



CSPP Geo GRB: GOES-R Rebroadcast Reconstruction for Everyone

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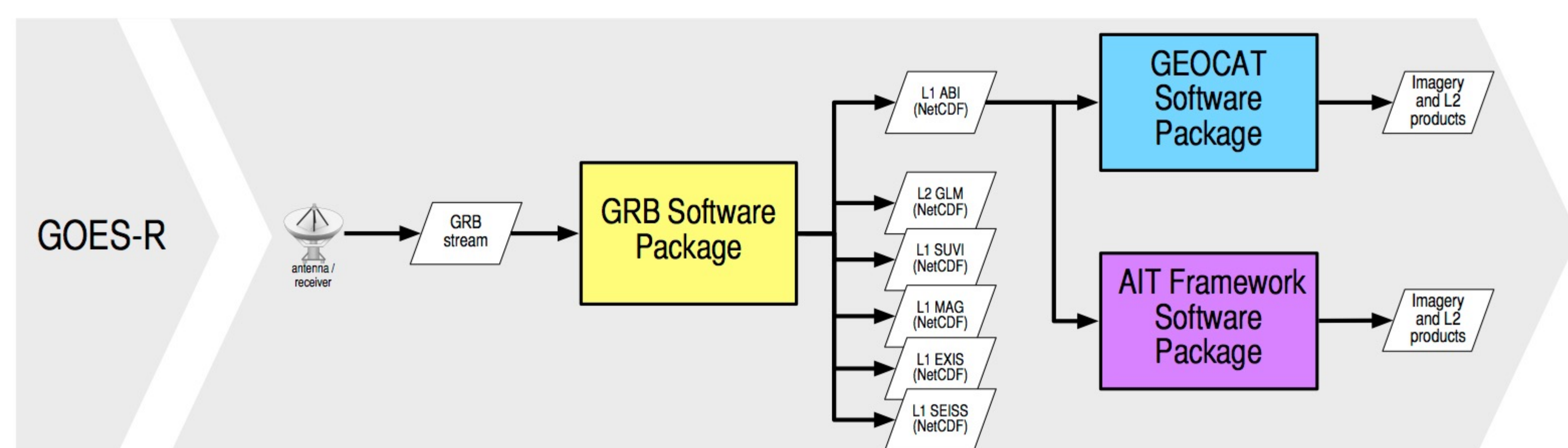
Abstract

GOES-R Rebroadcast (GRB) will provide the primary relay for full resolution, calibrated, near-real-time direct broadcast of imager, lightning mapper, space environment, and solar data captured aboard GOES-R. To support the direct broadcast community's use of GRB, the CSPP Geo team is developing and distributing CSPP Geo GRB: a free and open-source software package that can create easy-to-use NetCDF-4 and FITS files from the GRB stream.

