

Tropical Composition, Clouds and Climate Coupling Experiment (TC4) WB-57 High Altitude Research Aircraft

Overview

NASA embarks on the Tropical Composition, Cloud and Climate Coupling (TC4) mission this summer to study the hard-to-reach heights of the Tropical Tropopause Layer (TTL), where vast fields of icy cirrus clouds form. Cirrus clouds play a major role in determining how much solar energy is trapped in Earth's atmosphere. The TTL is the transitional layer between the troposphere and the stratosphere (about 9 - 11 miles above Earth), and is where airborne materials can penetrate the stratosphere and significantly change its chemistry. Knowing that water is the most powerful greenhouse gas in the atmosphere, mission scientists are interested in the changes in the water vapor at these high altitudes and its effect on the Earth's climate and atmospheric chemistry.

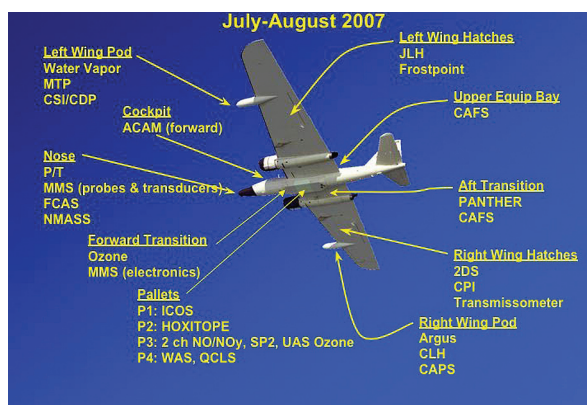
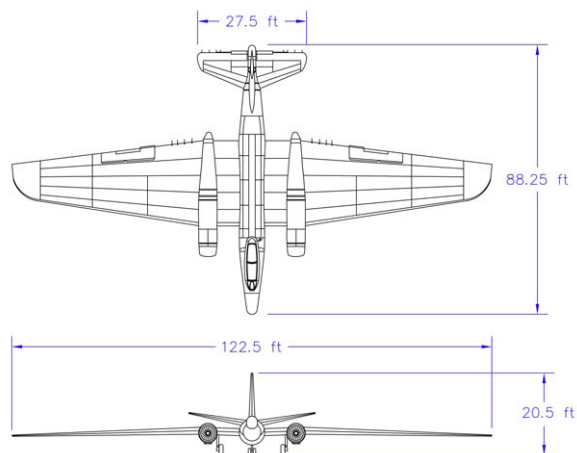
The mission, which will run from July through August, 2007, will be based in San Jose, Costa Rica, where there are warm waters, heavy rainfall, and high temperatures during the summer months. NASA will operate three aircraft equipped with scientific instruments, a DC-8, an ER-2 and a WB-57.

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The WB-57 is a mid-wing, long-range aircraft capable of operation for extended periods of time from sea level to altitudes well in excess of 60,000 feet. Two crew members are positioned at separate tandem stations in the cockpit. The pilot station contains all the essential equipment for flying the aircraft. The sensor operator station contains both navigational equipment and controls for the operation of the payloads and payload support systems located throughout the aircraft. The WB-57 can remain aloft for approximately 6.5 hours, flying both day and night, so long as separation from hazardous weather can be maintained. With a range of 2,500 miles, the aircraft can be deployed to any continent.



TC4 WB-57 Aircraft Platform Instruments:

- 2DS – two-dimension stereo
- ACAM - Atmospheric Compact Atmospheric Mapper
- ARGUS - Diode Laser Spectrometer
- CAFS - Composition of Carbon Dioxide - Actinic Flux Spectroradiometers
- CAPS - Cloud, Aerosol, and Precipitation Spectrometer
- CDP - Climate Dynamics and Predictability
- CEM - Transmissometer
- CLH - Closed-path Laser Hygrometer
- CPI - Cloud Particle Imager
- CSI - Cloud Spectrometer and Impactor
- FCAS - Focused Cavity Aerosol Spectrometer
- FP - Frost-Point Hygrometer
- HOXITOPE – Hydrogen Oxide Isotope
- H2Ov – Water Vapor
- ICOS - Integrated Cavity Output Spectrometer
- JLH - JPL Laser Hygrometer
- MMS - Meteorological Measurement System
- MTP - Microwave Temperature Profiler
- NMASS - Nucleation-Mode Aerosol Size Spectrometer
- PANTHER - PAN and Trace Hydrohalocarbon Experiment
- PT – Pressure-Temperature
- SP2 – Single Particle Soot Photometer
- WAS – Whole Air Sampler

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For further information on the WB-57 and a more complete list of instruments, please visit our website at: <http://www.espo.nasa.gov/tc4/>

Payload Integration Locations

The WB-57 aircraft can carry up to 6000 lbs. of payload. The WB-57 employs a pallet system in the main fuselage area. The pallet system consists of interchangeable pallet modules. Pressurized and unpressurized pallets are available. The pallet system will carry a total of 4000 lbs. including pallet weight. Lighter payloads can also be carried in the aft fuselage, tail cone, wing pods, wing hatches, and/ or the nose cone.

Performance and Capabilities

Operating Altitude:	Sea level to well above 60,000 feet
Maximum Flight Duration:	Approximately 6.5 hours
Range:	Approximately 2,500 miles
Maximum Gross Weight:	63,000 pounds
Maximum Payload Weight:	6,000 pounds.
Wing Surface Area:	2,000 square feet
Engine Thrust:	15,500 pounds per TF-33 engine
True Air Speed at 60,000+ feet:	~410 knots (Max Mach .8)
Max. Indicated Air Speed at 0 to 35,00 feet:	190 knots
Minimum Runway Dimensions:	7000 feet x 150 feet (sea level)
Maximum Crosswind Component:	15 knots
Air to Ground Communications:	UHF, VHF, HF, and SAT phone
Payload Power Options:	110V 400Hz 3-Phase, 110V 60Hz 1- Phase and 28VDC

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