

Wavelength Dependency and Angular Effects of Reflectance of Fog in Valles Marineris

Observed by the High Resolution Stereo Camera (HRSC) and OMEGA
on board Mars Express

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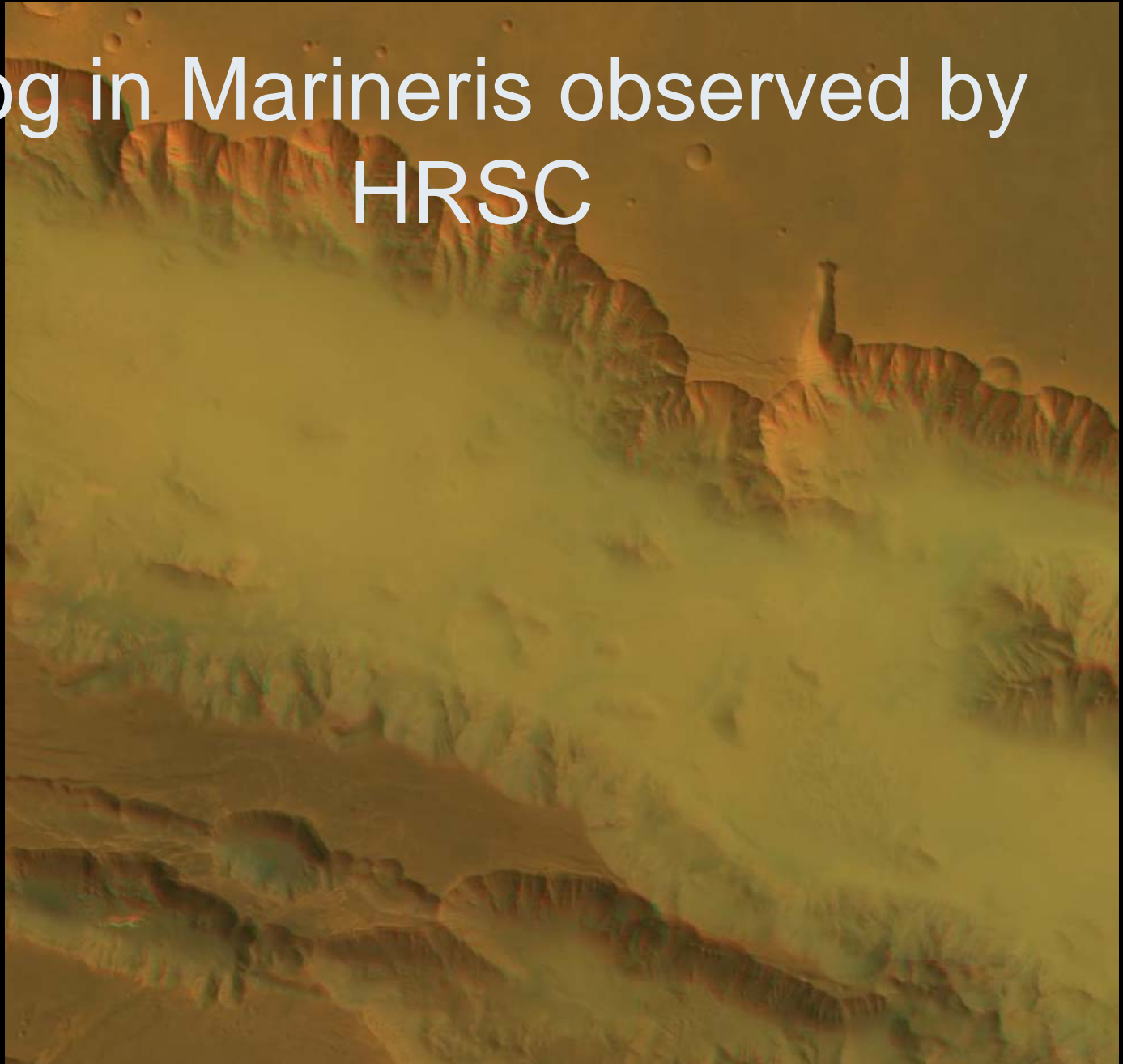
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Fog in Marineris observed by HRSC



