Suomi NPP VIIRS Imagery and the Grounding of the Oil Platform Kulluk in Alaska

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Introduction

The oil drilling platform Kulluk ran aground on the shore of Sitkalidak Island near Kodiak , Alaska (Figure 1) on New Years Eve, 2012 after a powerful storm in the Gulf of Alaska (Figure 2) and engine trouble with the tugs towing the Kulluk caused the platform to lose connection to its tugs and drift beginning December 28th.

Figure 1: The Kulluk aground on Sitkalidak Island, Alaska, December 31, 2012. (Photo credit U.S. Coast Guard)

During the storm which initially triggered the incident, and during subsequent efforts to free the Kulluk, imagery from the Suomi NPP's Visible Infrared Imaging Radiometer Suite (VIIRS) proved highly useful to the forecast staff at the National Weather Service forecast office in Anchorage.

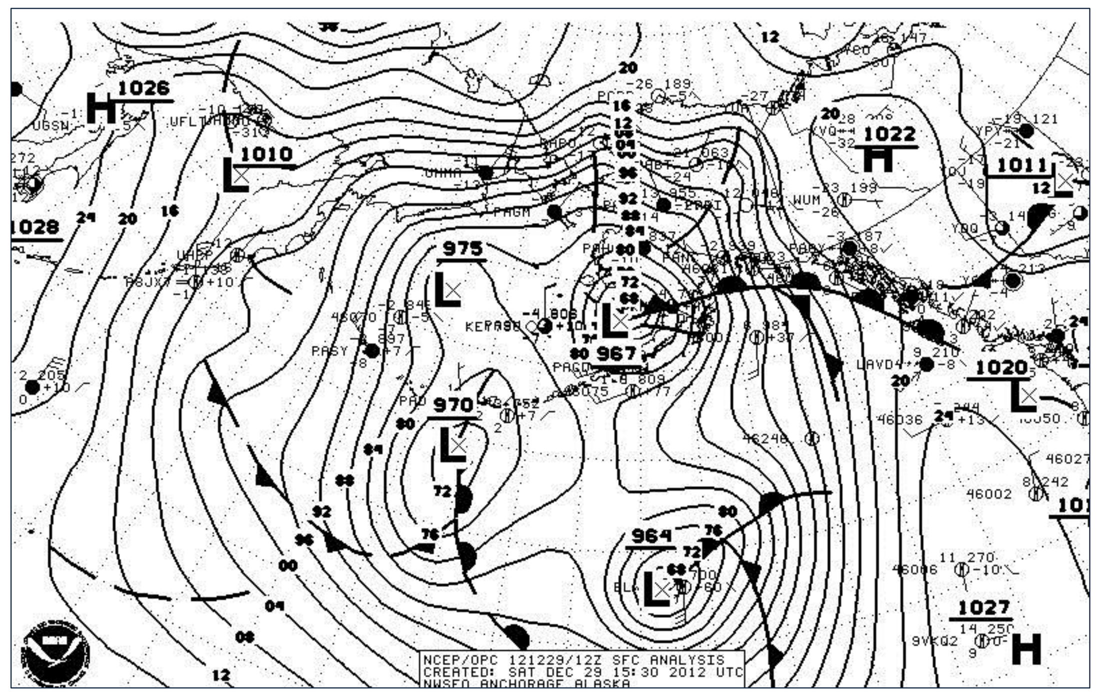

Figure 2: Sea level pressure analysis from National Weather Service Forecast Office in Anchorage during the Kulluk event, 1200UTC December 29, 2012.

Downloading, Processing, and Delivering Suomi NPP VIIRS Imagery to NOAA's National Weather Service in Alaska

As part of the High-Latitude Proving Ground, the Geographic Information Network of Alaska (GINA) at the University of Alaska Fairbanks receives data from the Suomi NPP satellite with an X-Band antenna via direct broadcast (DB). The data are then processed at GINA with the Community Satellite Processing Package (CSPP), with the resulting AWIPS-ready images delivered to the National Weather Service in Alaska via the Local Data Manager (Figure 3).

A principle advantage of the DB approach is the speed at which imagery can be delivered to the local NWS Forecast Offices in Alaska—there is no need to wait for the SNPP satellite to reach Svalbard and deliver its archive of accumulated passes during the global dump. GINA processes and delivers VIIRS imagery to the National Weather Service within 27 minutes of receiving an SNPP pass from the X-Band antenna.

