aerosonde Pacific reconnaissance: ready when you are!

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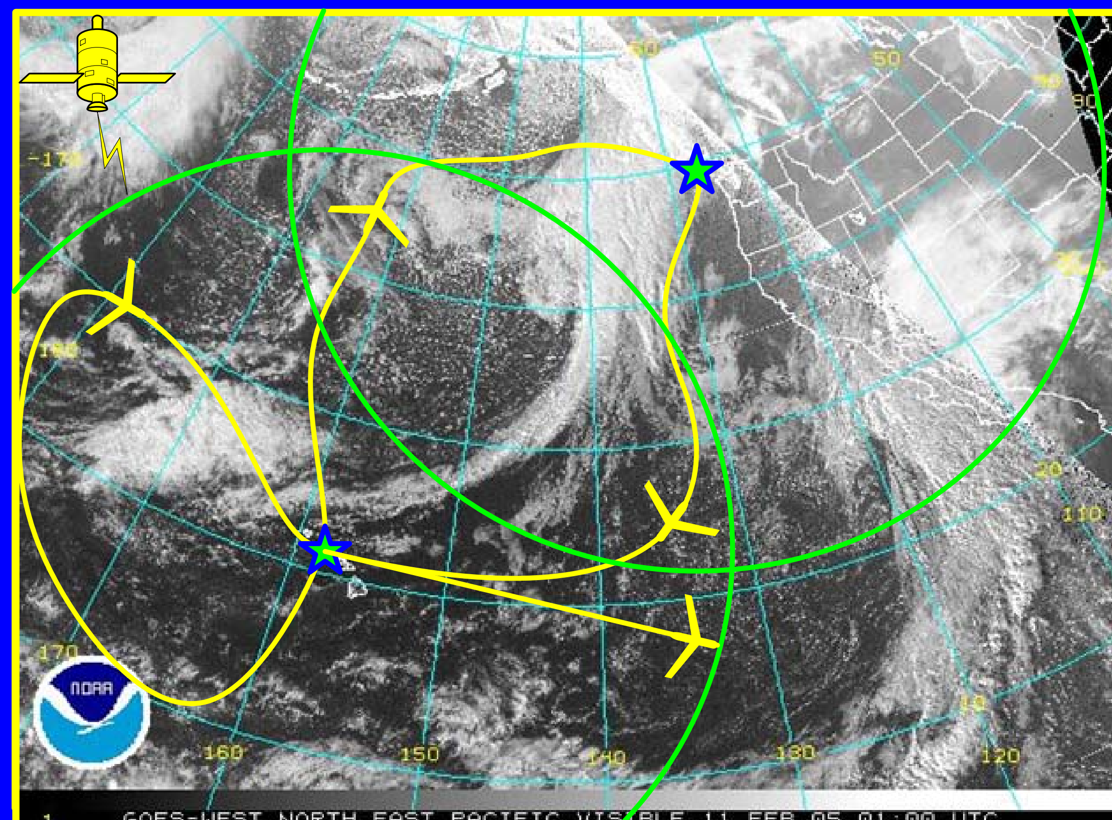

