

Visualizing satellite data - Worldview User Interface Improvements

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<http://worldview.earthdata.nasa.gov>



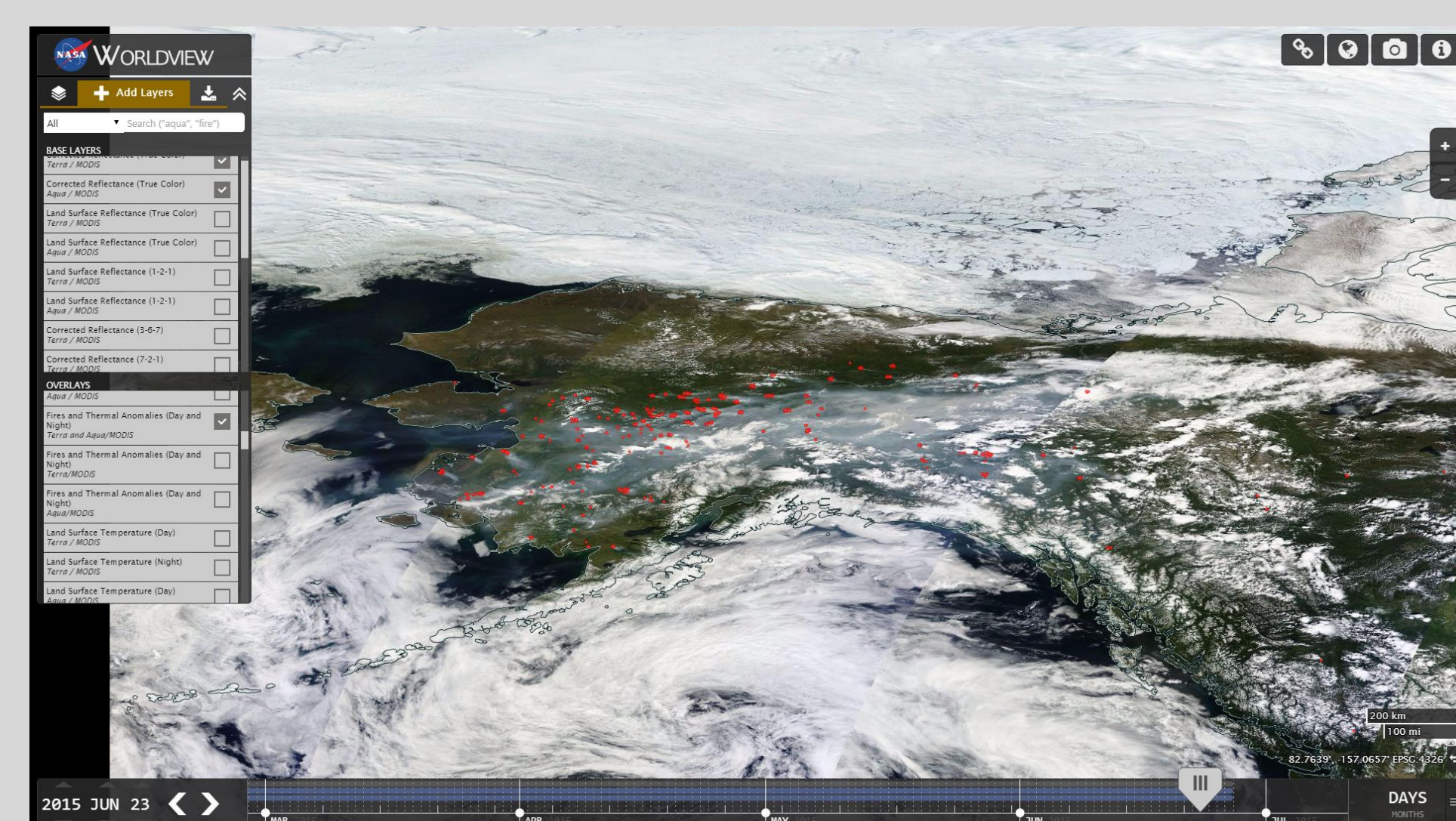
Abstract

Worldview is an open source web application developed in JavaScript. My project is to develop useful features to improve the application and to create new ways to visualize satellite data. The features include the ability to view and create animations of the satellite data and to rotate the polar projections. These are important for end users because animations clearly visualize patterns of change among the data, while rotatable polar map views allow more flexibility for scientific applications. I collaborated with my mentors to gather requirements for the functionality and how the interface should meet user needs. In my term, I successfully implemented these features to allow the general public to better analyze satellite data.

