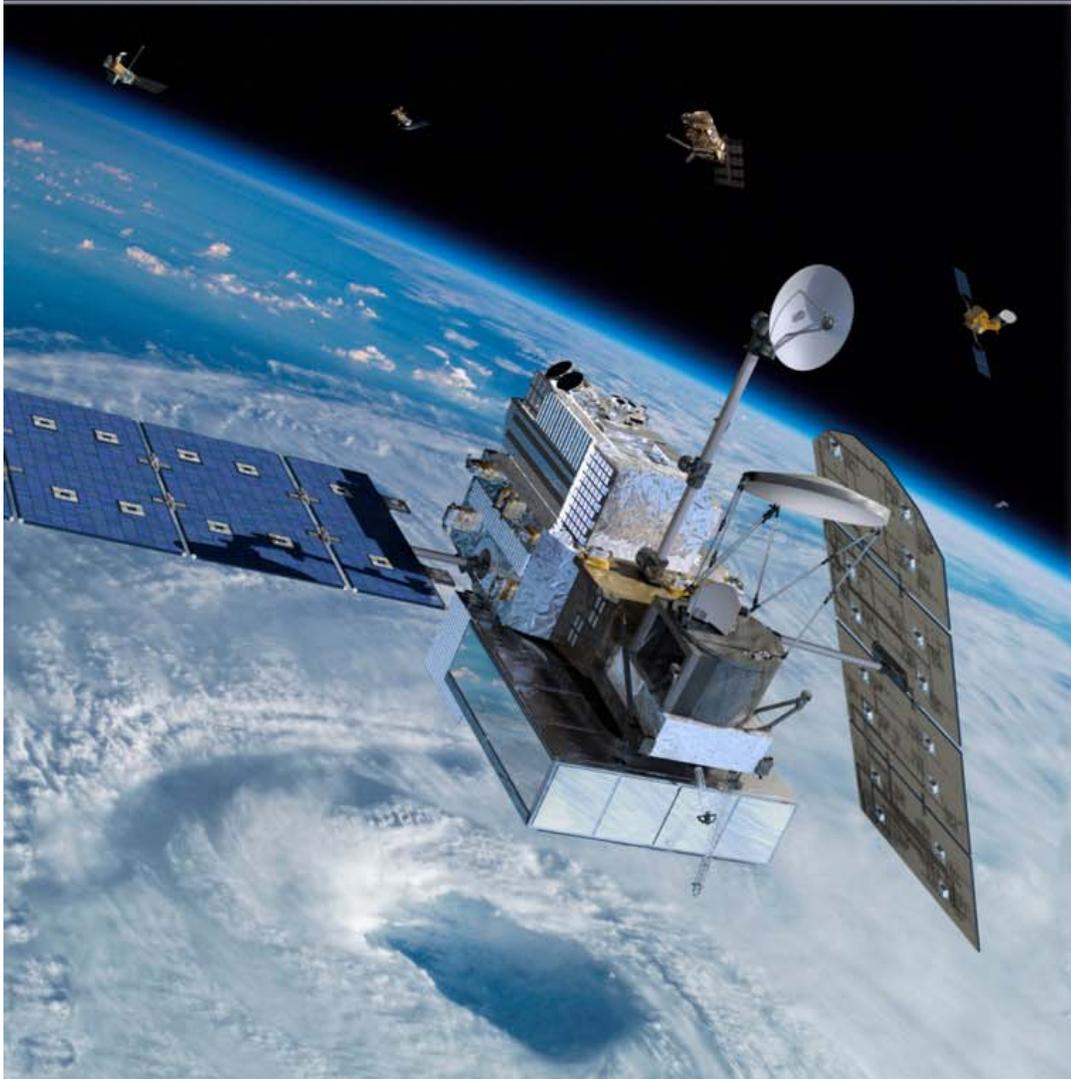




The Rain to Climate Connection: Exploring Earth's Water Cycle with the Global Precipitation Measurement (GPM) Mission



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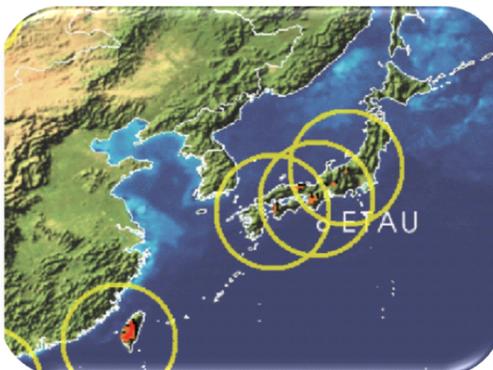
The Freshwater Connection