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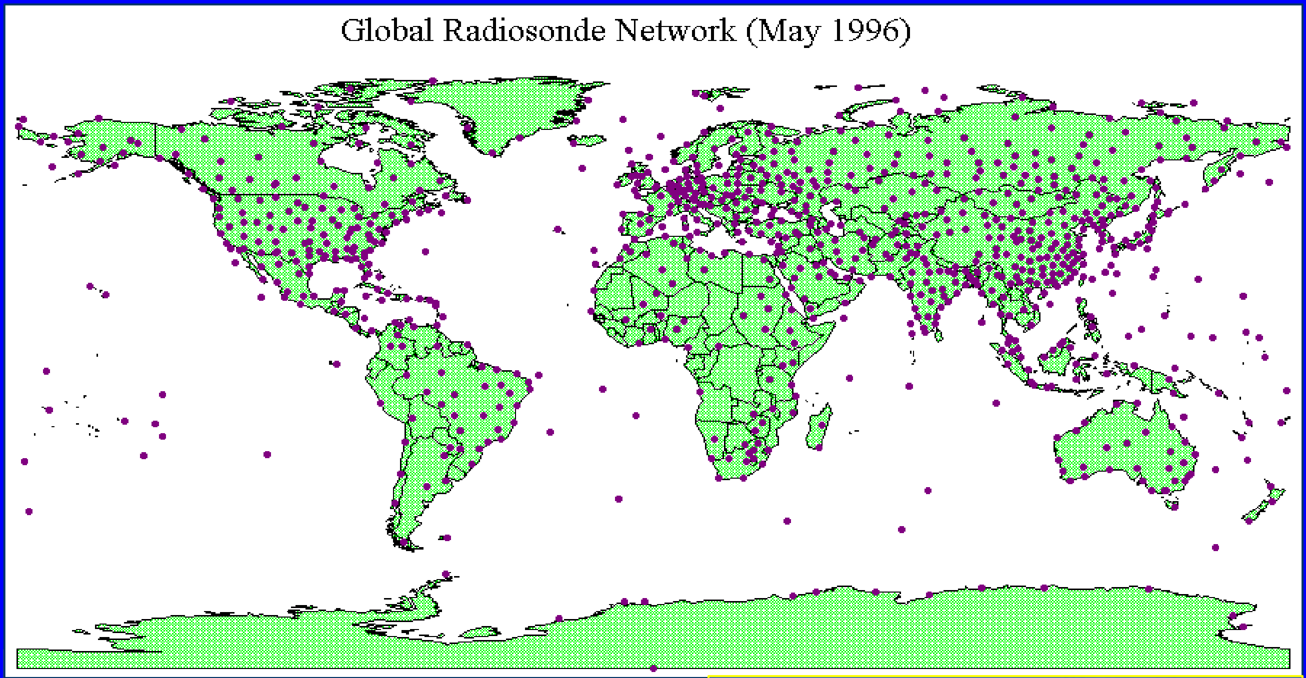
FILLING THE UPPER-AIR DATA VOIDS



- **upper-air soundings are dense only where costs are ~US$200 per sounding**
- **conventional methods leave large voids**
- **miniature aircraft can make soundings affordable almost anywhere**

Bulletin of the American Meteorological Society: Vol. 73, No. 12, pp. 1987–1998.

Autonomous Aerosondes for Economical Atmospheric Soundings Anywhere on the Globe

1992!!

Greg J. Holland

Bureau of Meteorology Research Centre, Melbourne, Australia

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The Insitu Group, Menlo Park, California

ABSTRACT

Considerable interest in the use of autonomous aircraft for atmospheric measurements in remote and hazardous areas world-wide has arisen over recent years. Their application in tropical cyclone reconnaissance is under study by the World Meteorological Organization and the International Council for Scientific Unions under the United Nations International Decade for Natural Disaster Reduction. More diverse experiments, particularly for stratospheric operations, are being planned by agencies in the United States.

The aerosonde can provide an economical and flexible element in these international initiatives. The concept is for a small aircraft (weighing less than 20 kg) with on-board meteorological sensors to provide radiosonde-quality observations at any location on the globe. Individual missions could span several thousand kilometers and several days' duration, using the Global Positioning System for autonomous navigation, and satellite relay for data return and flight-plan updates. With a supercharged engine, the aerosonde could make soundings from sea level to 100 hPa and back in a cycle of about 4 h. Aerosondes flying such profiles in routine wide-scale use are expected to achieve a per-sounding cost competitive with that of balloon-borne radiosondes, but with much greater flexibility of operation.

MINIATURE ROBOTIC AIRCRAFT

KEY FEATURES

- small size
- long range/endurance
- autonomy
- “semi-disposability”

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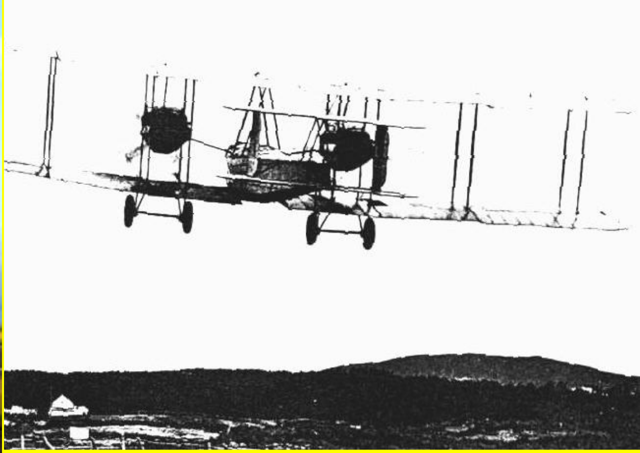


