SEARCH FOR ORGANICS ON A COMET NUCLEUS FROM CHARGE EXPERIMENT

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The ESA "cornerstone" Rosetta Mission to a comet is presently planned for a launch in January 2003 with a goal of better understanding the origin of comets and their relationship to other solar system bodies. Also addressed by this mission is the contribution of cometary material to the Earth's atmosphere and the relationship of the organic component of comets to prebiotic terrestrial organic matter. The mission is technically challanging: it consists in an orbiter spacecraft that will rendezvous with a comet in 2011 and carry out remote sensing experiments on the nucleus through 2013.

Surface Science Package will separate from the orbiter, land on the surface of the cometary nucleus, and carry out in situ experiments. One of these will be the Chemical Analysis of Released Gases Experiment (CHARGE). The experiment Principal Investigator, Paul Mahaffy (NASA), has grouped together many international collaborations: universities of Maryland, Michigan and Hawaii (USA), Tel-Aviv (Israel), LISA and SA (France), Leiden Observatory and Sterrewacht Leiden (the Netherlands), SRI (Austria), OAC (Italia). This experiment will come up to our expectations about the nucleus chemical composition, in particular its organic composition. This instrument will thermally evolve and pyrolyse solid phase samples of the comet nucleus and carry out a chemical analysis of the molecular composition and relative abundances of released gases, by mean of a miniaturized gas chromatograph mass spectrometer (GCMS). The molecular and isotopic analysis provided by CHARGE will provide a unique database which will be used to address a wide range of scientific issues, including:

+ the chemical conditions present in the region of cometary formation

+ the relationship between comets and other primitive or more evolved bodies in the solar system

+ the contribution of cometary material to planetary atmospheres as well as the relationship between these cometary impacts and organic chemistry on the primitive Earth

+ the nature of the mixture of ices and dust grains which give rise to the coma and extended sources of gas as a comet approaches perihellon