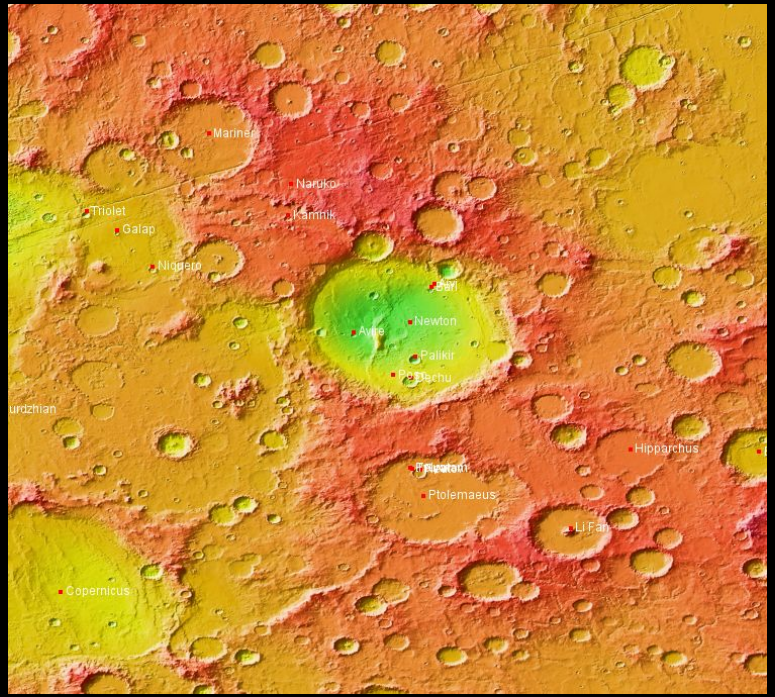
[1] Newton



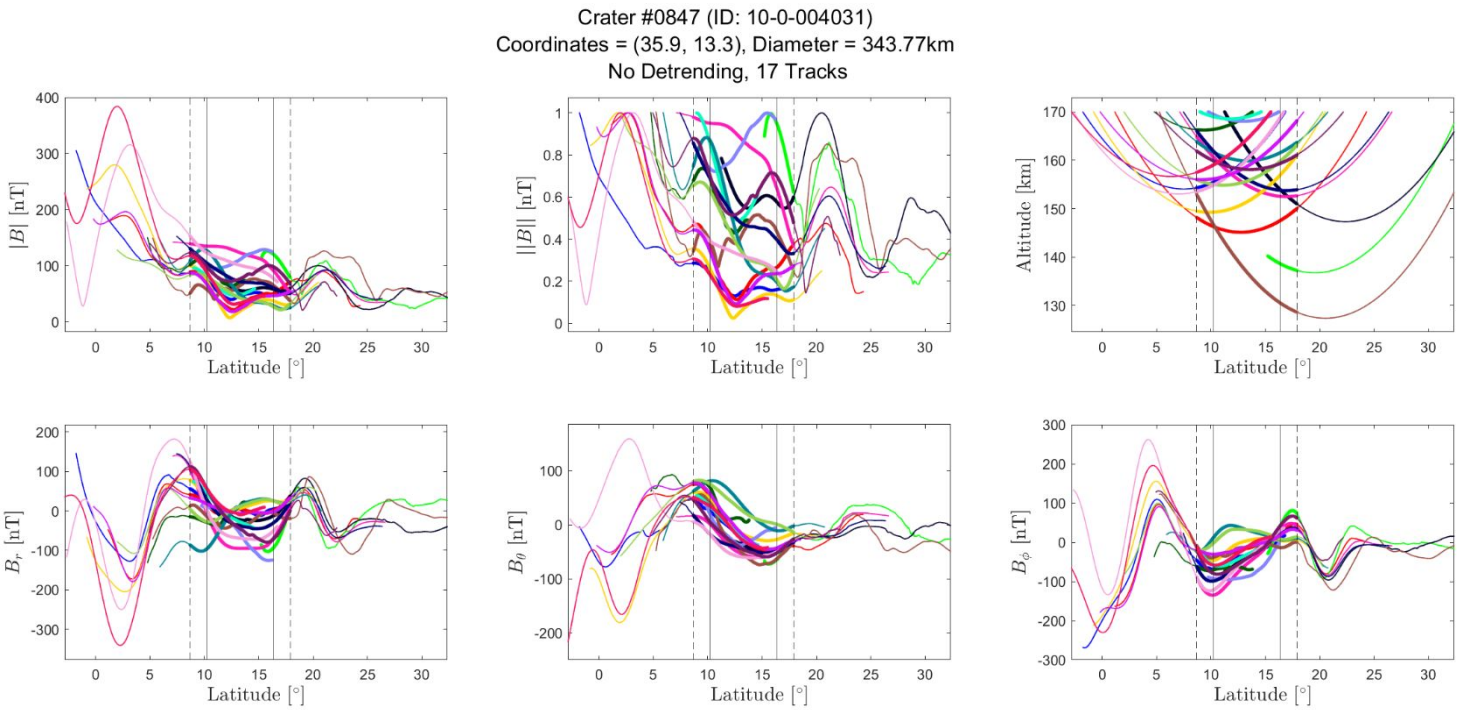
Highly remagnetized (Lillis et al. 2013)

[1] Newton



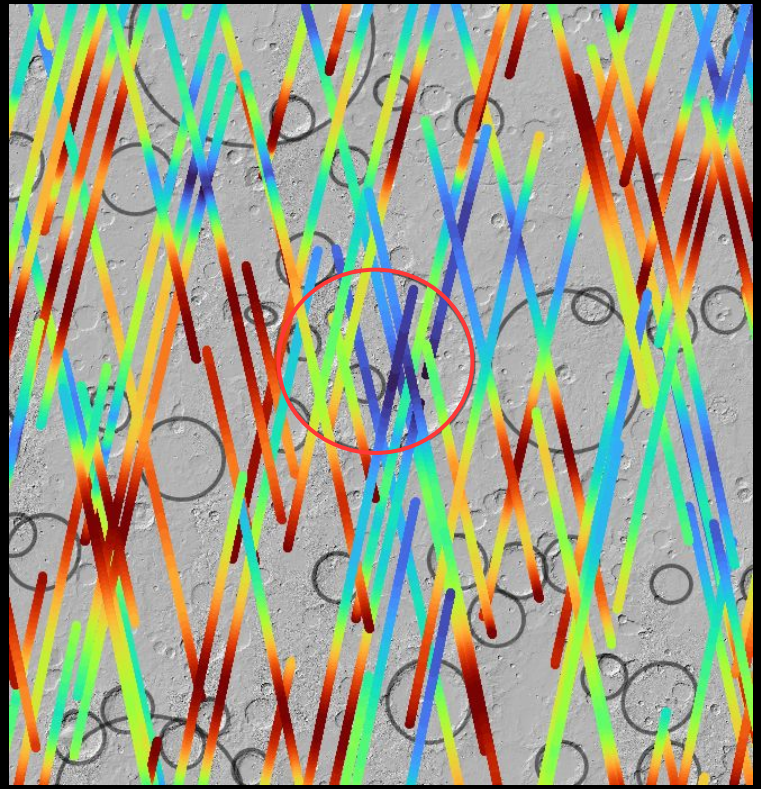

Mariner
Naruko
Triolet
Galap
Kamnik
Niggero
Newton
Palikir
Hipparchus
Ptolemaeus
Copernicus

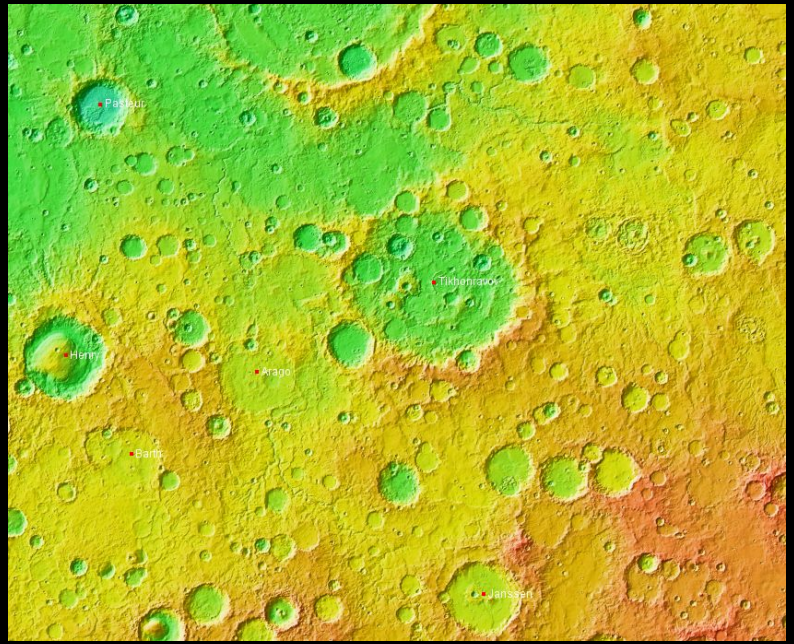
[2] Tikhonravov



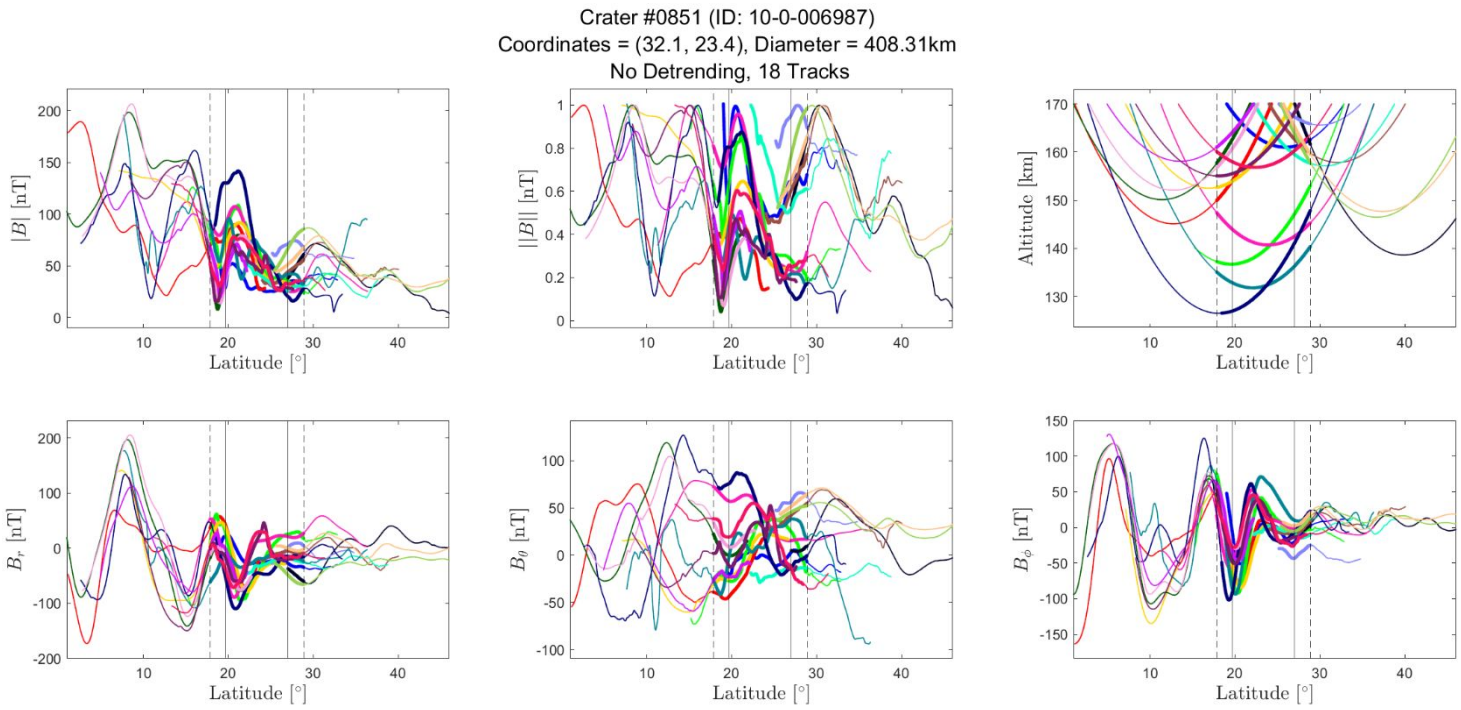
Likely partial remagnetization (Lillis et al. 2013)