What is Worldview?

Worldview visualizes satellite data from the Terra, Aqua, Aura, GPM, and GCOM-W1 satellites through the Global Imagery Browse Services (GIBS). Worldview allows users to observe, save, and share the satellite data. A wide variety of map layers and overlays are available from GIBS to be displayed as map tiles in OpenLayers that may be combined to visualize interesting imagery and natural phenomenon over time.

The Terra and Aqua satellites are equipped with the Moderate Resolution Imaging Spectroradiometer (MODIS) to provide imagery at a spatial resolution of 250 meters to allow almost full coverage of the Earth daily.



Methods and Approach

The features I prototyped and implemented are:

- Animation of data over a period of time
- Rotation of the polar views
- Generation of GIF animations

All three features involve developing functionality and a front end user interface. We followed the agile methodology for development by having daily standup meetings to check in our progress towards meeting goals set up in two week sprints, and spent time discussing possible user interfaces for each feature.

Animations

Animations in Worldview are done by continuously advancing the date and fetching map tiles. The animation dialog and timeline pickers allow the date range and interval to be setup.

Animations, however, may not be easily shared. They are held in a cache which only supports a seamless animation of up to 30 days before downloading map tiles again.

As an alternative, I also integrated gifShot and jCrop to allow an area to be cropped for generating a GIF. This allows an animation to be downloaded and shared.

