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A wave telescope concept as part of a planetary acoustic experiment

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We are developing a multi-microphone array (Acoustic Sensor Package, ACU) with the capability to investigate in-situ the acoustic phenomena of planetary atmospheres and surfaces (acoustic wave telescope), e.g. in the frame of TSSM / TandEM. In the current stage of the systems engineering the focus is to discriminate between the sources, e.g. waves due to atmospheric activity and signals generated during descent of the lander in-situ element and on surface. On-board digital signal processing with FPGA technology enables the determination of basic atmospherical parameters, e.g. velocity of sound, acoustic waves with direction of arrival from the local environment and turbulence parameters. This allows studies of layers in the atmosphere, acoustic properties of lake surfaces, precipitation and cryo volcanic acoustic signatures. They are partly complementary to Titan Electrical Environment Package (TEEP) measurements. Space heritage is drawn from Huygens Atmospheric Structure Instrument (HASI / PWA) on Huygens probe, mission Cassini-Huygens.