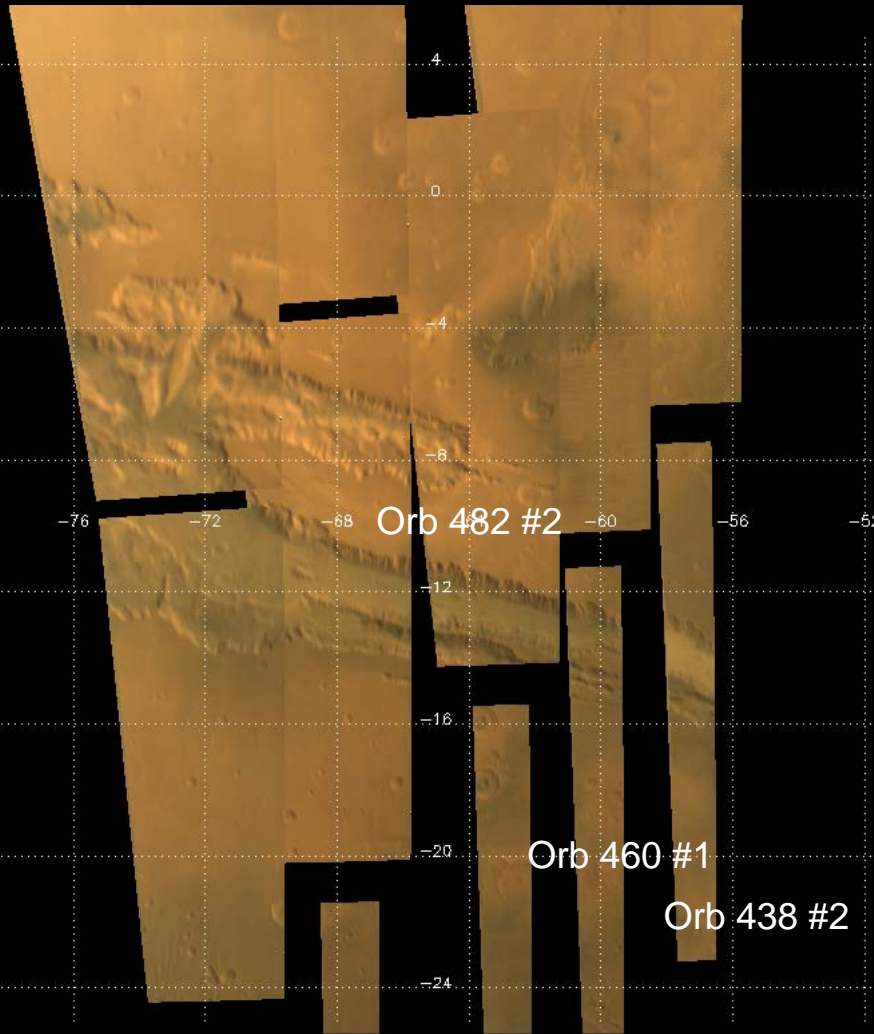
Orbit 438

25. May 2004

$i = 50$, $L_s = 38$

local time 9:20

Fog in Marineris observed by OMEGA



Orbit	observed by	local time
0438	OMEGA and HRSC	09:15
0449	HRSC	09:15
0460	OMEGA	09:07
0471	HRSC	09:00
0482	OMEGA	08:57

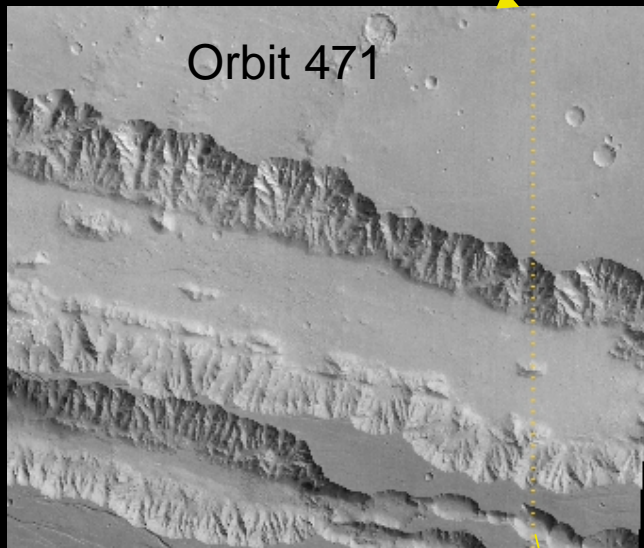
We compare

- the HRSC data of orbit 0438, 0449, 0471, and
- the HRSC and OMEGA's data of orbit 0438
- data from the stereo channels of HRSC in orbit 0438

