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## Galilean moon formation in a water-depleted environment

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A key feature of the Galilean satellite system is its monotonic decrease in bulk density with distance from Jupiter, indicating an ice mass fraction that is zero in the innermost moon Io, and about half in the outer moons Ganymede and Callisto. Jupiter formation models, as well as the Juno spacecraft water measurements, are consistent with the possibility that the Jovian system may have formed, at least partly, from ice-poor material. And yet, models of the formation of the Galilean satellites usually assume abundant water ice in the system. Here, we investigate the possibility that the Jovian circumplanetary disk was populated with ice-depleted chondritic minerals, including phyllosilicates. We show that the dehydration of such particles and the outward diffusion of the released water vapor allow condensation of significant amounts of ice in the formation region of Ganymede and Callisto in the Jovian circumplanetary disk. Our model predicts that Europa, Ganymede and Callisto should have little if any volatiles other than water ice, in contrast to the comet-like composition of Saturn's moon Enceladus. This mechanism allows for the presence of ice-rich moons in water-depleted environments around exoplanets as well.