Amateur observation of an atypical martian atmospheric feature: when serendipity leads to identify an atypical cloud system

EPSC2022

ODAA5 Pro-am collaborations session

Sept. 21st, 2022

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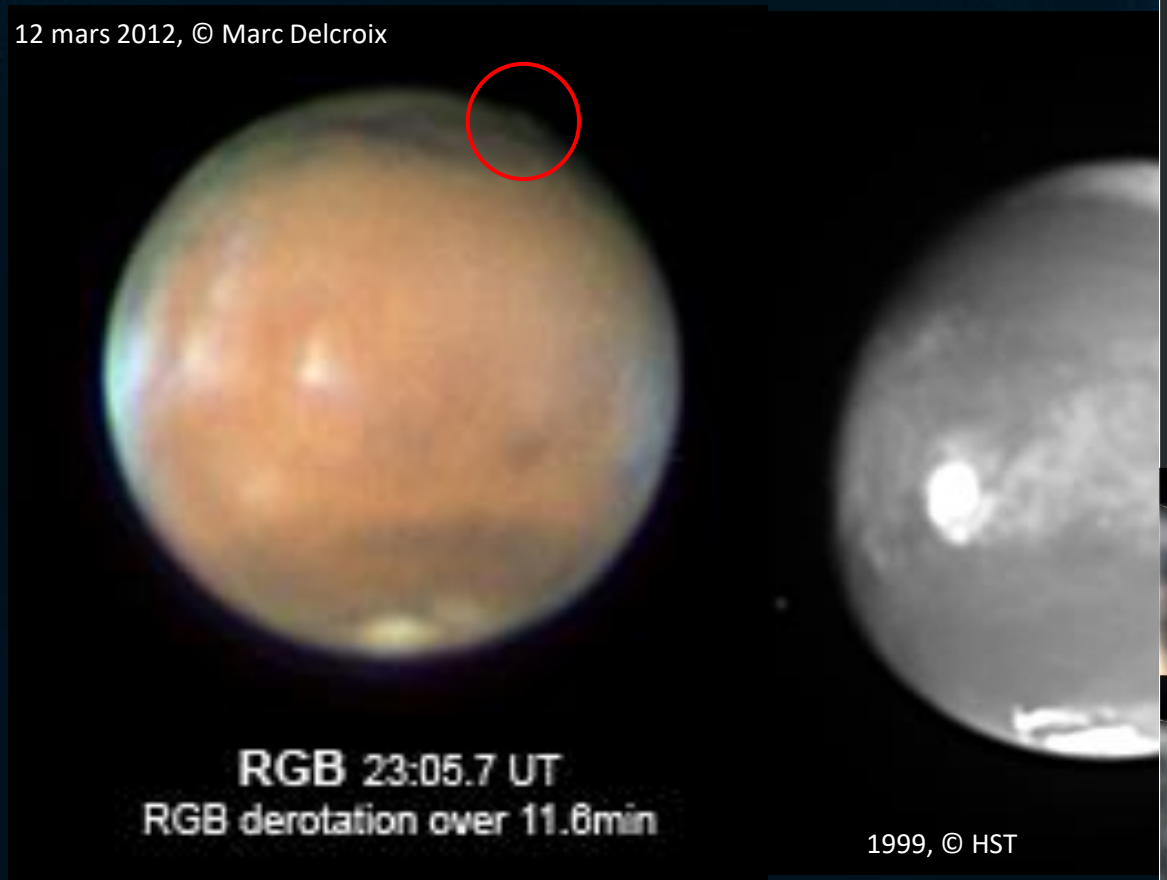
Pro-am collaborations since 2015 *(Sanchez-Lavega, Nature, 2015)*

