Development of the Global Hawk Turbulence Sensor for Aircraft Safety

Photo: NASA

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NOAA ESRL CSD

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The Global Hawk and NOAA UASPO

- The Global Hawk has become a powerful tool for atmospheric research
- NOAA's $3M contribution in 2008-2010 helped establish the GH program
- Limitations: Temperature, radiation, vibration
- The GHIS instrument is used for vibration monitoring

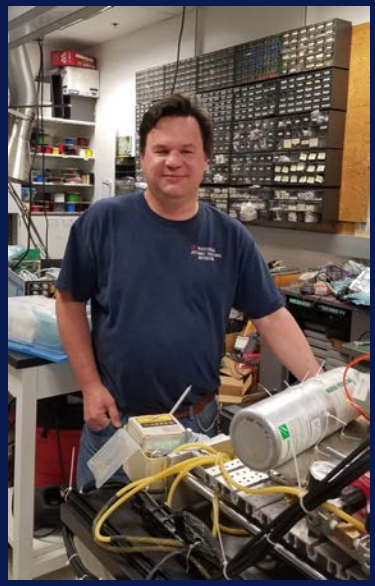
Photo: NASA

The GHIS instrument then

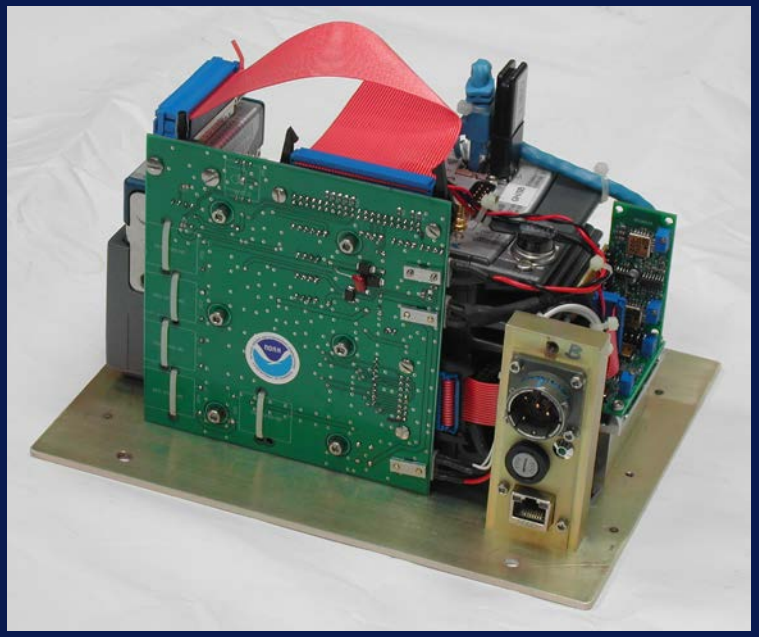
- Originally GHIS = “Global Hawk Instrument Simulator”
- Purpose: Determining the working environment of various GH instrument bays; testing interface between GH and payload instruments
- NOAA UASPO helped fund development of GHIS

GHIS measurements

- X, Y and Z accelerations 1 (± 2g)
- X, Y and Z accelerations 2 (± 5g)
- Instrument payload bay pressure
- Box temperature
- Bay temperature
- DC power quality