[2] Tikhonravov



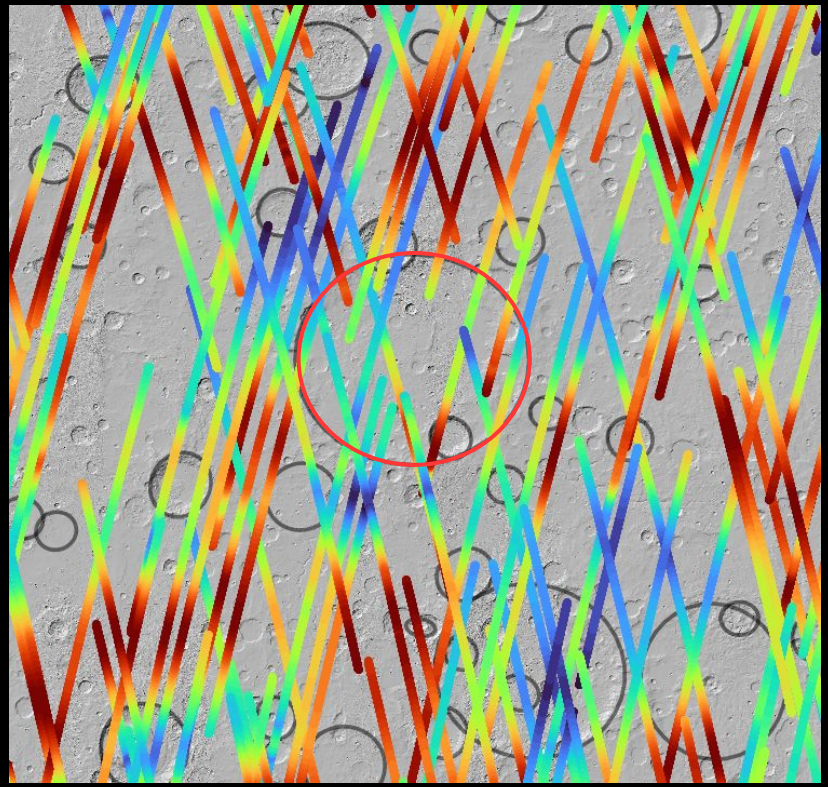


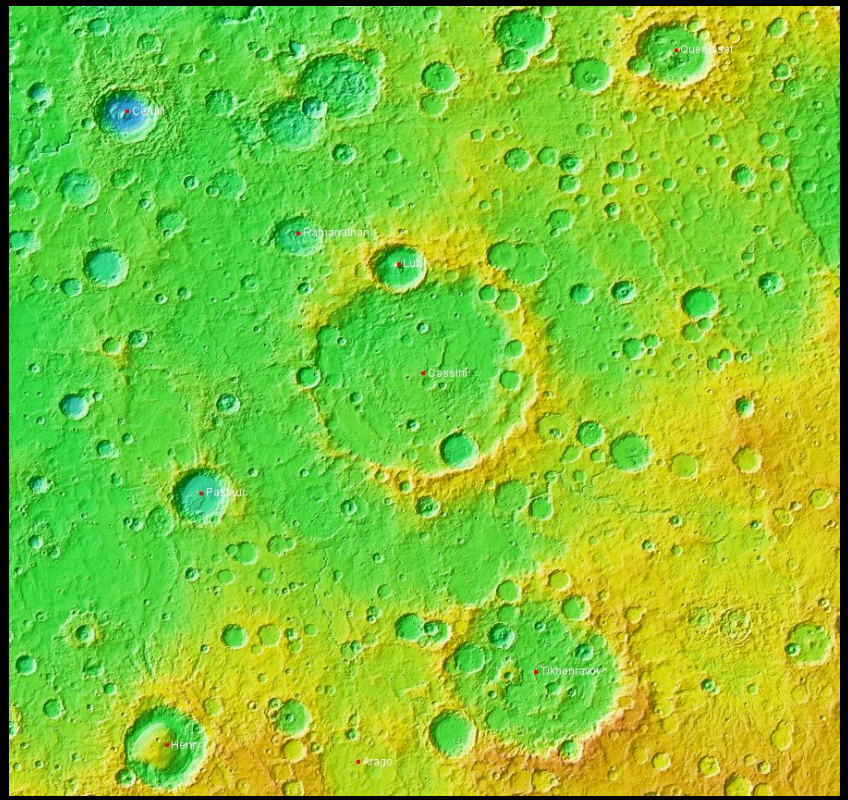
[3] Cassini



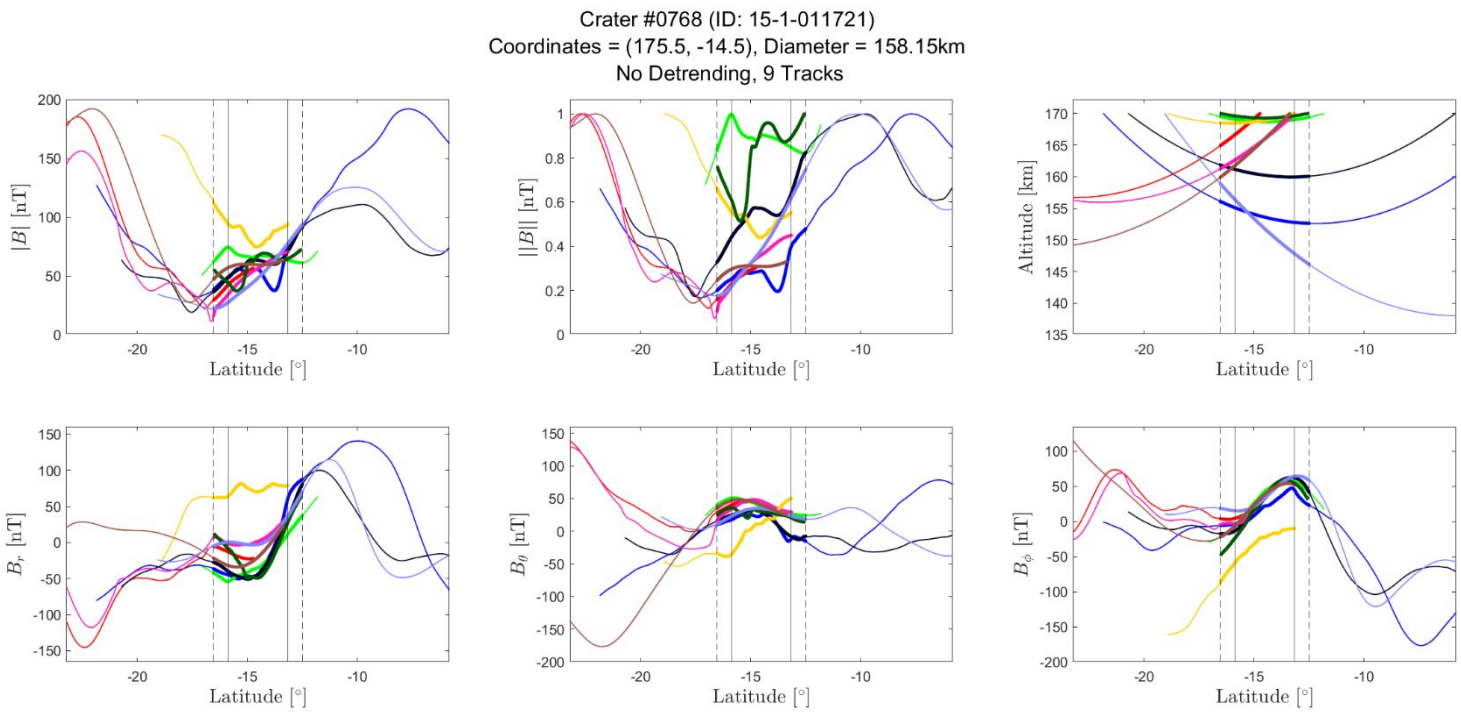
Possible remagnetization

[3] Cassini



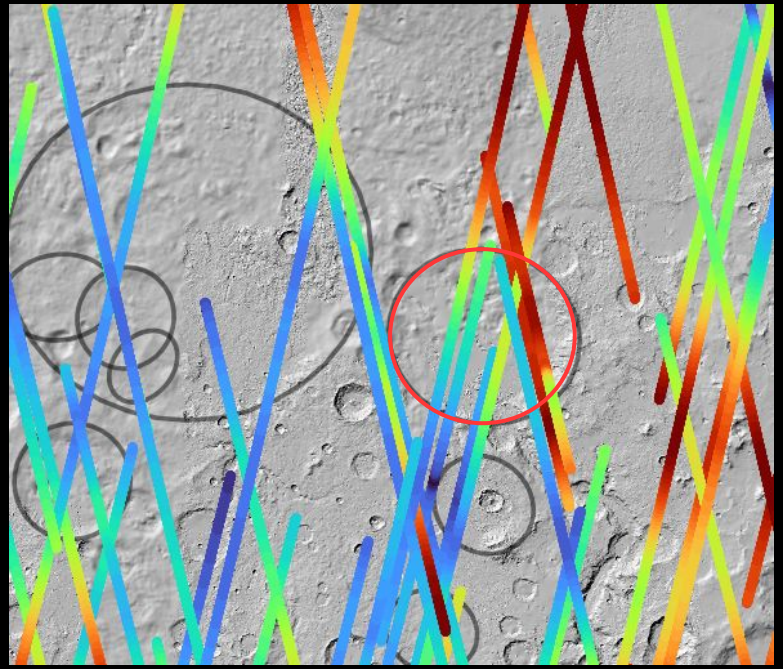


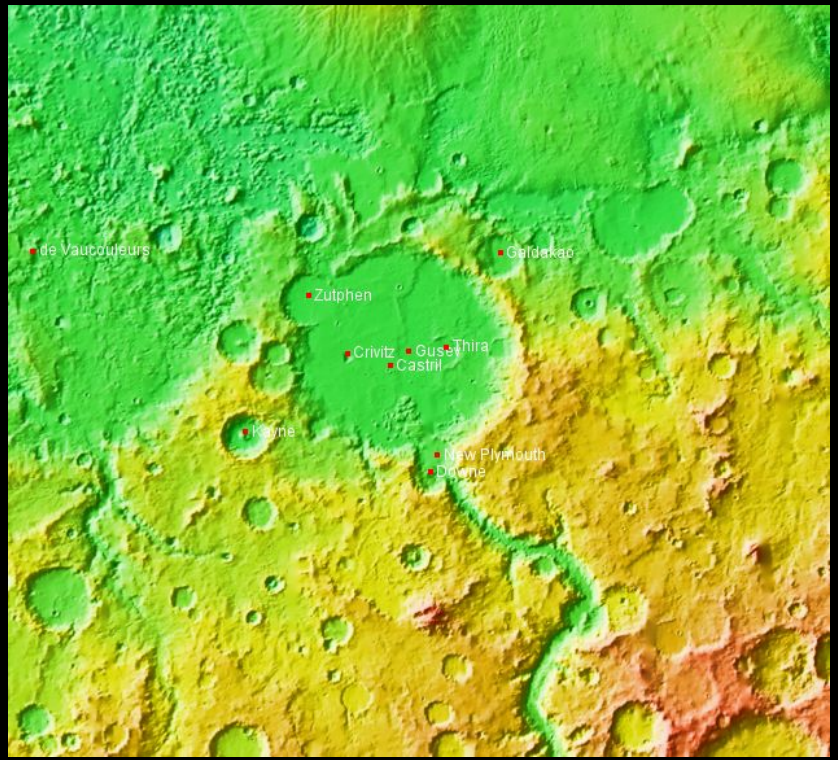
[4] Gusev



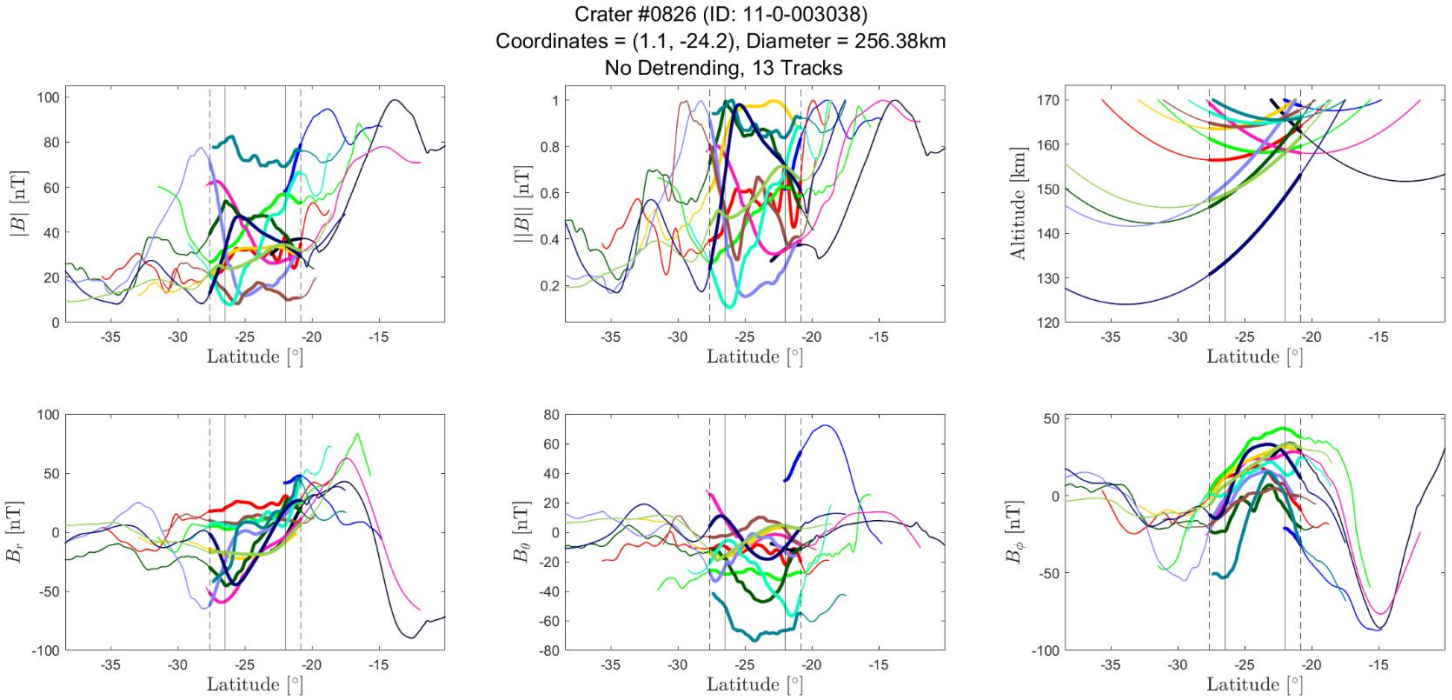
Possible demagnetization

[4] Gusev



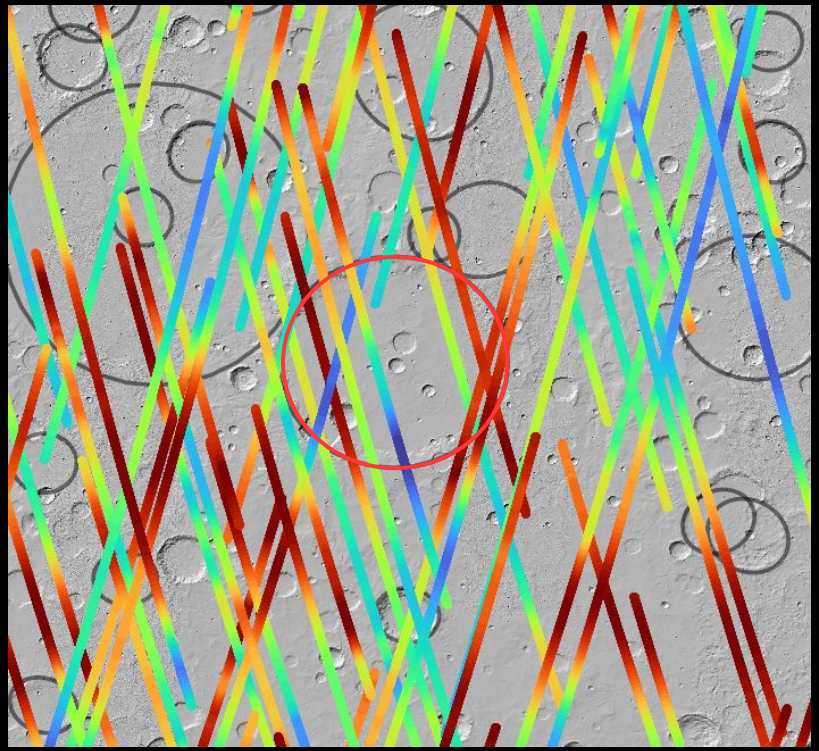

de Vaucouleurs
Gerdenkao
Zutphen
Crivitz
Gusev
Thira
Castril
Kayne
New Plymouth
Dorne

