



Chemical composition of Titan's aerosols analogues characterized with a systematic pyrolysis-gas chromatography-mass spectrometry characterization

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The in situ chemical characterization of Titan's atmosphere was achieved in 2005 with two instruments present onboard the Huygens atmospheric probe : the Aerosol Collector and Pyrolyzer (ACP) devoted to collect and pyrolyse Titan's aerosols ; the Gas Chromatograph-Mass Spectrometer (GCMS) experiment devoted to analyze gases collected in the atmosphere or coming from the aerosols pyrolysis. The GCMS was developed by Hasso Niemann in the filiation of the quadrupole mass spectrometers he built for several former space missions. The main objectives were to : determine the concentration profile of the most abundant chemical species; seek for minor atmospheric organic species not detected with remote observations ; give a first view of the organic aerosols structure; characterize the condensed volatiles present at the surface (e.g. lakes) in case of survival of the probe to the landing impact. Taking into account for the potential complexity of the gaseous samples to be analyzed, it was decided to couple to the MS analyzer a gas chromatograph capable to separate volatile species from light inorganic molecules and noble gases, to organic compounds including aromatics. This was the first GCMS analyzer that worked in an extraterrestrial environment since the Viking missions on Mars. Even if the GCMS coupling mode did not provide any result of interest, it has been demonstrated to be functional during the Huygens descent. But, the direct MS analysis of the atmosphere, and the pyrolysis-MS analysis of aerosols allowed to make great discoveries which are still of primary importance to describe the Titan's lower atmosphere composition. This contribution aims at presenting this instrument that worked in the Titan's atmosphere, and summarizing the most important discoveries it allowed.