Gas and Aerosol Monitoring System/ Langley Airborne A Band Spectrometer (GAMS/LAABS)

Instrument: Gas and Aerosol Monitoring System/
Langley Airborne A Band Spectrometer (GAMS/LAABS)
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GAMS/LAABS is a combination of the Gas and Aerosol Measurement System (GAMS) and the Langley Airborne Measurement Spectrometer. The instruments are optically co-aligned and use a common pointing system to track the Sun through an aircraft view port. In the field the instrument provides line-of-sight (LOS) O_3, NO_2, O_4, and water vapor measurements using both a SAGE III-like multiple linear regression algorithm and a full spectrum algorithm. Aerosol may also be derived for 'enhanced' conditions including polar stratospheric clouds and optically thin cirrus. Using profile data (1-D/2-D) transformed to GAMS/LAABS LOS geometry, quick-look validation/comparison products for SAGE III, AROTAL, AATS-14, SCIAMACHY, and other instruments will be obtained. The data from GAMS/LAABS will make possible crucial evaluations of SAGE III data processing possible following deployment. These activities include SAGE III etaloning/mirror correction validation, O_2 spectroscopy and forward model verification, ozone spectroscopy near the O_2 A band and 940-nm water vapor features, evaluation of the relative strength of spectroscopic features (e.g., water vapor features at 600 nm and 940 nm) and altitude registration validation using oxygen measurements.

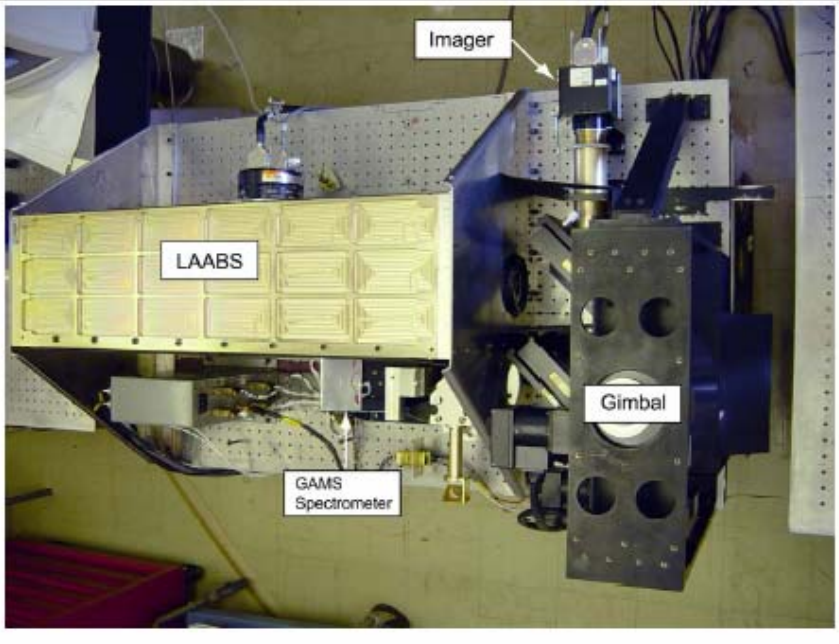
Instrument Details:

Gas and Aerosol Measurement Sensor (GAMS)
• Components:
o Solar spectrometer with 1024 channels from ~ 430 to 1030 nm
o Provides measurements of LOS transmission spectra and differential O_3, H_2O, O_2, O_4, and aerosol
o Solar imager to monitor scene homogeneity

• Outgrowth of a study to define a SAGE-IV concept
o Focus on UV-Vis-Near-IR solar occultation only
o Designed to extend the technique into the troposphere
  • Imager for altitude registration & classification
  • Vastly increased SNR & spectral sampling
• Successful Instrument Incubator Program development ($3.8M)
o Built space flight-like spectrometer, telescope, photon-to-bits boards, & MCM (detector controller).
o COTS imager to establish imager performance requirements
o 6 Flights on NASA 757 during Nov-Dec 2000

Langley Airborne A-Band Spectrometer (LAABS)

• High spectral resolution (~0.035 nm) grating spectrometer with > 800 channels from ~759 to 771 nm
• Provides measurements of LOS transmission spectra for evaluation of SAGE III O2 A-band forward model
• Originally developed to support CALIPSO (formerly PICASSO-CENA) spaceborne A-band spectrometer
• Designed and fabricated by BATC to provide high spectral resolution (~0.035 nm) radiance measurements in O_2 A-band spectral region (~765 nm)
• Three successful flights on Lear 25C during July 2001



GAMS/LAABS in the laboratory in flight configuration.