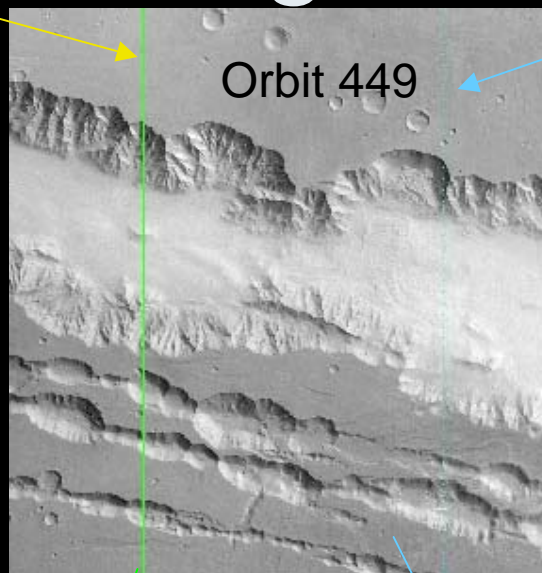
Same place

I/F of Fog in blue

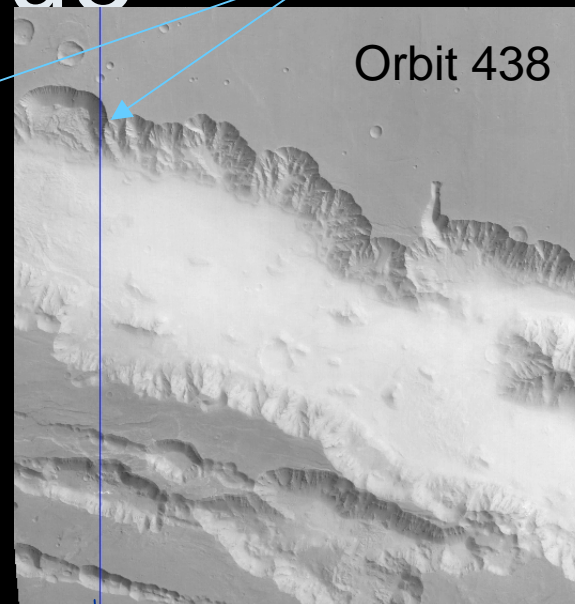
Same place



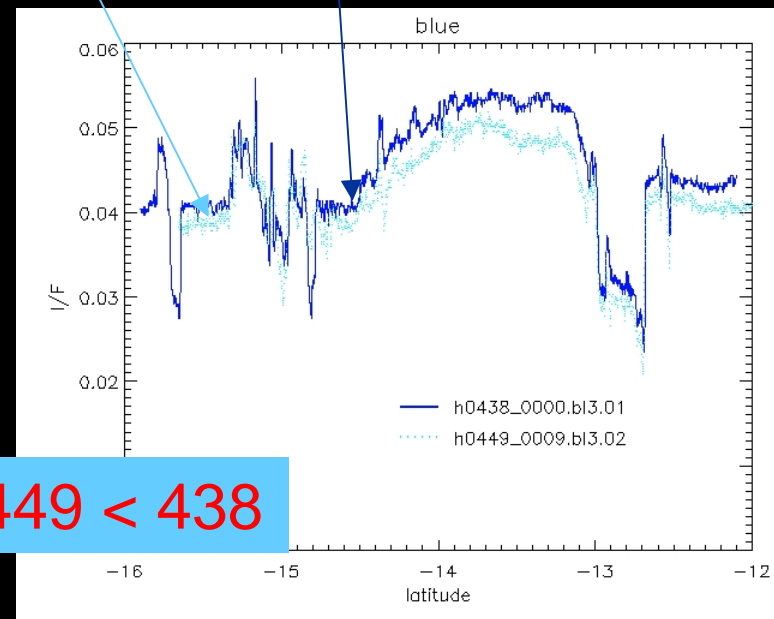