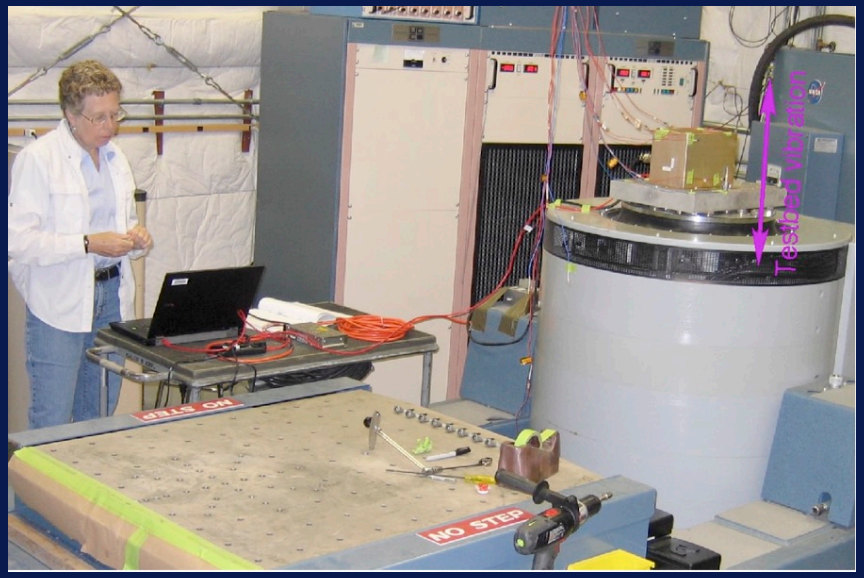
Electronics engineer Steve Ciciora



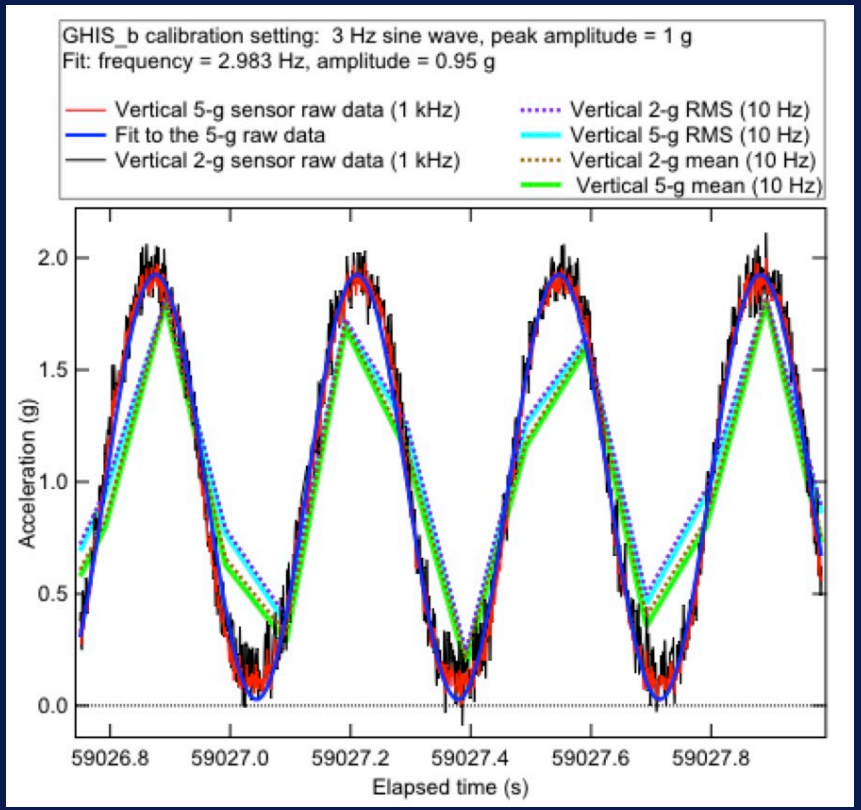
The GHIS instrument now

- NASA realized that GHIS provides valuable information for aircraft in-flight safety
- Now GHIS = “Global Hawk In-flight turbulence Sensor” – an operational instrument
- A second unit was built
- Rigorous calibration was carried out
- Beginning TRL 7, ending TRL 9

The GHIS vibration measurement was calibrated at the NASA Armstrong environmental testing facility