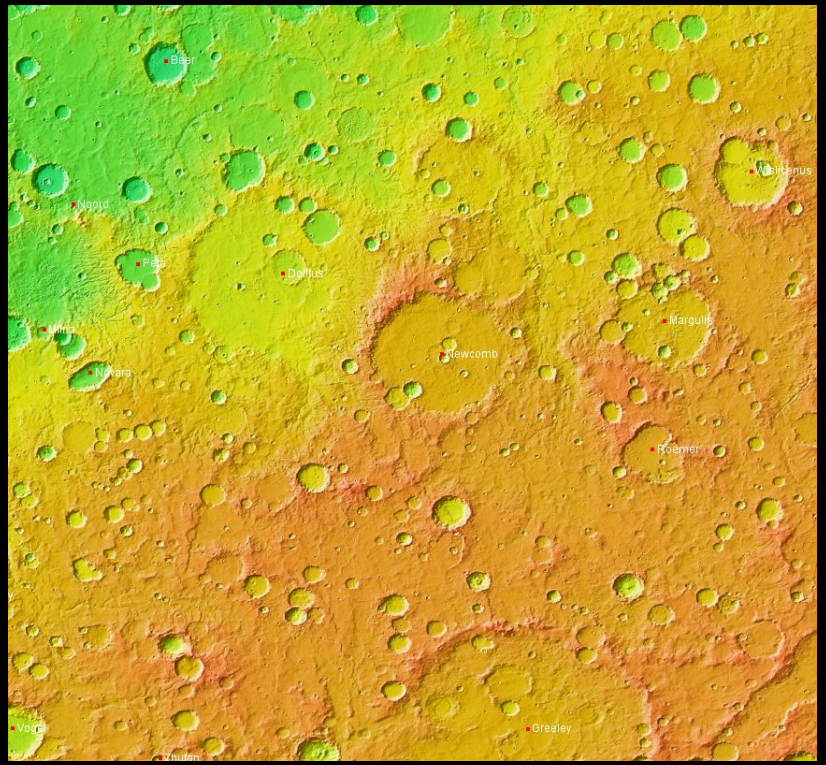
[5] Newcomb



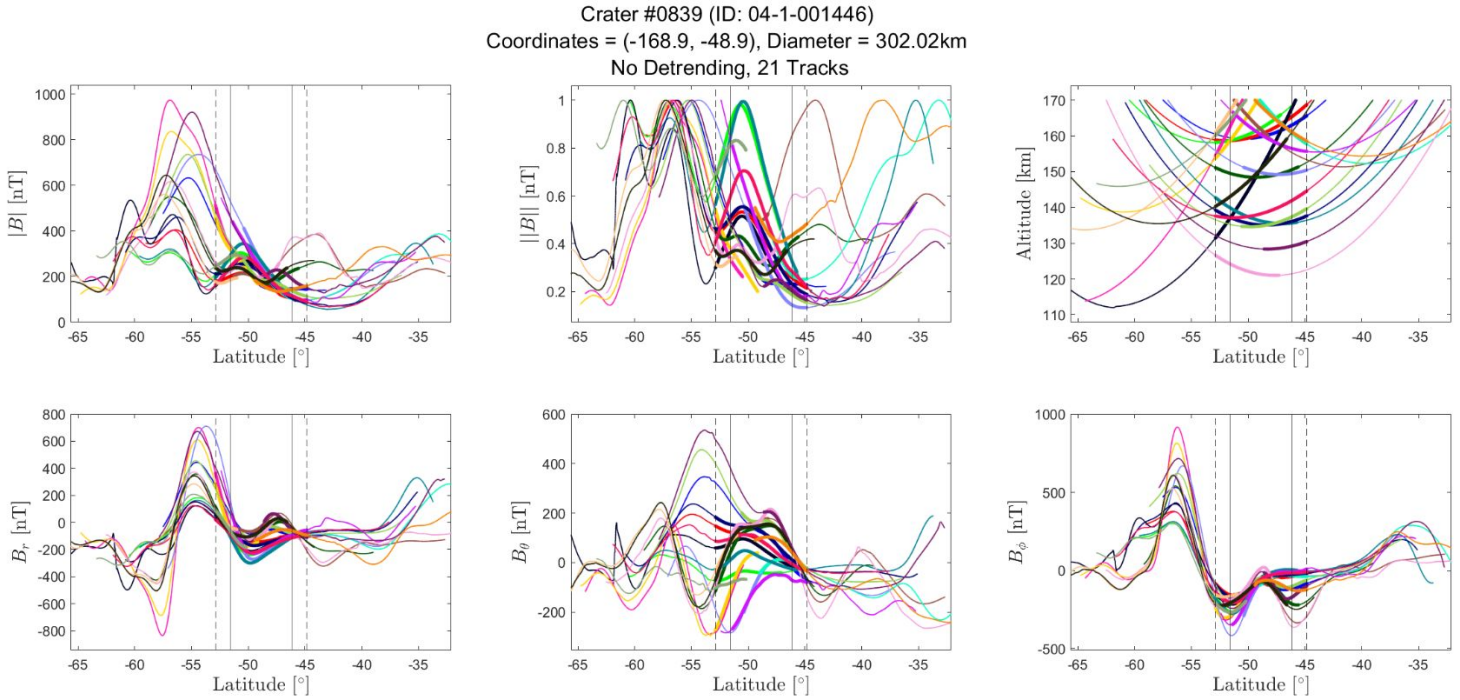
Possible remagnetization

[5] Newcomb



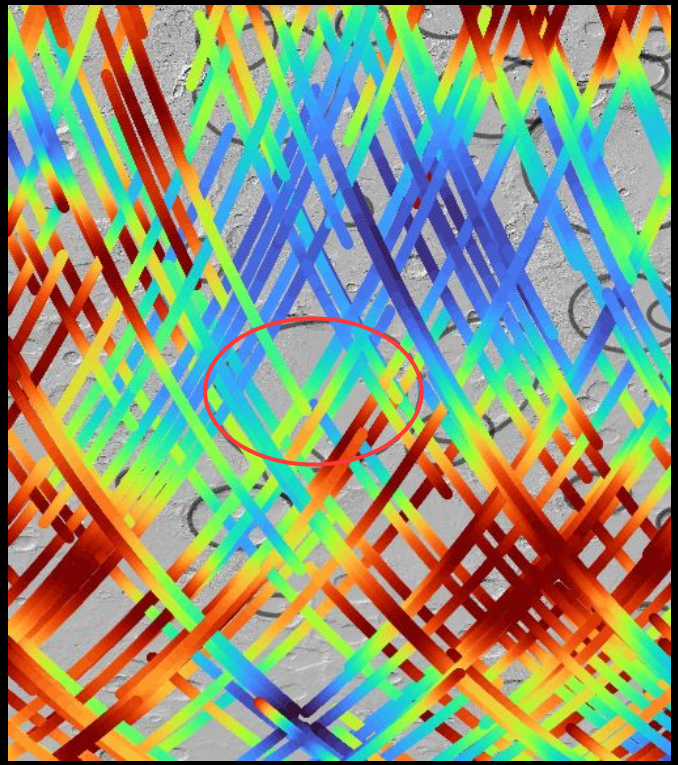

Beer
Ngoldi
Peta
Dollus
Margulis
Newcomb
Neper
Roemer
Grealey

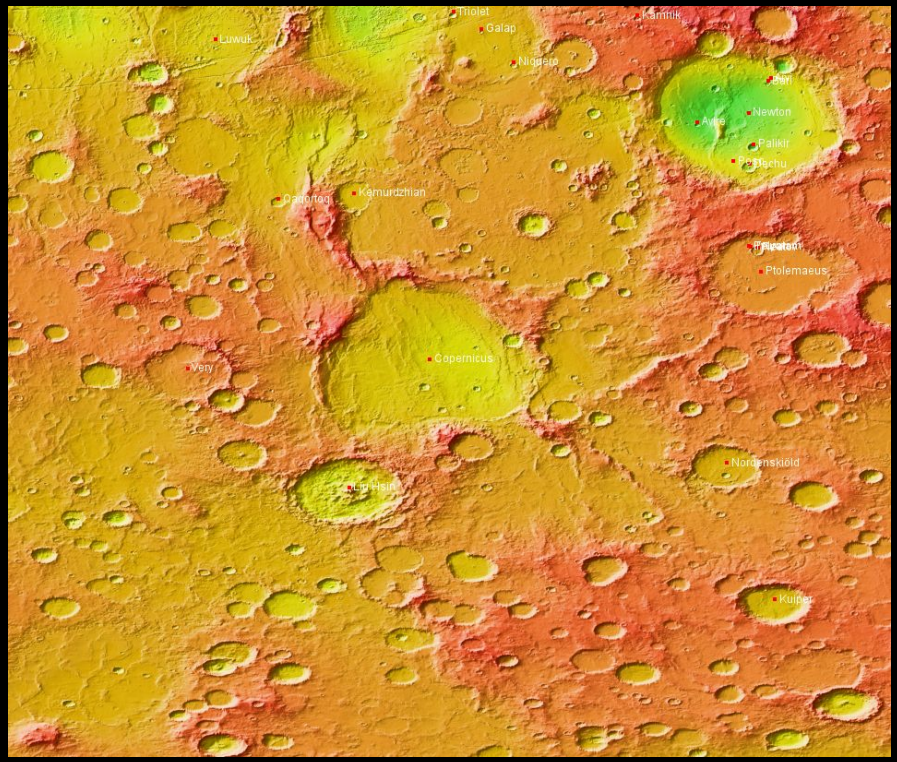
[6] Copernicus



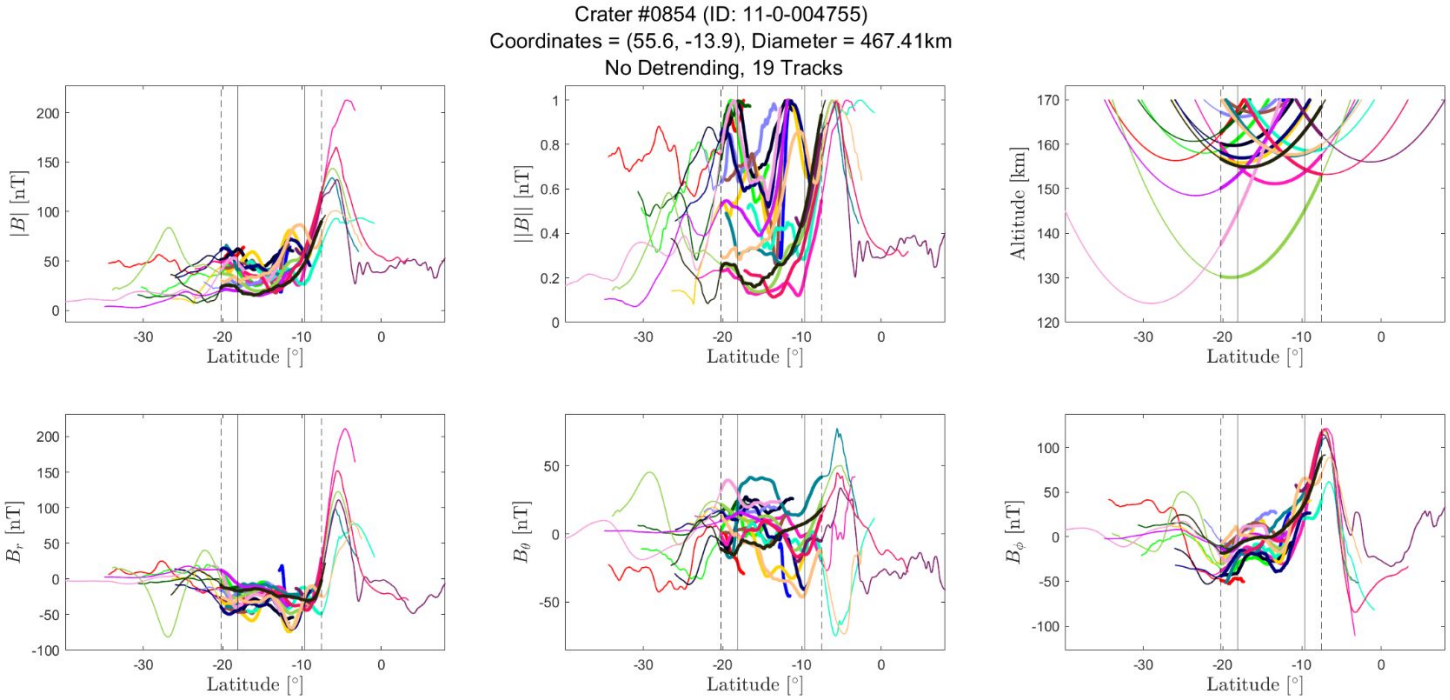
Likely remagnetization

[6] Copernicus



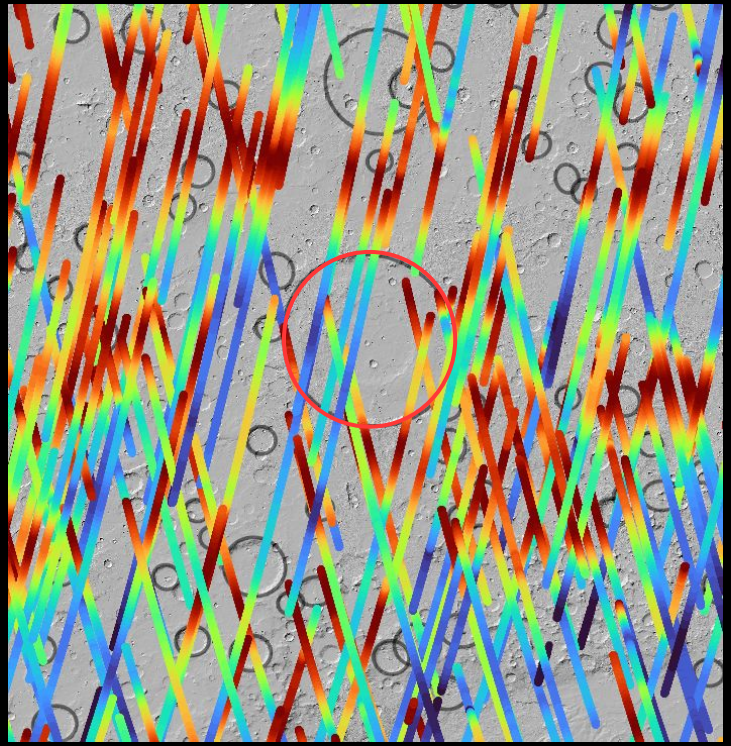


[7] Huygens



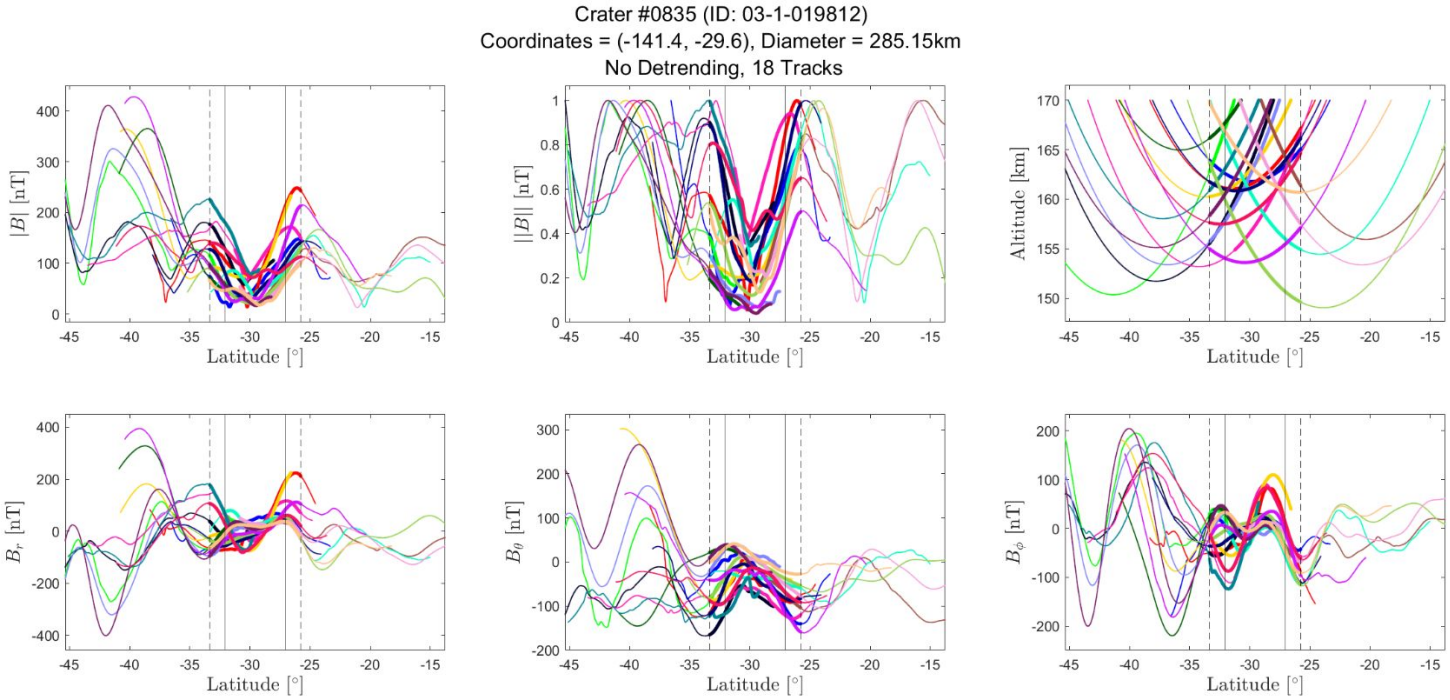