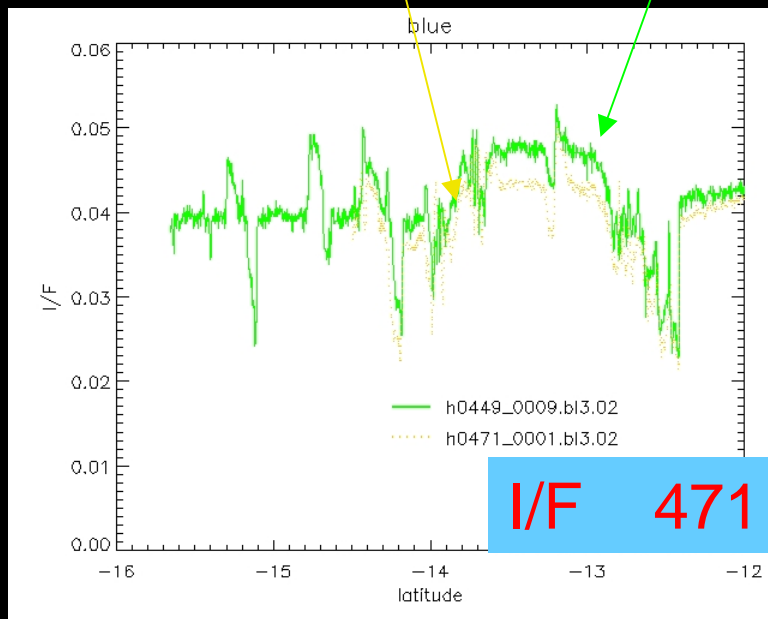
Orbit 471



Orbit 449

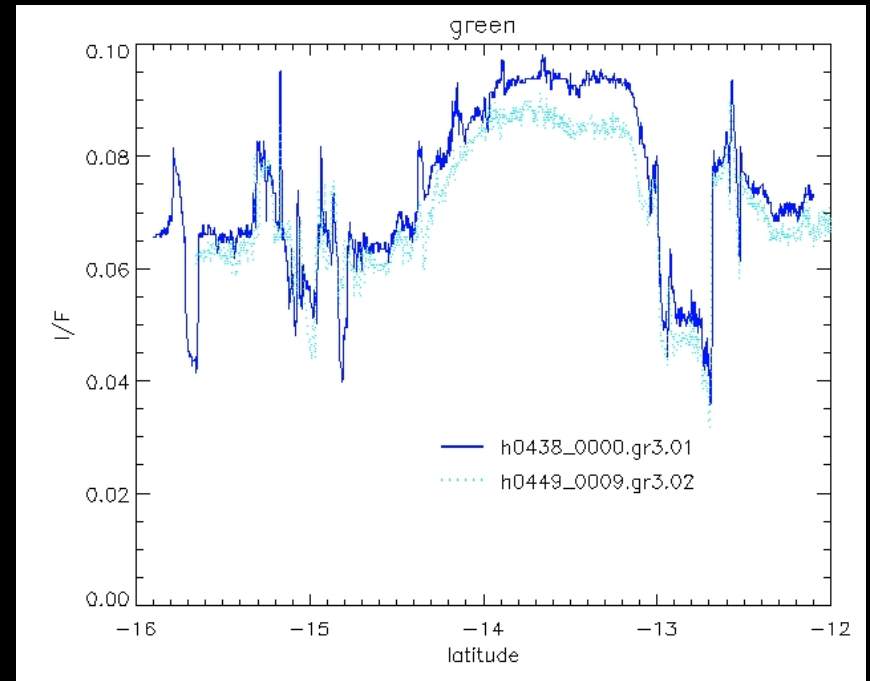
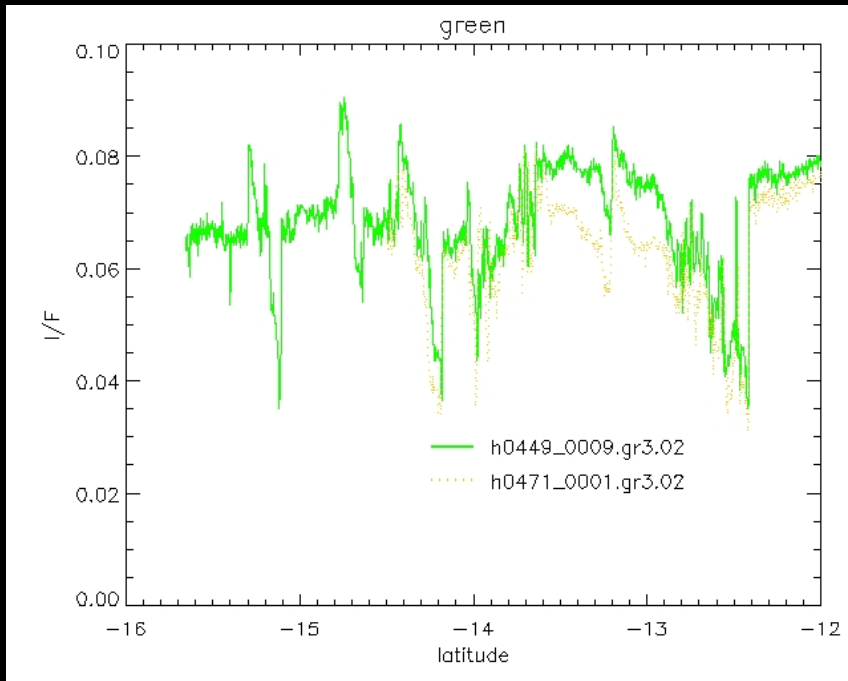


