

The CONSERT Antenna Characteristics in Context of the Final Landing Site on 67P/Churyumov-Gerasimenko's Surface

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Images of the final landing site of "Philae" at Abydos enable the refinement of the measurements performed by the CONSERT instrument, whose primary scientific objective is to estimate the dielectric properties of comet 67P/Churyumov-Gerasimenko's nucleus. This estimation was achieved based on data measured during the first science sequence (FSS) after "Philae's" final touchdown on the comet's surface. In order to perform the propagation measurements, a signal transmitted by the CONSERT instrument unit aboard the orbiter was lander received and processed by the CONSERT lander unit which then transmitted a signal back to the orbiter. This happened for multiple measurement positions along the FSS orbit at a time scale of milliseconds for each measurement.

Essential for the enhanced processing of the CONSERT signal along the FSS orbit is the knowledge of "Philae's" CONSERT antenna characteristics at the final landing site. The antenna characteristics cannot be measured directly due to the coupling of the antenna with the surroundings and surface structures. The only way to estimate the antenna properties is by simulating the "Philae" CONSERT antennas, incorporating the comet surface structures and properties.

The images taken from "Philae" by OSIRIS at his final landing site and models of the near subsurface of the comet are the basis for these simulations.

From the simulations, it can be seen that the structure of the comet's surface, the material properties and the orientation of "Philae" relative to the comet's surface, have a significant influence on the properties of "Philae's" CONSERT antennas.

The results of the simulations considering the complete polarisation properties of the CONSERT antennas are compared to the CONSERT FSS measurements, especially with regard to the received signal strength along the orbit.