

# **The transport of water ice and organic compounds to the inner Solar System: A numerical investigation**

## **Abstract**

The asteroids 24 Themis and 65 Cybele orbit in the outer part of the asteroid belt. Recent observations have shown the surfaces of these two asteroids contain water ice and organic compounds. While these findings were not unexpected, they are at odds with the solar nebula hypothesis which implies the temperature in the outer asteroid belt when the Solar System formed was too high for water and organic compounds to condense. One possible implication is that the material was transported to the outer main belt from beyond Jupiter by small bodies during the formation of the Solar System. We [1] used N-body simulations to investigate if such transport was likely, and I will describe our work in this talk. I will begin with a review of the solar nebula hypothesis, the asteroid belt and the observations of 24 Themis and 65 Cybele. I will then describe our model for the N-body simulations and the numerical scheme we used to perform the simulations. I will end with our results and their possible implication. This was joint work with Kevin Grazier and Julie Castillo-Rogez of the Jet Propulsion Laboratory, Pasadena.

[1] Grazier K.R., Castillo-Rogez J.C., Sharp P.W., Dynamical delivery of volatiles to the outer main belt, *Icarus*, 232, April 2014, 13-21.