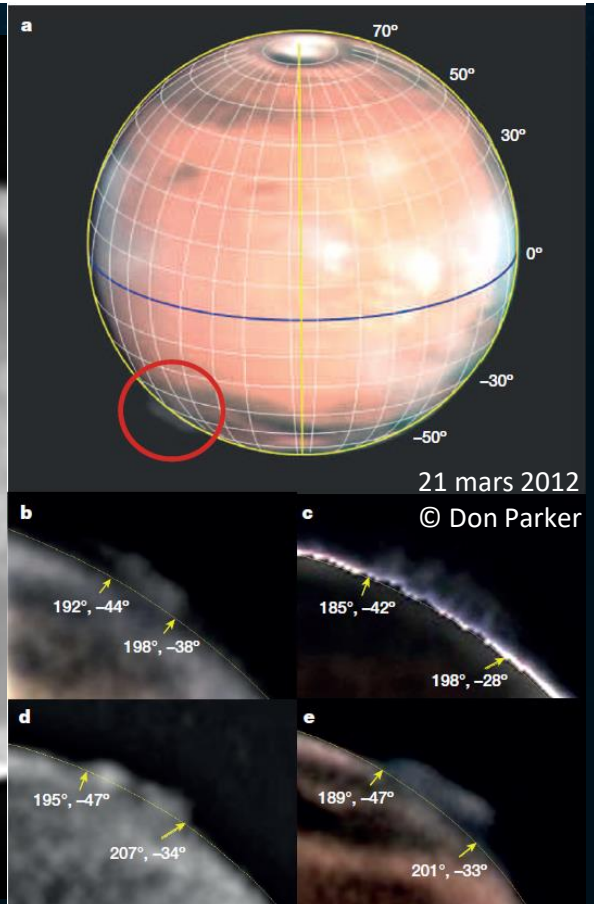
LETTER

doi:10.1038/nature14162

An extremely high-altitude plume seen at Mars' morning terminator

A. Sánchez-Lavega[1,2], A. García Muñoz[3], E. García-Melendo[1,4], S. Pérez-Hoyos[1,2], J. M. Gómez-Forrellad[4], C. Pellier[5], M. Delcroix[5], M. A. López-Valverde[2,6], F. González-Galindo[2,6], W. Jaeschke[7], D. Parker[8], J. Phillips[9] & D. Peach[10]



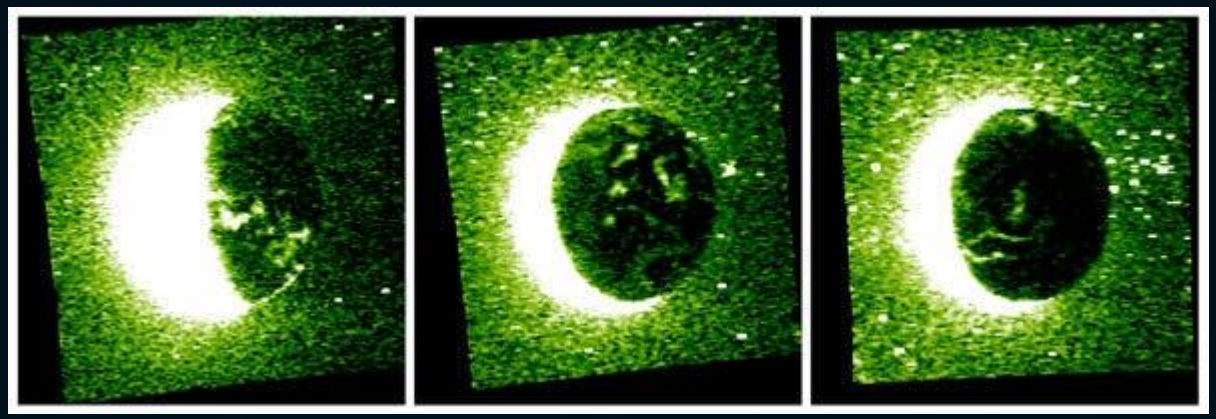


New paper (A&A) … it started by looking for aurorae

A&A proofs: manuscript no. 41735corr_clean_2col
Astronomy & Astrophysics manuscript no. 41735corr_clean_2col
February 27, 2022

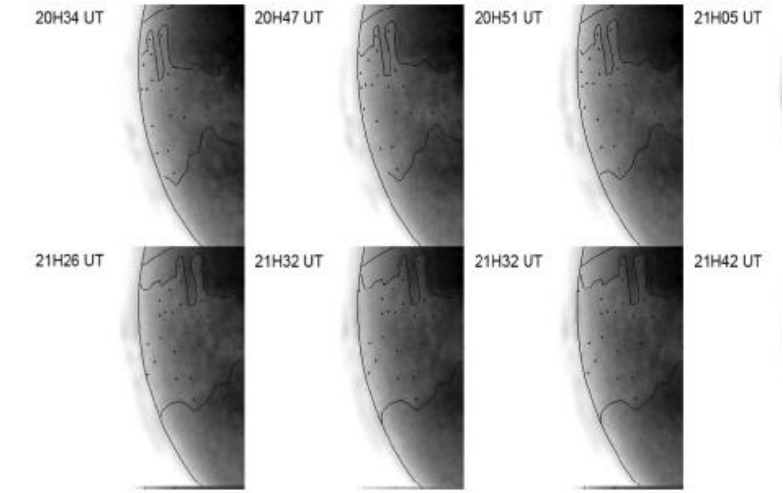
Observation from Earth of an atypical cloud system in the upper Martian atmosphere

