Jet Propulsion Laboratory
California Institute of Technology

Demonstration of a down-borehole Deep UV instrument for the detection of microbes and organics in the icy crusts of the Ocean Worlds

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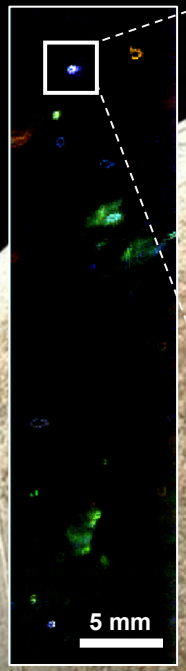
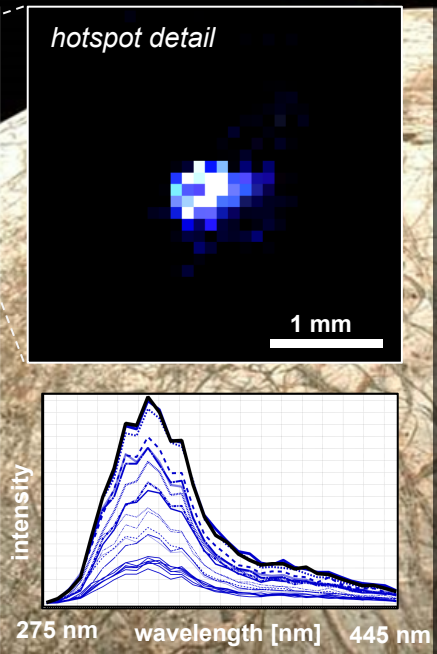
Instrument-drill in Greenland ice borehole



Fluorescence map from 93.8 m depth



Hotspot detail and fluorescence spectra

Background: Deep Ice will be the first habitable environment encountered during deep drilling in the Ocean Worlds. We developed an Deep-UV fluorescence instrument for detecting microbes and organics in a drilled ice borehole.

Results: We drilled to 105 m deep in the Greenland ice sheet. With our instrument integrated into the drill string, we detected fluorescent organic and microbial concentrated spots in both firn and glacial ice.

Significance: This instrument can be used to detect biosignatures in the icy crusts of the Ocean Worlds as well as further exploration of Deep Ice habitats on Earth.

Malaska, M.J., Bhartia, R., Manatt, K.S., Priscu, J.C., Abbey, W.J., Mellerowicz, B., Palmowski, J., Paulsen, G.L. Zacny, K., Eshelman, E.J., D'Andrilli, J., 2020. Subsurface *in situ* detection of microbes and diverse organic matter hotspots in the Greenland ice sheet. Astrobiology 20, in press. doi: 10.1089/ast.2020.2241
Link to open-access article: https://www.liebertpub.com/doi/10.1089/ast.2020.2241

This work was supported by an award to R. Bhartia through the NASA PSTAR program.