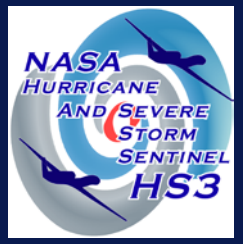


Software engineer Laurel Watts



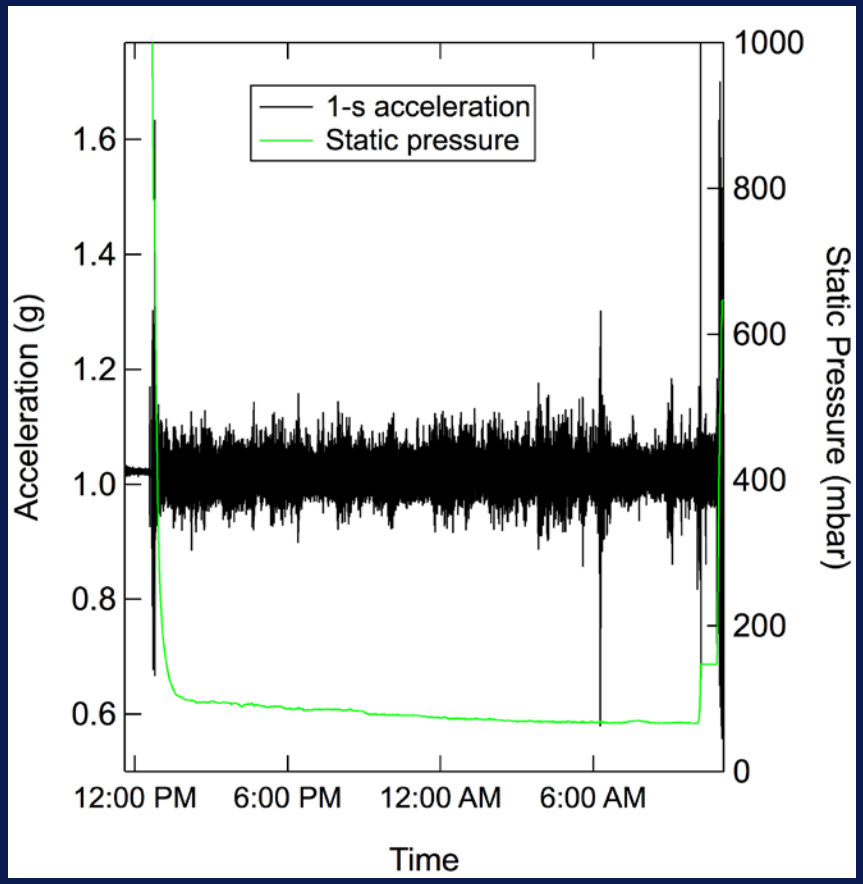
A graphical user interface was developed by Laurel Watts to allow real-time monitoring of the aircraft vibrational environment by the pilots

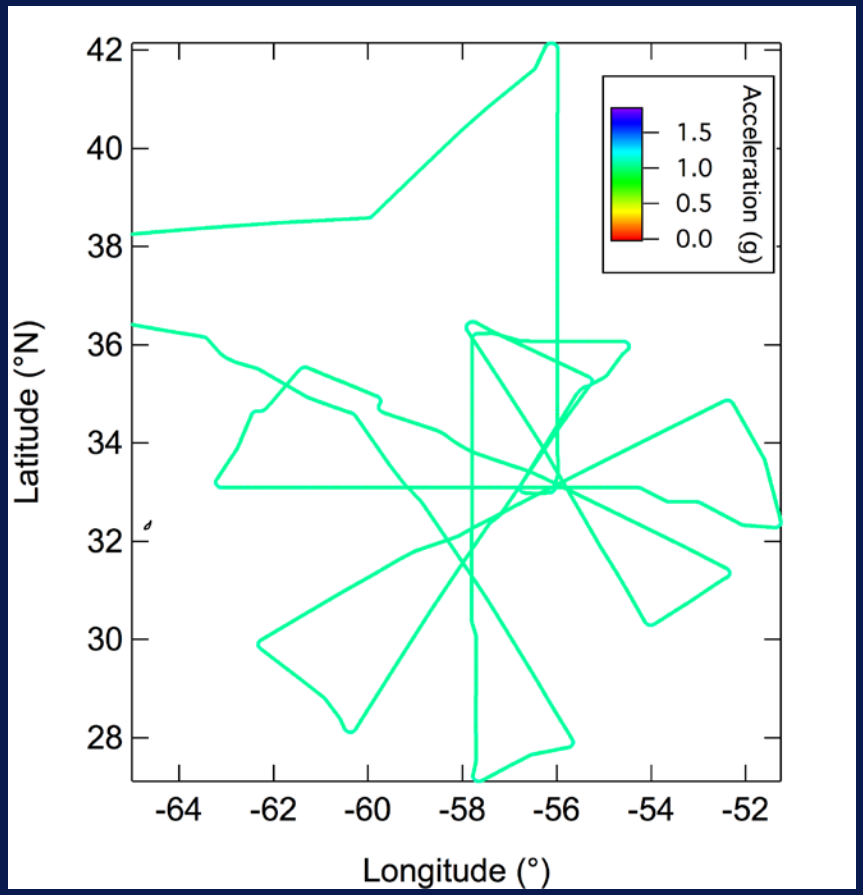
GHIS mission participation



Impact: Allows operation of the GH in regions where it would otherwise have been considered unsafe to fly

Hurricane Edouard overflight during HS3
16 September 2014





Conclusions

- GHIS was originally developed as an instrument simulator to assess the GH payload environment
- GHIS has become a critical tool for safe operation of GH during severe weather research
- Successfully flown on five GH missions since 2010
- GHIS is a success story of “research to operations” transition (TRL 9 now)