High performance animation of GOES weather images

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ABSTRACT

Geostationary orbit provides a wonderful viewpoint for collecting movies of meteorological processes. Because GOES-8 images are large and frequent, high-performance workstations and user-friendly software are required to review the current pools of GOES weather imagery at full resolution.

During the post-launch checkouts, the GOES-8 and GOES-9 satellites were exercised in rapid-scan imaging modes that challenge most display systems. At NASA-GSFC, the Interactive Imaging Spread Sheet (IISS) software/hardware was used to roam and zoom through gigabytes of GOES image data collected in 1994-95. We use the IISS to examine exciting meteorological features within the hurricanes of 1995 and during typical episodes of severe weather that occur somewhere over the United States every day.

The IISS demonstration shows how weather forecasters could make good use of the full resolution and depth of GOES-8 imagery, adapting to the meteorological event as it develops, especially when synchronized with corresponding weather radar.

Keywords: image, weather, animation, GOES

1. INTRODUCTION

At NASA-GSFC, the Interactive Imaging Spread Sheet (IISS)[1] software/hardware tool is heavily used for examination of GOES-8 and GOES-9 data during post-launch checkouts. The IISS is able to pan and zoom through 400 Mbytes of in-core images, loading a megapixel of full color images to the monitor and to S-video output at video rates (30 frames per second). Not only single frames can be roamed, zoomed and animated, but different channels in separate cells can be grouped together and examined in a coordinated, interactive session. For full use of the 10-bit precision in the GOES Imager data, the IISS software was enhanced to operate on 16-bit integers.

Because animations cannot be printed, this manuscript will just present a few still examples of the animations presented at the conference. Miniaturized versions of some animations are available on the Internet[2] as Quicktime and/or MPEG movies.

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2. IISS EXAMPLE

Figure 1 shows a GOES session on the IISS, simultaneously probing the relative values of GOES-8 and GOES-9 pictures of Hurricane Luis in side-by-side stereo, and top-to-bottom zooms.

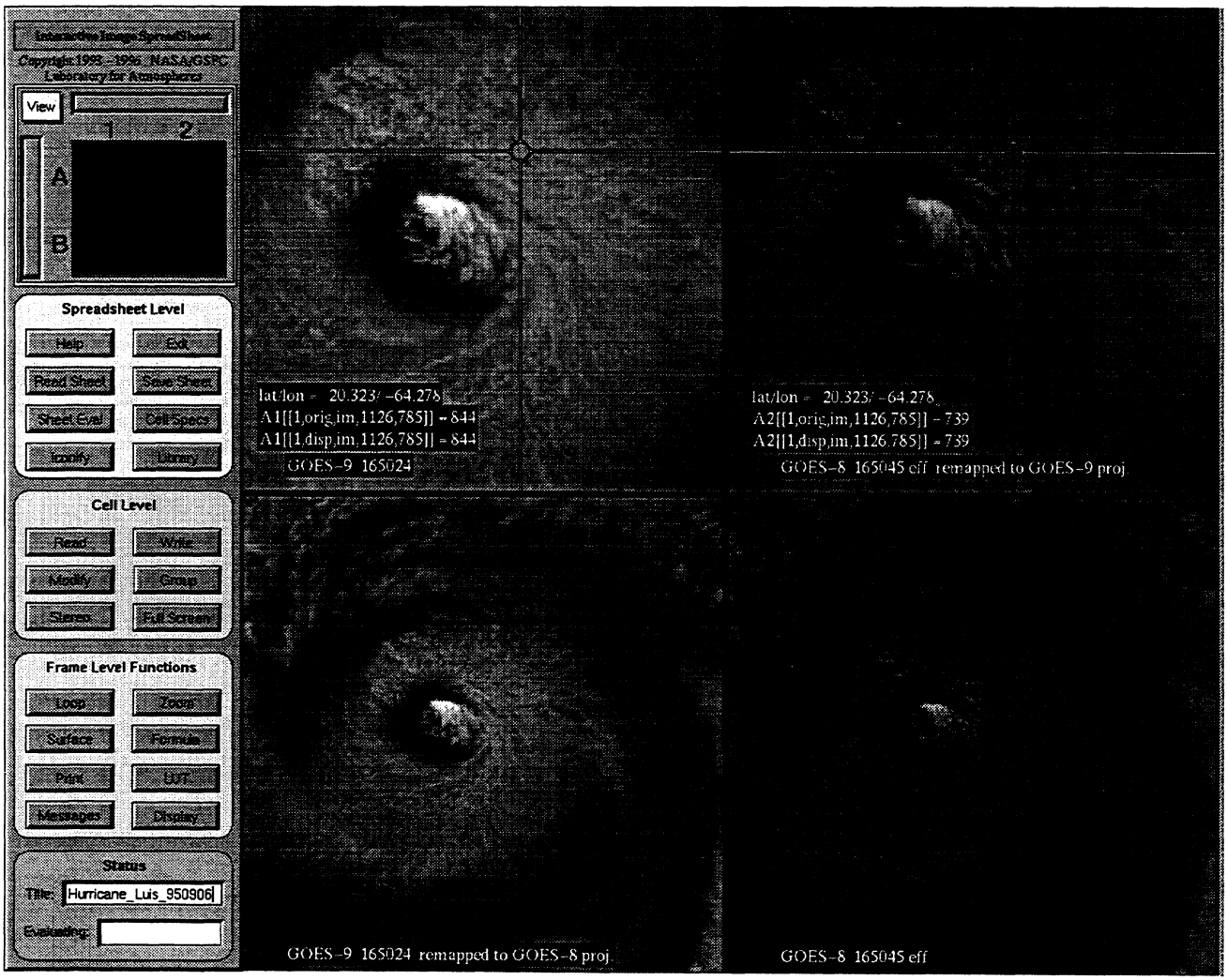

Figure 1: The IISS being used to examine simultaneous views of a hurricane.

3. ANIMATION EXAMPLE

Figure 2 shows a close-up view of southern Florida during a day of 1-minute interval imagery over the southeastern United States during a GOES-9 performance test by NASA. The IISS was used to roam and zoom across a field of 3000x2000 pixels, finding many other storms of local interest. Such interactive power and flexibility is readily available with today's workstations.

Figure 2: One frame from an animation of 1-minute interval GOES-9 scans over Florida.

In order to make these animations as smooth and pleasant as possible, bad scanlines were removed, and enhancements were applied that bring the dynamic range of the original GOES Imager data into the more limited human bandwidth[1] .

4. SUMMARY

High performance animation of large volumes of high precision GOES images is now relatively easy and affordable using modern hardware and software packages like the Interactive Imaging Spread Sheet (IISS). The IISS was useful in discovering and displaying the progress in GOES Image Navigation and Registration (INR) during the post-launch checkouts. During the very busy 1995 hurricane season, the IISS was used to animate each day's activity and pipe the animations directly to NASA Select TV, where they were occasionally picked up and used by the national TV broadcast networks.

NOAA's National Weather Service (NWS) field offices could be empowered with similar animation engines to combine imagery from two GOES satellites with digital radar and investigate it all interactively, as the weather develops.

5. ACKNOWLEDGMENTS

The IISS software was enhanced for GOES use by Mike Manyon. Hal Pierce was instrumental in processing the stereo images from GOES-8 and -9.

6. REFERENCES

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