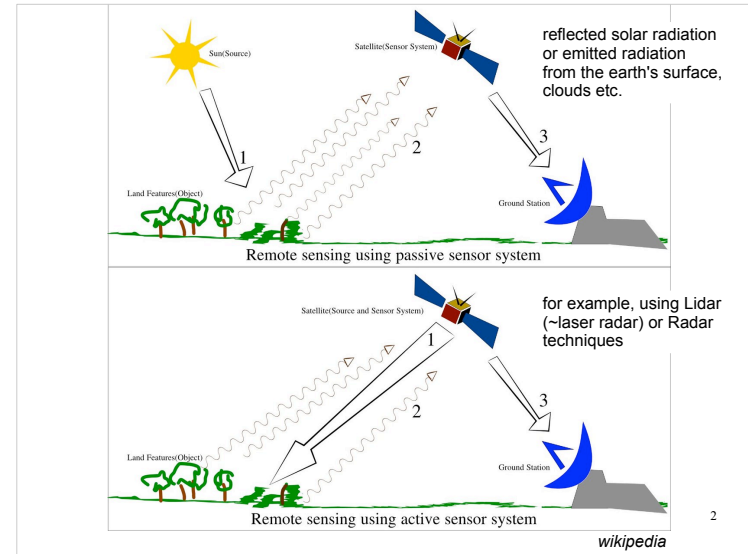


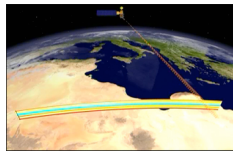
**MONDAY AM**  
Radiation, Atmospheric Greenhouse Effect

**How do Satellites take Data?**

1



**Satellite Temperature “Measurements”**

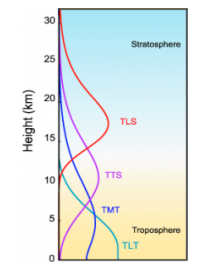
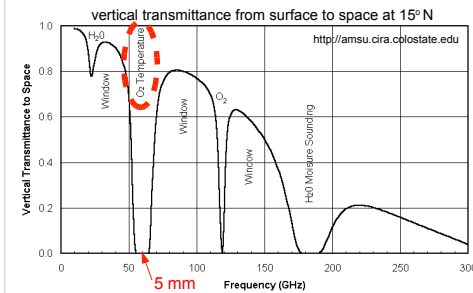
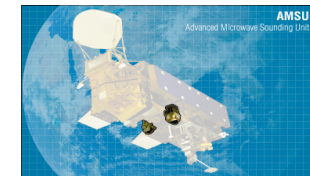


- Satellites cannot measure air temperature directly (nor any other property of air)
- most Satellites measure radiation emitted at certain wavelengths
- using a model (a so-called retrieval algorithm), the measured radiances are converted into temperature
- different research groups use different algorithms and therefore obtain different temperatures

3

**Microwave Sounding Unit (MSU)**

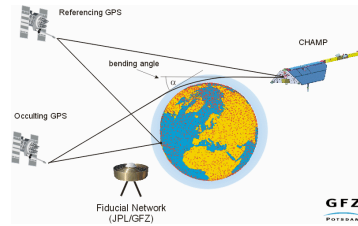
- Measurements since 1979 (beginning of satellite era)
- very important for long-term climate trends
- Temperature over several broad vertical layers



4

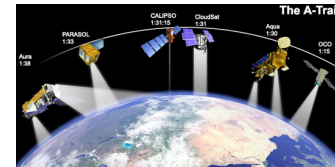
## Global Positioning System Radio Occultations

- Based on bending of signal through the atmosphere
- Refractivity is a function of density, temperature and water vapor
- At temperatures below ~ 240 K water vapor contribution can be neglected → high vertical resolution (< 1 km) temperature profiles

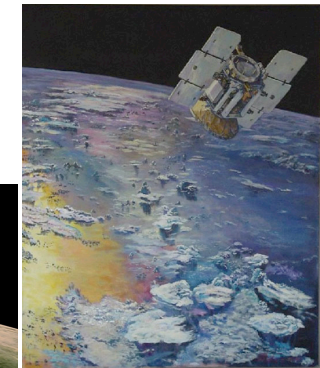
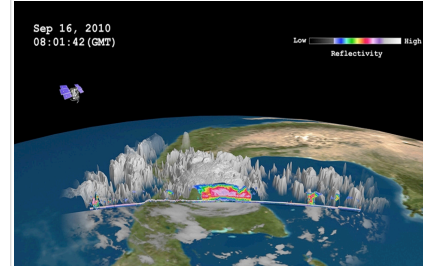


5

<http://cloudsat.atmos.colostate.edu>



## Cloud Profiling Radar



Painting by Principle Investigator Prof. Graeme Stephens

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