

NPOESS Airborne Sounding Testbed – Microwave Spectrometer (NAST- M)

The NAST-M currently consists of two radiometers covering the 50-57 GHz band and a set of spectral emission measurements within 4 GHz of the 118.75 GHz oxygen line with eight single sideband and 9 double sideband channels, respectively. To be added prior to CRYSTAL-FACE are five double side band channels within 4 GHz of the 183 GHz water vapor line and a single band channel at 425 GHz. For clear air, the temperature and water vapor information provided by the 50-57 GHz, 118 GHz, and 183 GHz channels is largely redundant; but, for cloudy sky conditions the three bands provide information on the effects of precipitating clouds on the temperature and water vapor profile retrievals and enables sounding through the non-precipitating portion of the cloud, a feature particularly important for CRYSTAL-FACE. More information on NAST-M can be obtained at <http://www-nastm.mit.edu/>.

NPOESS Airborne Sounding Testbed Product

The basic NAST product is a two-dimensional “image” of spectral radiance, for any spectral channel within the 3.5 micron to 0.5 centimeter range of NAST. The derived products include cloud and surface radiative and physical feature imagery (e.g., spectral emissivity and temperature) and a three-dimensional image of the temperature, water vapor, and the concentration of other radiatively active trace gases (e.g., O₃, CO, CH₄, and N₂O) of the atmosphere. NAST-I provides a vertical resolution of 1–2 kilometers, so that distinct layers are observed, the number depending upon aircraft altitude. Thus, as the aircraft passes over the Earth, NAST-I and NAST-M scan an area at the Earth’s surface collecting data on the properties of the Earth’s surface and atmosphere beneath the aircraft. These data provide a wide variety of surface and atmospheric sounding and cloud products in support of scientific studies to be performed with the CRYSTAL-FACE data set. The NAST system (NAST-I and NAST-M) have already been successfully implemented during nine major field campaigns, the last five of which were on the Proteus aircraft as will be used during CRYSTAL-FACE. Information on the Northrup Grumman Proteus aircraft (maintained and operated by Scaled Composites) and its capabilities can be obtained by visiting <http://www.scaled.com>.