

Collocation of Environmental Satellite Precipitation Measurements using STK

Jun Park and W. Linwood Jones

Central Florida Remote Sensing Lab.

University of Central Florida, Orlando, FL



The Problem



- By its nature, precipitation is very transient and therefore difficult to observe by a satellite
- We desire to provide spatial and temporal collocation of multiple environmental (remote sensing) satellites with precipitation - very infrequent and unpredictable events
- Using STK, we developed a simple procedure to accomplish this objective



Satellite # 1 QuikSCAT



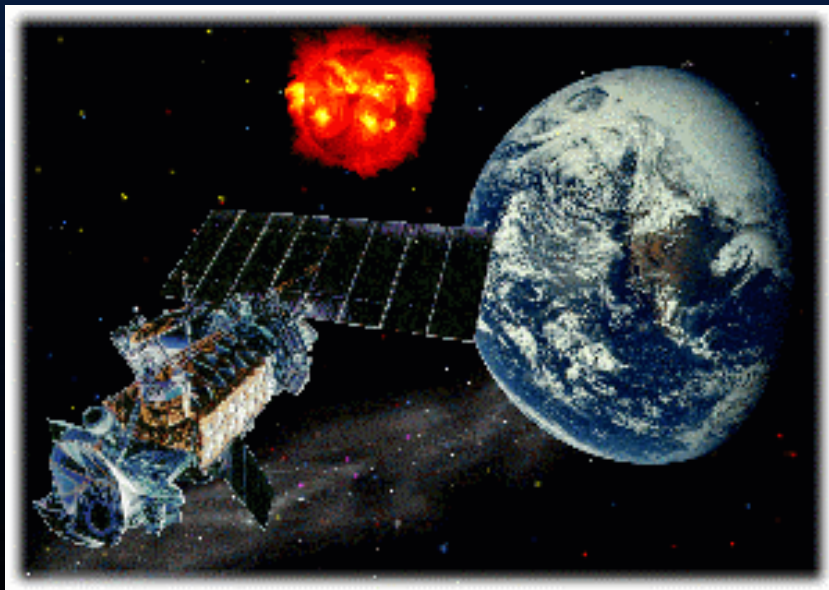
- Launched June 1999
- *Sun-synchronous near-polar orbit*
 - *Altitude: 803 km*
 - *Inclination: 98.6°*
 - 0705 am ascending node
- *Science instrument: QScat Radiometer (QRad)*
 - 1800 km swath

Satellite # 2 Tropical Rainfall Measuring Mission (TRMM)



- Launched November 1997
- Low Earth Orbit
 - Altitude 350 km
 - Inclination: 35°
 - Variable ascending node time
- *Science instrument:* TRMM Microwave Imager (TMI)
 - 800 Km swath

Satellite # 3 Defense Meteorological Satellite Program



- Three DMSP satellites
- Sun-synchronous near-polar orbit
 - Altitude: 830 km
 - Inclination of 98.8°
 - Ascending node times:
 - 0124 am
 - 2205 pm
 - 2338 pm
- *Science instrument: Special Sensor Microwave Imager (SSMI)*
 - 1200 km swath