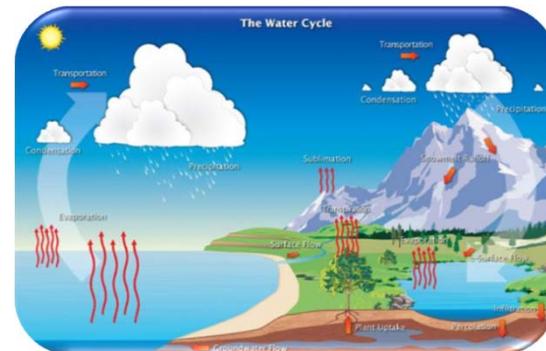
Flooding



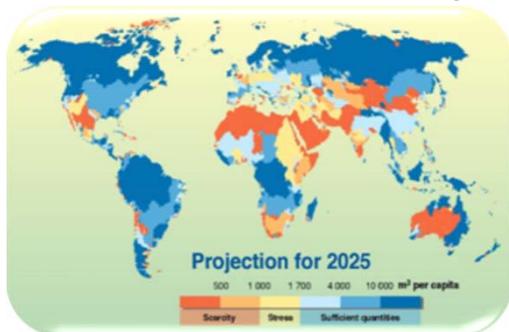
Landslides



Land surface and climate modeling



Freshwater Availability

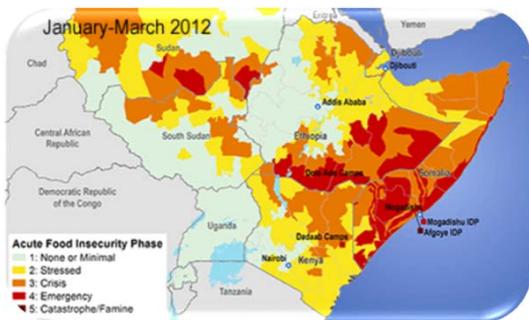


The rain and snow data gathered from the TRMM and GPM missions already provide and will extend our capabilities to study a wide range of applications for scientific research and societal benefit.