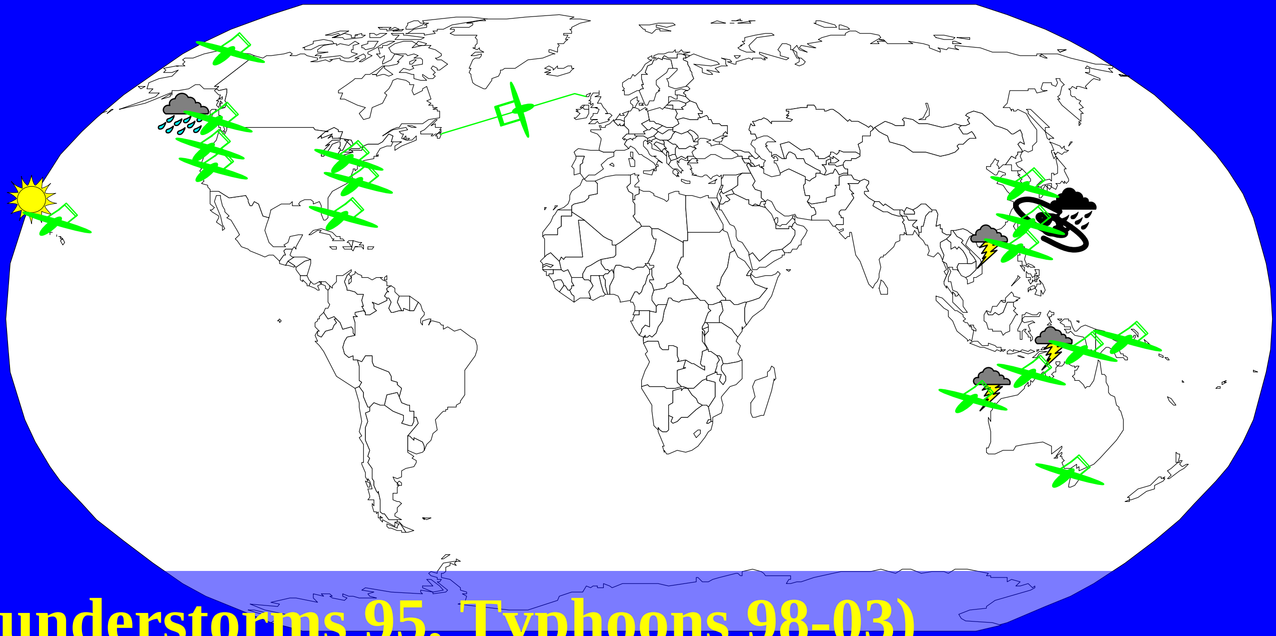
First Atlantic Crossing by an Unmanned Aircraft

20-21 August1998 : 27 Hr – 3200 Km

1.5 Gallons of Gasoline

The Insitu Group / U. of Washington / ES&S Pty Ltd

AEROSONDE TRIALS PROGRAM



- Aus BoM (Thunderstorms 95, Typhoons 98-03)
- Environment Canada/AES (Vancouver Island 97, 98)
- US NWS/NCEP (Hawaii 99)
- NASA/NOAA HRD (Florida 01)
- ONR/USN (Carolina 99)
- DoE (Alaska 00-04)
- Taiwan CWB/NTU (Thunderstorms 98, Typhoons 00-03)
- JMA/KMA (Tropical weather 01-02)

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Seascan

economical ship-based reconnaissance …

… longest-ever endurance for ship-based aircraft

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Boeing *ScanEagle* military variant