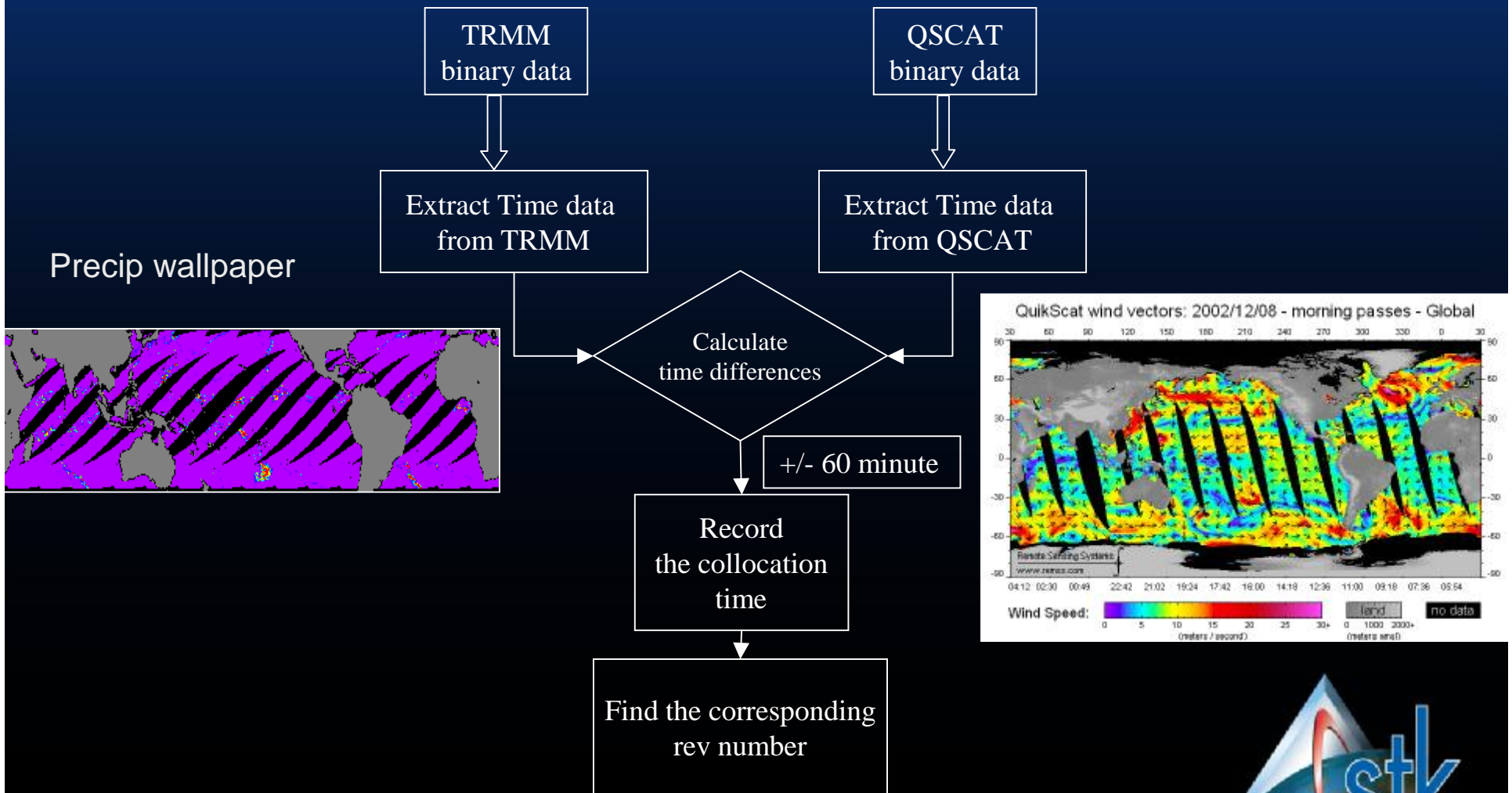
Satellite Collocation using STK



- For ocean precipitation, requirement to collocate multiple remote sensing satellites:
 - 0.25° Lat/Long grid
 - ± 1 hr time-window
- A procedure developed using STK to easily find the collocation cases
- STK scenario created for this collocation finder and exported the data to MATLAB