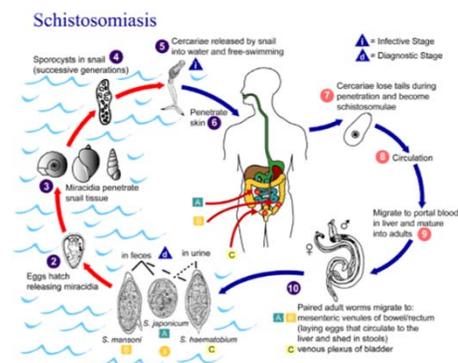
Extreme Events



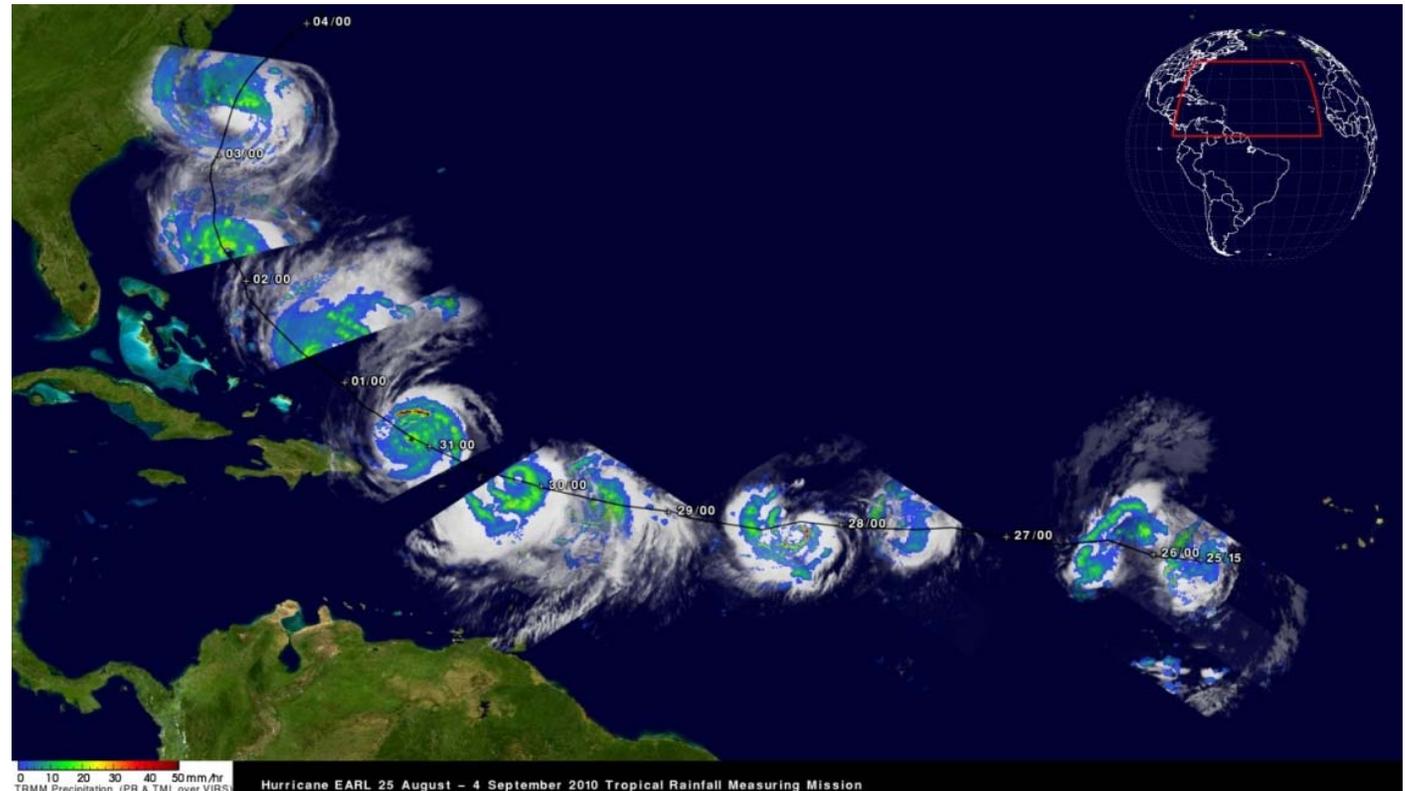
Agriculture/Famine Early Warning



World Health



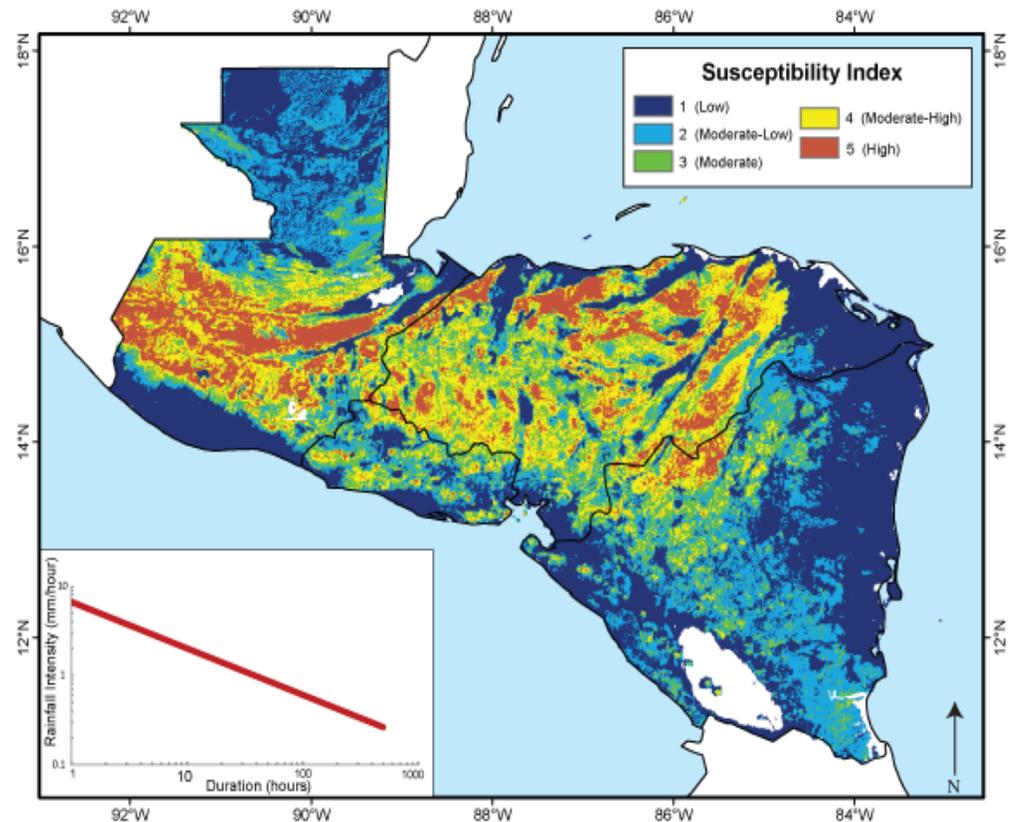
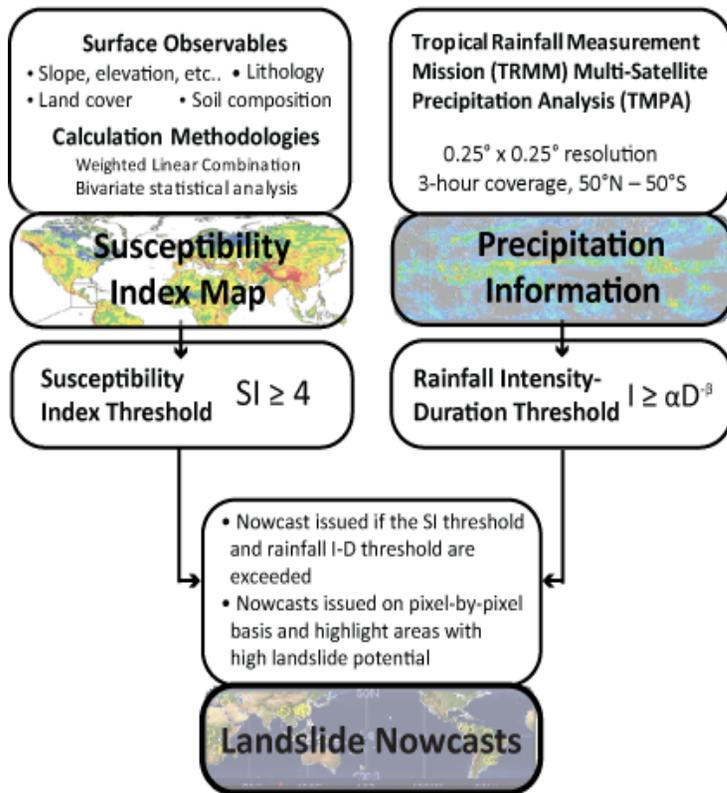
GPM's orbit will enable observation of tropical cyclones as they progress from tropical to mid-latitude systems



TRMM data are used by many tropical cyclone forecasting centers worldwide to detect the location and intensity of tropical cyclones. In 2004, more than 600 tropical cyclone fixes were made using TRMM.

