



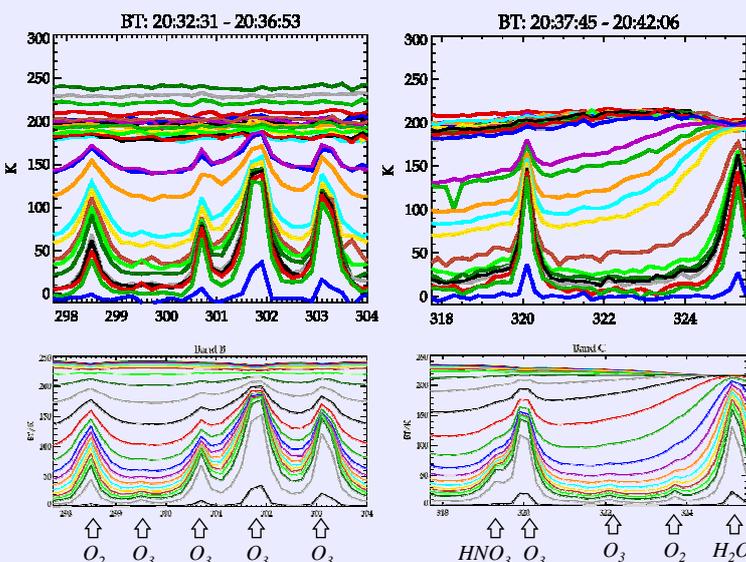
First results from the MARSCHALS mm-wave UTLS limb-sounder deployed in SCOUT-O3

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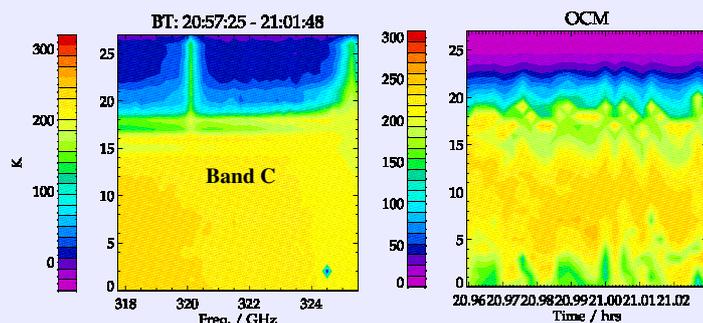
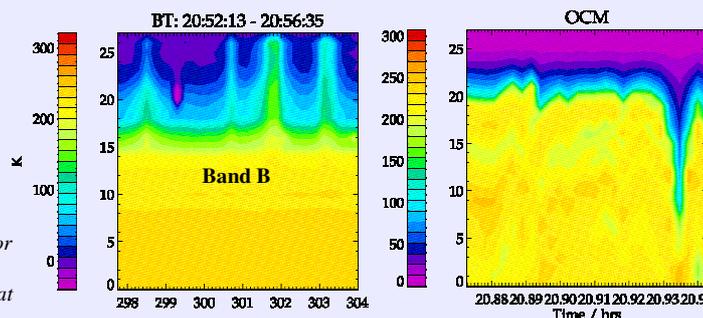
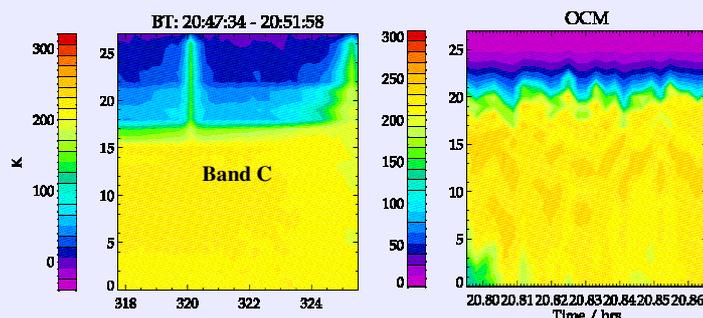
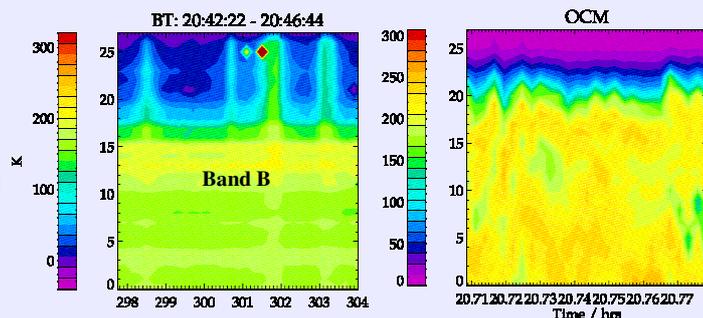


