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Characterization of 67P/Churyumov-Gerasimenko interior from CONSERT signal amplitude variability

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The bistatic radar CONSERT on Rosetta and Philae operated for 9 hours during Philae's First Science Sequence (FSS), on 12 and 13 November 2014. A strong signal was detected for 30 min at the beginning of the sequence, and for 80 min at the end. The signal propagated through the smaller lobe of the nucleus, with a length of propagation ranging between 200 and 800m, and a rapid decrease of its amplitude. First results have been published, based on the study of the signal propagation delay and the propagation path (Kofman et al., Science 2015; Ciarletti et al, A&A, 2015).

This work focuses on the study of the signal amplitude, which shows variability throughout the acquisition sequence. The cause of this variability is twofold: (1) losses within the comet interior; (2) depolarization due to both antennas' varying relative attitudes. We simulate the depolarization by taking into account Rosetta's position and attitude on its orbit and by making assumptions on Philae's position, attitude, and close environment on the comet (dielectric properties). Then we assess the variability due to losses within the medium, and infer a characterization of the composition of the comet interior.