National Aeronautics and Space Administration

Postdoc Research

Studying the (spectro)photometry of Europa

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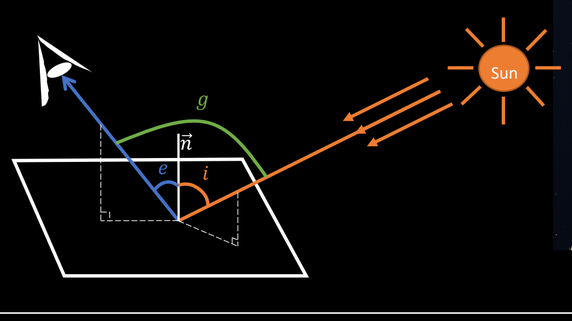
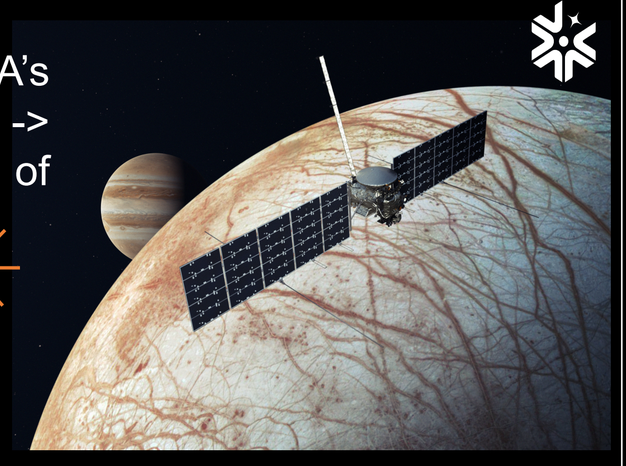
In a nutshell

- ❑ **Photometry is closely linked to surface microtexture**
- ❑ **Identification of three forward scattering areas on Europa -> potential activity**
- ❑ **Forward scattering increases with increasing wavelength and is anti-correlated to single scattering albedo**
- ❑ **Applicable to any planetary body if enough coverage**

Context

- Photometry = reflectance w.r.t. geometry
- Closely linked to surface microtexture
- Has significant effects on any and all remote sensing applications (mapping, spectroscopy etc.)
- Important for future missions (e.g. ESA's JUICE and NASA's Europa Clipper) -> mission planning, targeting of regions of interest…





Europa Clipper

Why should you care about photometry?

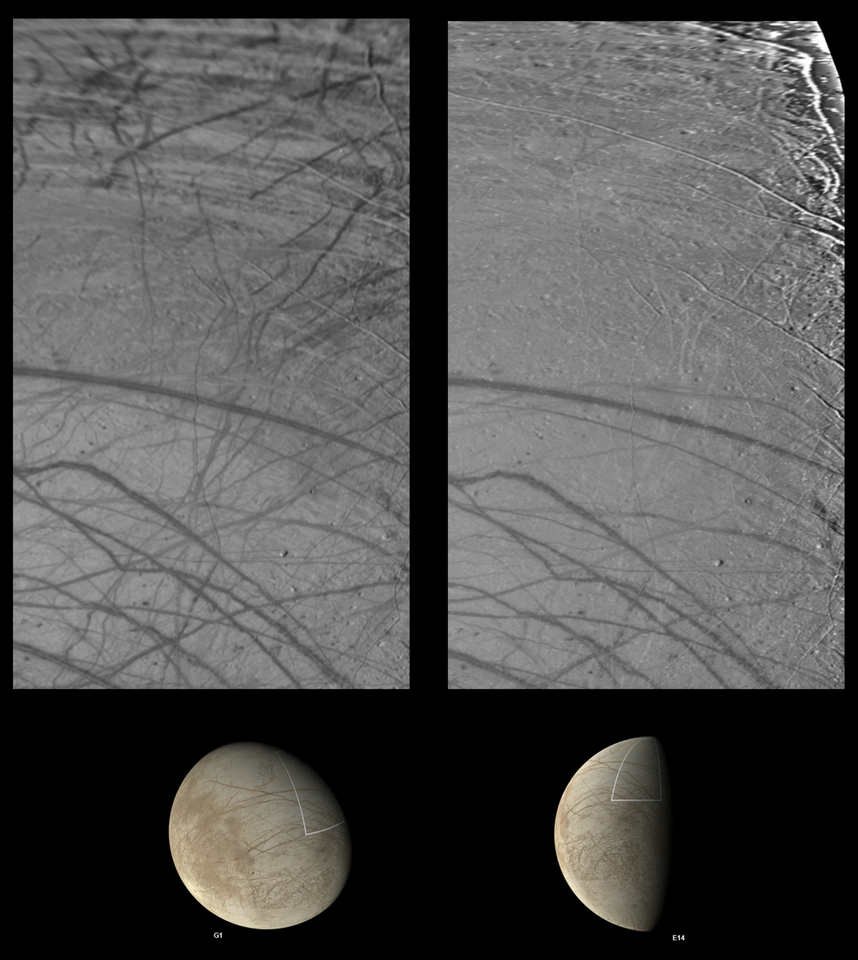
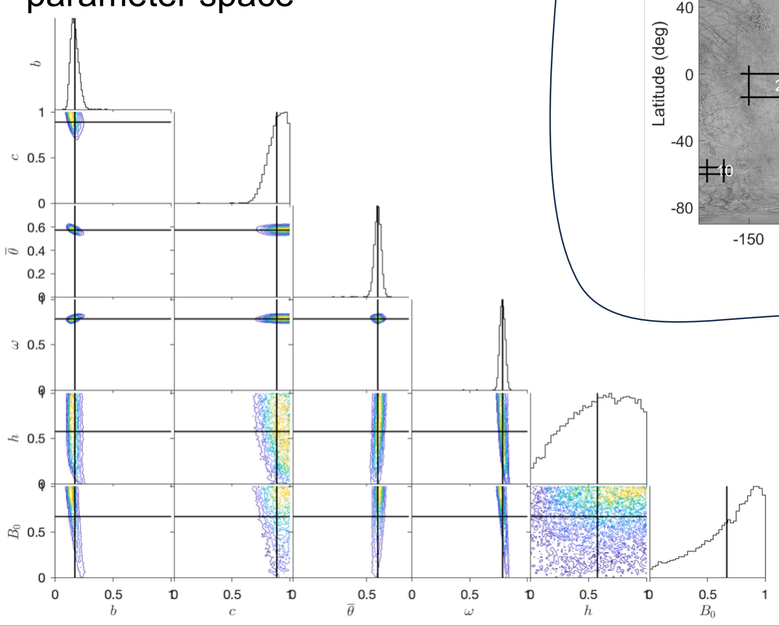


