**PAESTA Podcast Series  --  You Asked, We Answered!**

**Episode 3  --  How do scientists measure rainfall?**

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Many schools will have a rain gauge installed, where students can measure and record the amount of rain that falls each day. But scientists do not measure precipitation on the ground – they measure precipitation from space, using a combination of active and passive remote-sensing techniques, improving the spatial and temporal coverage of precipitation observations on a global scale. You see, reliable ground-based precipitation measurements are difficult to obtain because most of the world is covered by water, and many countries do not have precise rain measuring equipment (such as rain gauges and radar). Precipitation is also difficult to measure because precipitation systems can be somewhat random and can evolve very rapidly. During a storm, precipitation amounts can vary greatly over a very small area and over a short time span.

There are two important satellites to be familiar with when it comes to measuring precipitation from space. The first one was a joint mission between NASA and the National Space Development Agency of Japan called The Tropical Rainfall Measuring Mission, or TRMM, spelled TRMM. TRMM was launched in 1997 with a primary mission of measuring tropical and subtropical rainfall, and was the only satellite of its time to carry weather radar. TRMM was only supposed to last for three years, but it exceeded expectations by collecting 17 years of rainfall data, creating a benchmark for rainfall climatology which is used to test, compare and improve global climate models. Unfortunately, the fuel source was eventually depleted, and the spacecraft re-entered the Earth’s atmosphere and mostly burned up in 2015.

Although we have lost TRMM, we are excited to have The Global Precipitation Measurement mission, or GPM. Run by a consortium of international space agencies and launched in 2014, GPM is an international network of satellites that provide the next-generation of global observations of rain and snow. Not only will there be improved measurements of precipitation globally, but we will be able to advance our understanding of Earth’s water and energy cycle, improve forecasting of extreme events that cause natural hazards and disasters, and extend current capabilities in using accurate and timely information of precipitation to directly benefit society. It is impressive that the GPM spacecraft, along with existing and future satellites, will map global rainfall and snowfall every three hours!

To summarize, measuring precipitation from space is important for scientists, as visible and infrared space-borne sensors can provide precipitation information inferred from cloud-top radiation, and microwave sensors provide direct precipitation measurement based on radiative signatures of precipitating particles. This type of information is not available through ground-based measuring systems. And that is how scientists measure rainfall.

*(This audio file was recorded by Laura Guertin on July 21, 2015)*