Title:	The Origin of Dwarf Planet Ceres Constrained by Dawn
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Publication:	American Astronomical Society, DPS meeting #47, id.#103.03
Publication Date:	11/2015
Origin:	AAS
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Bibliographic Code:	2015DPS....4710303M

Abstract

The Dawn spacecraft has acquired important clues regarding the origin of dwarf planet Ceres. The surface composition is characterized by a prominent absorption band at 2.7 micron that is best explained by the presence of ammoniated phyllosilicates (De Sanctis et al. 2015), while the average density indicates a bulk water content of 30-40%. The occurrence of widespread smooth terrains, marked by a flat topography and few superposed craters, associated with a large 290-km crater is best explained by the present of low viscosity material mobilized by the impact energy (Marchi 2015). Such low viscosity material is compatible with an ice-rich outer shell whose melting temperature is reduced by the presence of salts and/or ammonia hydrates. Such inferred internal structure could also explain the lack of impact structures larger than about 400 km, which may have relaxed leaving no obvious signatures in imaging data.The presence of ammoniated phyllosilicates points toward the presence of ammonia available in

Ceres' makeup. Ammonia is relatively rare among meteorites due to its high volatility at typical main belt temperatures, thus indicating a potential contribution of material from the colder outer solar system.Two main scenarios emerge. Either Ceres formed in the trans-neptunian disk and subsequently was captured in the main belt, or it formed close to its current position with a late addition of material drifting from the outer solar system. The two scenarios imply rather different collisional evolution, therefore Ceres' cratering record can potentially help to discriminate the more likely evolution. As craters are susceptible to degradation due to internal heat flow, terrain properties and superposed cratering, here we will evaluate the evidence for and against these formation scenarios by taking into account the latest digital terrain models and gravity data acquired by Dawn.De Sanctis et al, submitted, July 2015.Marchi S., IAU General Assembly, August 2015.
