Geophysical Research Abstracts
Vol. 21, EGU2019-6150, 2019
EGU General Assembly 2019

Accretion of supersolar gas by the growing proto-Jupiter in the vicinity of the amorphous ice snowline

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Argon, krypton, xenon, carbon, nitrogen, sulfur, and phosphorus have all been measured enriched by a quasi uniform factor in the 2-4 range, compared to their protosolar values, in the atmosphere of Jupiter. To elucidate the origin of these volatile enrichments, we investigate the possibility of inward drift of particles made of amorphous ice and adsorbed volatiles, and their ability to enrich in heavy elements the gas phase of the protosolar nebula once they cross the amorphous-to-crystalline ice transition zone. To do so, we use a simple accretion disk model coupled to modules depicting the radial evolution of icy particles and vapors, assuming growth, fragmentation and crystallization of amorphous grains. We show that it is possible to accrete supersolar gas from the nebula onto proto-Jupiter's core to form its envelope, and allowing it to match the observed volatile enrichments.