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Attitude-Reconstruction of ROSETTA's lander PHILAE using two-point observations by ROMAP and RPC-MAG

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As part of the European Space Agency's ROSETTA Mission the lander PHILAE touched down on comet 67P/Churyumov-Gerasimenko on November 12, 2014. The lander is equipped with a tri-axial fluxgate magnetometer as part of the Rosetta Lander Magnetometer and Plasma-Monitor package (ROMAP). This magnetometer was switched on during descent, the bouncing between the touchdowns and after the final touchdown, which made it possible to reconstruct not only PHILAE's rotation and nutation during flight, but also to determine the exact touchdown times. Together with the tri-axial fluxgate magnetometer of the Rosetta Plasma Consortium (RPC-MAG) onboard the ROSETTA orbiter, simultaneous measurements during the descent and after the touchdowns were used to determine PHILAE's absolute attitude. This was done by correlating magnetic low-frequency waves below 60 mHz simultaneously observed on PHILAE and in orbit by RPC-MAG, which was made possible by the relatively small distance between the two spacecraft's of less than 50km. The results gained from this method are consistent with the illumination patterns of PHILAE's solar arrays and the RF-link periods.