



PREMIER - Instrument Development of the Millimetre-Wave Limb Sounder MWLS

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The PREMIER (Process Exploration through Measurements of Infrared and millimetre-wave Emitted Radiation) mission is one of 6 candidates for ESA's 7th Earth Explorer Core Mission (due for launch \sim 2016), for which Phase 0 Assessment Studies have recently been undertaken. The mission proposes to make detailed measurements in the mid/upper troposphere and lower stratosphere in order to quantify processes controlling atmospheric global composition in this height range of particular importance to climate. PREMIER would consist of an infrared limb-imaging spectrometer which would observe 3D fields of trace gases, alongside a millimetre-wave limb sounder which would enable observations in the presence of most cirrus clouds, and also provide complementary trace gases.

In this presentation we report on instrument development of the millimetre-wave limb sounder MWLS during Phase 0 of the PREMIER mission proposal. The PREMIER MWLS is a Swedish lead instrument (aka STEAM-R) co-developed by the Swedish Space Cooperation SSC and Chalmers University of Technology. Retrieval simulations have been performed at RAL to asses the radiometric performance of the MWLS. Based on that information, the observing system has been defined as a progressively spaced feed horn array. Physical optics simulations have been performed at Astrium UK to define the antenna pattern at the main reflector, as well as the quasi-optical layout of the antenna arrays and beam-shaping components. Hardware development has been pushed forward at RAL at several fronts to provide novel components for the instrument, most notably a sub-harmonic image rejection mixer (SHIRM).