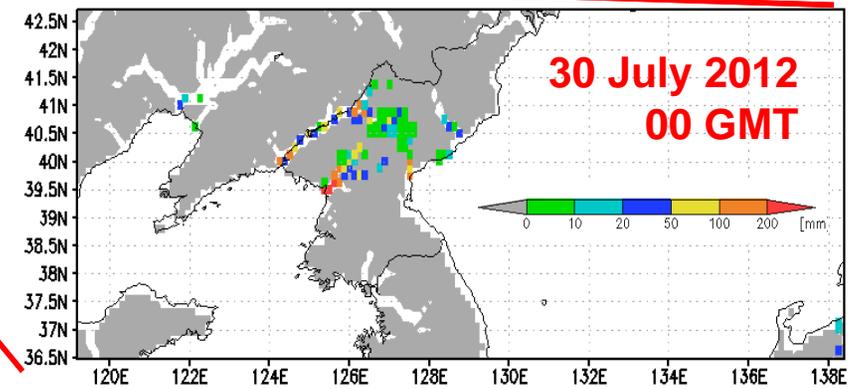
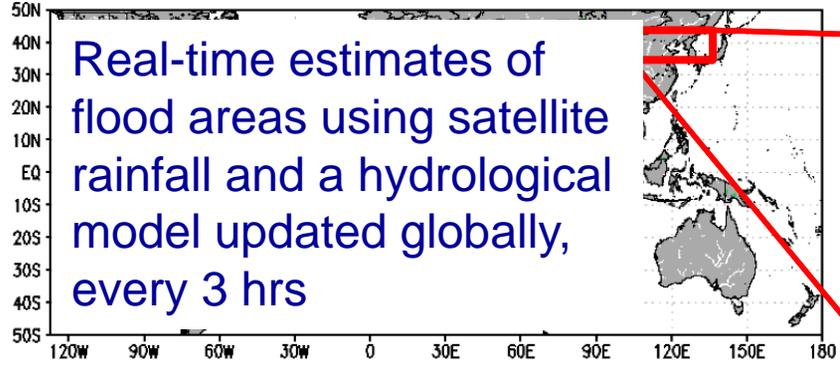
GPM will provide rain accumulation and distribution data at high resolution to advance predictions of high-impact natural hazard events

Landslide Hazard Forecasting

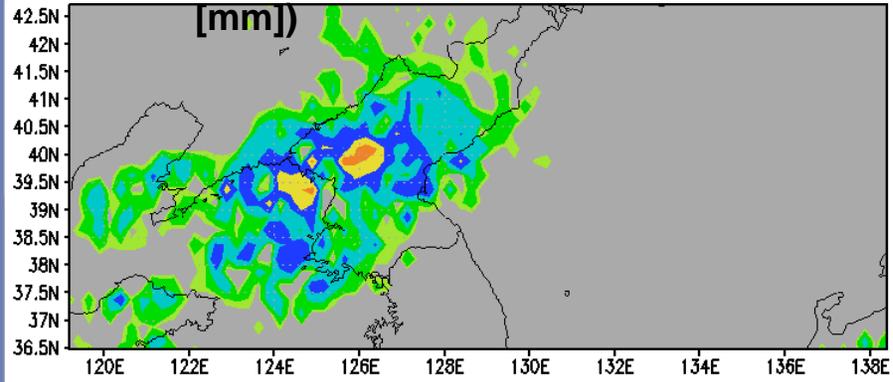


Flood Detection/Intensity (Depth above Threshold [mm])

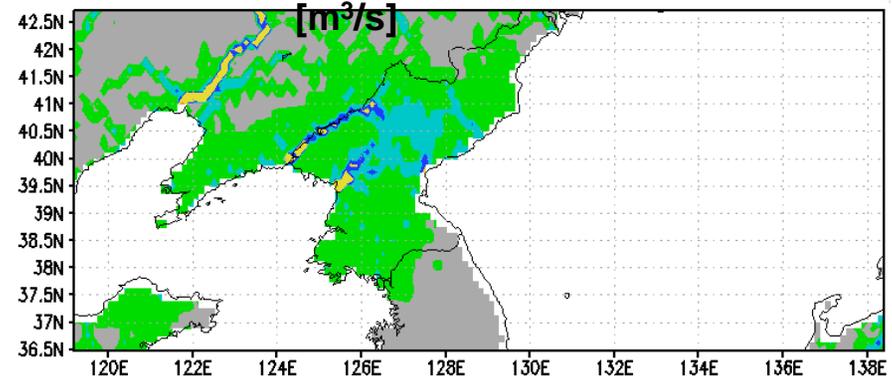
Example: Detection of Flooding over North Korea



Rainfall (1 day Accumulation [mm])



Streamflow [m³/s]



The multi-decadal, continuous record that TRMM and GPM will provide will be invaluable for improving modeling of short and long-term fluctuations in climate and the water cycle