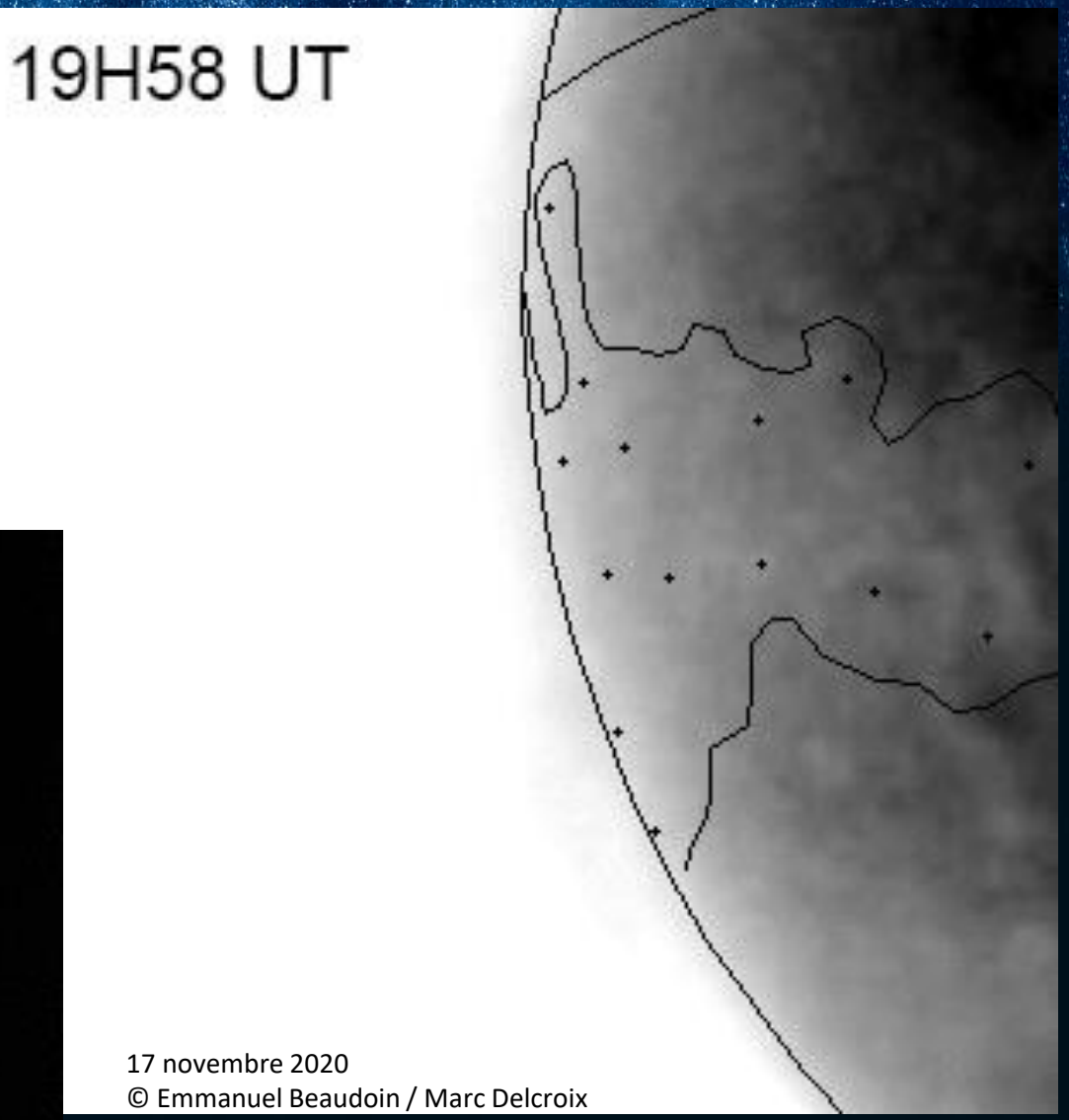
J. Lilensten[1], J.L. Dauvergne[2], C. Pellier[3], M. Delcroix[4], E. Beaudoin[5], M. Vincendon[6], E. Kraaikamp[7], G. Bertrand[8], C. Foster[9], C. Go[10], E. Kardasis[11], A. Pace[12], D. Peach[13], A. Wesley[14], E. Samara[15], S. Poedts[16,18], and F. Colas[17]



Aurores
Avril/mai 2021, © Hope

Serendipity…actually an extremly large cloud system emerging from night side!





17 novembre 2020

Those clouds even cast shadows!

