

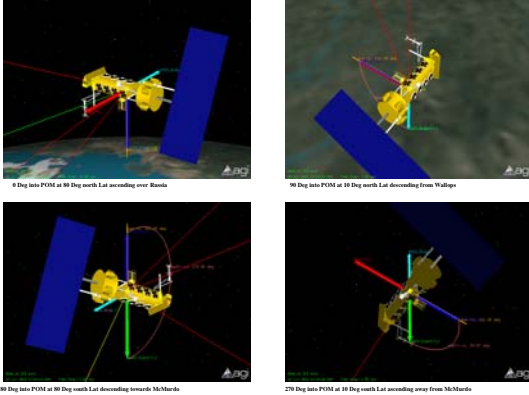
Serendipitous Characterization of the Microwave Sounding Unit during an Accidental Spacecraft Tumble

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Pitch Maneuver

This was a carefully planned event in which the normal forward pitching of the spacecraft was stopped for one orbit.

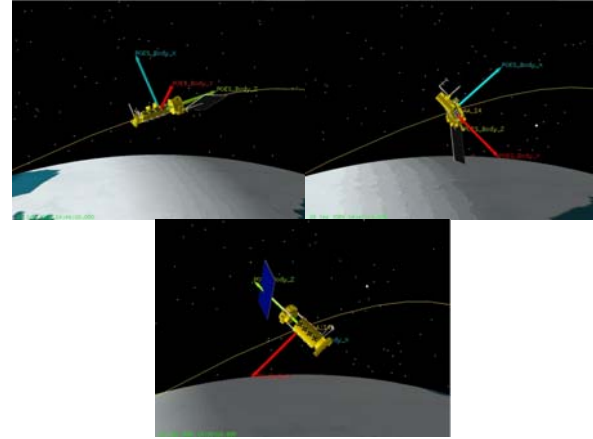


Conclusions

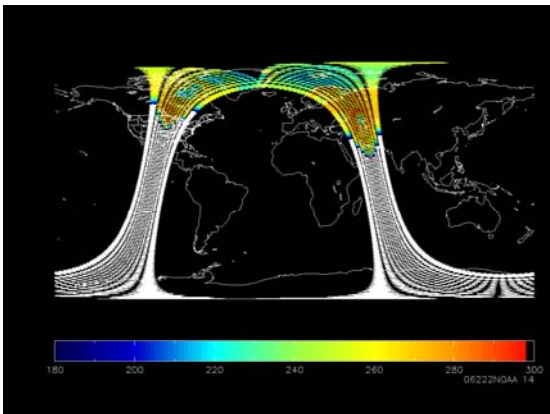
- The nominal earth scene viewing space records different brightness temperatures than the space calibration view.
- There is a marked asymmetry in the nominal earth scene, and the characteristics of the asymmetry differ for the two different polarizations (1&3V,2&4H)
- Position 1 difference from space reads higher values than position 2. This suggests that that side of the scan may be seeing part of the spacecraft or another instrument.
- Channel 2 difference from space look is sensing about 1-1/2 counts colder during the tumble than during the pitch. The other channels either have no change, or the difference from space look is positive (warmer).
- The absolute average of all scene positions is warmer during the tumble than during the pitch.

Tumble

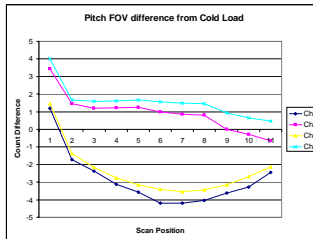
This was an unplanned event in which a thruster released hydrazine, causing the spacecraft to tumble



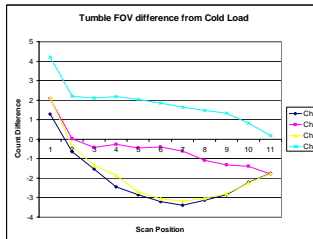
NOAA-14 at three discrete times during early phase of tumble.



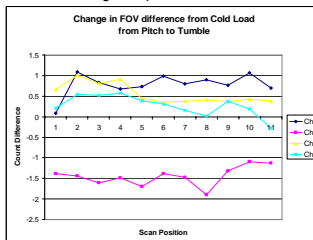
MSU brightness temperatures plotted on the earth during the pitch maneuver. The instruments lift off the earth on the descending node (left) and re-acquire the earth on the ascending node (right).



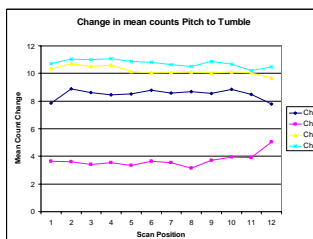
Average space looks minus average scene counts during the pitch maneuver.



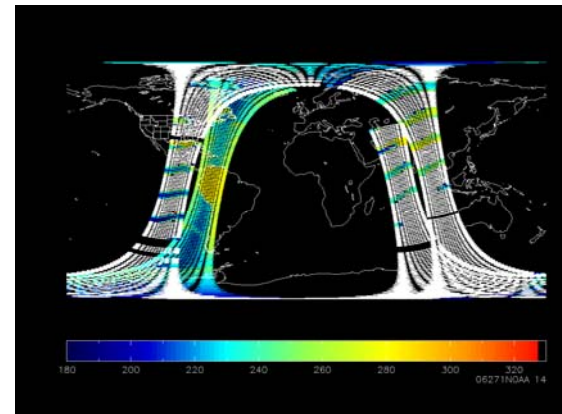
Average space looks minus average scene counts during the spacecraft tumble.



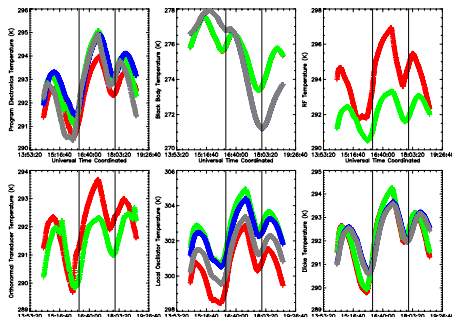
Change in average difference between scene and cold looks between pitch and tumble.



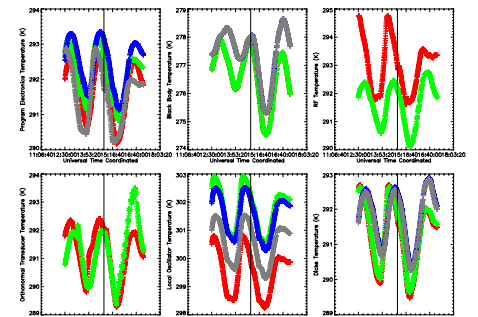
Change in average scene and space look counts between pitch and tumble.



MSU brightness temperatures plotted on the earth during the tumble event. The instrument is on the earth during the first descending node (inside, left). The tumble event began over South America. The instrument periodically viewed the earth (colored bands within the white fields).



MSU temperature telemetry for the orbit before, during and after the pitch maneuver. The vertical lines denote the orbit of the maneuver. The instrument temperatures during the maneuver were not greatly different than before and after the maneuver.



MSU temperature telemetry for the orbit before the tumble event, and during the tumble until the instrument was turned off. The vertical line indicated when the tumble began. The instrument temperatures during the tumble were not greatly different than before the tumble.

Acknowledgements
 The STK spacecraft depictions were provided by the NOAA Office of Satellite Operations POES Engineering Branch.