Ambiguous

[7] Huygens



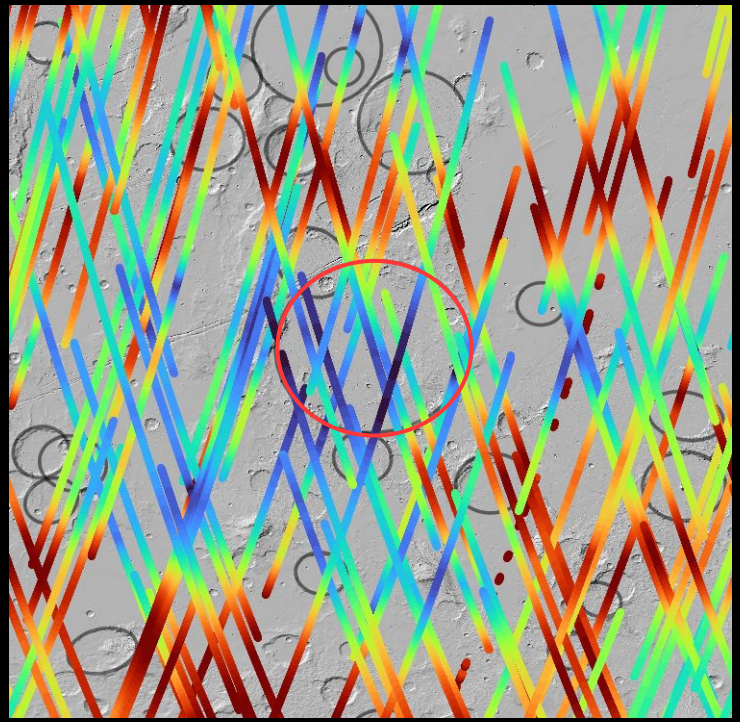

Schroeter
Winslow
Verlaine
Lucaya
Prae
Huygens
Cankuzo
Harris
Klimia
Schaeberle
Izola
Niesten

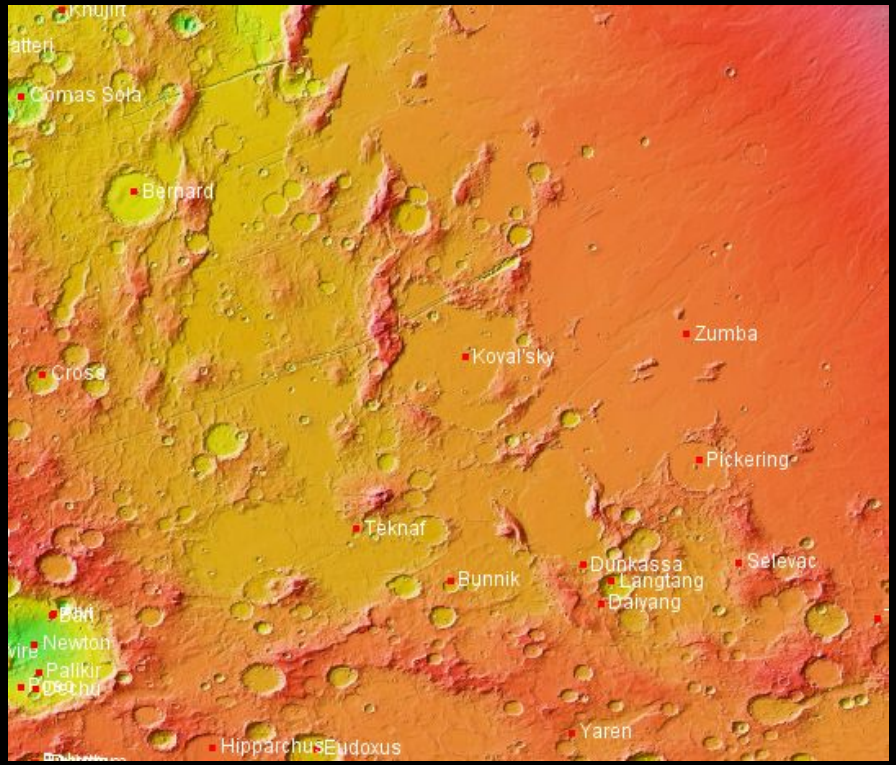
[8] Koval'sky



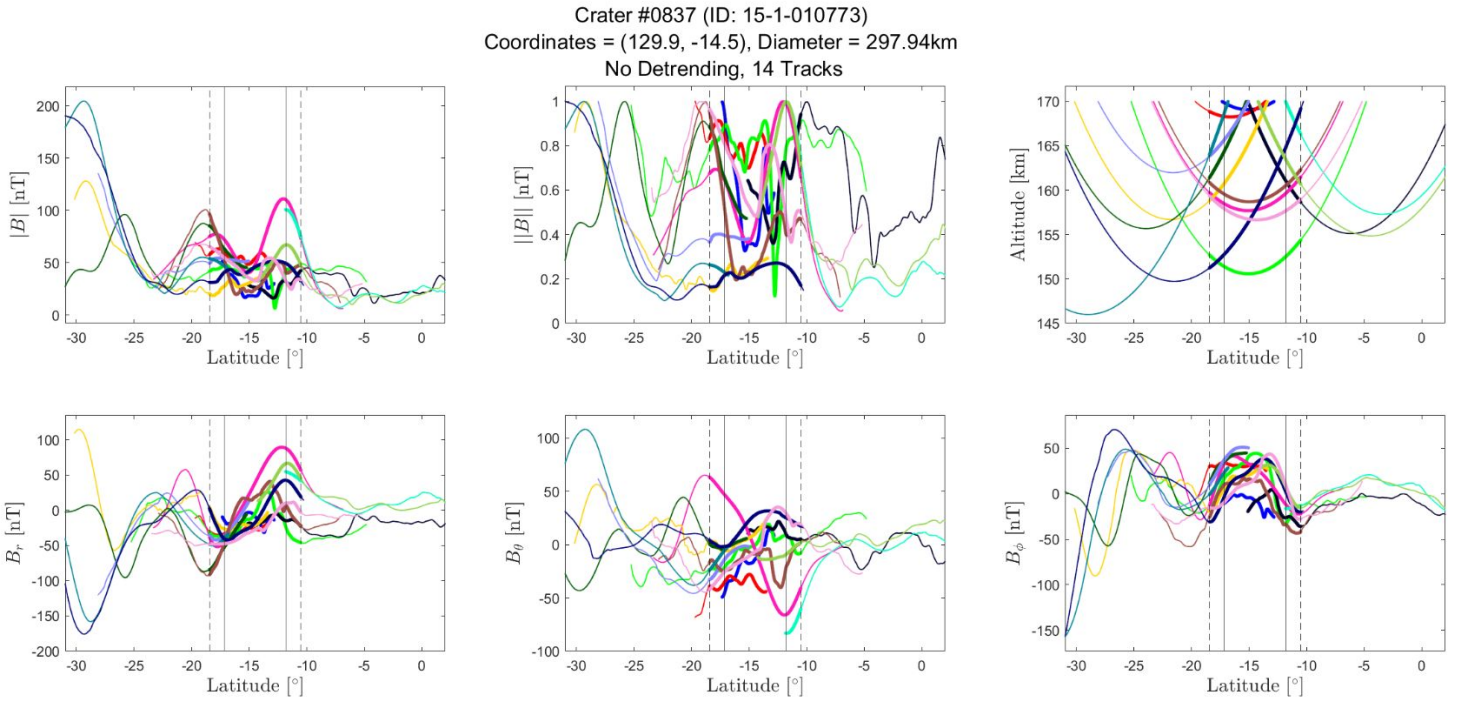
Strong demagnetization

[8] Koval'sky



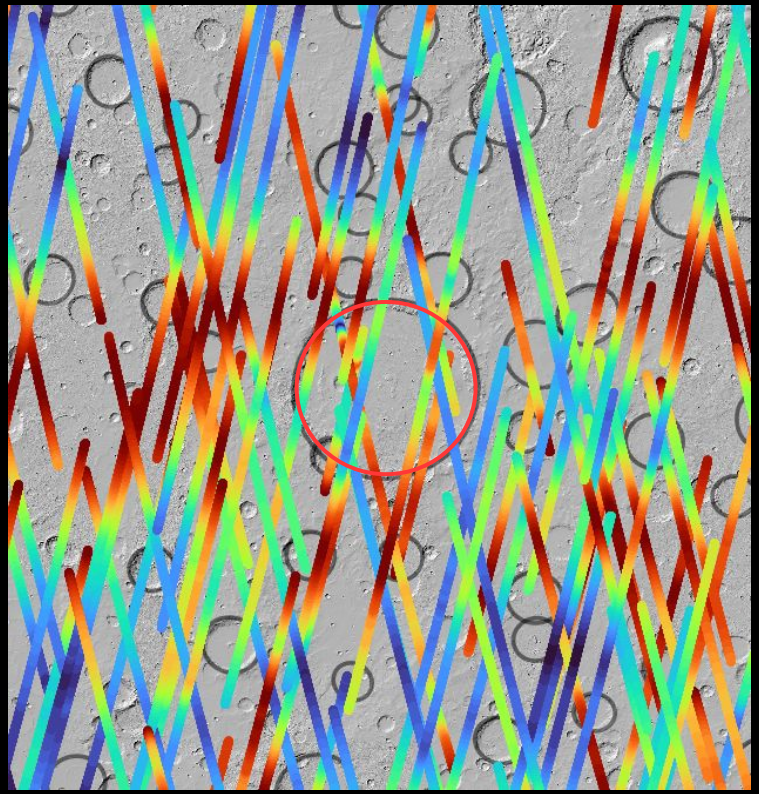

Comas Sola
Bernard
Zumba
Koval'sky
Crose
Pickering
Teknaf
Dunkassa
Selevac
Bunnik
Langtang
Daiyang
Newton
Pallki
Hipparchus
Eudoxus
Yaren