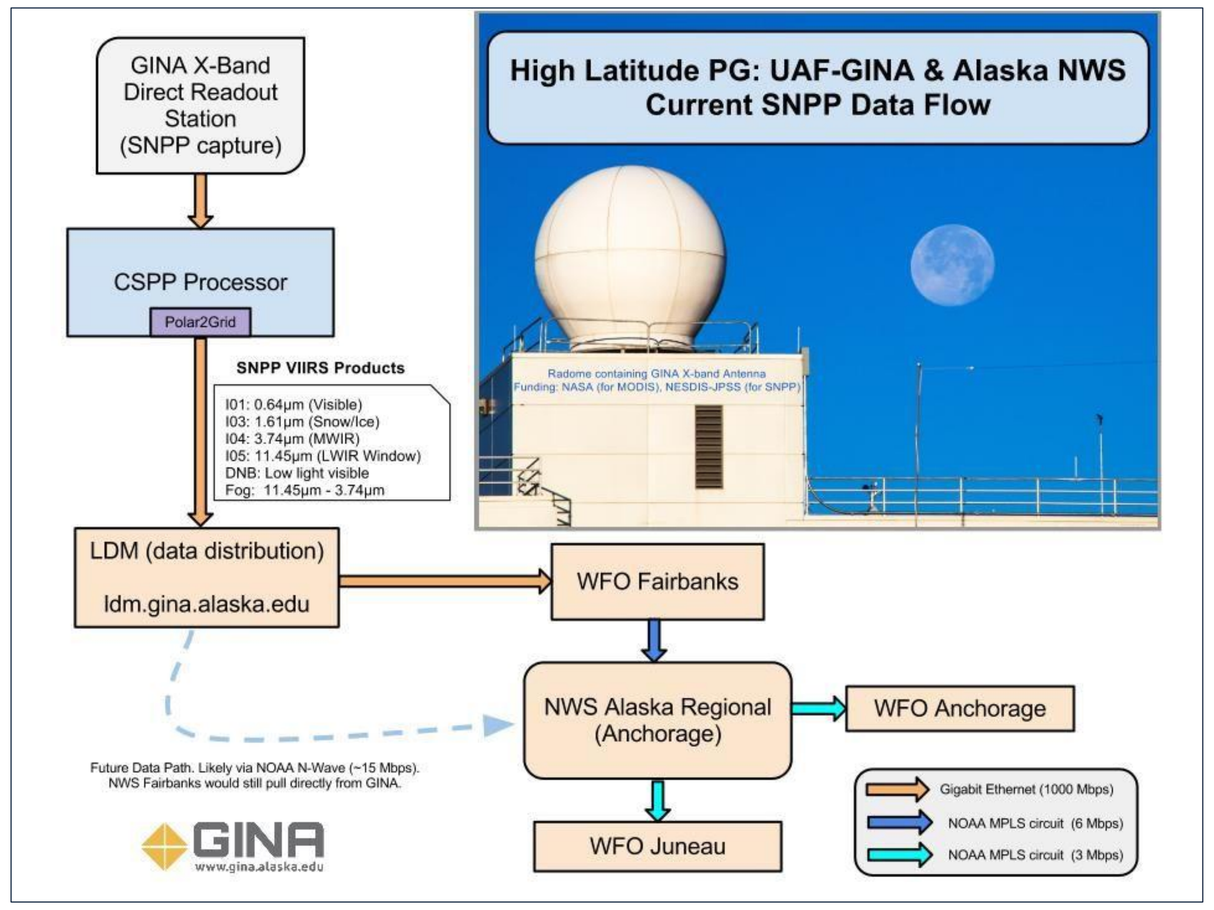

Figure 3: GINA's Direct Broadcast method to deliver imagery to the National Weather Service in Alaska