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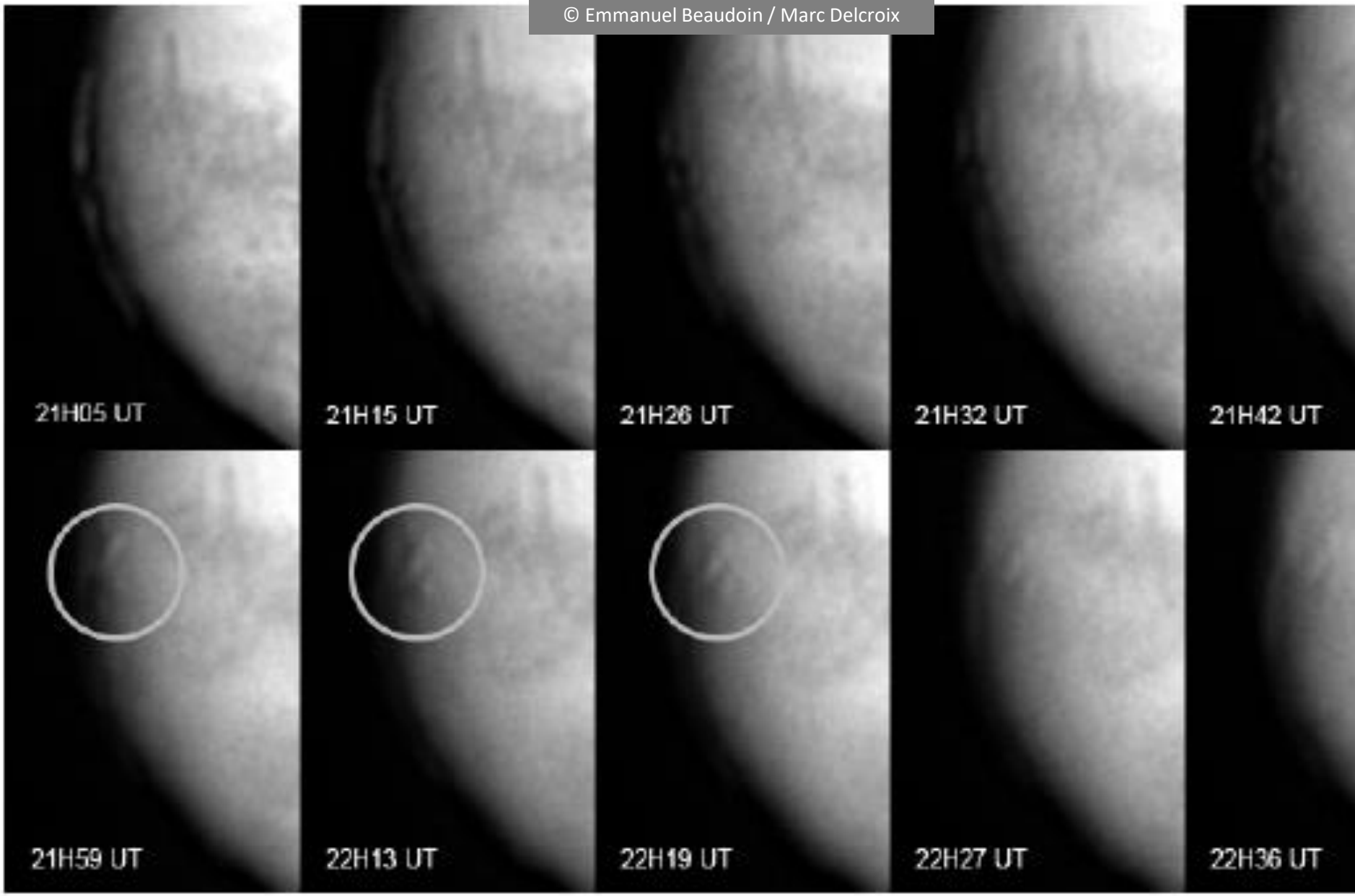
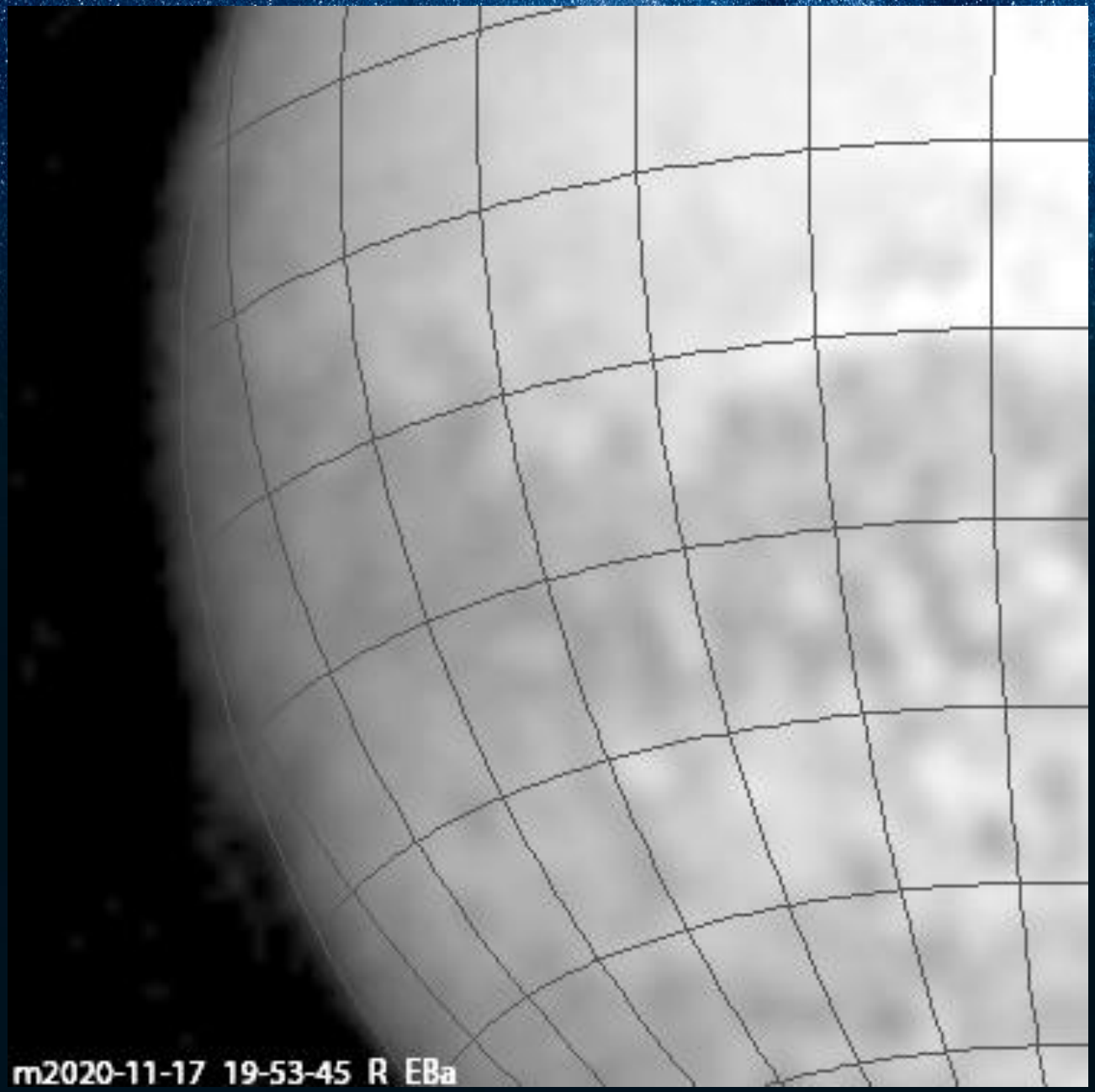