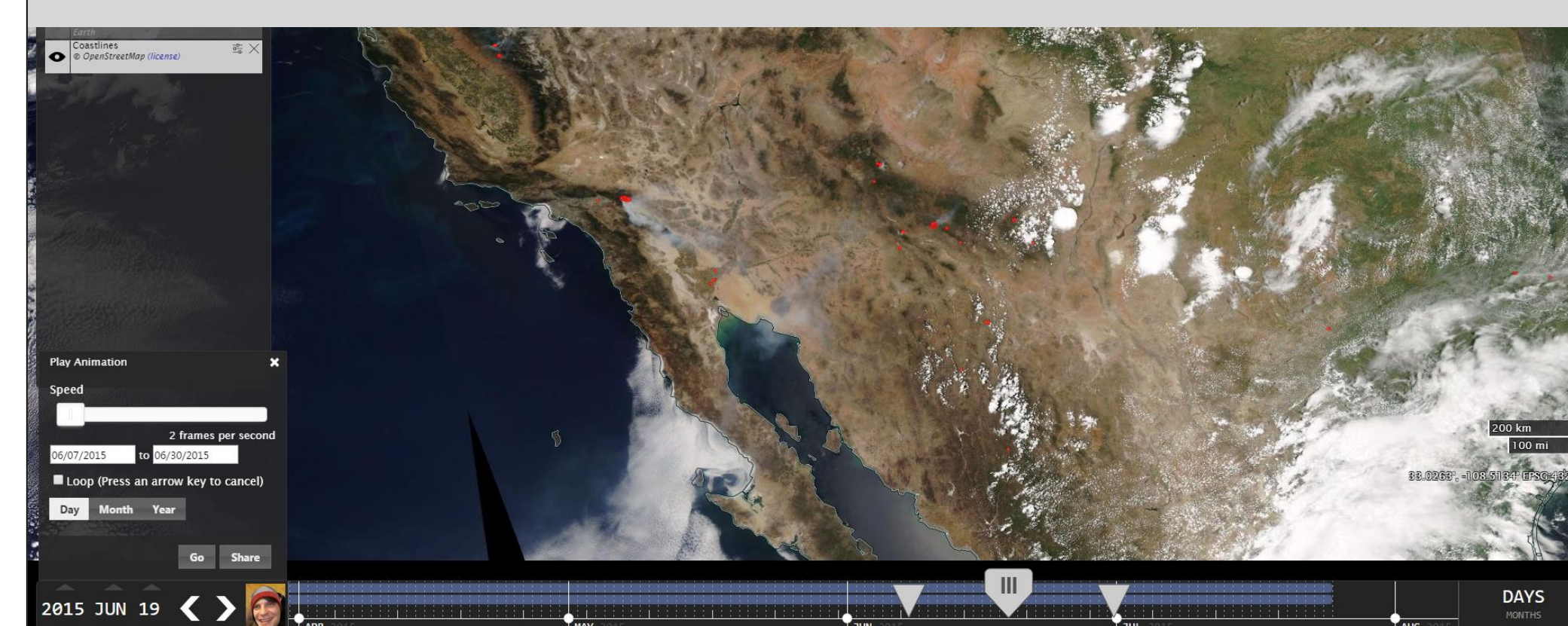


Fig. 1: Preparing an animation

Polar Rotation

To improve the view in the Arctic and Antarctic projections, I activated rotation support in OpenLayers through click and drag interactions, and buttons. As the view is rotated, the permalink for the current state of Worldview is saved to preserve the rotation. A reset button also shows the current rotation in degrees.

