

NPOESS Airborne Sounding Testbed - Interferometer (NAST- I)

The NPOESS Airborne Sounding Testbed-Interferometer (NAST-I) is a high spectral resolution (0.25cm^{-1}) and high spatial resolution (0.13 km linear resolution per km of aircraft flight altitude, at nadir scanning (2.3 km ground cross-track swath width per km of aircraft flight altitude) interferometer sounding system that was developed to be flown on high-altitude aircraft to provide experimental observations needed to finalize the specifications and to test proposed designs and data processing algorithms for the Cross-track Infrared Sounder (CrIS) to fly on the National Polar-orbiting Operational Environmental Satellite System (NPOESS). Because the NAST-I temperature and humidity soundings have an unprecedented spatial resolution, the data are being used to support a variety of atmospheric research programs. The NAST-I covers a spectral range from $\sim 600\text{-}2900\text{ cm}^{-1}$ ($3.5\text{-}16\text{ microns}$) with 0.25 cm^{-1} spectral resolution, yielding more than 9000 spectral channels of radiance emission information. The NAST-I passive infrared (IR) Michelson interferometer is usually flown with the NAST passive microwave sounding instrument (NAST-M) to provide an all-weather sounding capability. More information on NAST-I can be obtained at <http://danspc.larc.nasa.gov/NAST/>.

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., O_3 , CO , CH_4 , and N_2O) of the atmosphere. NAST-I provides a vertical resolution of $1\text{-}2\text{ kilometers}$, 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>.