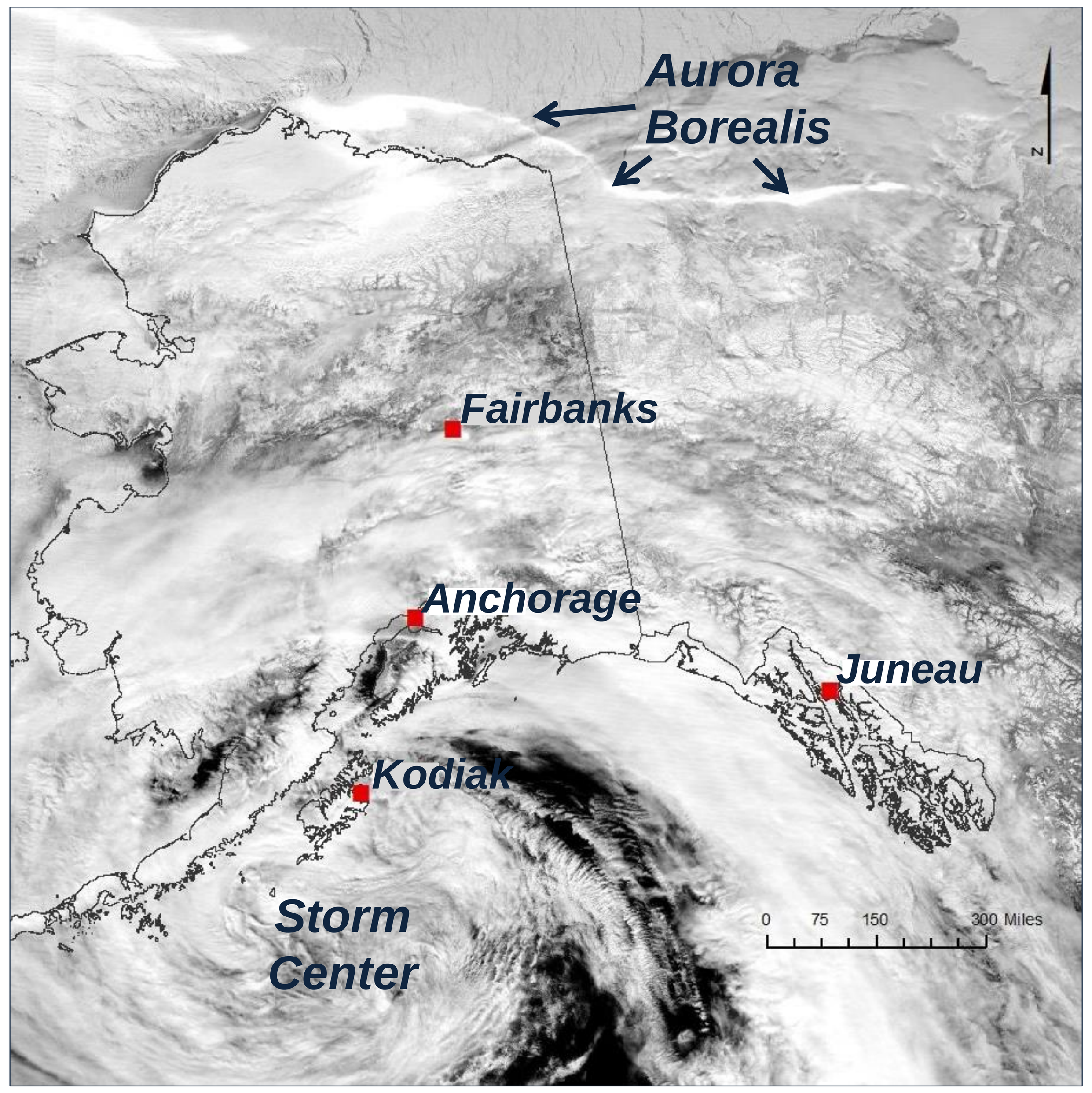

Figure 4: Suomi NPP VIIRS day-night band image downloaded by GINA 1141UTC Dec 30, 2012.

During the Kulluk event, the VIIRS day/night band was of particular interest to forecasters, as the situation developed during the darkest month of the Alaskan winter but fortunately within days of the full moon of December 28th, 2012.

In comparison to the Lower 48 states, Alaska, due to its high latitude, benefits from more hours of moonlight on winter nights as well as more frequent passes from polar-orbiting satellites, including the Suomi NPP.

During the Kulluk event, thanks to ample moonlight and the revolutionary sensitivity of the VIIRS instrument (*Lee, et. al, 2006*), National Weather Service forecasters benefitted from access to real-time visible satellite imagery in AWIPS at spatial resolutions of 1 km. This is a new capability, supporting hazardous weather response during the middle of the night just a week after the winter solstice in America's northernmost state.

The example shown in Figure 4 is from 3:41am, Alaska Standard Time, on December 30, 2012. The storm center is evident in the lower-left quadrant of the image. Also of note is the ribbon of aurora borealis crossing the top of the image.

Conclusions

The case of the Kulluk demonstrates how a new type of imagery, in this case the day-night band, from a newly-launched satellite can be integrated into NWS operations during a significant event.

This brief example highlights the utility of the day-night band in providing forecasters simulated visible imagery during the dark of the Alaskan winter when conventional visible imagery is in very short supply.

It is hoped that GINA and the NWS can build upon this precedent to deliver additional products from the Suomi NPP's variety of instruments to Alaskan meteorologists. Future opportunities could include RGB imagery from the VIIRS, as well as sounder data gathered by the CrIS instrument.

Literature Cited

NOAA's Office of Response and Restoration, 2013 <http://response.restoration.noaa.gov/about/media/noaa-responds-shell-drilling-rig-kulluk-grounding-gulf-alaska.html>

Lee, T.E., S.D. Miller, F.J. Turk, C. Schueler, R. Julian, S. Deyo, P. Dills, and S. Wang. 2006. The NPOESS VIIRS day/night visible sensor. *Bull. Amer. Meteor. Soc.* **87**, 191-199

Acknowledgements

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Further Information

GINA's Puffin Feeder:
http://feeder.gina.alaska.edu/
National Weather Service Anchorage, AK
http://pafc.arh.noaa.gov/
Joint Polar Satellite System
http://www.jpss.noaa.gov/