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Molecular characterization of a cometary nucleus composition with the gas chromatograph-mass spectrometer of the COSAC experiment onboard the Philae lander of the Rosetta mission

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One among the main goal of the Rosetta mission is to characterize the physical and chemical properties of the comet P46/Churyumov-Gerasimenko nucleus. With this aim, the mission will offer for the first time the capability to achieve in situ measurements at the cometary surface with the Philae lander. This characterization is all the more important that the properties of cometary nuclei surfaces are almost unknown whereas it is the source of the processes taking place in the cometary comae and tails. In this frame, the determination of the cometary nucleus molecular composition is of primary importance as it would allow to : i. give clues on the relationship between the molecules present in the nucleus and those detected from observations ; ii. determine the importance of comets in the delivery of inorganic and organic molecules to planetary surfaces ; iii. improve our knowledge of the connection between comets and materials present in the interstellar medium.
The COmetary SAmpling and Composition experiment will be the molecular analyzer onboard the Philae lander. It is constituted of a solid sampler, a gas chromatograph and a mass spectrometer, that allow to analyze volatile compounds coming from both the cometary atmosphere and samples collected in the cometary regolith. In order to prepare the analysis and interpretation of the data to be collected after the landing of Philae, a series of calibration and tests were done in laboratory with the COSAC spare model or spare components of the GC. These were done in order to evaluate the health state of the gas chromatograph after almost 10 years spent in the interplanetary environment, and also to estimate the analytical performances of the instrument under realistic operation conditions to be used at the cometary surface. This contribution presents the results of these tests that will be usefull for the COSAC data analysis.