# The CubeSat Infrared Atmospheric Sounder (CIRAS) Selected for Development at NASA JPL

- Hyperspectral infrared sounders provide 2nd highest impact to operational forecast
- Infrared complements microwave by “sharpening” the vertical and horizontal resolution. (Microwave sees through clouds while IR is limited)
- CIRAS selected by NASA ESTO InVEST program in Sept. 2015
  - Objective: To demonstrate IR sounding technologies in a CubeSat: HOTBIRD Detectors, Immersed Grating, MPT Cooler
  - PI: Thomas S. Pagano
    Jet Propulsion Laboratory,
    California Institute of Technology
- CIRAS measures the infrared spectrum of temperature and water vapor in the lower troposphere
- Retrieval accuracy similar to AIRS/CrIS in lower troposphere
- CIRAS selected by the CubeSat Launch Initiative to fly in 2018/2019
- NOAA participation in requirements definition and design studies

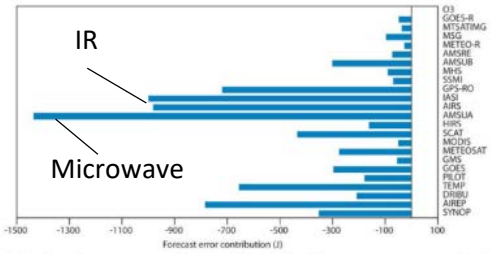
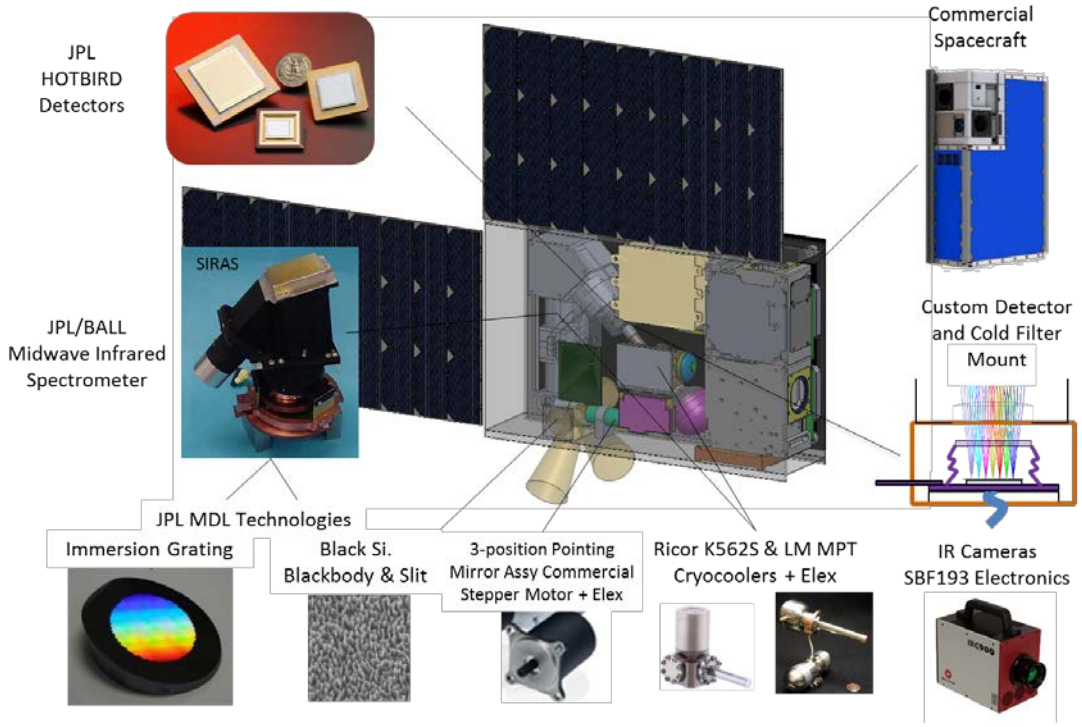



*Figure 11. 24-hour forecast error contribution (Joule*$10^{-4}$) of the components (types) of the observing system during September, October, November and December 2008. Negative (positive) values correspond to a decrease (increase) in the energy norm of forecast error.*

From Cardinali (ECMWF Tech. Memo. 599, 2009)

| Parameter | Legacy (CrIS) Performance | CBE |
|---|---|---|
| **Orbit** | **824 km** | **450 km** |
| **Vertical Range** | 1000-50mb | 1000-300 mb |
| **Temperature Profile** | **≤1.5 K/km** | **≤1.2 K/km** |
| **Humidity Accuracy** | 15%/2km | 15%/2km |
| **Spatial Res. (nadir)** | **13.5 km** | **13.5 km** |
| **Scan Range** | 2040 km | 165 km |
| **Spectral Range** | **3.9-15.4µm** | **4.78-5.09µm** |
| **Spectral Resolution** | 0.625 $cm^{-1}$ | 0.5 $cm^{-1}$ |
| **NEdT** | **<0.25 K** | **<0.25K** |




© 2016. California Institute of Technology. Government sponsorship acknowledged