

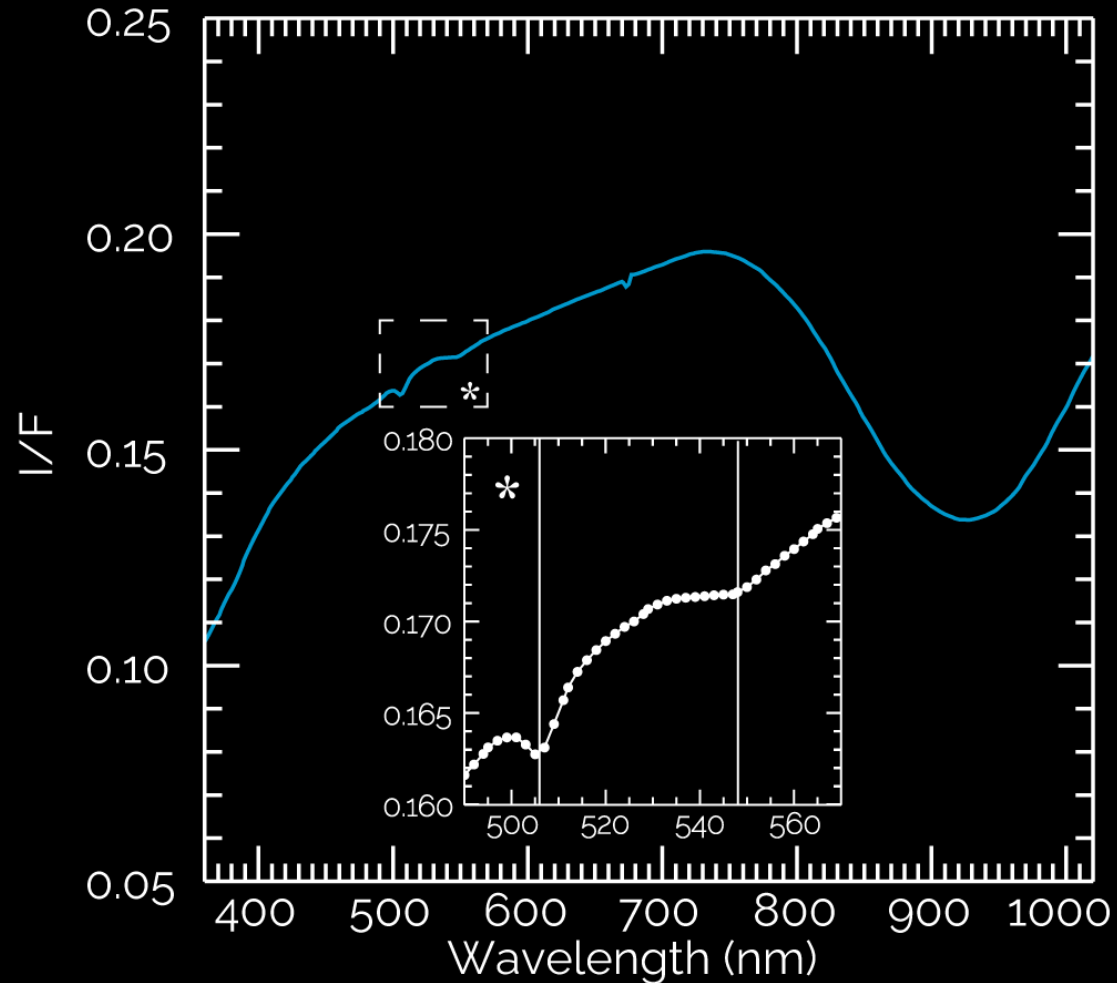
DAWN/VIR AT VESTA: LITHOLOGICAL INFERENCE FROM THE VISIBLE DATA

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The VIR spectrometer onboard the Dawn spacecraft