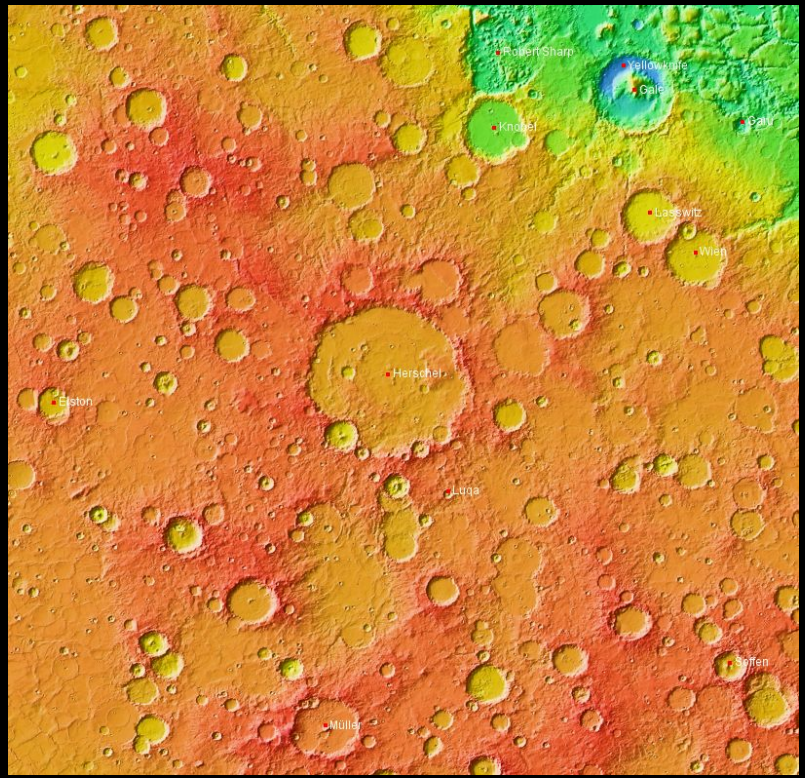
[9] Herschel



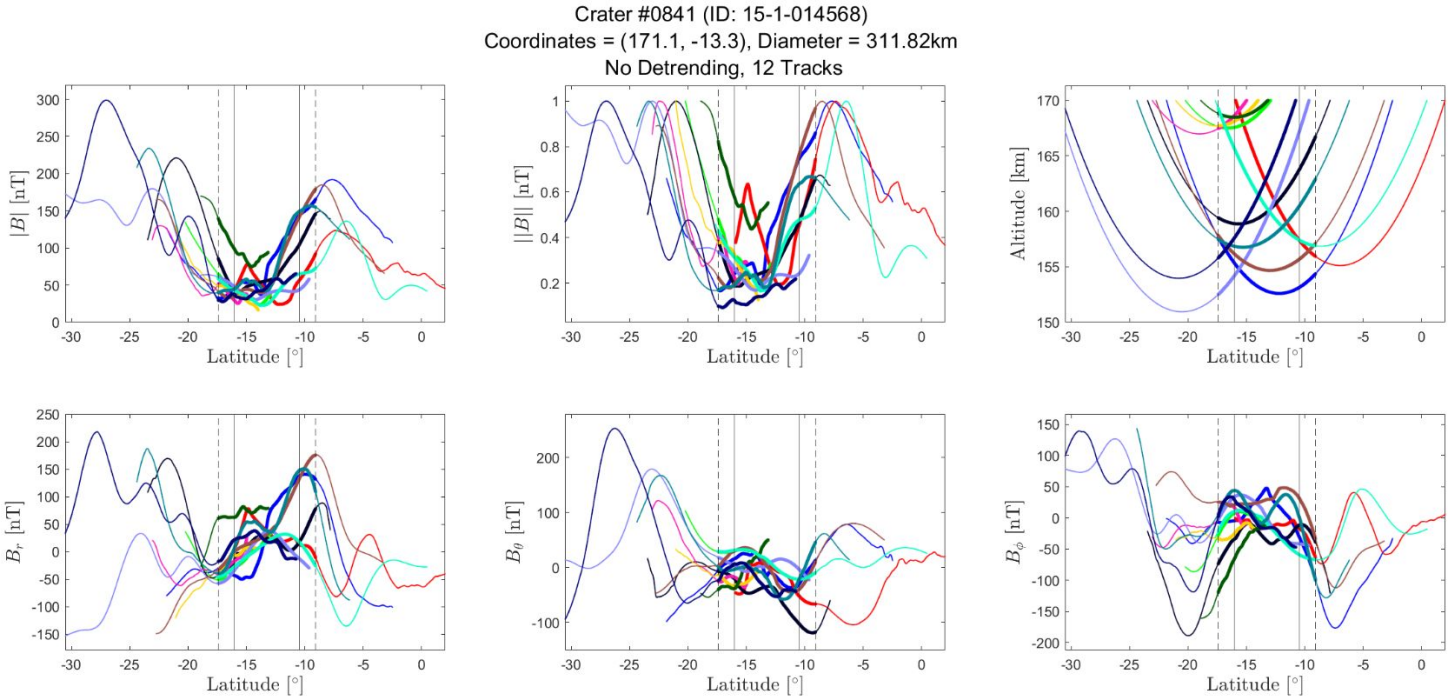
Likely demagnetization

[9] Herschel



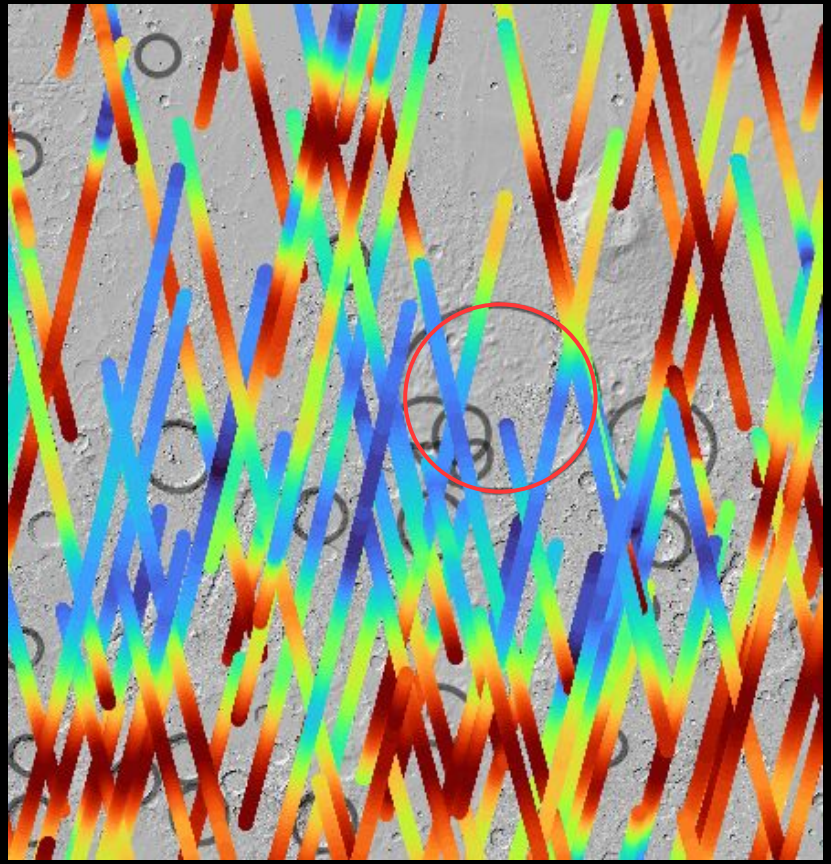

Robert Sharp
Yellowknife
Gale
Knobel
Galv
Lasswitz
Wien
Herschel
Elston
Luna
Seffen
Müller

[10] de Vaucouleurs

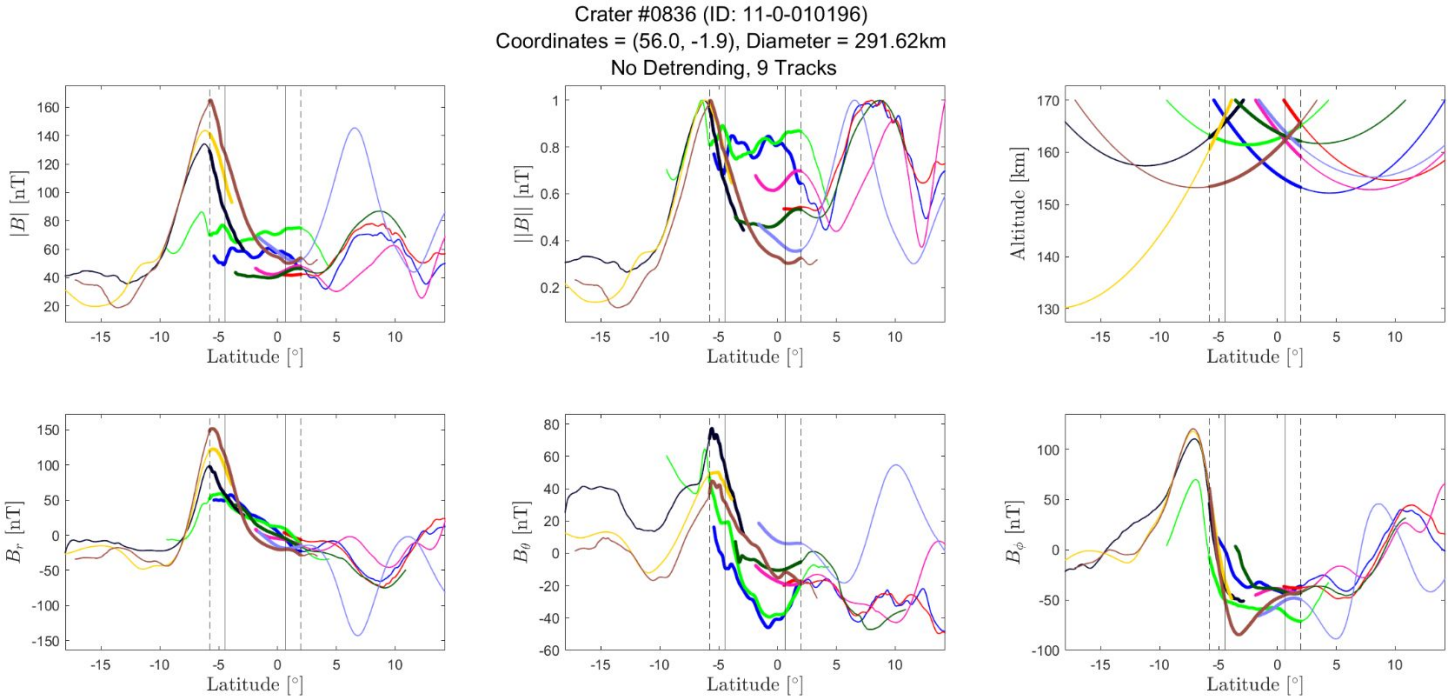


Likely demagnetization (?)