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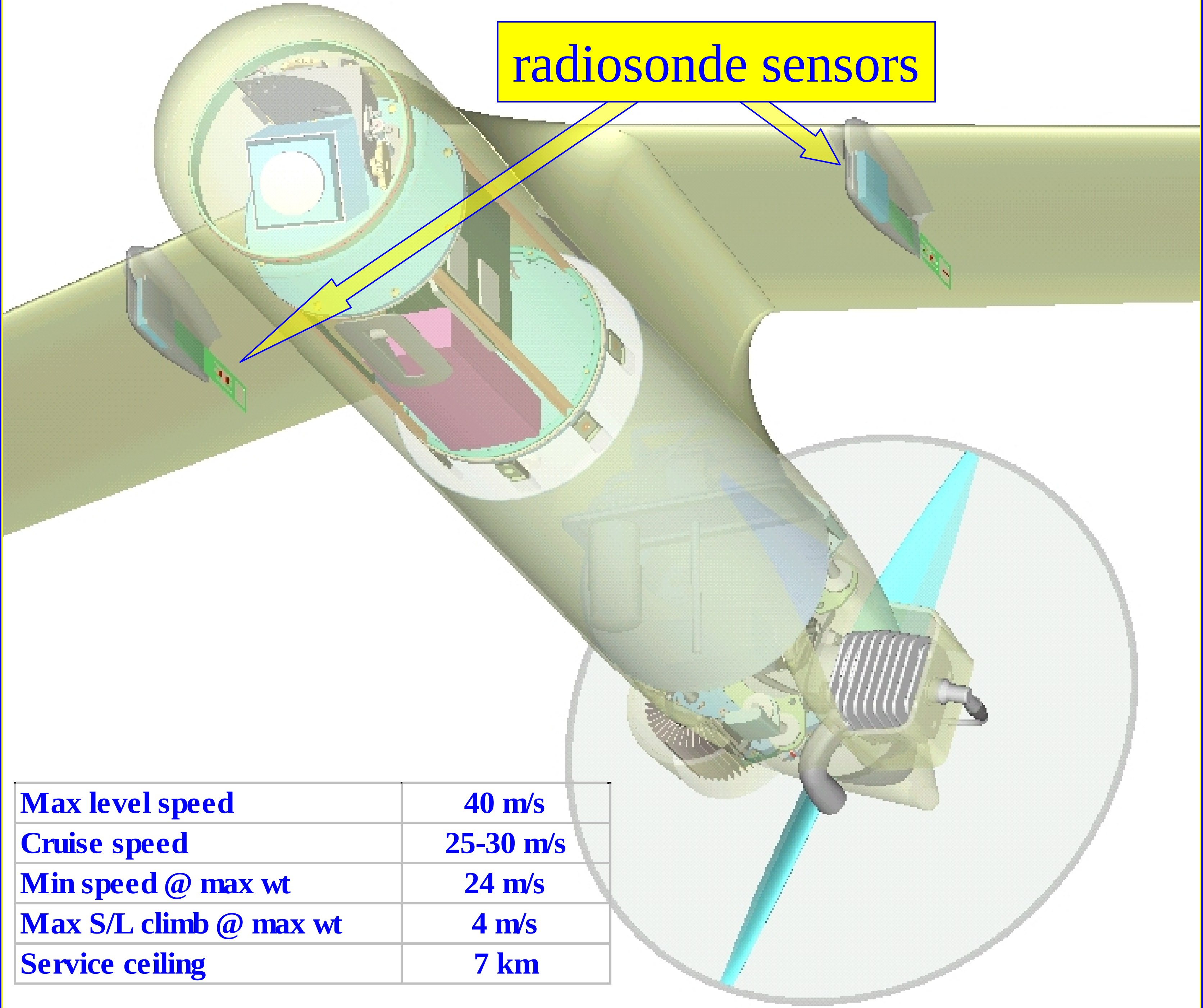
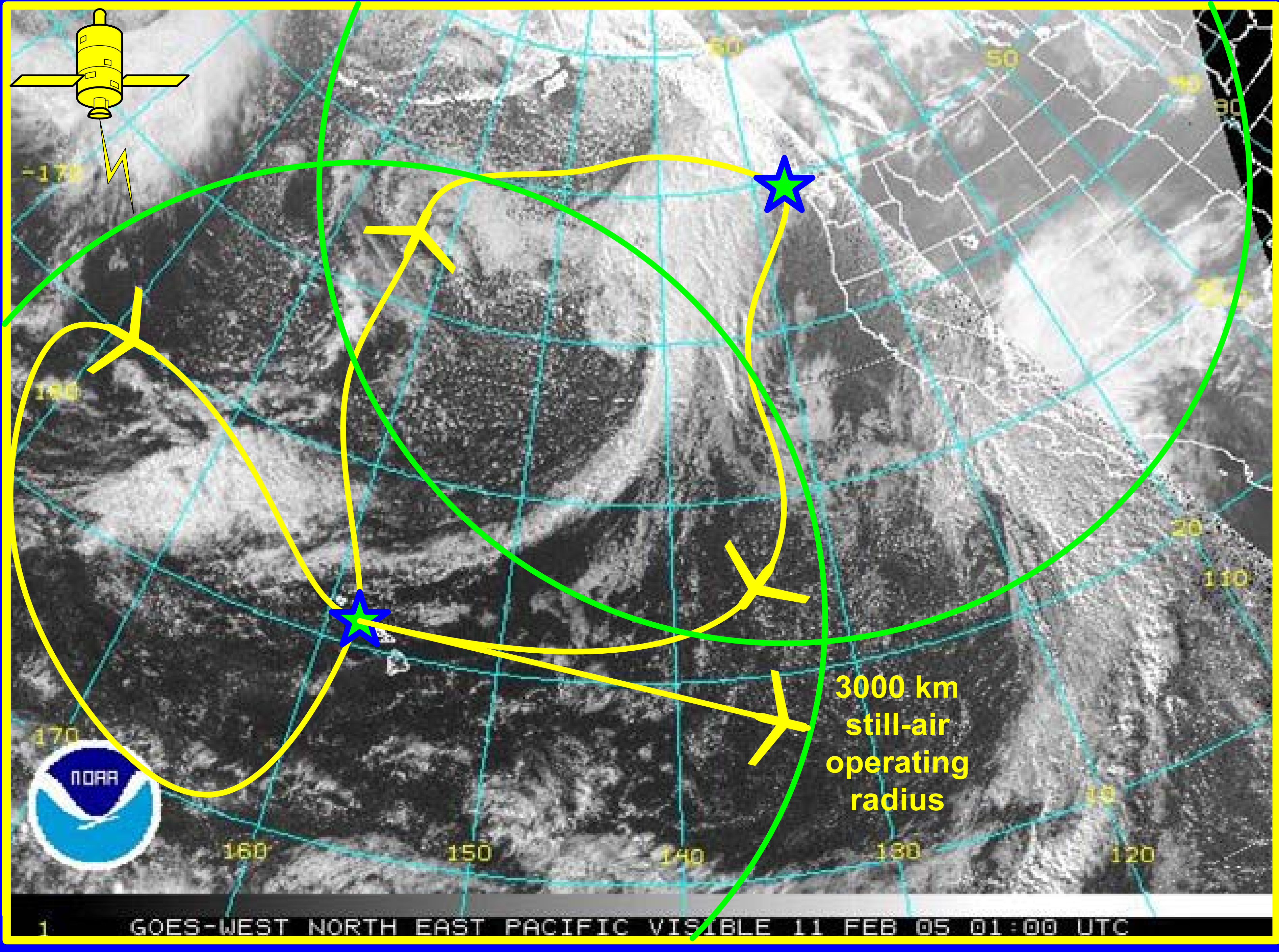