- We use the data of the Visible InfraRed spectrometer (VIR¹)
 - *an imaging spectrometer that operates in the VIS (0,25 – 1,07 μ m) and IR (1,02 – 5,09 μ m) ranges.*
- From July 2011 to September 2012, VIR mapped almost all the asteroid Vesta.
- We previously corrected the VIR VIS data acquired at Vesta from artefacts due to instrumental temperature issue².
- Several spectral parameters have been mapped to analyze the surface:
 - *Radiance factor, RGB composites, spectral slopes, band area, band center.*
 - *Their maps are discussed in a forthcoming paper: ["The surface of \(4\) Vesta in visible light as seen by Dawn/VIR"](#) in A&A journal.*

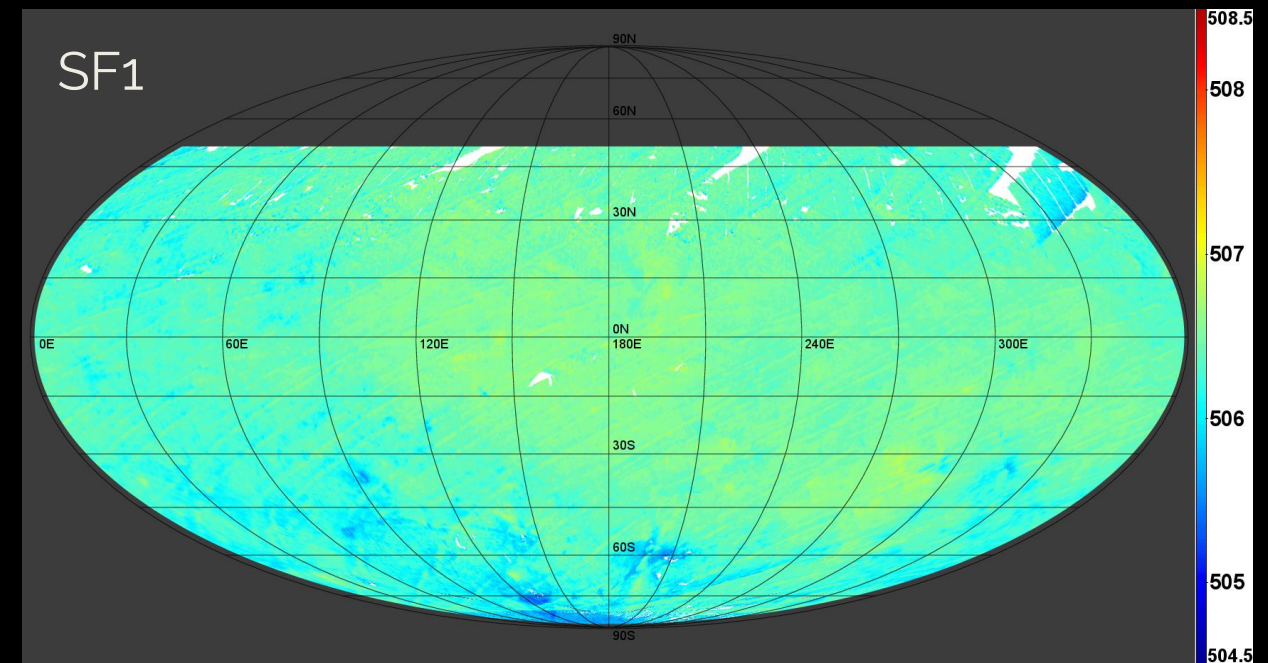
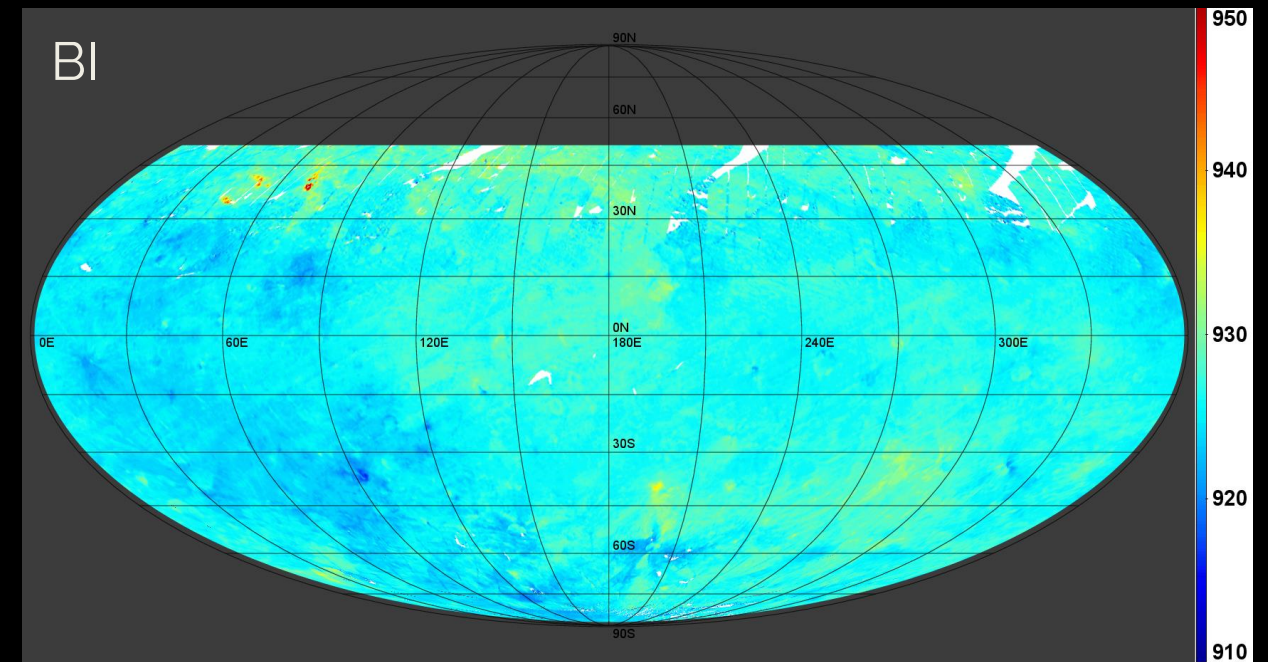
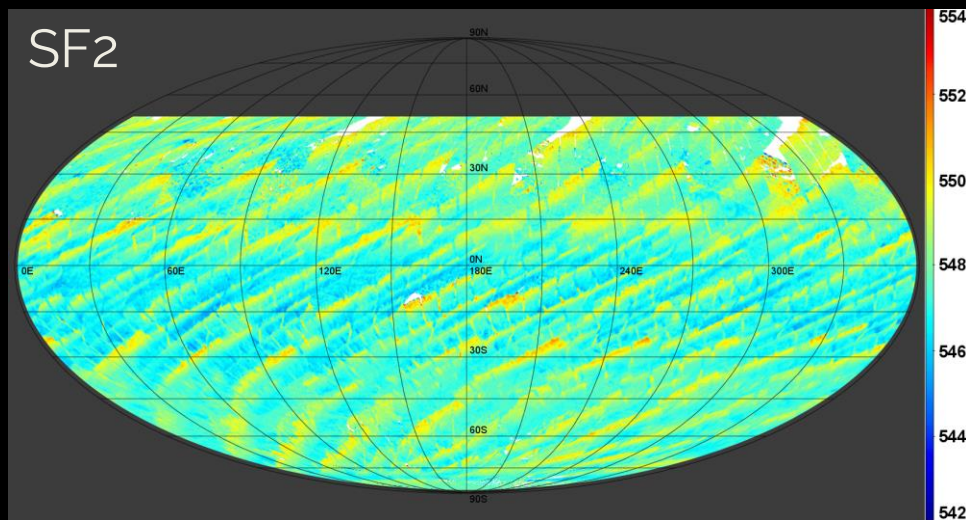
Vesta spectral characteristics