Illustration of photometric effects.
Credits: NASA / JPL-Caltech / Björn Jonsson

Same area, different geometry -> very different appearance!

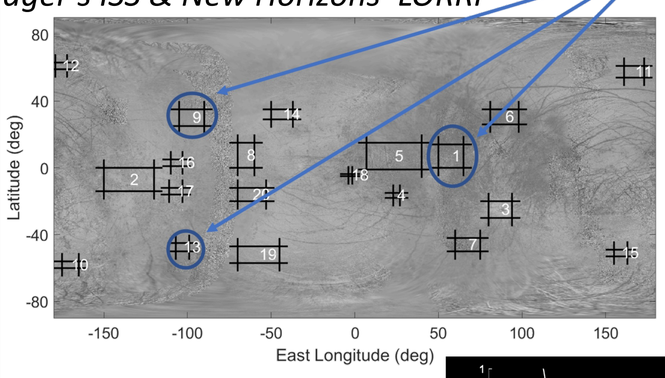
Approach and Results

- Bayesian approach: a comprehensive view of the parameter space

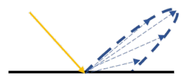


In the visible

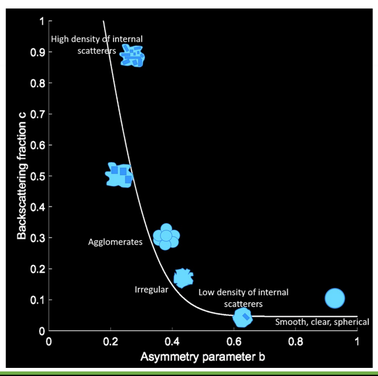
Voyager's ISS & New Horizons' LORRI



- Identification of 3 regions with remarkable behavior

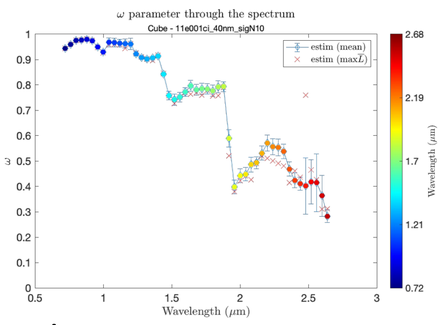


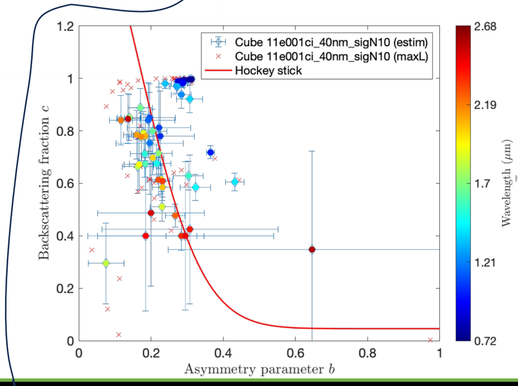
- Forward scattering
- Low density of internal scatterers -> Fresh deposits?!

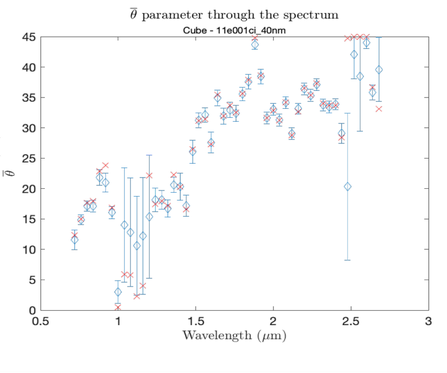


Through the spectrum

Galieo NIMS







Relevance to NASA/JPL

Direct application for preparation of Europa Clipper. Approach is of interest for other airless bodies such as the Moon or Ceres for example bodies and related science activities at NASA/JPL.

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