Positions measured and tracked with planet rotation to derive their altitude



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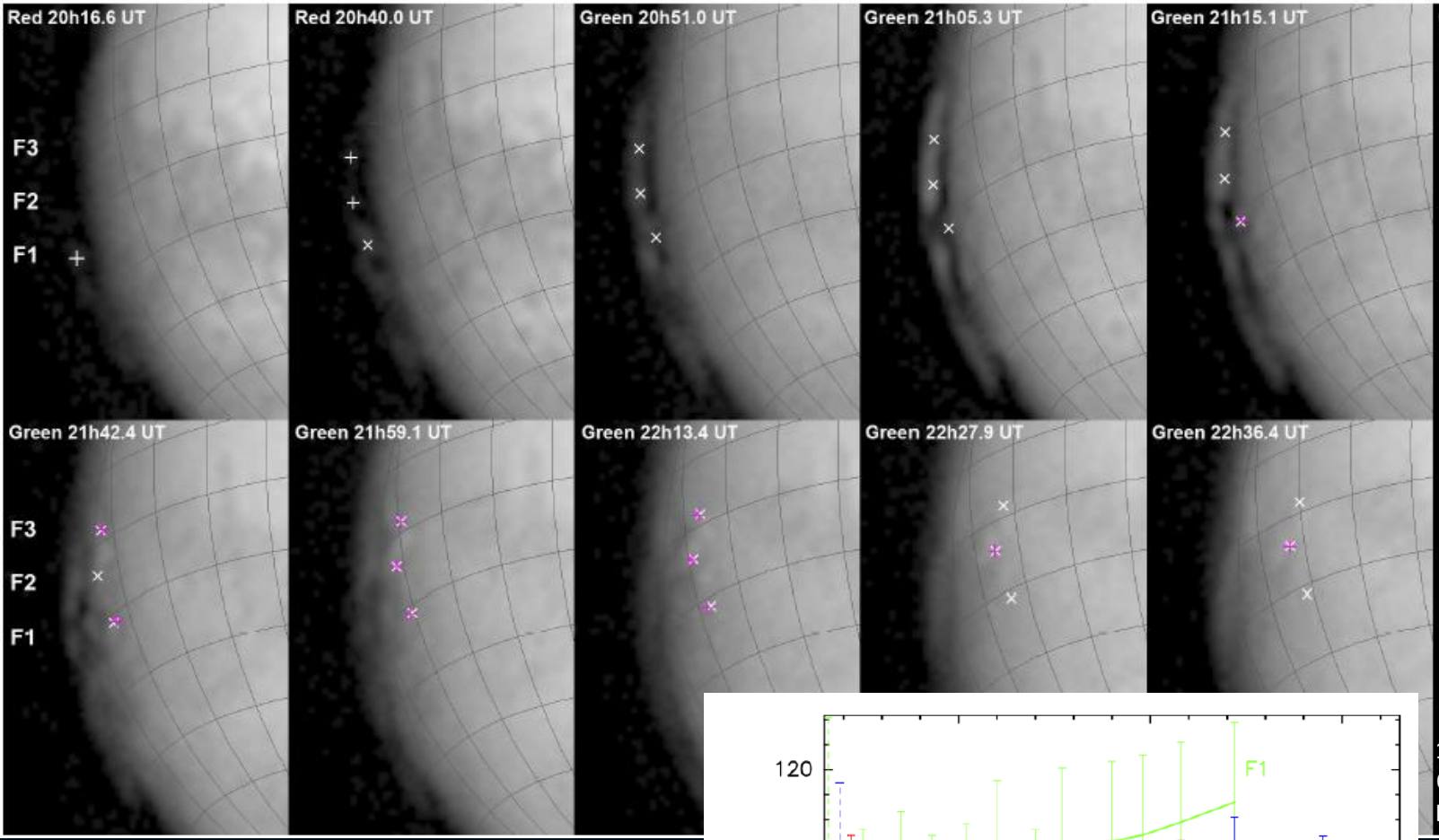
Positions measured and tracked with planet rotation to derive their altitude



