

ER2 Microwave Temperature Profiler (MTP/ER2)

Instrument: ER2 Microwave Temperature Profiler (MTP/ER2)

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Measurement Description: The ER2 MTP is a passive microwave radiometer which measures the thermal emission from oxygen molecules in the atmosphere for a selection of elevation angles (normally 10 between +60 and -58 degrees). The current observing frequencies are 56.6 and 58.8 GHz, although more may be implemented for SOLVE using a new sensor unit which has a synthesized local oscillator (LO) source. Measured brightness temperature versus elevation angle is converted to air temperature versus altitude using a statistical retrieval procedure. An altitude temperature profile (ATP) is produced in this manner every 3 km along the flight path, and these can be used to produce a color-coded temperature curtain (CTC) of the temperature field which the ER2 has flown through. ATPs can be used to locate altitudes where the air is cold enough to condense nitric acid or water vapor to form polar stratospheric clouds. In addition, the temperature field can also be used to derive the altitudes of isentropic surfaces to look for the presence of atmospheric waves. The waviness of isentropic surfaces is used to characterize the magnitude of temperature fluctuations, which is needed for deriving effective temperatures to be used in atmospheric chemistry calculations involving reaction rates and solubility.

Accuracy: Temperature accuracy is approximately 1 K within 3 km of ER2, and < 2K for an 8 km region centered on the ER2.

Response Time: Temperature profiles are obtained every 16 seconds.

Location on the ER-2: The MTP is located on the right engine cheek aft of the air intake.