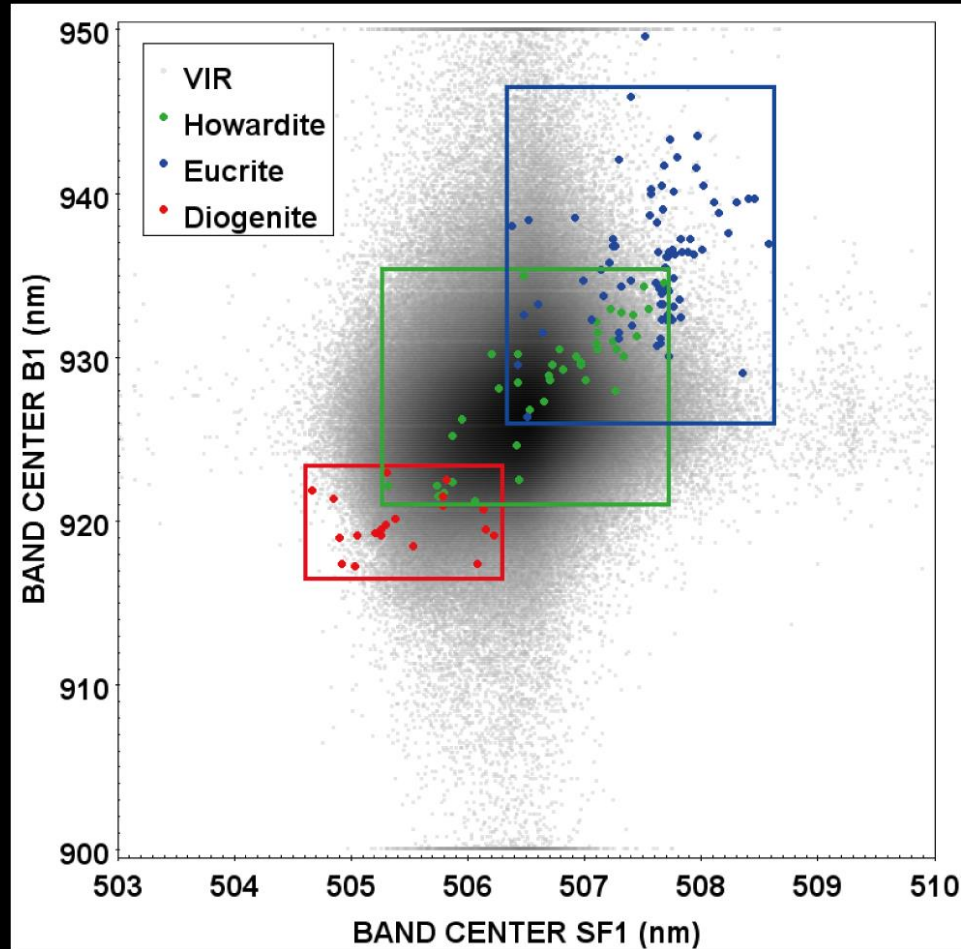
- In the VIS, Vesta is mainly characterized by two slopes and by the BI pyroxene band at ~930nm.
- VIR allows us to identify two spin-forbidden bands; at 506nm (SF1) and, for the first time, at 550nm (SF2).
- BI (0,9 μ m) and BII (at 1,9 μ m) bands allow to derive the lithology of the pyroxene^{3,4,5} at the surface of Vesta.
- Question: is it possible to derive the lithology with the VIS data alone?

Band centers

- We calculated and mapped the band centers.
- Only the BI (930nm) and the SF1 (506nm) are meaningful.
- The SF2 (550nm) does not show significant variations at the surface (and in general does not follow the Fe content in the pyroxene⁶).



Vestan lithology



- The lithology is derived thanks to the band center shifts that mostly depends on the Ca and Fe content.
- We compared the VIR data to the Howardite-Eucrite-Diogenite meteorite data from the RELAB database⁶ of which Vesta is the parent body.
- A class is assigned to the VIR data, depending of their location in the opposite BI-SF1 band center diagram.

Vesta lithology & Summary

- Vesta is dominated by a howarditic lithology.
- Pure eucritic regions are rare to inexistent.
- Howarditic-eucritic areas are spread in the north and equatorial belt.
- Diogenite rich spots are localized and result from the giant impacts in the south (Rheasilvia and Veneneia) and their ejecta mainly north-east oriented.
- Our lithology is similar to the one obtained with IR data⁴ but now cover the whole surface.
- VIS data alone are enough to obtain meaningful result on the pyroxene lithology.
- More details: [“The surface of \(4\) Vesta in visible light as seen by Dawn/VIR”](#) in A&A journal.