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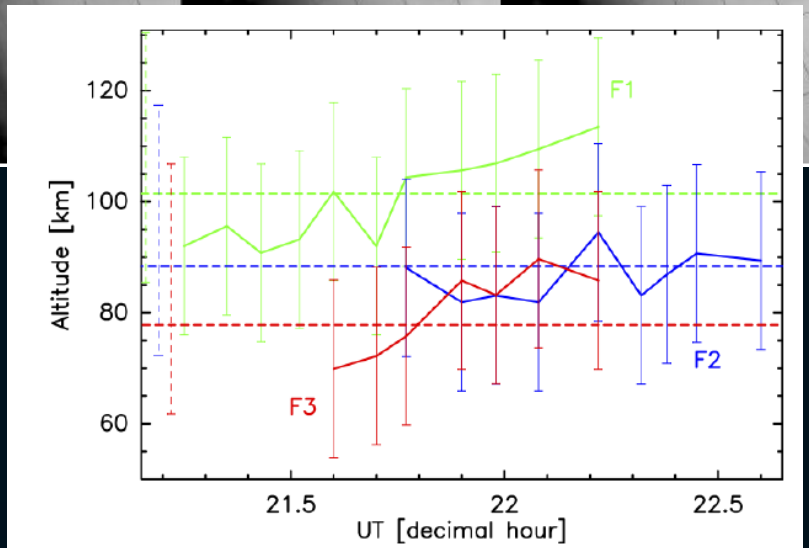
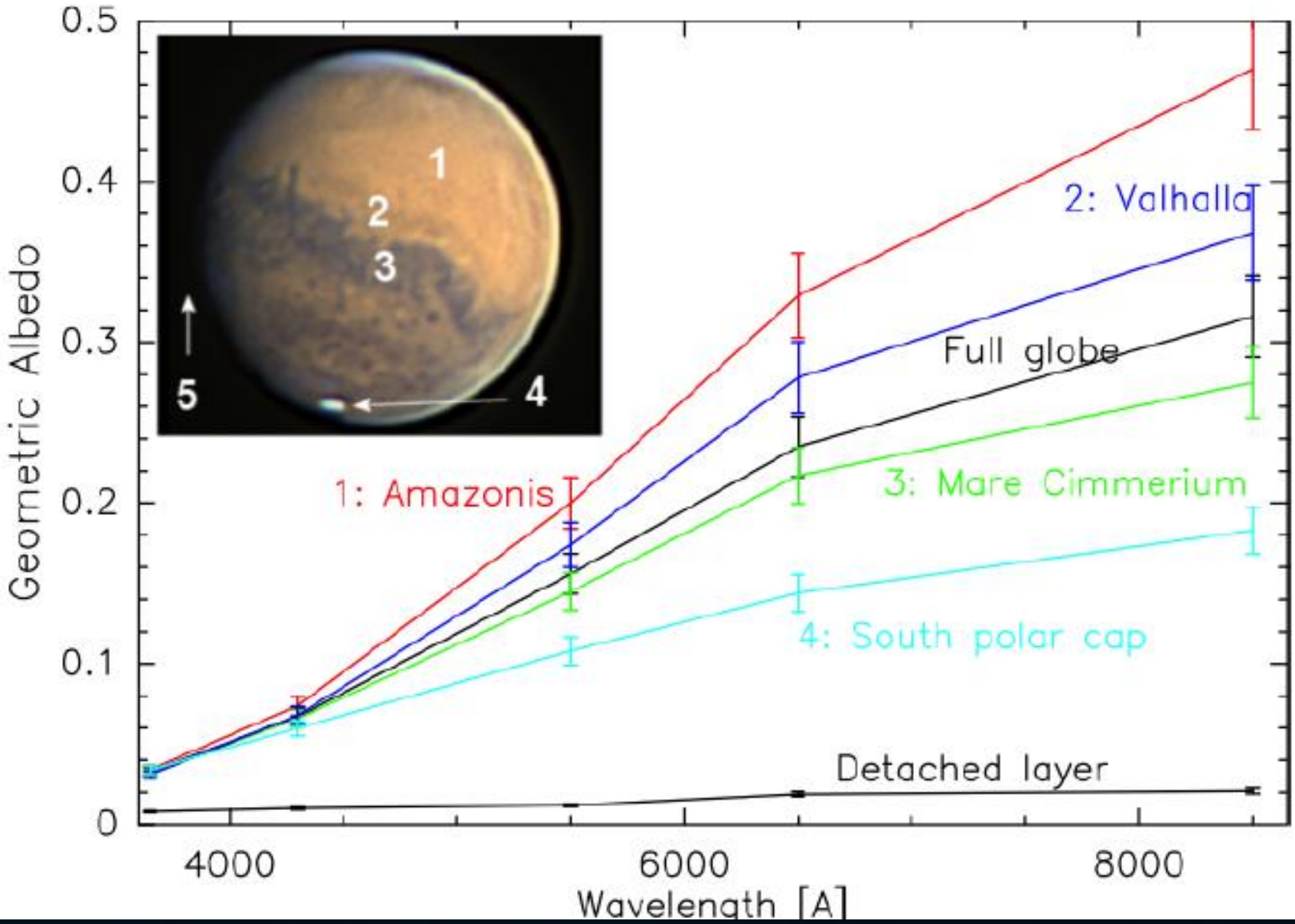


