

Cometary dust at the nanometre scale - latest results from the MIDAS experiment on Rosetta

Mark S. Bentley¹

¹*Space Research Institute, Austrian Academy of Sciences, Graz, Austria*

The spatial and size distribution of dust emitted from cometary nuclei can be estimated remotely, but only in a limited size range and far from the nucleus. Several nuclei have been visited by spacecraft carrying remote and in-situ detectors, but the details of the dust release, acceleration and fragmentation process remained elusive.

Rosetta carries a payload suite adapted to the unique nature of the mission - a comet rendezvous mission to intercept the nucleus before the onset of activity and through its perihelion passage. Amongst this payload is MIDAS, an atomic force microscope designed to collect and image the smallest dust emitted from the comet with nanometre resolution.

MIDAS has been operating since arrival at the comet in August 2014, alternating between exposing targets to the local dust environment, and searching for and imaging particles with the AFM. The number of particles collected in the first few months of operating was smaller than expected. This is believed to be partly due to the intrinsic dust distribution, and partly due to dust and spacecraft charging. Those particles that have been found can be classified as either micro-sized compact dust, or larger aggregate grains with a size of tens of microns.

The results of the MIDAS dust observations to date will be summarised as well as their implications for cometary and Solar System science.