Features

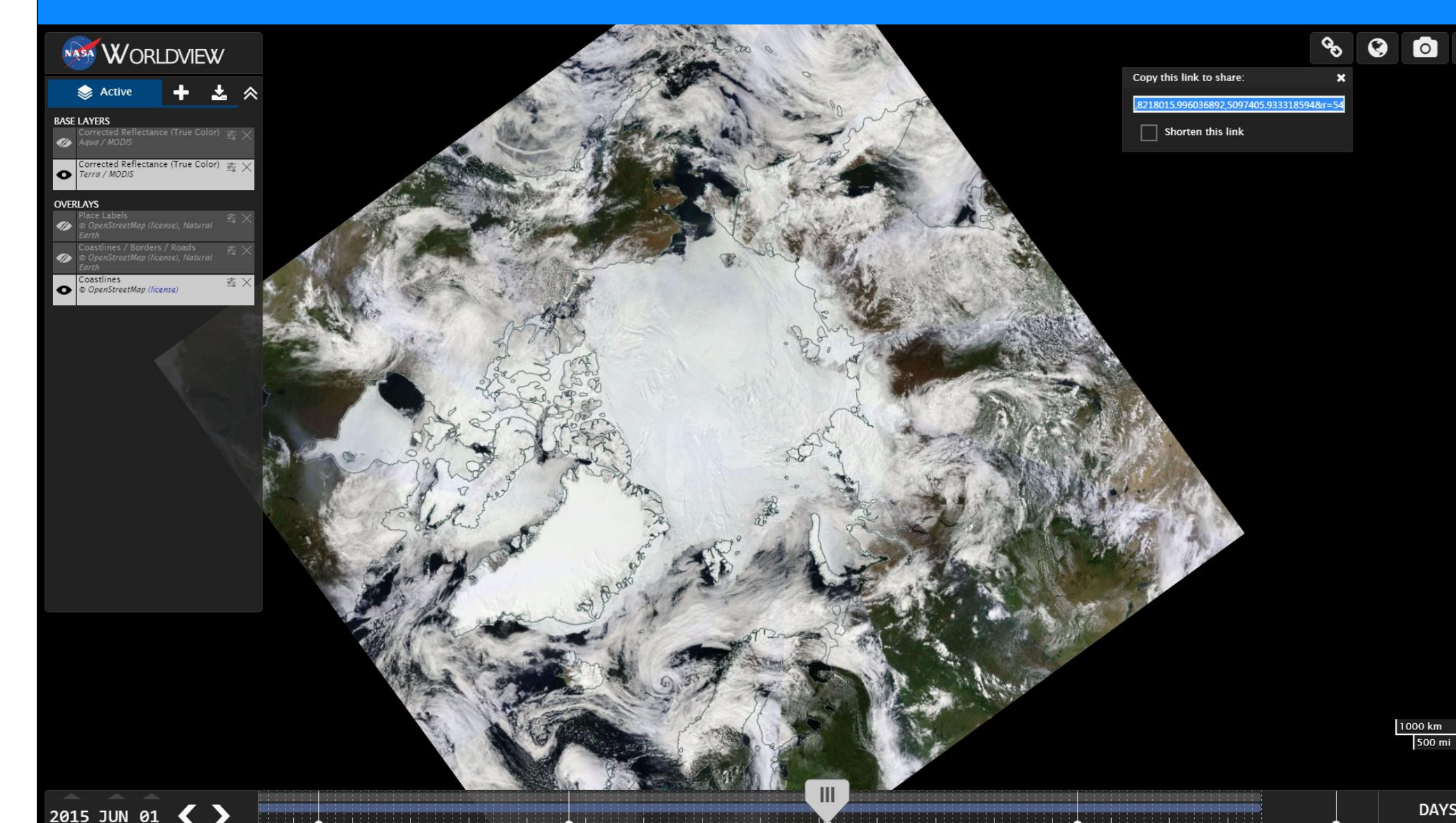


Fig. 2: Rotating the Arctic view

