Abstract Submission

P4_39

T1 - Extraterrestrial mineralogy
The minerals and the fluids of the ocean worlds

IMA2022-1671

Salt hydrates diversity at high pressure and low temperature relevant for icy moons.

Baptiste Journaux[*1], Anna Pakhomova[2], Ines Collings[3], Sylvain Petitgirard[4], Tiziana Boffa Ballaran[5], Dongyang Huang [4], Jason Ott[6], J. Michael Brown[1], Stella Chariton[7], Vitali Prakapenka[7], Michael Hanfland[2], Gaston Garbarino[2], Davide Comboni[2], Konstantin Glazyrin[8]

[1]Earth and Space Sciences, University of Washington, Seattle, United States, [2]ESRF, Grenoble, France, [3]EMPA, [4]ETH Zurich, Zurich, Switzerland, [5]BGI, Bayreuth, Germany, [6]University of Washington, Seattle, [7]APS-GSECAR, Chicago, United States, [8]DESY - PETRA III, Hamburg, Germany

Please designate the presenter/contributor author(s)?: Baptiste Journaux

Abstract Content: The water-rich layer of icy moons of the outer solar system contains a variety of organic (*e.g.* CH_4, NH_3, CO_2) and inorganic (*e.g.* NaCl, $MgSO_4$, Na_2SO_4, $MgCl_2$) solutes detected by robotic mission like NASA Cassini and Galileo probes. Many of the geological processes on these moons, like cryovolcanism tectonics, oceanic evolution, involve processes of partial melting and fractional crystallization of ices and hydrate species. If the ice thermodynamic is relatively well constrained at the high pressure and low temperature conditions found inside these moons, the stability of hydrates and their diversity remains unexplored. We will present here results from *in situ* single crystal X-Ray diffraction in a cryostat-cooled diamond anvil cell that allowed us to discover and characterize salt hydrates in the H_2O-(Na^-,Cl^+,Mg^{2+},SO_4^{2-}) systems at high pressures and low temperatures. Formation of a diversity of highly hydrated salt species at moderate pressures suggests a pressure-induced hydration process. We will discuss the implication of our results for chemical physics and mineralogy of icy ocean worlds as well as for the upcoming exploration of icy worlds of our solar system by NASA and ESA robotic space missions.

Disclosure of Interest: None Declared