Orbit 438



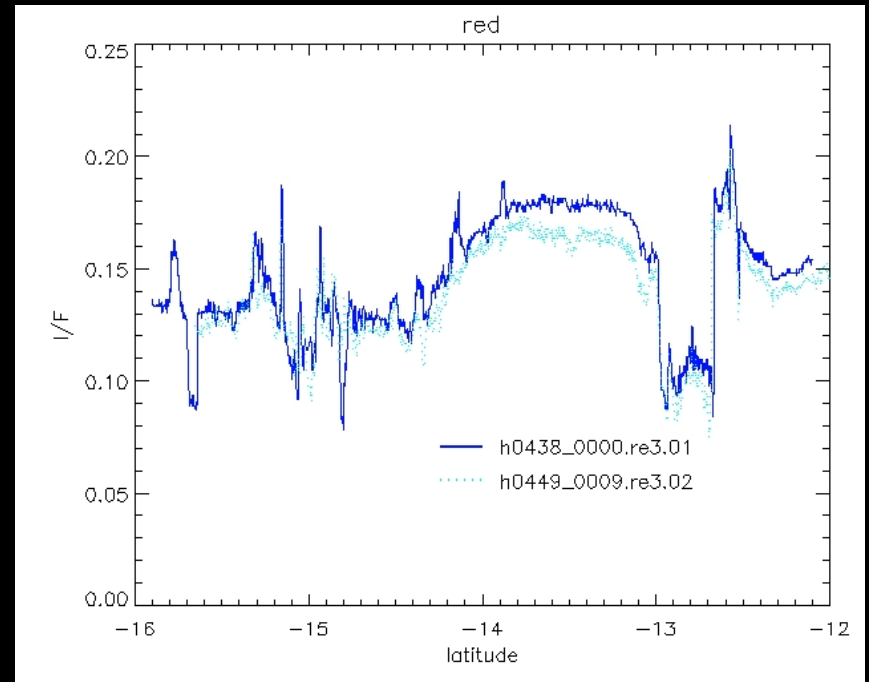
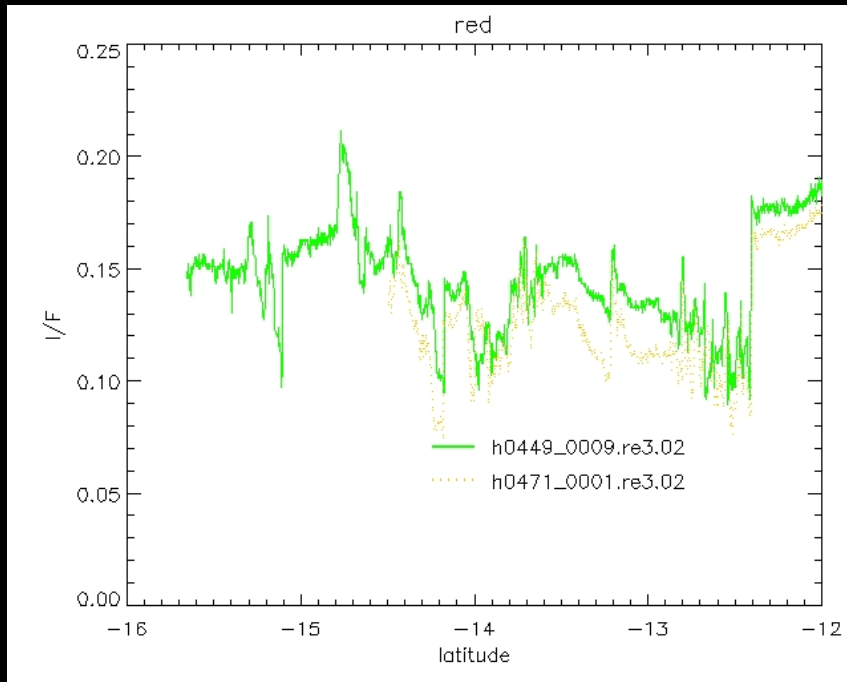
I/F 471 < 449 < 438