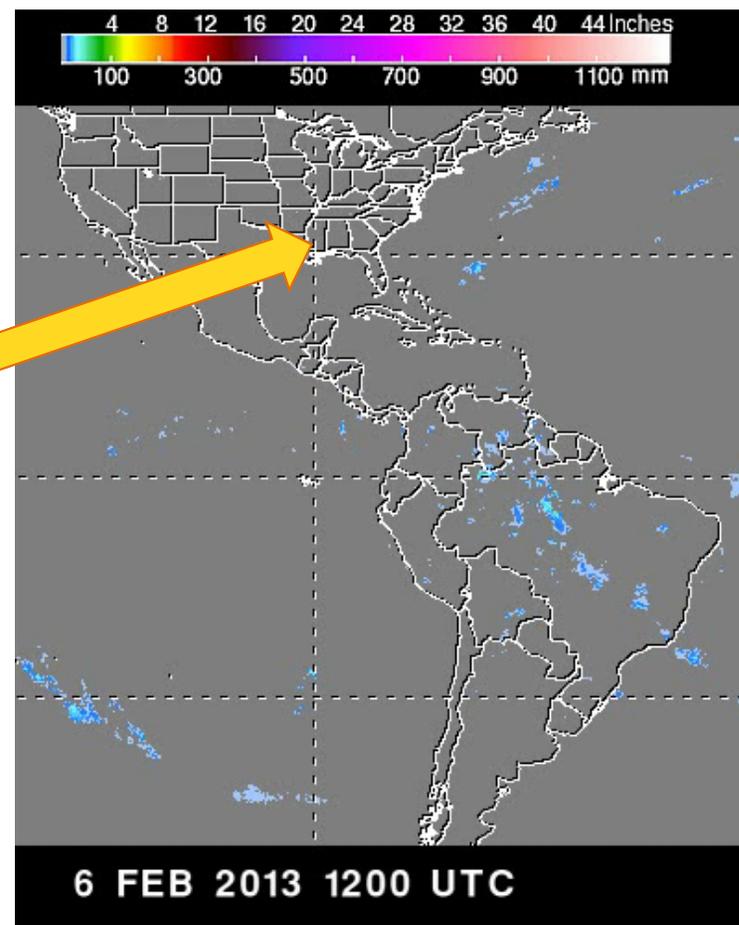
Heavy rain, flooding continues across portions of Mississippi for a third day

FLOOD WATCH | FEBRUARY 12, 2013 | BY: JOHNNY KELLY | + [Subscribe](#)