The MARSCHALS instrument aboard the M-55 Geophysica

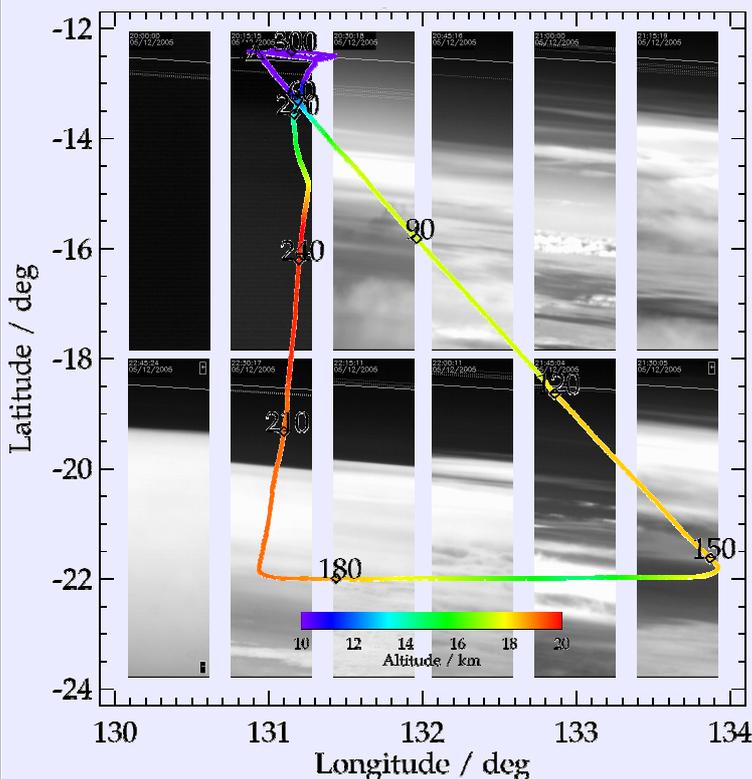
MARSCHALS is a millimetre-wave radiometer which measures H₂O, O₃ and CO in three spectral bands around 300 GHz. It is a limb-sounder, i.e. it scans the UTLS region with high vertical resolution. Millimetre-waves offer the possibility to see through thin cirrus clouds. These occur frequently in the tropical upper troposphere. MARSCHALS had its first flight at stratospheric altitudes during the SCOUT-O3 Tropics campaign in Darwin on 5th Dec 2006.



Above: Measured spectra from flight 9, 2005-12-05 (top) versus simulations (bottom) for bands centred near 300 (Band B) and 325 GHz (Band C). MARSCHALS scans the atmosphere in steps of 1 km from surface level to flight altitude with a final space view at +25 degrees elevation.



Above: Sequence of atmospheric scans from flight 9 (2005-12-05). From top to bottom alternating measurements of bands B and C are shown together with near-infrared cloudiness as measured by the optical cloud monitor (OCM). The OCM panel shows cloud brightness in arbitrary values (0=black, max=white). Note that spectral features are still visible even in the presence of clouds at altitudes between 15 and 20 km. Some horizontal patterns are due to aircraft roll and will be corrected in a future version of the data which is currently *work in progress!*



Left: Sample frames taken by the optical cloud monitor at a fixed angle in respect to the airframe. The solid line depicts the horizon for level flight attitude. The dashed lines depict the true pointing horizon as calculated by our onboard gyro. A frame was taken every 30 seconds approximately. Over-plotted to this is the flight-track of flight 9 (2005-12-05) with time stamps in minutes after take-off and colour-coded flight altitudes in kilometres.

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