I/F of Fog in green



I/F 471 < 449 < 438

I/F of Fog in Red



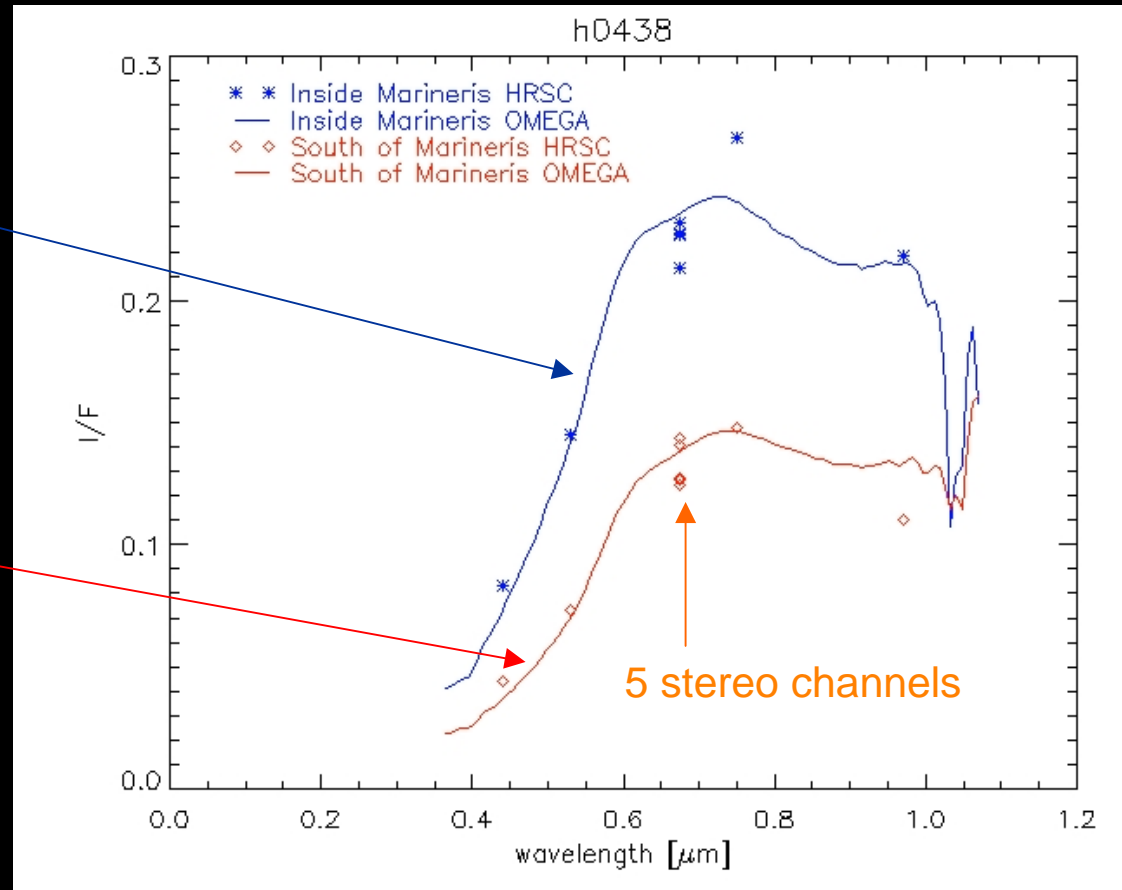
I/F 471 < 449 < 438

I/F in Marineris decreased from orbit 438 to 471 within 10 days in all channels.

I/F of OMEGA also shows the same sense through orbit 438 to orbit 482.

--> Fog was thick on orbit 438 (25 May 2004).