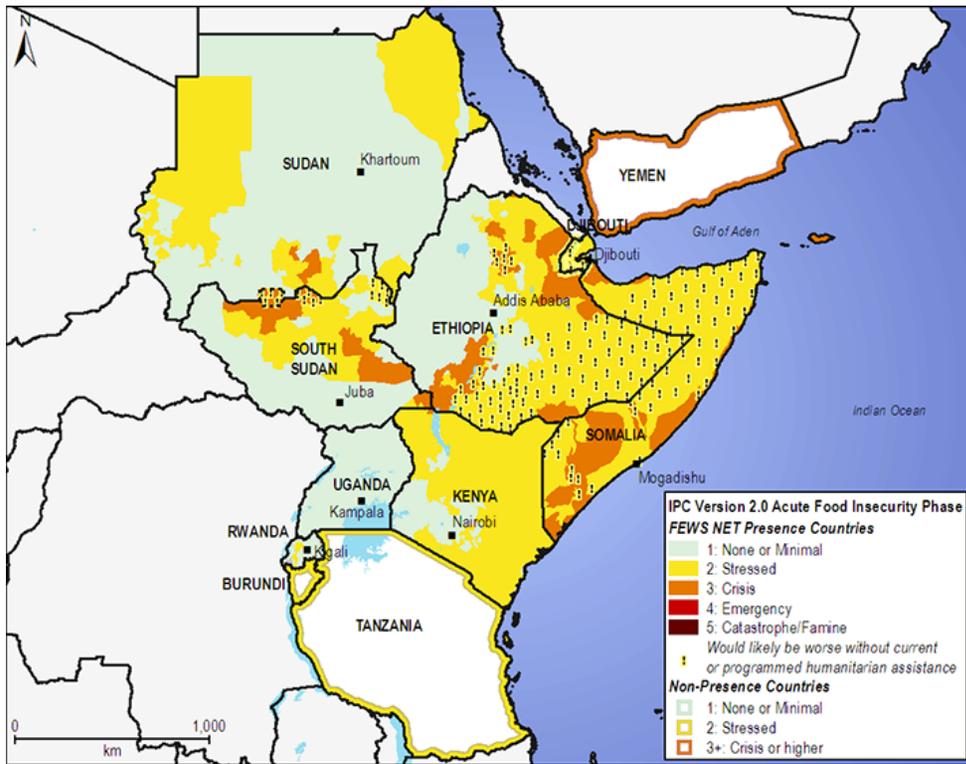


@STORMCHASER4850

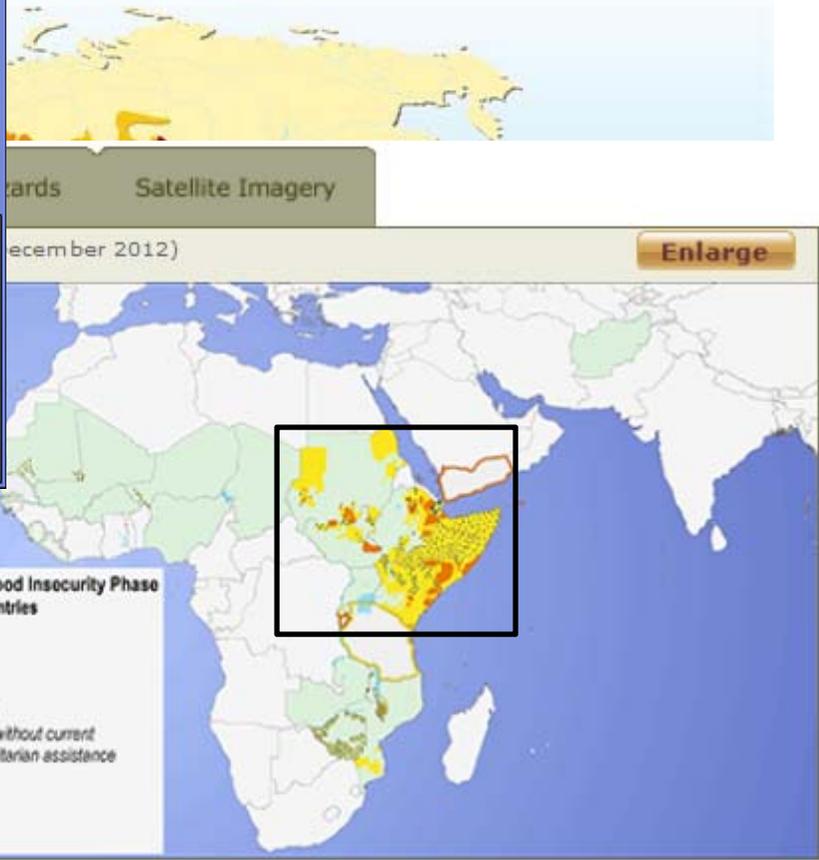
<http://www.examiner.com/article/heavy-rain-flooding-continues-across-portions-of-mississippi-for-a-third-day>



Rainfall accumulation for NWP



Accurate satellite precipitation estimates are critical to crop forecasts. Famine Earth Warning System (FEWS) relies on TRMM and other satellite estimates for



<http://www.fews.net>

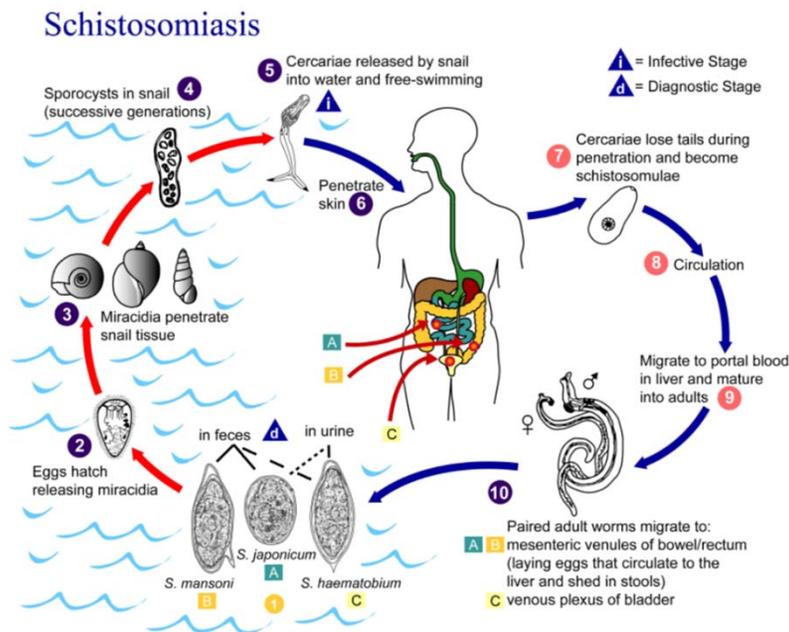
- The agricultural community **needs to know the timing and amount of rain or snow to forecast crop yields** as well as any freshwater shortages that might affect irrigation and production.
- The U.S. Department of Agriculture (USDA) is collaborating with NASA and the USDA Foreign Agricultural Service (FAS) to **use satellites to monitor agriculture worldwide.**
- **GPM** global precipitation estimates over land **will help to improve** the U.S. Air Force Weather Agency's AGRicultural METeorology (AGRMET) model and others, which evaluate and forecast rain and snow estimates to use within hydrologic models.