Collocation Algorithm for TRMM/QSCAT



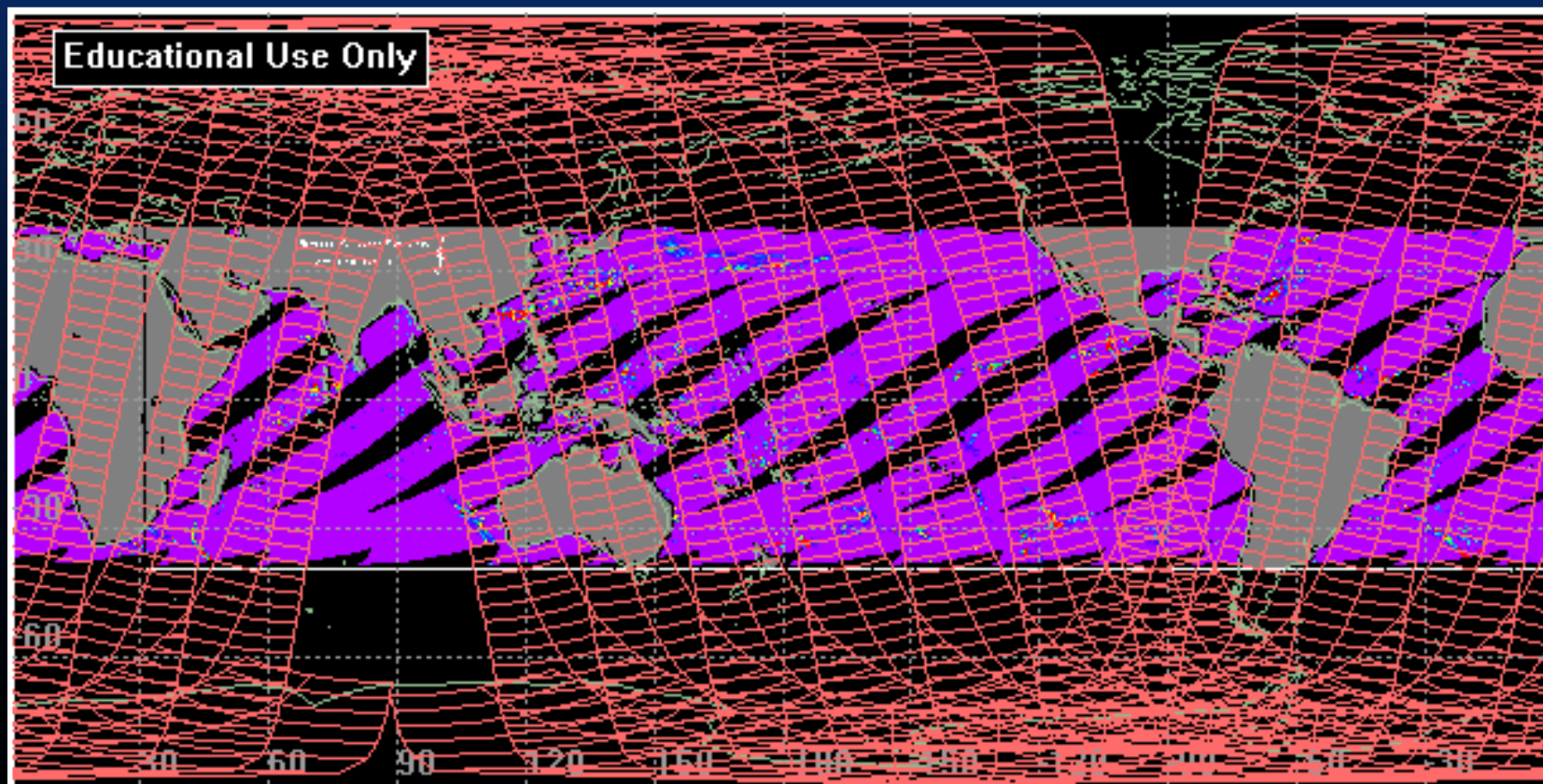
Benefits using STK



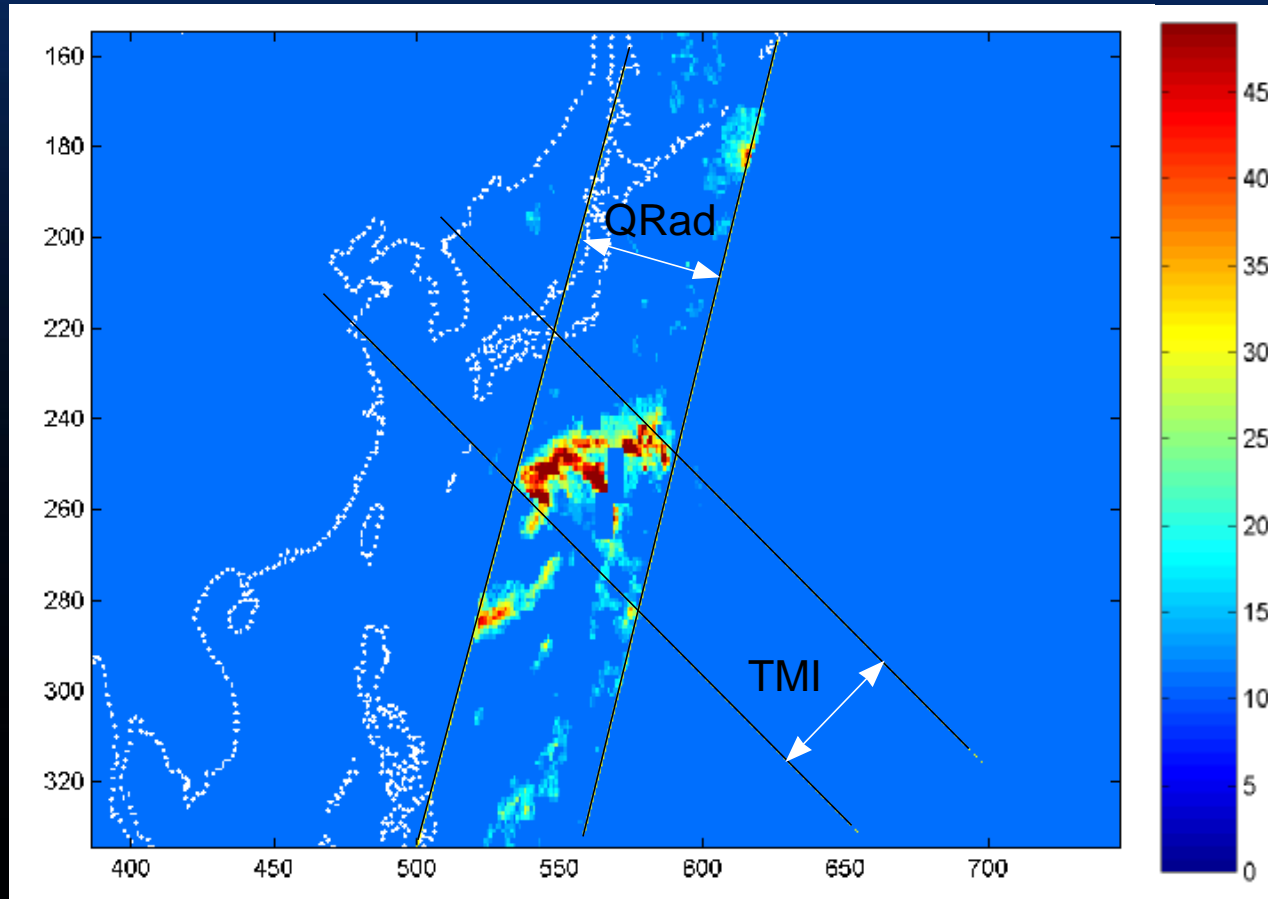
- Ability to use daily precipitation images from TRMM as wallpaper in STK window
- Ability to display QScat ground swath and easily locate common areas and corresponding pass times for each satellite
- Ability to export collocation data to MATLAB for processing



Example of TRMM/QSCAT



Instantaneous Rain Rates Comparison



Rain
Rate,
Mm/hr

Conclusions



- STK expedited the collocation of transient precipitation events over oceans with two or three remote sensing satellites for scientific study
- The use of STK significantly increased productivity and reduced manual labor-intensive analysis



Acknowledgement



- Thanks to AGI for support in the Educational Alliance Program
 - STK software for electrical engineering under-grad and graduate courses:
 - Satellite Communications
 - Radar Systems
 - Satellite Remote Sensing

Website: <http://www.engr.ucf.edu/centers/cfrsl/>

