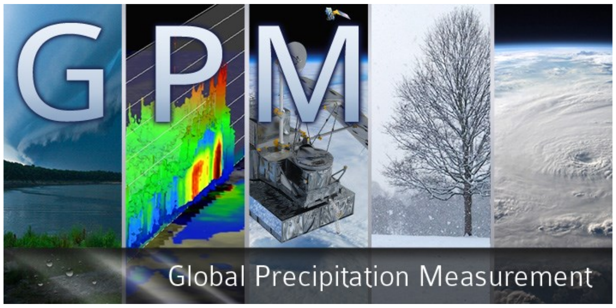


What's in a satellite?

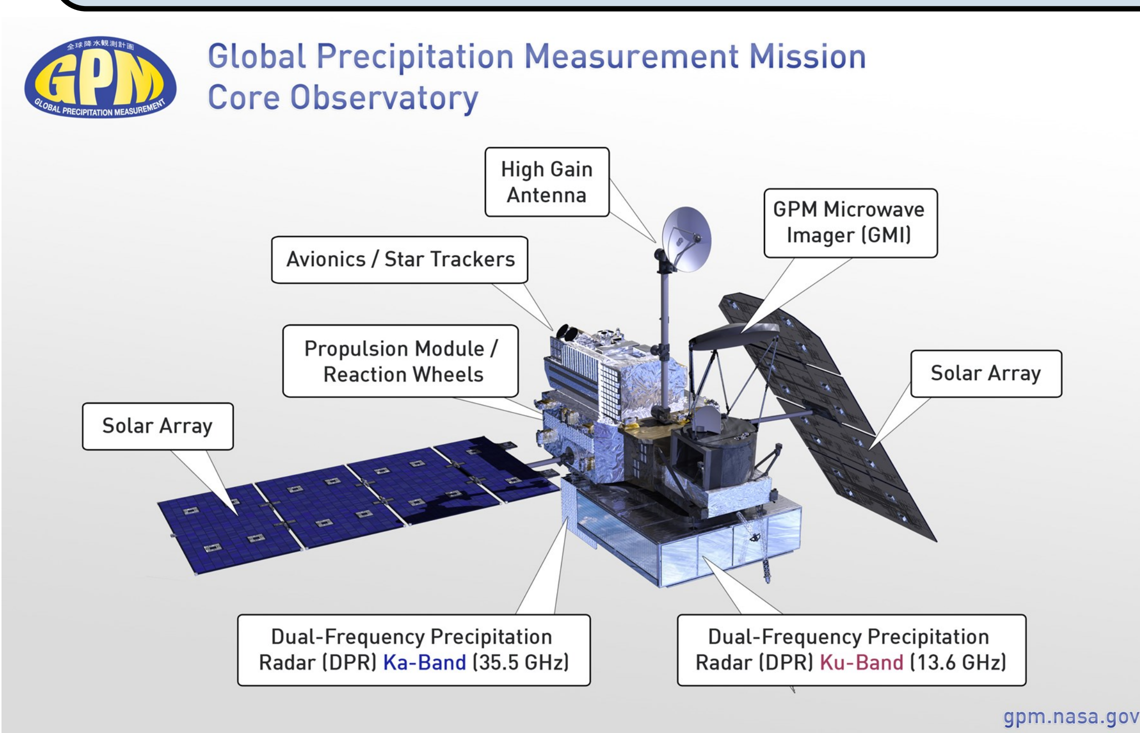
The Global Precipitation Measurement (GPM) mission is an international network of satellites that are all looking down on Earth and measuring precipitation from above. The GPM concept centers on the deployment of the GPM Core Observatory, a satellite carrying two advanced instruments to measure precipitation all over the world every three hours. The data from these two instruments will be used to standardize precipitation measurements made by an international network of partner satellites. Not only will this data give us a better picture of global precipitation, it will help advance our understanding of Earth's water and energy cycles and improve forecasting of extreme events like floods, droughts, landslides and hurricanes.

The GPM satellite constellation
http://go.nasa.gov/1dtqF0L

Fun Facts:

- NASA and the Japanese space agency (JAXA) partnered to build the satellite—it will launch from Japan in early 2014.
- Compared to its predecessor TRMM (the Tropical Rainfall Measuring Mission), launched in 1997, GPM will be much better at measuring light rain and snow.
- The GPM Core satellite weighs 3850 kg, about the same as a large pickup truck.

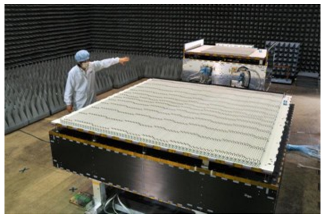
Think about this: What parts does a satellite need to do its job? Look at the diagram below and try to predict what each labelled piece does and why it's important. Then flip over the paper to find out!



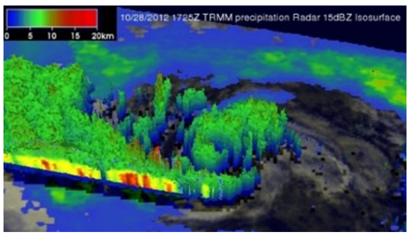
Launch animation

http://go.nasa.gov/1dtslqX

Dual-Frequency Precipitation Radar (DPR)

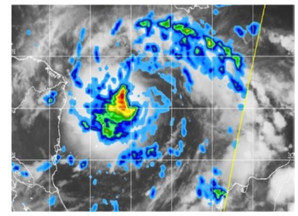


The DPR provides three-dimensional information about precipitation particles in the different layers of clouds. It sends energy at two frequencies (Ku and Ka) into the cloud and observes the energy that is reflected back from different heights in the cloud. The DPR collects information on the size, shape and distribution of raindrops, which improves rain estimates.



GPM Microwave Imager (GPM)

The GMI is a radiometer instrument that measures microwave energy that is emitted naturally by precipitation within and beneath clouds. Different types of precipitation, like heavy rain and light snow, emit different wavelengths of energy. The GMI measures these wavelengths which scientists use to tell what kind and how much precipitation is in the cloud.

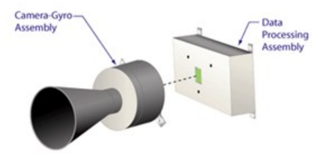


The instruments in action
http://go.nasa.gov/1dtqouJ
http://go.nasa.gov/1dtqyCt

High Gain Antenna

The High Gain Antenna allows the Core satellite to communicate with the ground, and send real-time, continuous data from the GMI and DPR.

Avionics / Star Trackers



Star trackers measure the position of stars, and use a catalog of star locations to help the satellite know where it is in space.

Propulsion Module / Reaction Wheels

The propulsion system consists of the fuel and thrusters used to move the satellite while in orbit and the reaction wheels which maintain the Core's orientation. Together, they maintain and correct the orbit as needed throughout the life of the spacecraft. When the mission is over, they will drive the spacecraft into the atmosphere for a controlled re-entry to safely destroy it and land the pieces in the ocean.

Solar Array

GPM's two solar panels provide power for all the satellite's systems by converting sunlight into electrical energy.

Array deployment test: http://go.nasa.gov/1dtq9zL

Math Connection:

- What scale is your completed paper model? The real solar panels on the GPM Core Observatory are 2.8 meters (9.2 feet) wide. Measure the panels on your model, and calculate how many times bigger the real thing would be.

Engineering Challenge:

- After you build your model, come up with a creative way to display it. You might think of a museum exhibit, and create a label and caption as well.
- On the real satellite, the GMI spins around to collect data. Can you find a way to have your model do this?