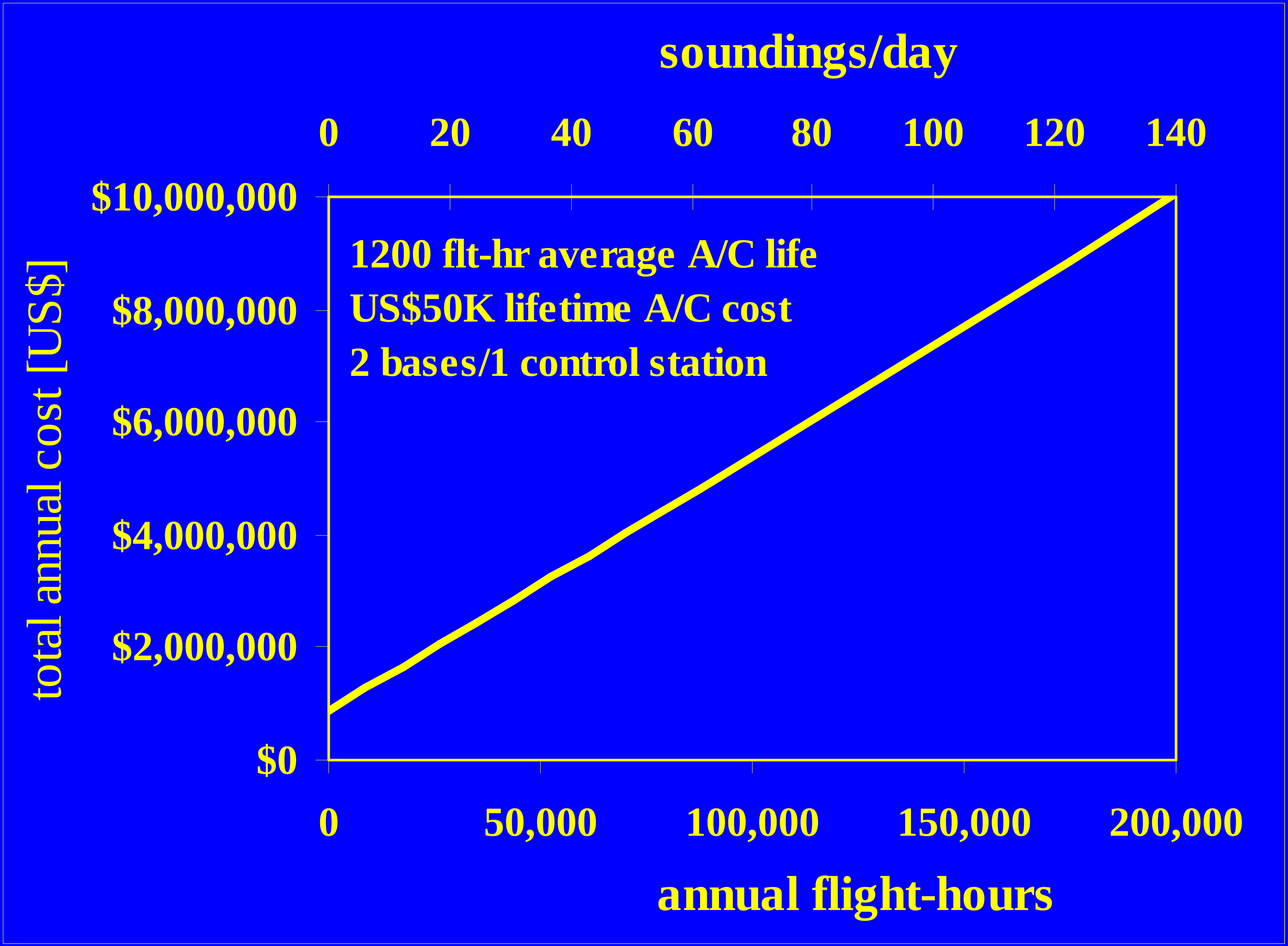