[10] de Vaucouleurs

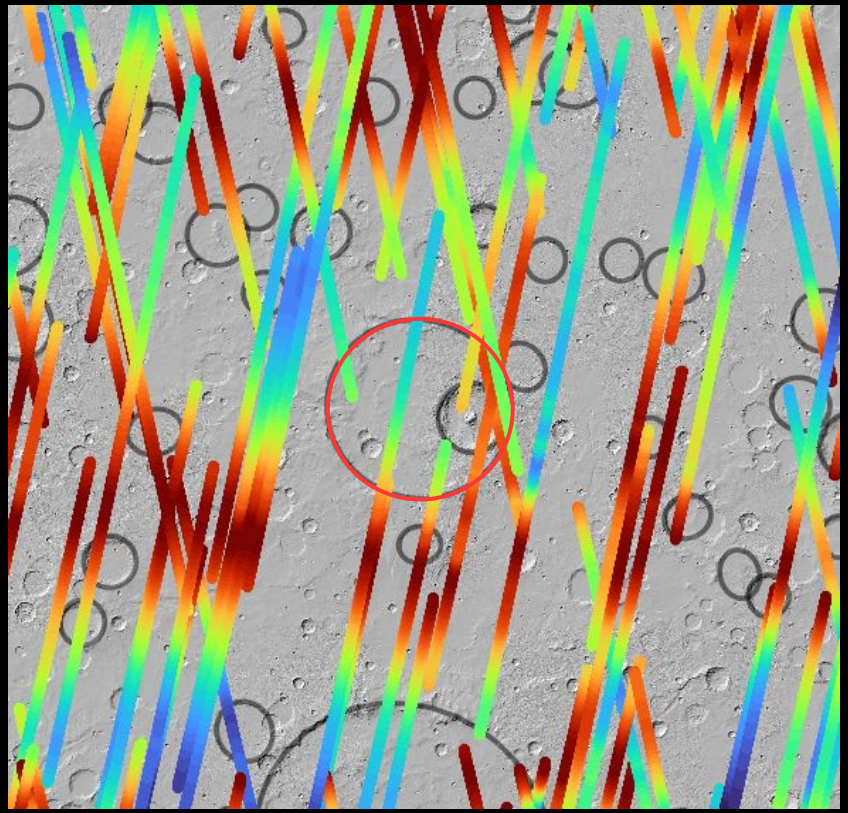


[11] Schroeter

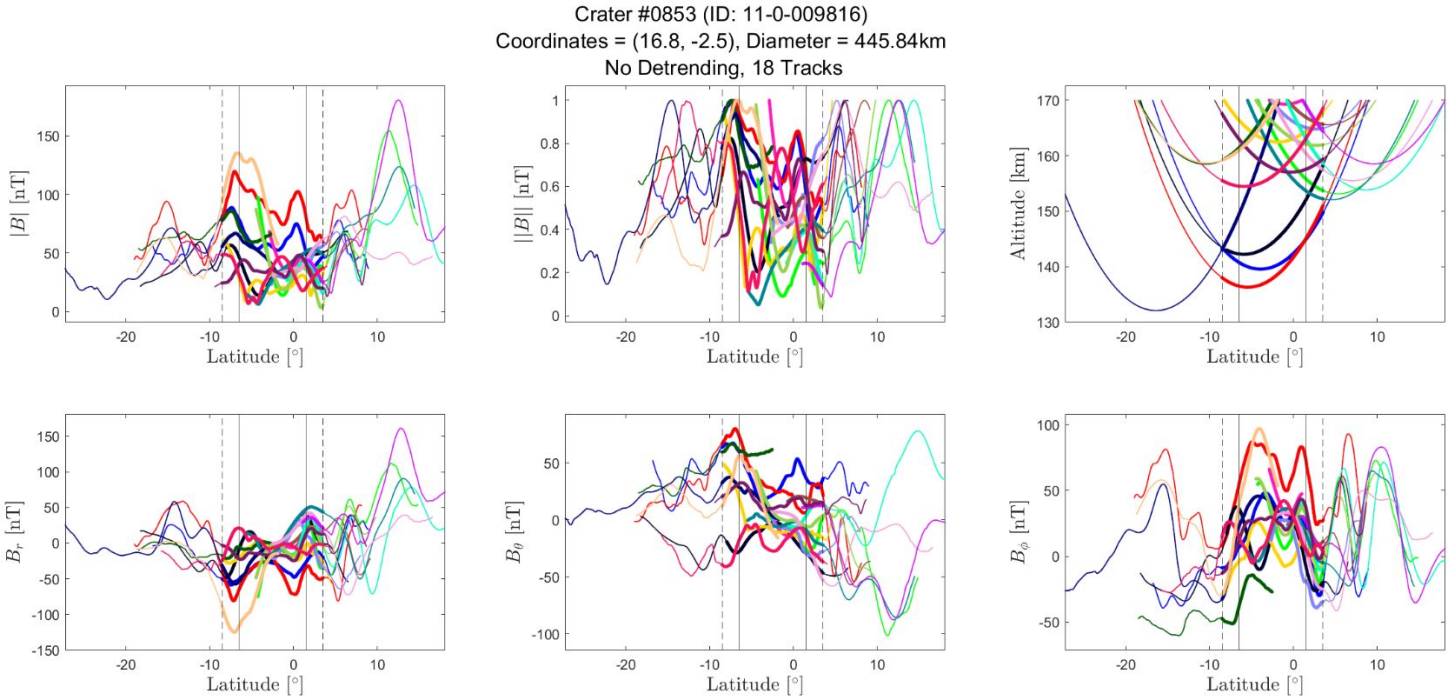


Likely demagnetization

[11] Schroeter

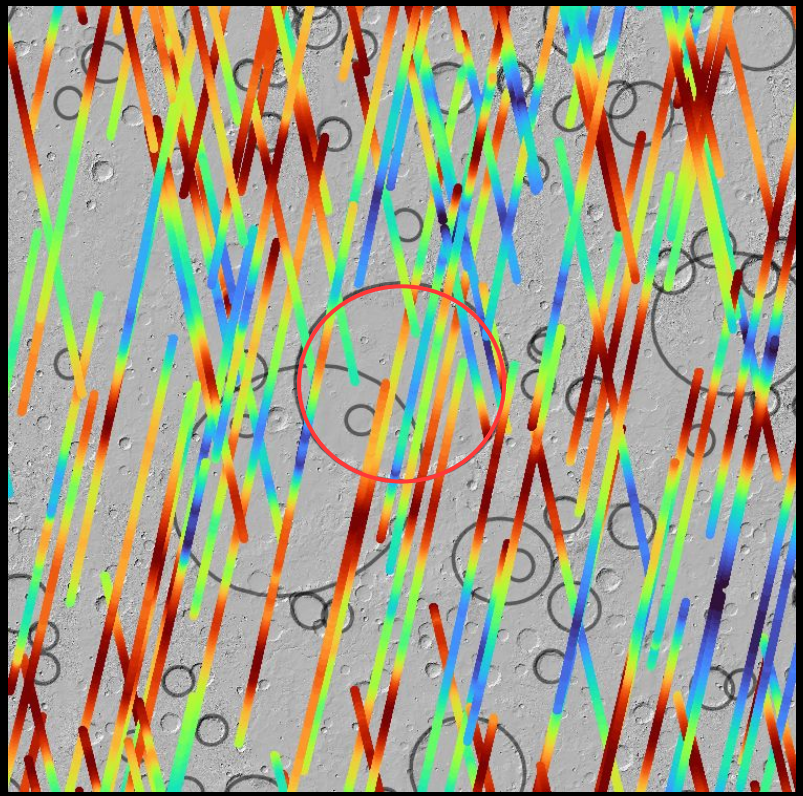


[12] Schiaparelli

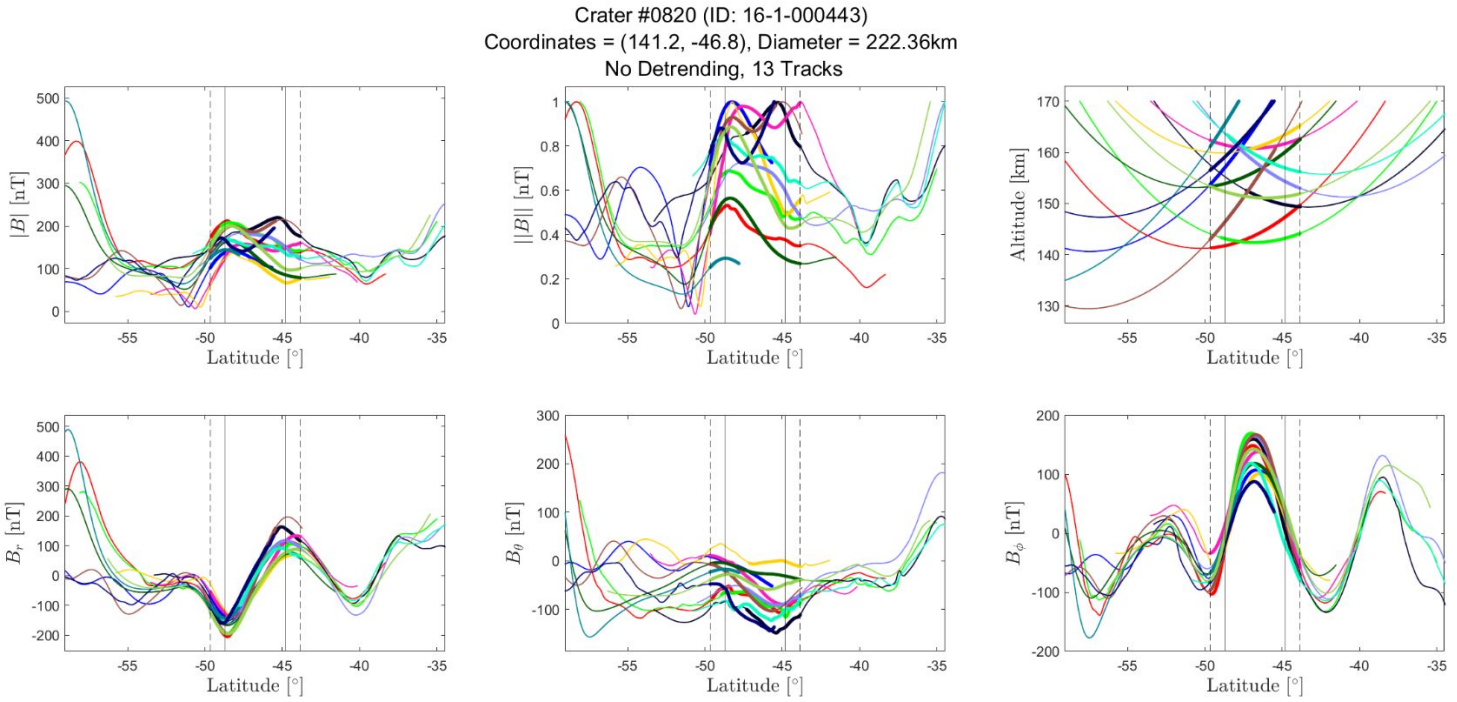


Possible remagnetization? (luju)