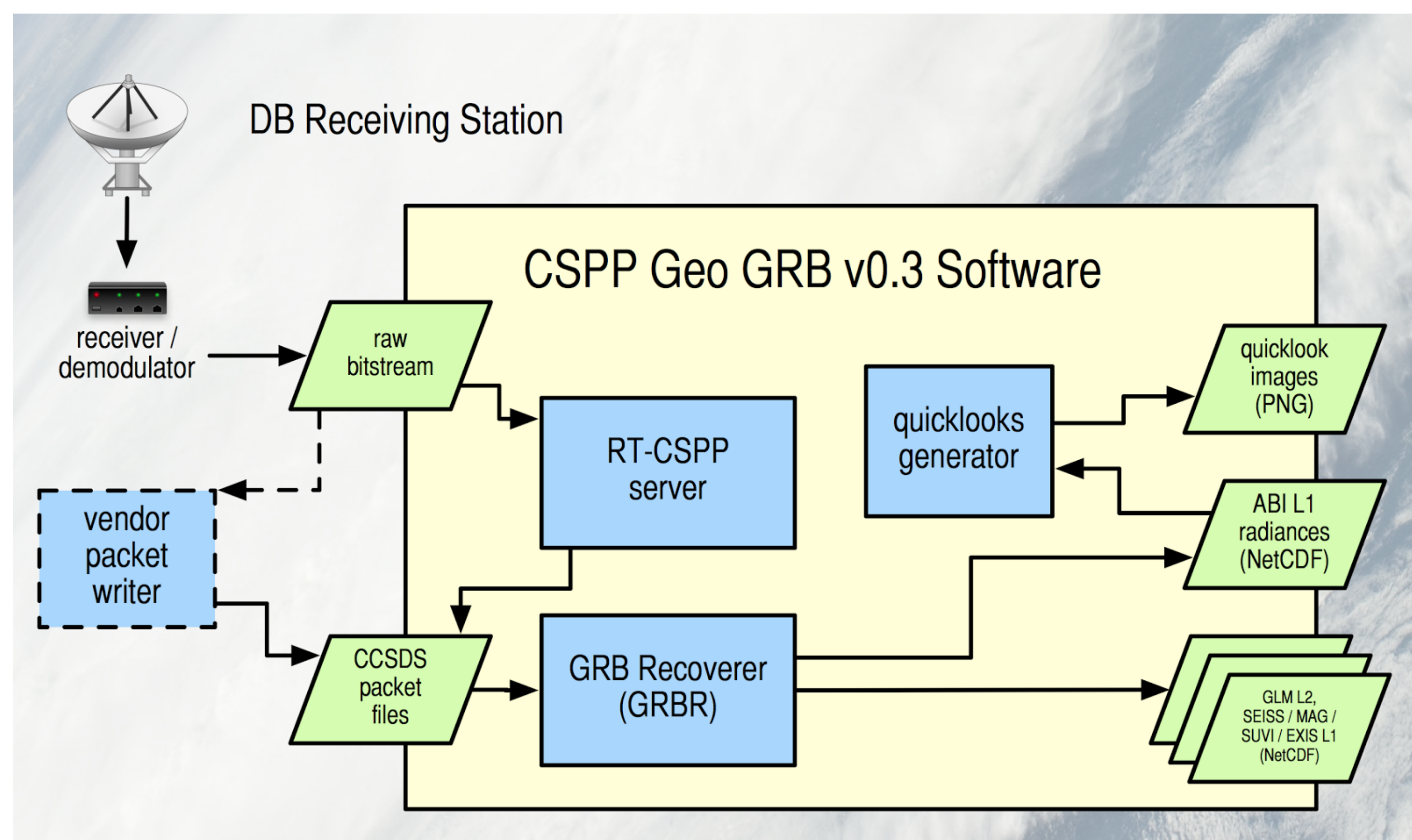
Why Direct Readout for GOES-R?

NOAA has said that Level 1B and Level 2+ data will also be available to users via the Internet. Users who do not have sufficient Internet bandwidth, or who are concerned about potential interruptions in Internet service, may prefer to receive data directly on an antenna via the GRB stream. The CSPP GEO software will also potentially offer newer versions of the operational product algorithms that include recent science improvements.

Where does CSPP Geo GRB fit?



Typically, CSPP Geo GRB runs as a daemon, receiving CADU-encapsulated CCSDS packets via UDP from a socket connection and creates Level 1b (or Level 2+, for GLM) NetCDF-4 files that can be used by downstream software. However, because of its modular design, the component pieces can be used in more advanced configurations to filter and save bundles of sorted CCSDS packets for later use, to reconstruct the data stream from similar bundles, or just to make quick images from GOES-R Level 1b data.



