



## **DSMC Calculations of Gas Jet Interactions**

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Observations of comet 9P/Tempel 1 have indicated a very low thermal inertia (Groussin et al. *Icarus*, 187, 16, 2007). This indicates that local surface temperatures can be affected by small scale topography and inhomogeneity. This implies that sublimation production rates might also vary strongly on length scales down to a few centimetres. The observations of Feaga et al. (*Icarus*, 190, 345, 2007) also show that chemical inhomogeneity of outgassing sources exist.

In view of the potential importance for Rosetta, we have been conducting a series of simple calculations of the interaction between gas sources separated by small distances. We have been using a 2-D DSMC code (Bird, *Molecular Gas Dynamics and the Direct Simulation of Gas Flows*, Oxford, 1994) to assess at which distances from a cometary surface the influence of a non-homogeneous source becomes difficult or impossible to distinguish from a homogeneous source. We have taken different source structures but matched the production rates to allow direct comparison of resulting densities and temperatures. The properties of the inactive surfaces (i.e. the degree of absorption/reflection of the molecules) are seen to influence the results. Both H<sub>2</sub>O and CO<sub>2</sub> sources have been studied to allow comparisons which may also be useful for the analysis of Deep Impact data.

The presentation will show some examples of the effects (density and temperature distributions, gas interactions) seen in the calculations.