[12] Schiaparelli

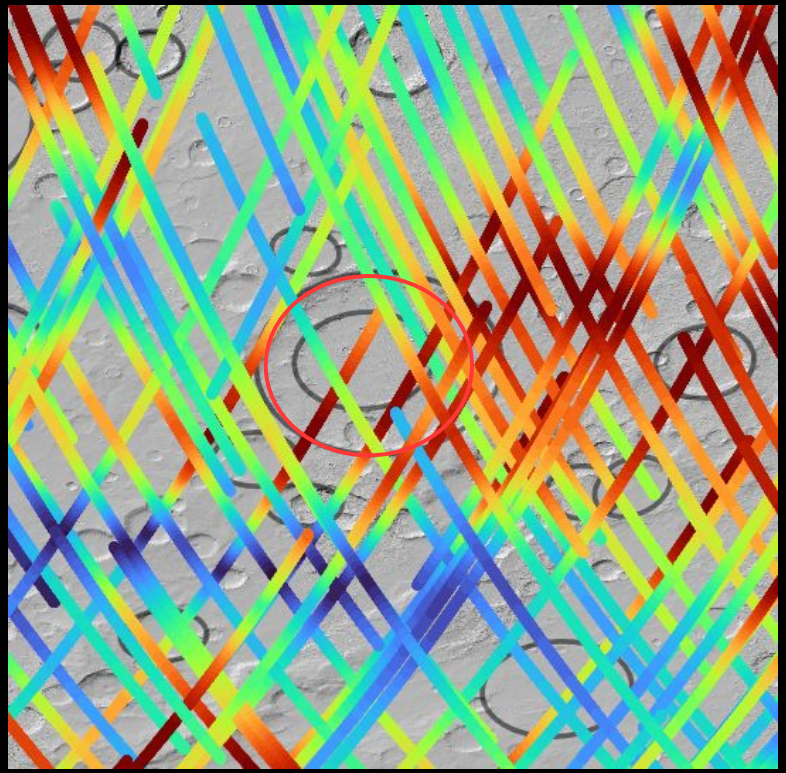


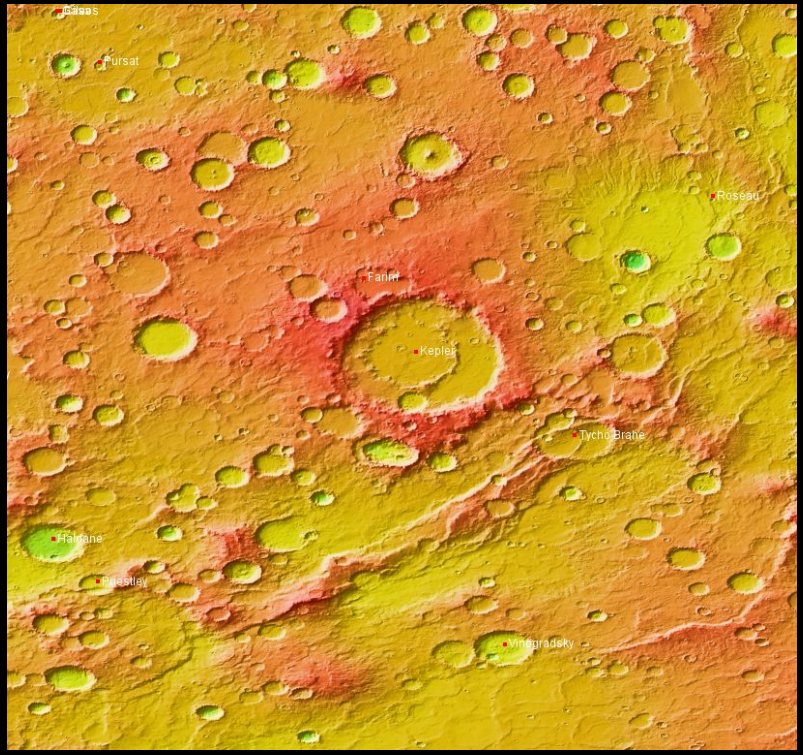
[13] Kepler



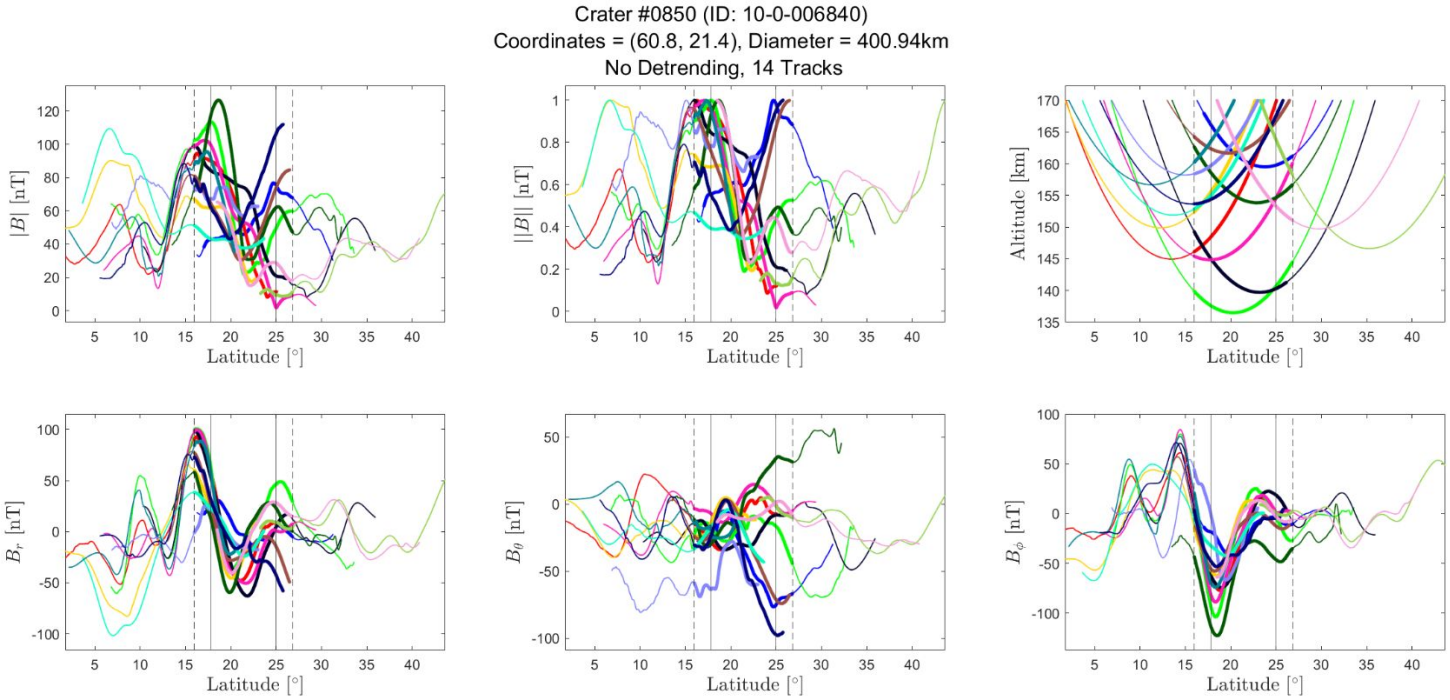
Ambiguous (luju said remag?)

