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Organics and Ices in the Outer Solar System: Connections to the Interstellar Medium

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Abstract:
The solar nebula, that aggregate of gas and dust that formed the birthplace of the Sun, planets and plethora of small bodies comprising the Solar System, originated in a molecular cloud that is thought to have spawned numerous additional stars, some with their own planets and attendant small bodies. The question of the chemical and physical reprocessing of the original interstellar materials in the solar nebula has challenged both theory and observations. The acquisition and analysis of samples of comet and asteroid solids, and a growing suite of in-situ and close-up analyses of relatively unaltered small Solar System bodies now adds critical new dimensions to the study of the origin and evolution of the early solar nebula. Better understanding the original composition of the material from which our solar nebula formed, and the processing that material experienced, will aid in formulations of chemistry that might occur in other solar systems. While we seek to understand the compositional history of planetary bodies in our own Solar System, we will inevitably learn more about the materials that comprise exoplanets and their surrounding systems.