

## **Karen Meech Abstracts**

### **Results from Comet Missions and the Importance for Understanding Where We Came From**

Comets are small primitive bodies that are relicts of the solar system's formative process. They provide clues to what the chemical and physical conditions were in our solar system during the time of planet formation. We would like to know how much of the chemistry that is necessary for life was created in interstellar space, or was a result of the chemical processes that occurred in the protoplanetary disk that would eventually become our solar system. When gas was present in the disk during the first 5 million years of our solar system's history, a local chemical signature was imprinted on the planetesimals, the planetary building blocks. The connection to today's solar system relies on how this material was dynamically re-distributed during the era of planet formation. Recent dynamical models are reproducing key characteristics of today's solar system; some of these require significant giant planet migration, while others do not. Studies of comets allows us to look at the precursor materials, and studies of ensembles of comets can provide clues about movement of material in the young solar system. This talk will summarize what we have learned about comets from ground-based observations, and then show some of the exciting results that we have obtained from the Deep Impact, EPOXI, Stardust-NEXT and Rosetta missions. What the missions are showing us is that there was likely a lot of redistribution of material in the solar system, and that comets may well preserve some material from the interstellar birth cloud. Nevertheless, as seen from the Rosetta mission, there was a wide array of prebiotic chemical compounds found in comet 67P/Churyumov-Gerasimenko, and certainly comets could have delivered some of this material to Earth.