[13] Kepler



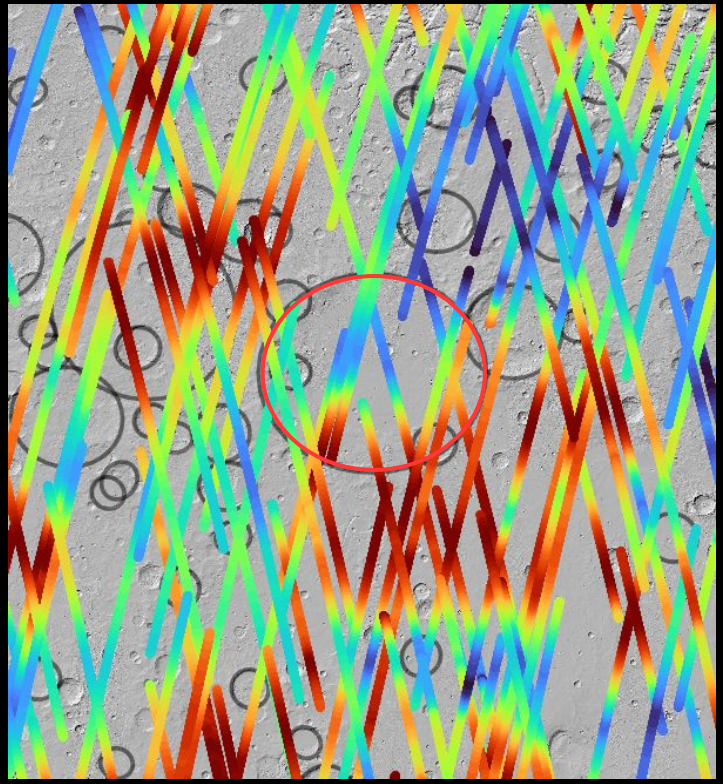

Fursat
Roseau
Fanin
Kepler
Tycho Brahe
Hakane
Vinogradsky

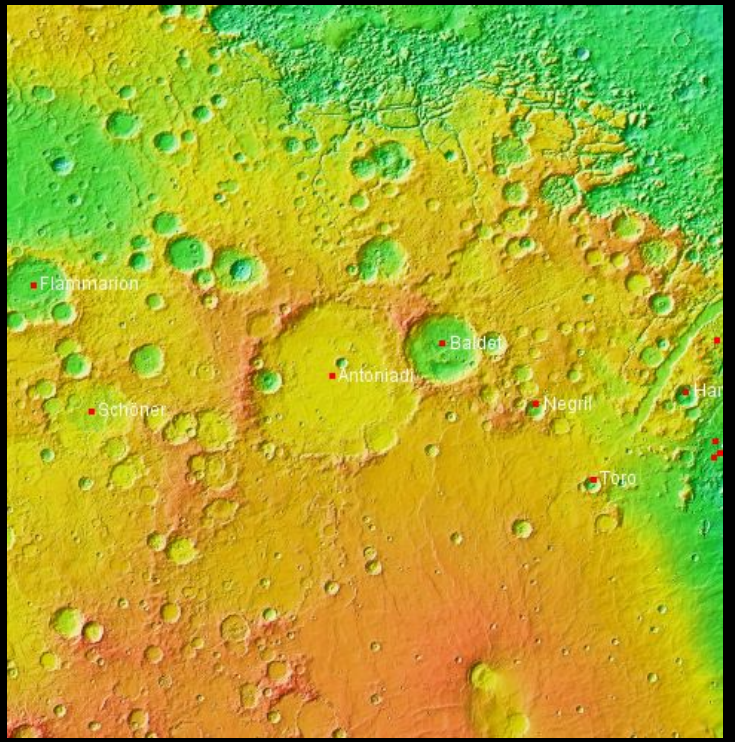
[14] Antoniadi



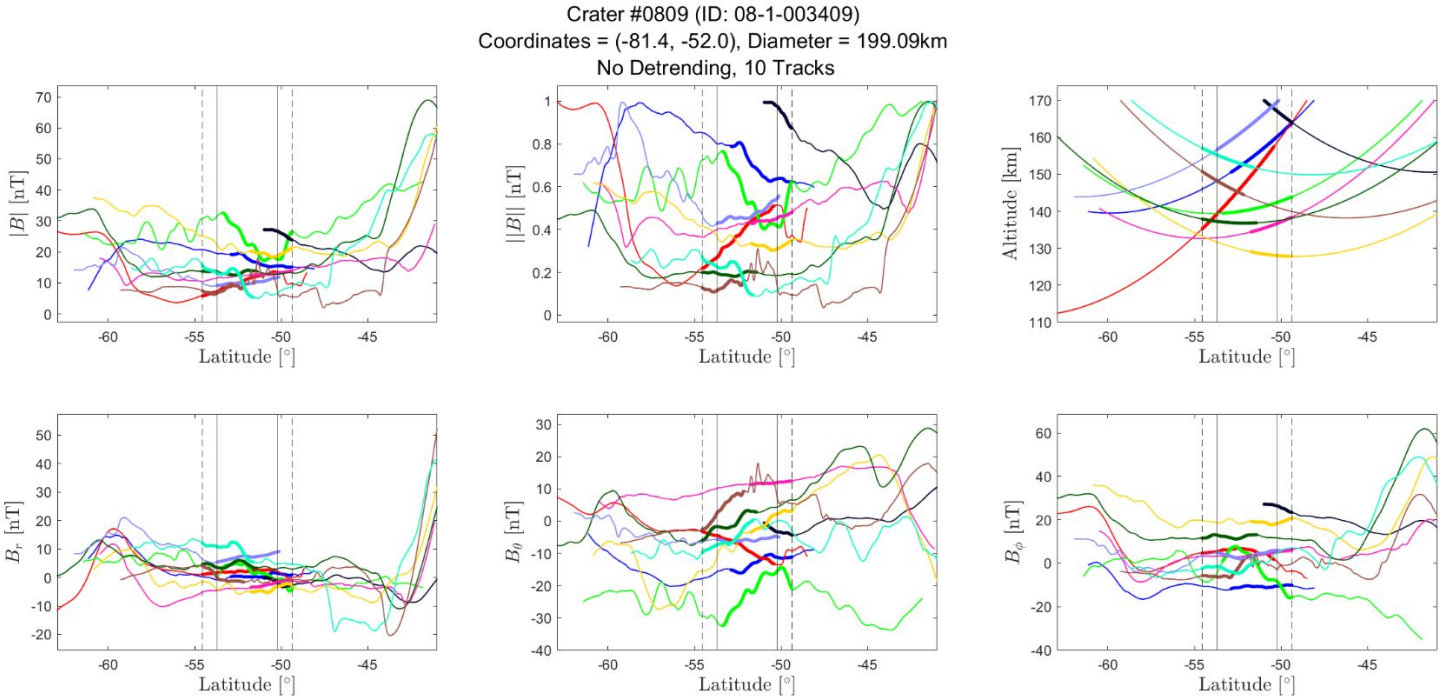
Likely demagnetization

[14] Antoniadi



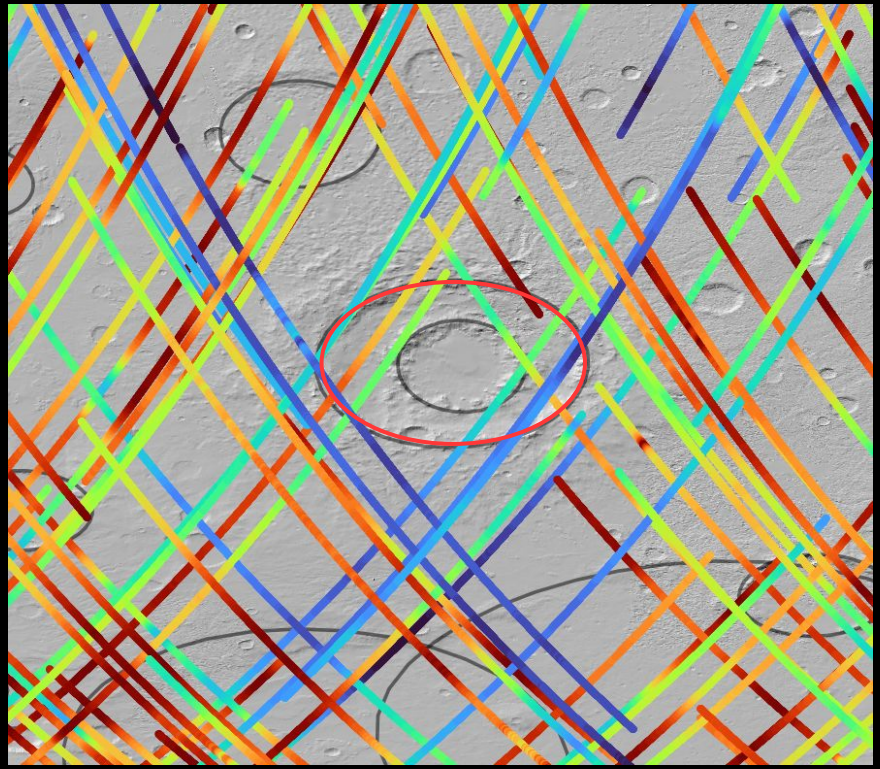


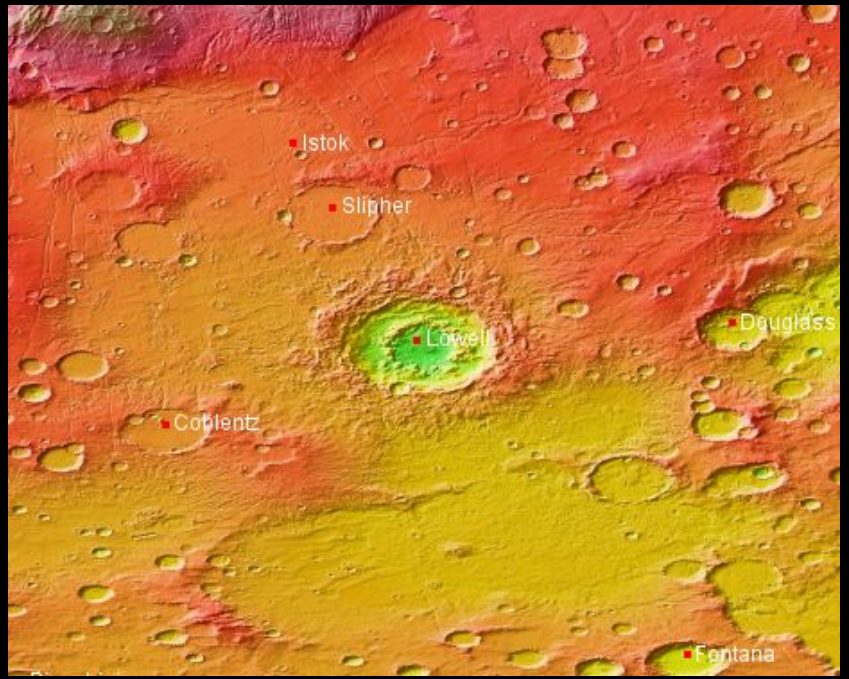
[15] Lowell



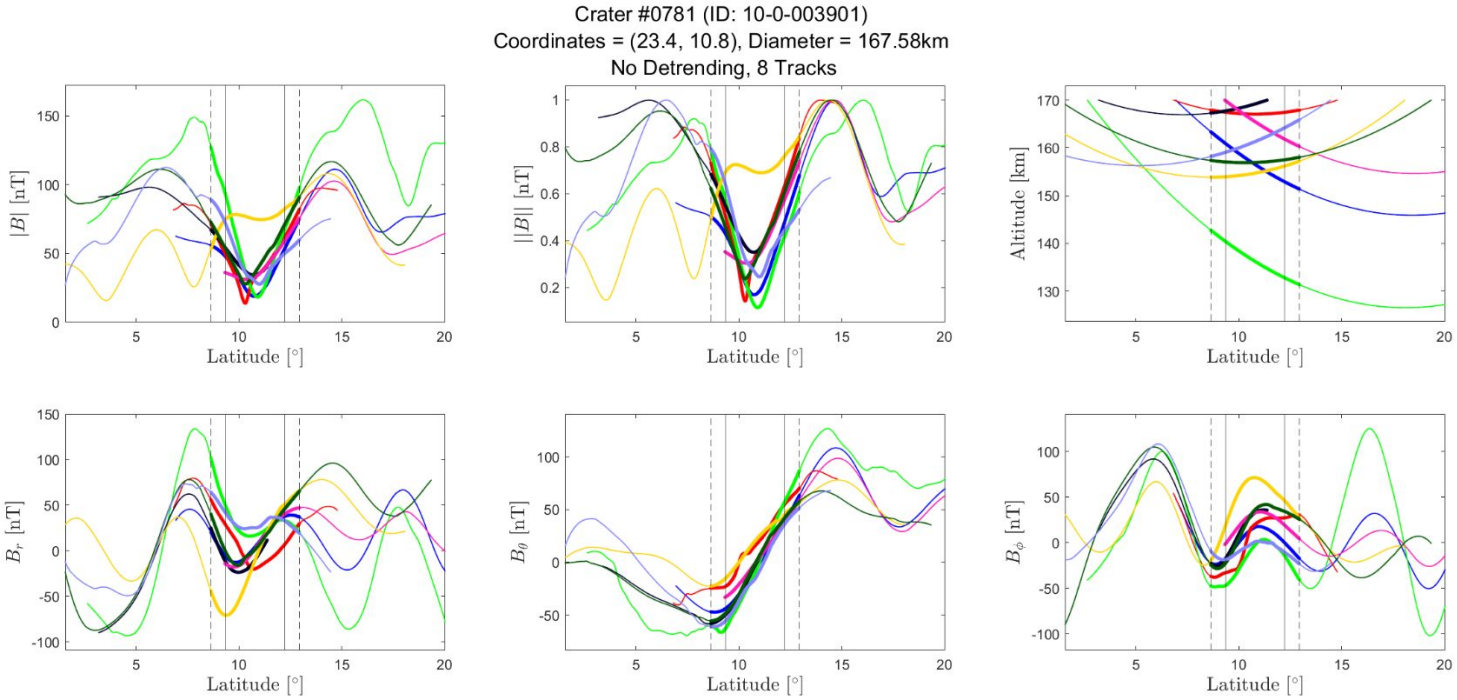
Ambiguous (heavily demagnetized region)

[15] Lowell



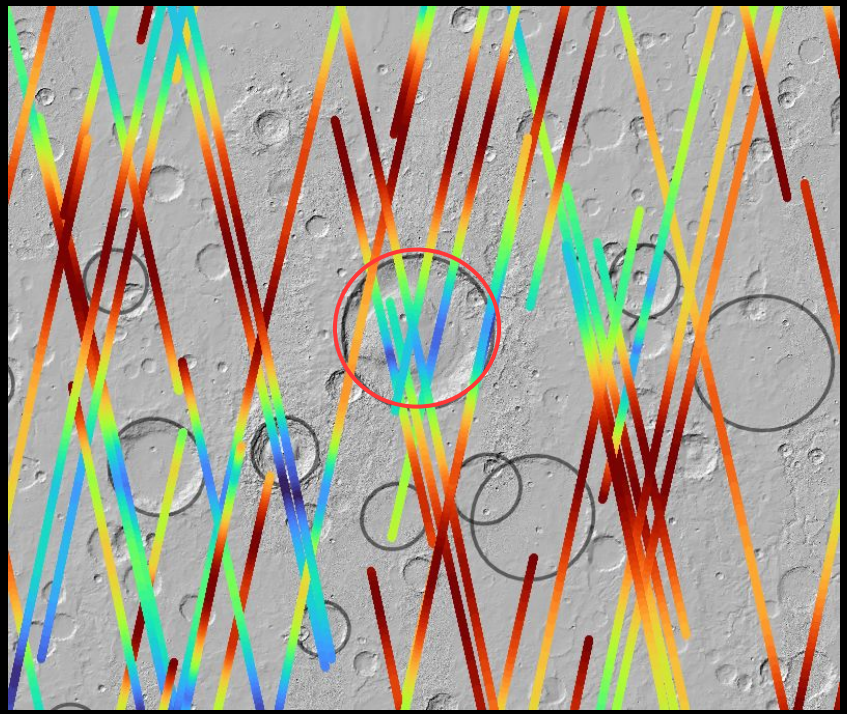


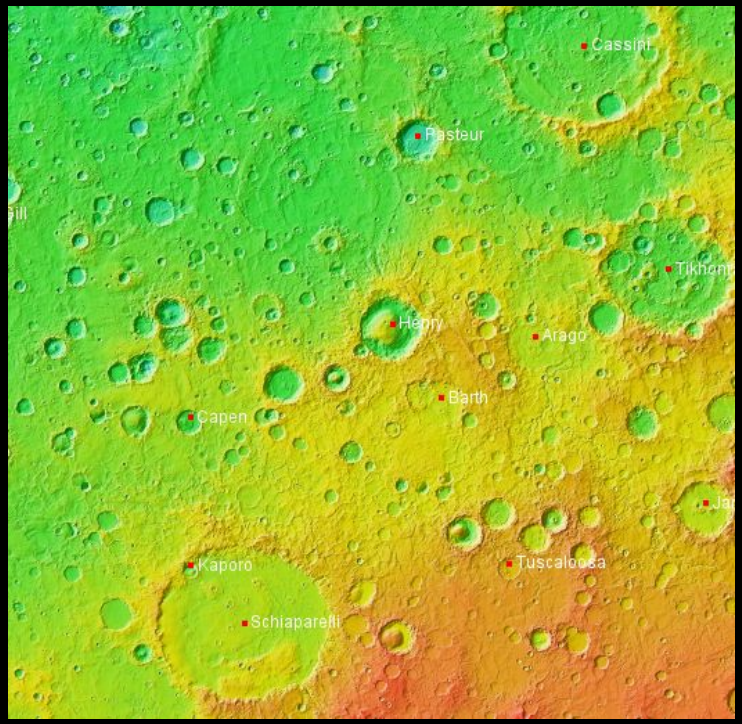
[16] Henry



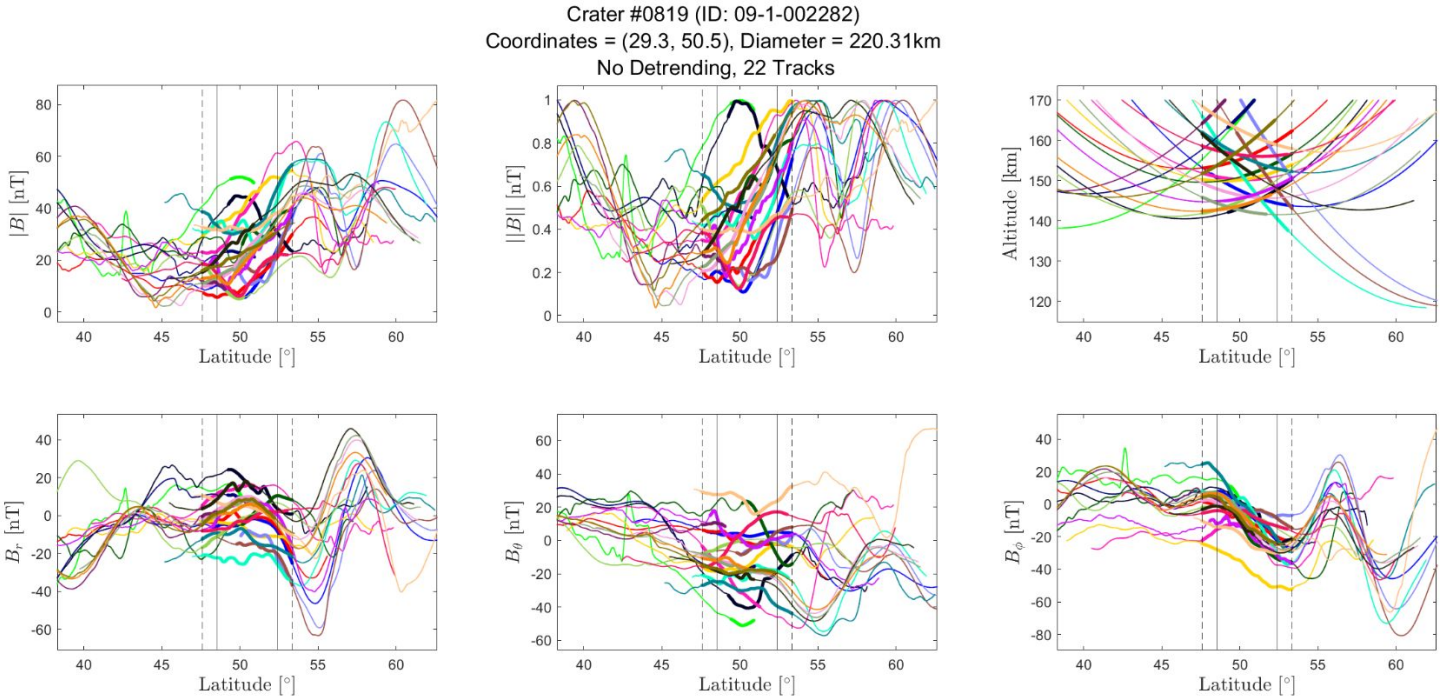
Strongly demagnetized

[16] Henry



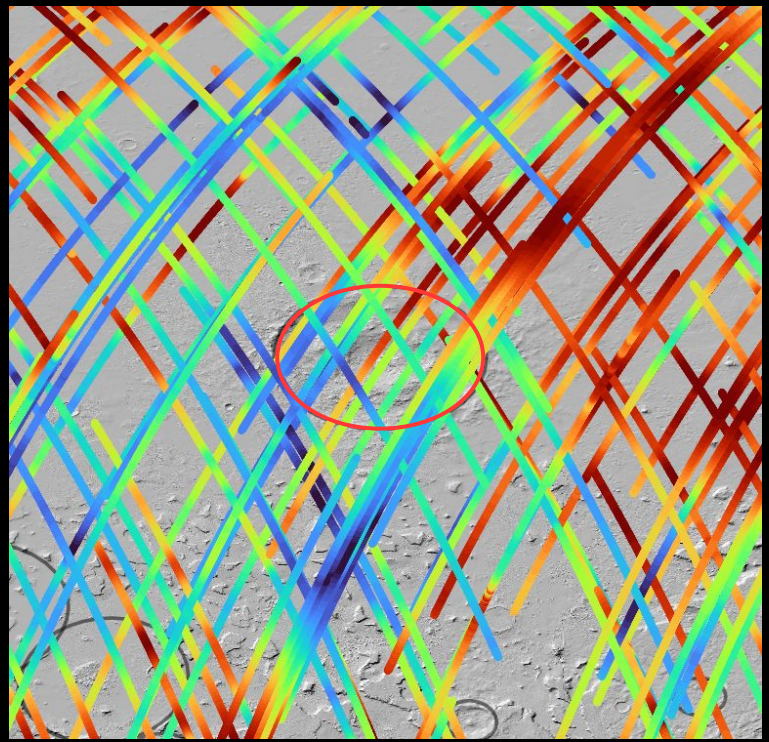

Cassini
Pasteur
Tikhonravov
Henry
Arago
Barth
Capen
Kaporo
Tuscaloosa
Schiaparelli

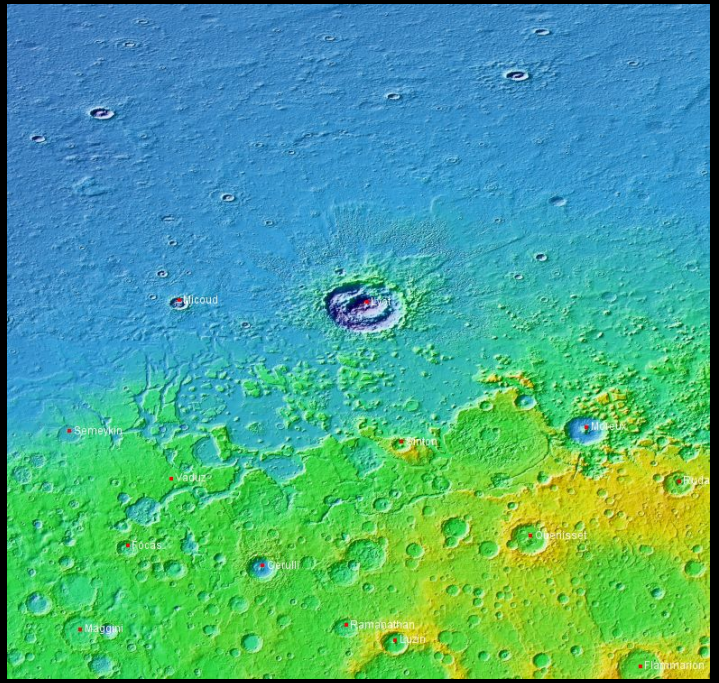
[17] Lyot



Ambiguous, see lower altitude tracks

[17] Lyot




Lyot
Semeykin
Vaduz
Rocas
Gerulli
Ramanathan
Lyot
Flammarion