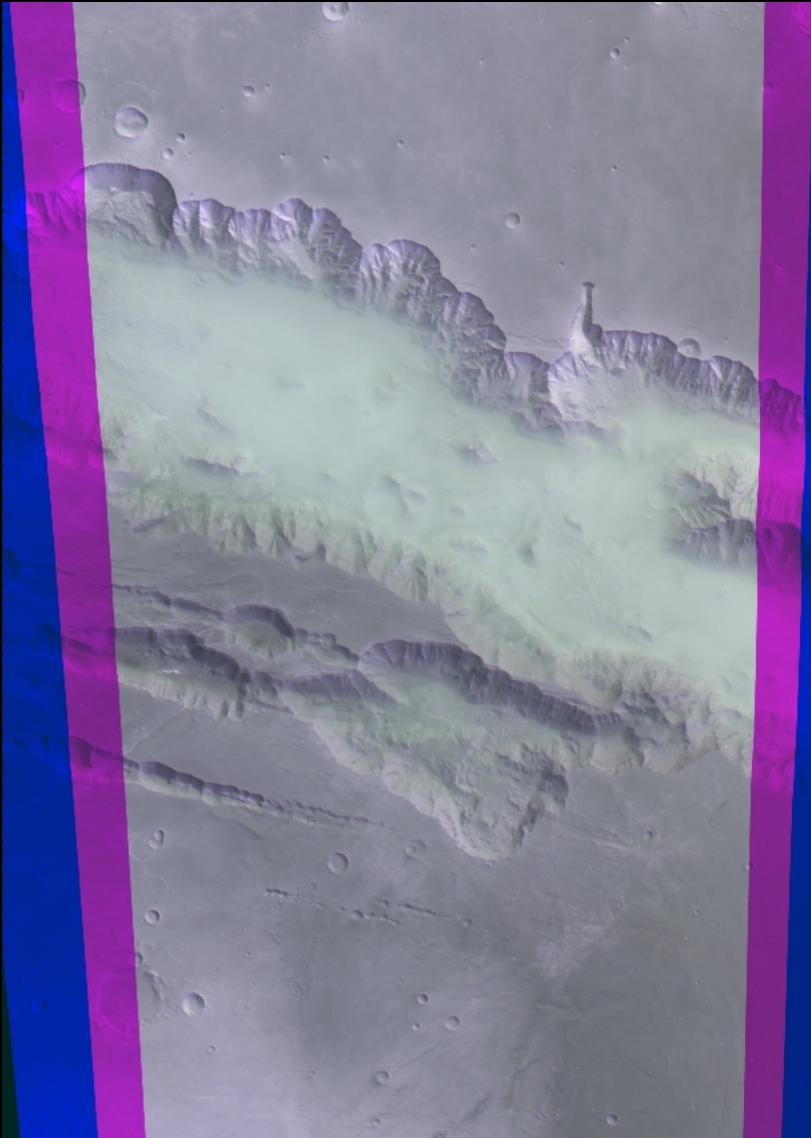
Spectrum Comparison with HRSC and OMEGA



The data fit each other, except

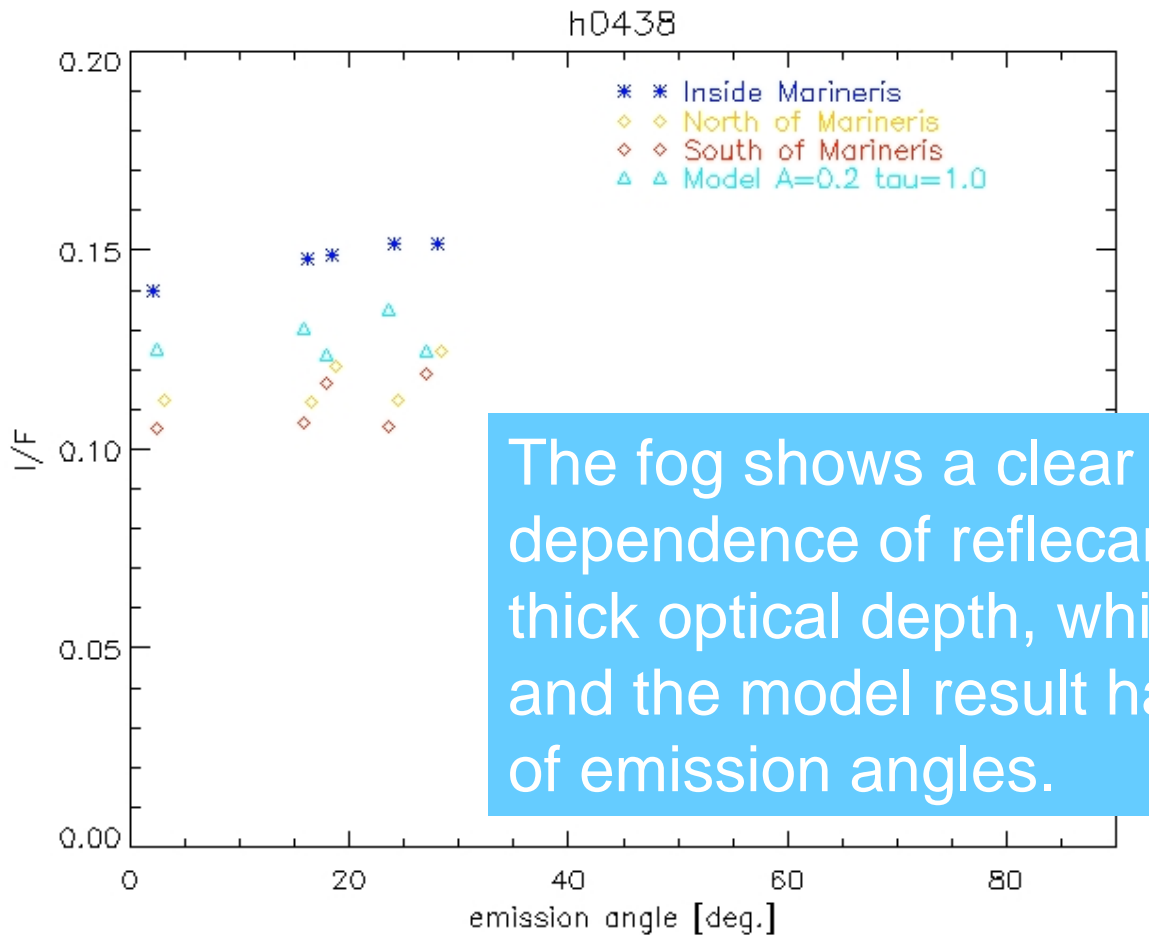
- The red channel inside Marineris (fog)
- The IR channel outside Marineris (surface)

Angular Dependence of Fog and Surface (orbit 438)



- HRSC has five stereo channels
- Perspective image
Nadir -- Red
S1(forward) -- Green
S2(backward) -- Blue
- The color difference between the fog and the surface indicates the angular dependence of I/F.

I/F vs emission angles



Model: SHDOM

Lambert surface

Albedo = 0.2

Optical depth = 1.0

The fog shows a clear emission angle dependence of reflectance due to the thick optical depth, while the surface and the model result have less effect of emission angles.

Conclusions

- HRSC and OMEGA detected the decrease of I/F in the fog in Marineris
 - Daily or weekly weather change
- Spectra of HRSC and OMEGA fit each other well, except
 - Red in Fog
 - IR on the surface
 - Due to angular dependence?
- Fog shows a clear emission angle dependence of I/F due to the thick optical depth
- Backscattering is dominant in the reflectance of the surface