Component Breakdown

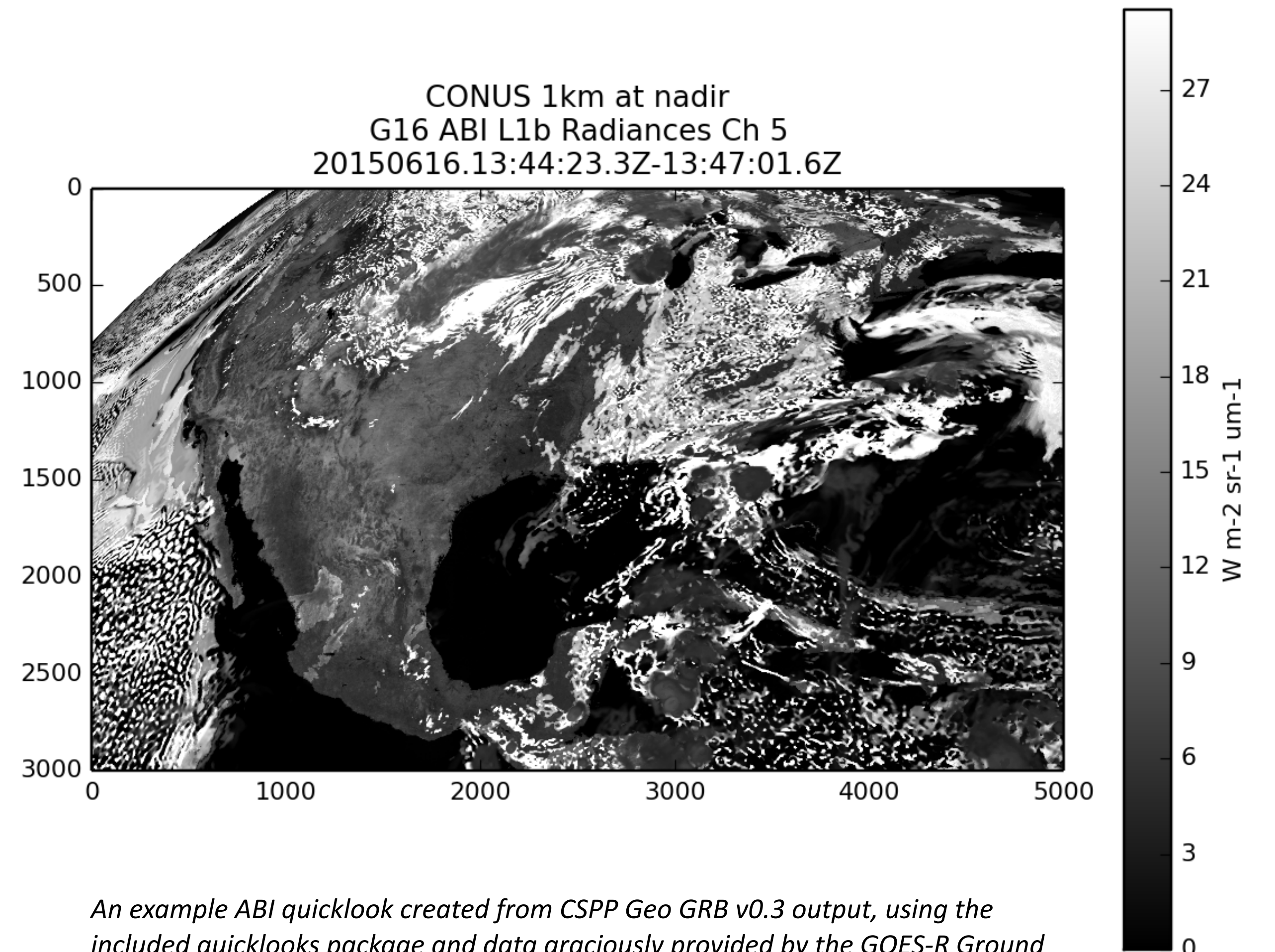
RT-CSPP is a modified version of RT-STPS, which is developed and maintained by the NASA Direct Readout Laboratory. We were well familiar with this software from previous work handling the data stream from other satellites, but GOES-R GRB comes with its own challenges due to the 31 Mb/s data rate and some quirks of its design. RT-CSPP includes GRB-specific support and configuration, and trims some unused features to improve performance.

GRB-R is new software developed by CSPP Geo to recover NetCDF files from CCSDS bundles like those produced by RT-CSPP. It dispatches incoming packets to individual dataset reconstructors, which parse the CCSDS headers, decompress the data payload, and ultimately write it all to NetCDF. For FITS enthusiasts, a NetCDF-to-FITS converter is also provided.

Quicklooks should be familiar to users of other CSPP packages. Using the produced Level 1b files, you can create PNG or GeoTIFF images for monitoring purposes or to spice up your poster for ITSC-20!

But wait there's more...

It's unreasonable to expect all of our users to receive and test a GRB Simulator before GOES-R launches, so we've developed scripts to mimic a GRB stream when provided with sample CCSDS bundles. These scripts filter the CCSDS packets into the correct polarization channels, recreate the CADU framing seen in the GRB stream, and send it all via UDP to two ports for CSPP Geo GRB to pick up. For release v0.3, we've included test data derived from output from a GOES-R Ground System Data Operations Exercise (DOE-1/2), including the ABI Triplet dataset produced by the GOES-R Proxy Team.



An example ABI quicklook created from CSPP Geo GRB v0.3 output, using the included quicklooks package and data graciously provided by the GOES-R Ground System Data Operations Exercise (DOE-1/2).