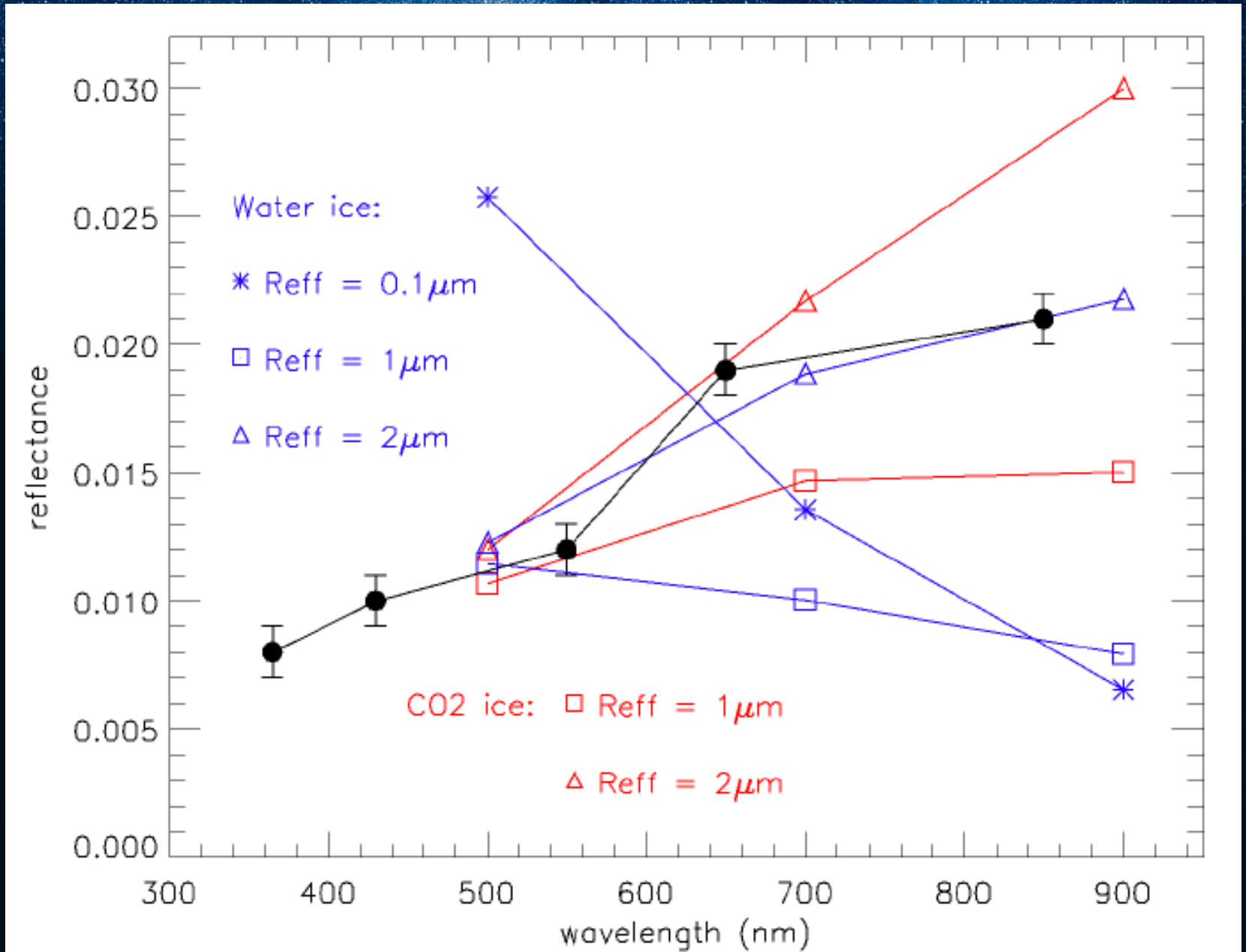
Altitude at night side emergence
92 (-16/+30) km