Sierra Nevada Mountains



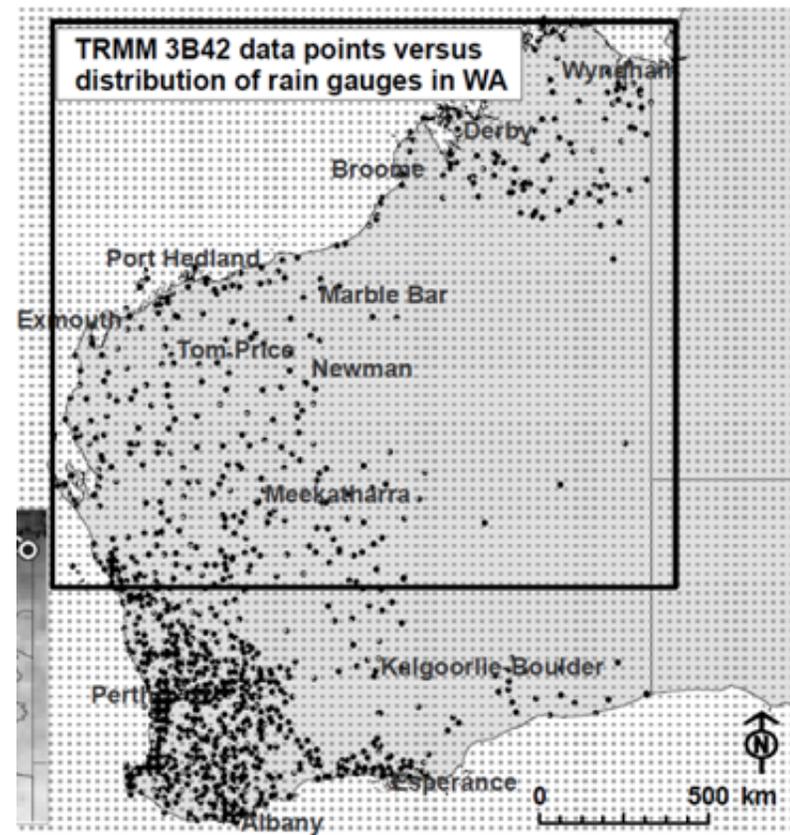
65 percent of California's water supply comes from the Sierra Nevada mountains' snowpack. Winter rain and snow replenish rivers and groundwater for the year.

TRMM data has been used to estimate and trace the source areas of vector and river-borne diseases in Africa and Western Australia. Examples include Schistosomiasis (snail-spread) in Ethiopia and Murray Valley Encephalitis virus (vector borne)



Results indicate a 1-2 month lag between rainfall and patients exhibiting symptoms

Courtesy of Bitew and Gebremichael



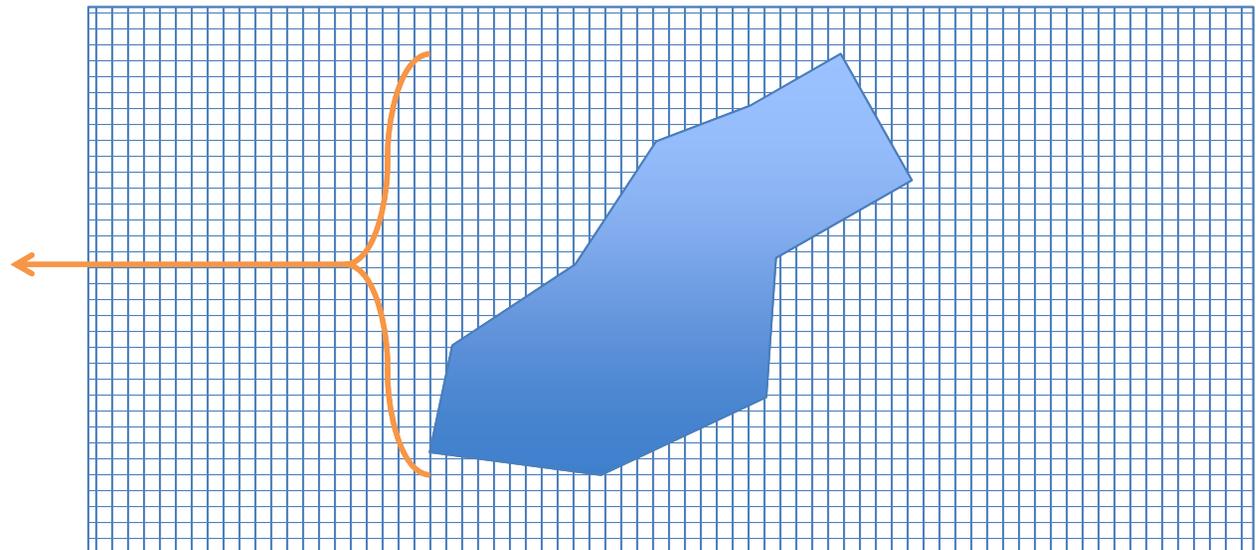
Schuster et al. (2011)

- **GPM Applications Workshop**
 - October 28-29th, 2013
 - Tentative location: NOAA Conference Center
- **Workshop objectives :**
 1. Update the Earth science and applications communities on GPM
 2. Provide an overview of current data applications for TRMM and potential applications for GPM across elements of the Applied Sciences Program
 3. Provide an opportunity for community feedback to NASA on data products, data access and other user needs
- The intended audience for this workshop is Earth observation data users and end users in the research and applications communities across all sectors – government, commercial, non-government organizations, and academia.

- **Data availability and access:** being able to easily get the data and know where to find it
- **Data interpretability:** gear product dissemination towards “non-expert” users
- **Data processing for other formats:** time series, polygon extraction and area analysis, etc.