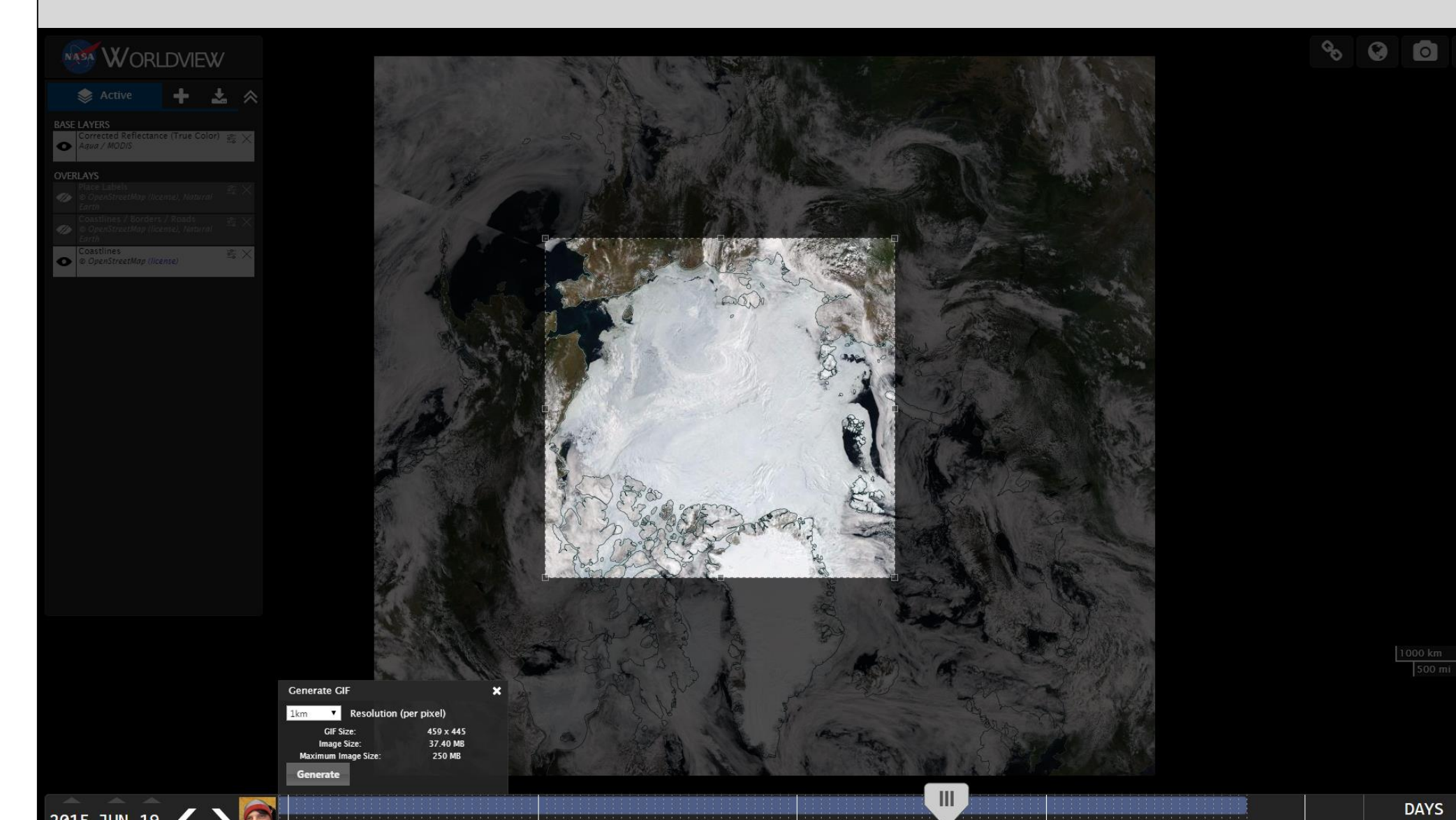


Fig. 3: Preparing a GIF animation

