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Philae Cometary Permittivity Probe model and operations with a reduced

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The Permittivity Probe (PP) is a subsystem of the SESAME instrument on the Philae lander of the Rosetta mission to comet Churyumov-Gerasimenko. The probe consists of a system of 2 receiving and 3 transmitting electrodes which can be operated in different quadrupolar probe configurations, involving only two receivers and two transmitters at any given time. However, the system of electrodes is strongly influenced by the vicinity of the lander body and other grounded elements that work as additional electrodes. During the operational phases of the mission only one of the transmitter electrodes will always be available, as the two others depend on the deployment status of the host instruments they are attached to. We have built an electrical model of Philae to study non conventional ways for measuring the cometary permittivity with a reduced set of electrodes and the distorting influence of the various lander structure elements.