Time series (area avg)

Yyyymmdd	mm/hr
19980101	10
19980102	6
19980103	.4
19980104	0
19980105	0
...	
20130401	2





- **Formal Education:**
 - Master Teachers: working with teachers to develop curriculum based on GPM themes
 - Outdoor Education: “Survivor Module” based on measuring water in different environments
- **Informal Education:**
 - Earth to Sky partnership: stipends to National Parks, Fish and Wildlife Centers, etc. to develop an activity for their park
 - Student Ambassadors: Working with college students to develop K-12 activities that can be used in a variety of venues
 - CoCoRaHS: citizen science rain and snow collection
- **Outreach:**
 - Science on a Sphere show, “Water Falls” premiering in October
 - Social Media, websites, Photo contests, Anime Character Challenge
 - Videos, feature stories, Google+ Hangouts, LEGO Model
 - Family Science Nights



GPM Anime Character Challenge



GPM and JAXA are holding a design challenge for people around the world to develop an Anime character for GPM. You will need to learn about the GPM mission and science themes and incorporate one or more of these themes into your Anime character design.

ANIME CHALLENGE

WE NEED **YOU** TO HELP US DESIGN AN ANIME CHARACTER FOR NASA'S

GLOBAL PRECIPITATION MEASUREMENT MISSION

GPM IS AN INTERNATIONAL SATELLITE MISSION THAT WILL USE MULTIPLE SATELLITES ORBITING EARTH TO COLLECT RAIN AND SNOW DATA WORLDWIDE EVERY THREE HOURS.

USE WHAT YOU LEARN ABOUT THE SCIENCE AND TECHNOLOGY OF MEASURING PRECIPITATION TO CREATE A CHARACTER THAT WILL HELP TELL GPM'S STORY IN FUTURE EDUCATIONAL MATERIALS. **SUBMISSIONS ACCEPTED FROM 2/25/13 - 4/30/13**

- WHAT DOES THE CHARACTER LOOK LIKE?
- DO THEY HAVE ANY SPECIAL POWERS OR ABILITIES?
- WHAT IS THEIR BACK STORY?
- ANY FRIENDS OR FOES? PETS OR SIDKICKS?
- HOW WILL THIS CHARACTER TEACH OTHERS ABOUT PRECIPITATION?

CONTEST RULES & ENTRY:

<http://pmm.nasa.gov/education/anime>

- The contest is going on **NOW** (2/25/2013 – 4/30/2013)
- Please see our website for more details pmm.nasa.gov/education/anime



- Follow us on Twitter: @NASA_Rain

- “Like” us on Facebook: <https://www.facebook.com/NASA.Rain>



- Check out the Precipitation Measurement Missions website: <http://pmm.nasa.gov>

- Browse our new Education Website: <http://pmm.nasa.gov/education>

Precipitation Education

Home | Current Activities | GPM Originals | Glossary & FAQ | GPM Mission

Water Cycle
The continuous movement of water on, above and below Earth's surface.

Weather & Climate
The atmospheric conditions that lead to our daily weather and global climate.

Technology
The spacecraft, instruments and people that study Earth systems.

Societal Applications
How studying our planet's rain and snowfall makes the world a better place.

Why Measure Rain and Snow?
Rain, snow, and other forms of precipitation affect every part of life on Earth. Rain falls on the crops we eat, fills the reservoirs of water we drink, and is an integral part of everyday weather and long term climate trends. This website, presented by NASA's Global Precipitation Measurement (GPM) mission, provides students and educators with resources to learn about Earth's water cycle, weather and climate, and the technology and societal applications of studying them.

Global Precipitation Measurement
GPM is an international satellite mission that will use multiple satellites orbiting Earth to collect rain, snow and other precipitation data worldwide every three hours. In 2014, NASA and the Japan Aerospace Exploration Agency (JAXA) will launch a Core Observatory satellite carrying advanced instruments that will improve upon today's precipitation-measuring capabilities and is designed to bring all the data from the partner satellites into a unified global dataset.

Learn More about GPM
See our Current Activities
Water Cycle Basics

Featured Resources
What We Don't Know about Snow - GCPEX



The End



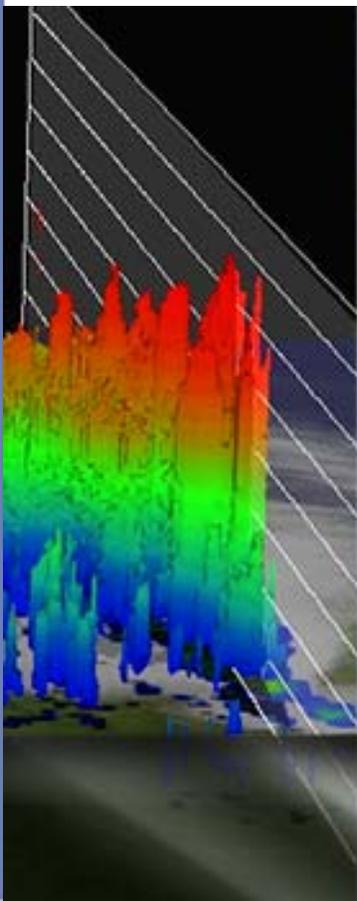
For more information on the TRMM and GPM Missions:

<http://gpm.nasa.gov>

www.nasa.gov/gpm

Twitter: NASA_Rain Facebook: NASA.Rain

GLOBAL PRECIPITATION MEASUREMENT



PMM Science