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PREMIER - a candidate ESA mission for UTLS research

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PREMIER is one of three candidate ESA Earth Explorer mission concepts currently undergoing feasibility studies and related science activities. The objective of the mission is to make global high spatial resolution observations of mid / upper tropospheric and lower stratospheric composition, which are needed to understand the mesoscale processes in this region most critical to climate change.
Sensitivity of surface climate to UTLS variability and dynamical couplings, impact of convection and pyroconvection on the UTLS, the tropospheric ozone budget and trace gas exchange between stratosphere and troposphere are largely unresolved science questions. These issues remain unresolved due to limitations in vertical and horizontal resolution of contemporary limb space data, which is exacerbated by their limited coverage due to cloud and aerosol interference. Nadir observations, while providing adequate horizontal resolution, generally have limited vertical resolution.
PREMIER is the first space mission concept dedicated to the study of the mid / upper troposphere and lower stratosphere. It will carry limb-sounding spectrometers in the infrared and millimetre-wave region. The IR instrument will image the limb and provide high resolution in 3 dimensions. It incorporates a cloud imaging capability to identify cloudy pixels. The millimetre-wave instrument will combine high resolution in 2 dimensions with low cloud sensitivity. PREMIER will fly in formation with Metop and operate synergistically with instruments on that platform to enhance the vertical resolution of the lower tropospheric composition data.