Longitudinal size
~3000 km

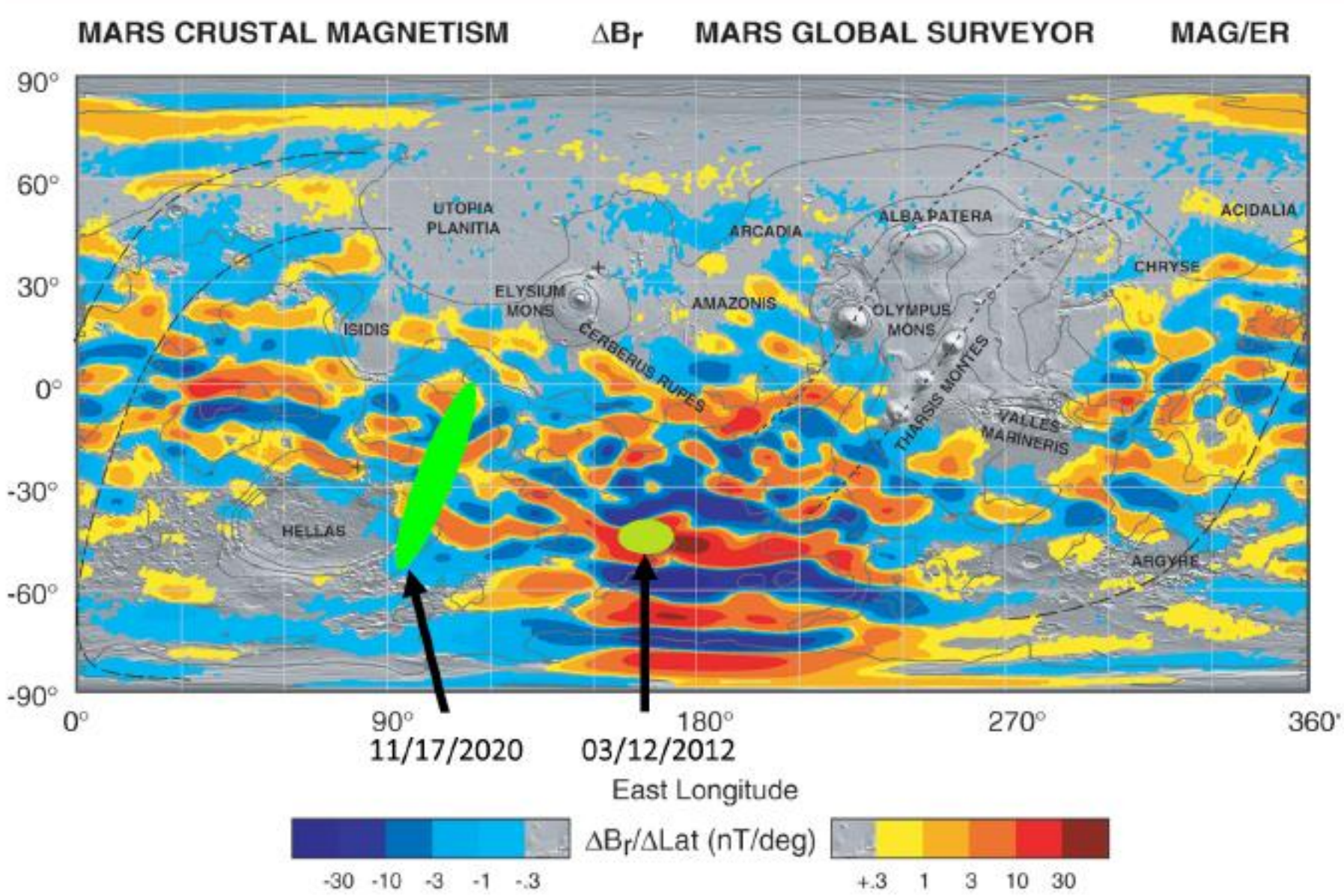
Cloud system photometry



Clouds photometry compared with simulations (grain size, H_2O or CO_2 ice)



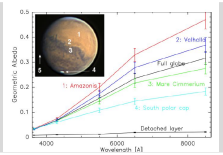
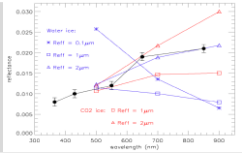
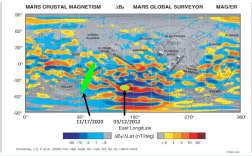
Position compareéd to residual magnetism – cosmic rays influence?



Connerney, J. E. P. et al., (2005) Proc. Natl. Acad. Sci. USA, 102, No. 42, 14970-14975.

R1599_1pub

What type of phenomenon ?

Formation type	Altitude, profile	Size	Color	Grain size	Localisation	Solar activity	Dust storm
	92 km, detached from ground	3000 km				none	Regional, 180° from cloud
Aurorae	---		-		+	---	
Dust	--		--				+
H_2O ice	+++	++	++	-	++		+
CO_2 ice	++	-	++	++	++		

<u>Atypic</u> cloud of water ice or carbon dioxyde
Cosmic rays influence?

Take away

- Amateur observations useful despite probes
- Amateurs' analysis capacity (altitude, photomy)
- Article really co-constructed, multiple discussions to understand observed phenomenon, amateurs at the heart of scientific works!
- Amateurs, monitor limb / Martian night side to look for cloud/bright features, do not think those are processing artifacts!