Status

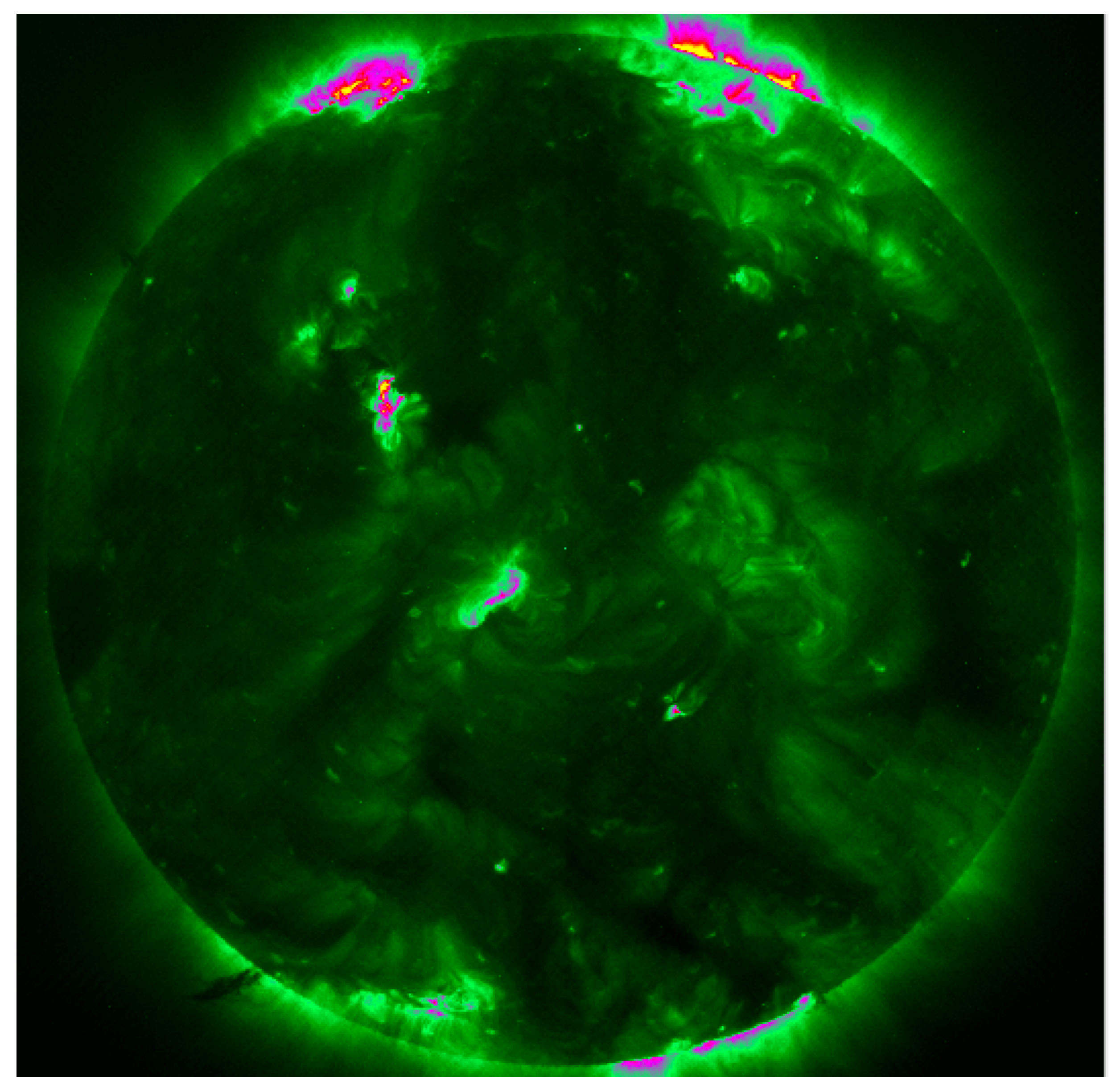
We've made steady progress with regular prototype releases, available for free on the CSPP Geo GRB website:

v0.1 released March 2015
v0.2 released June 2015
v0.3 released Oct 2015

For v1.0 the focus is on tuning performance, providing improved logging and monitoring capabilities, and responding to user feedback.

CSPP Geo GRB now supports all GOES-R instruments:

ABI	Advanced Baseline Imager
EXIS	Extreme Ultraviolet and X-ray Irradiance Sensors
GLM	Geostationary Lightning Mapper
MAG	GOES-R Magnetometer
SEISS	Space Environment In-Situ Suite
SUVI	Solar Ultraviolet Imager



An example SUVI image created from CSPP Geo GRB v0.3 output, using the Aladin Sky Atlas and data graciously provided by the GOES-R Ground System Data Operations Exercise (DOE-1/2).

For More Information

CSPP Geo: <http://cimss.ssec.wisc.edu/cspgeo/>
GOES-R GRB: <http://www.goes-r.gov/users/grb.html>

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