Max level speed	40 m/s
Cruise speed	25-30 m/s
Min speed @ max wt	24 m/s
Max S/L climb @ max wt	4 m/s
Service ceiling	7 km


3000 km
still-air
operating
radius
NOAA
GOES-WEST NORTH EAST PACIFIC VISIBLE 11 FEB 05 01:00 UTC

ESTIMATED COSTS FOR ROUTINE OPERATIONS



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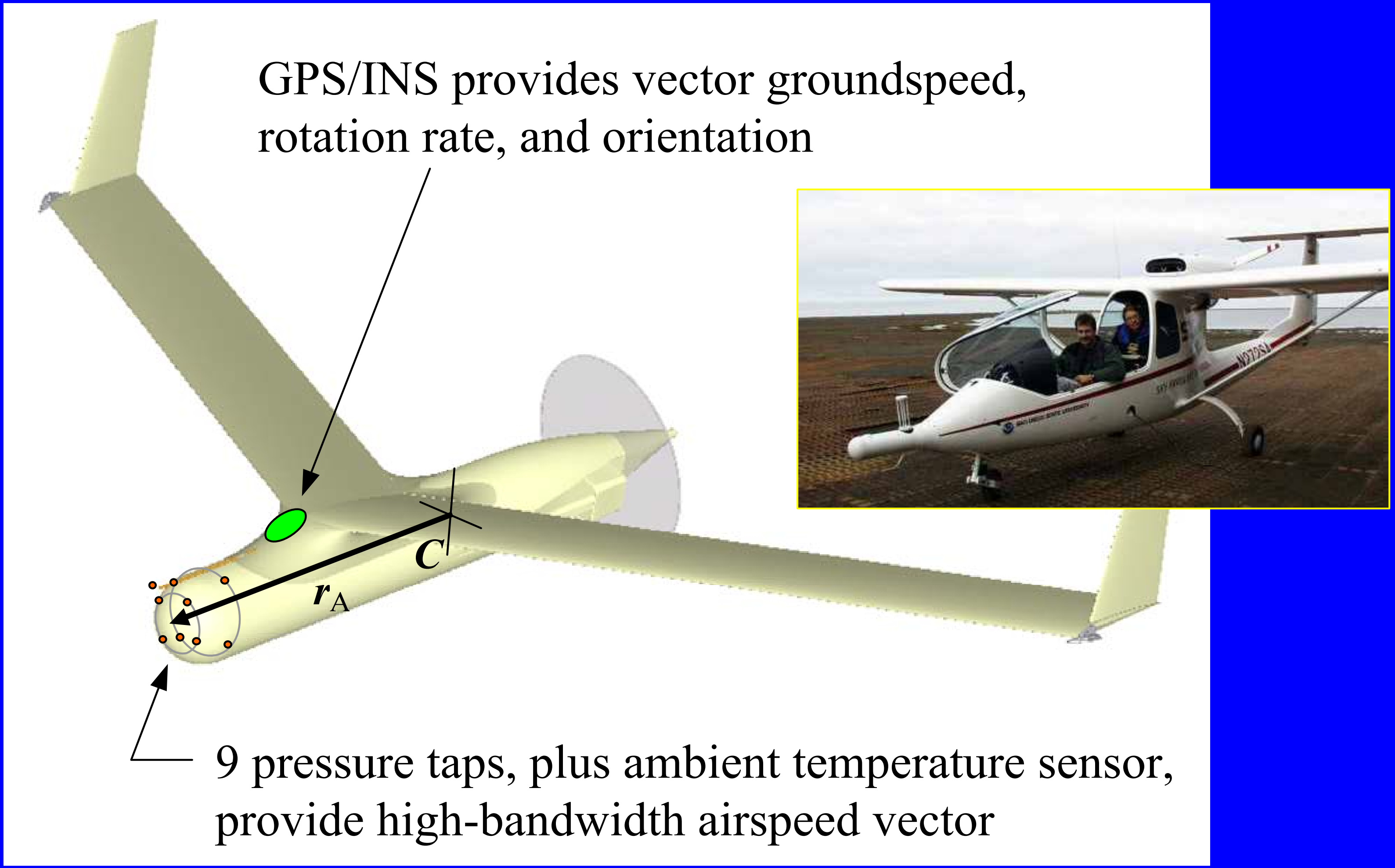
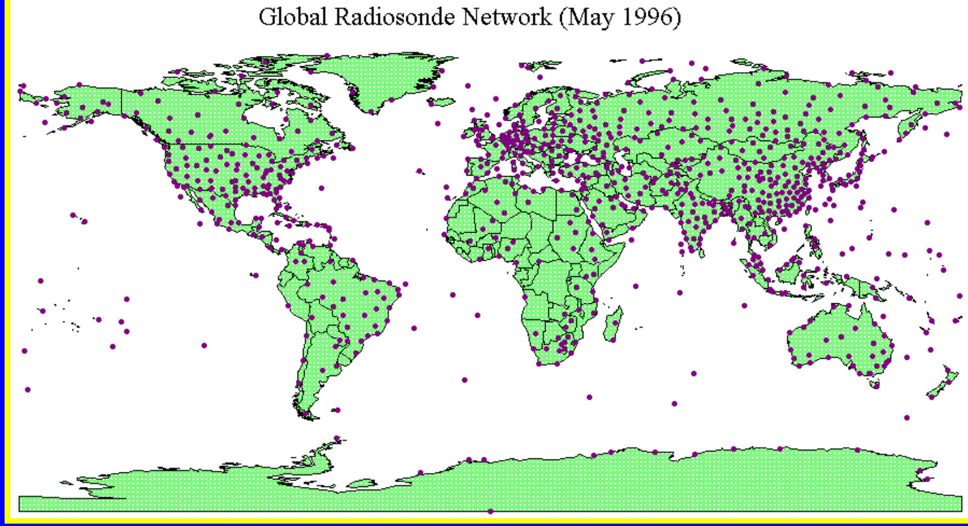
turbulence measurement: high-bandwidth vector (groundspeed - airspeed)



METEOROLOGICAL SENSORS

- P, T, U
- wind
- SST
- ice/rain/liquid-water content
- momentum flux
- GPS scatterometer (surface wind)
- LIDAR (column integrals)
- aerosols

ROUTINE OFFSHORE MONITORING



- Feasibility has been demonstrated
- Regulatory/air traffic accommodation is manageable
- Costs are fiscally practical
- Suitable aircraft is in production for diverse markets
- Ready when funded!

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