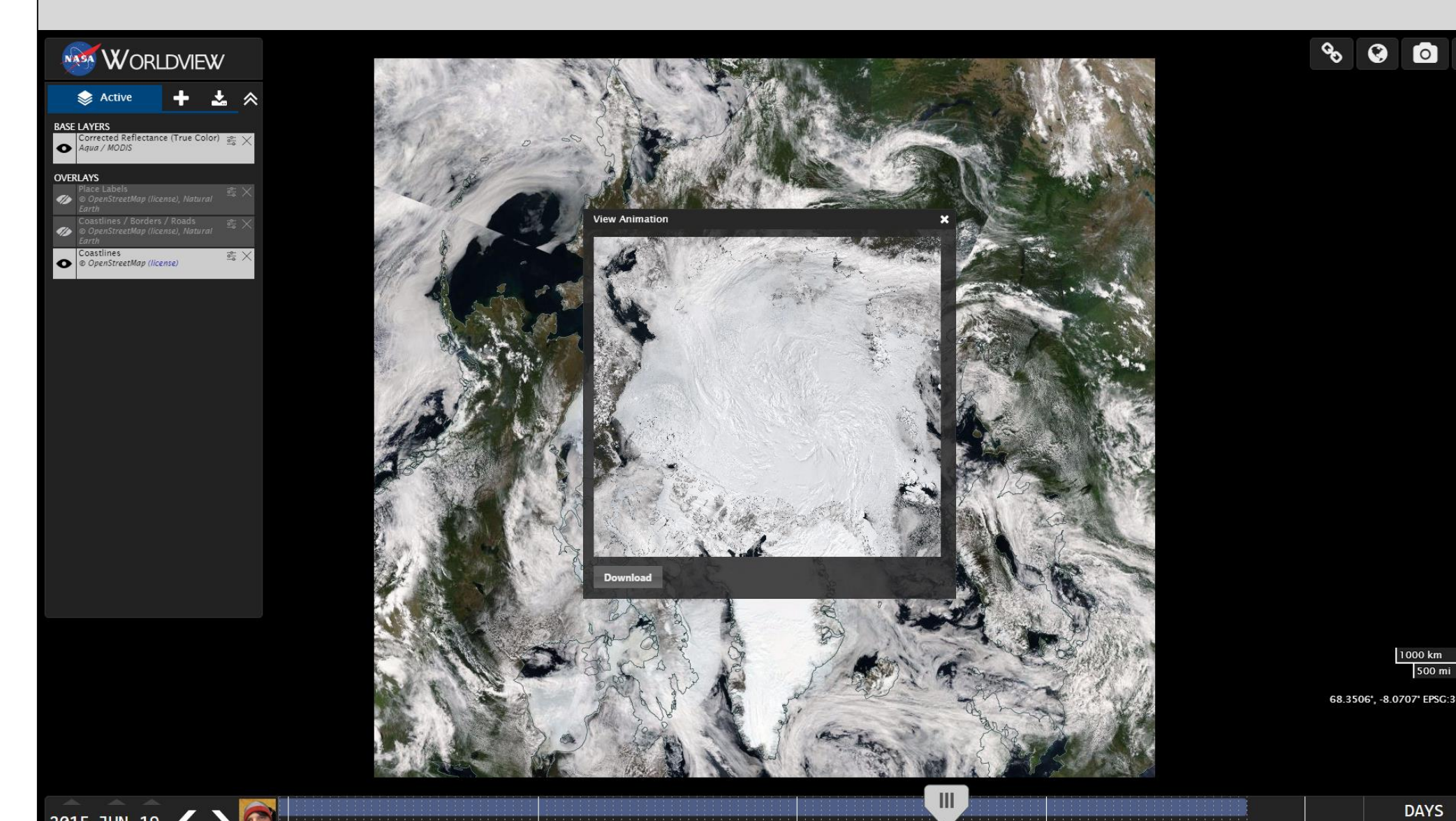
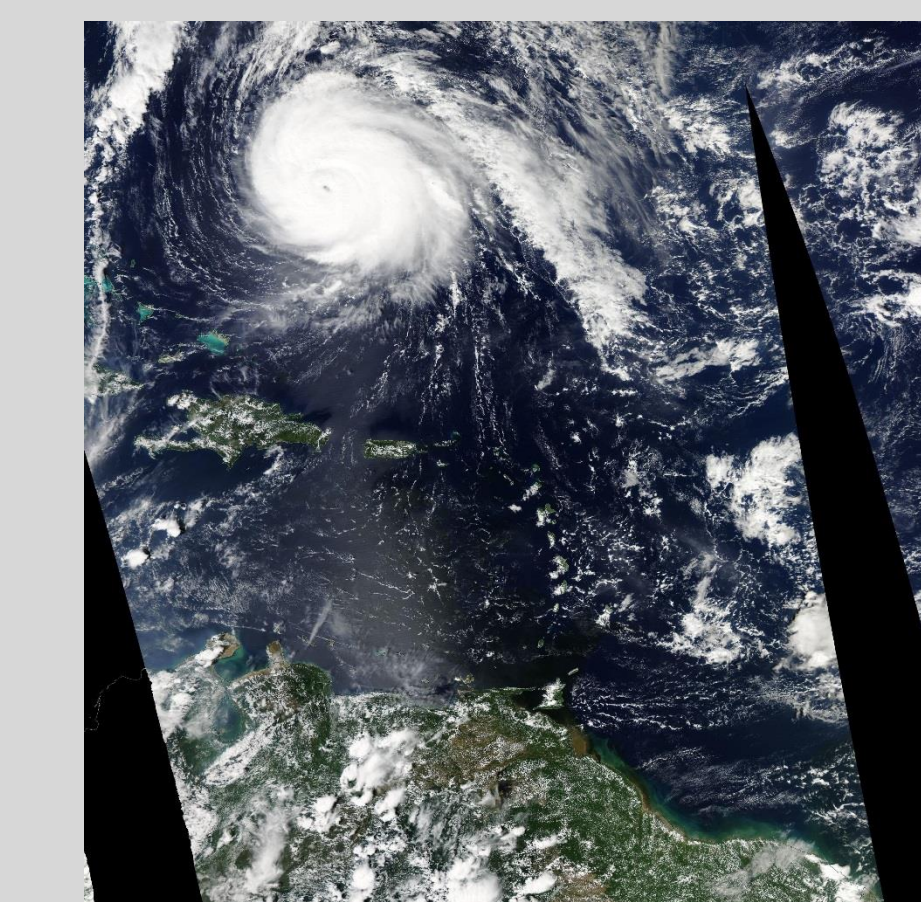
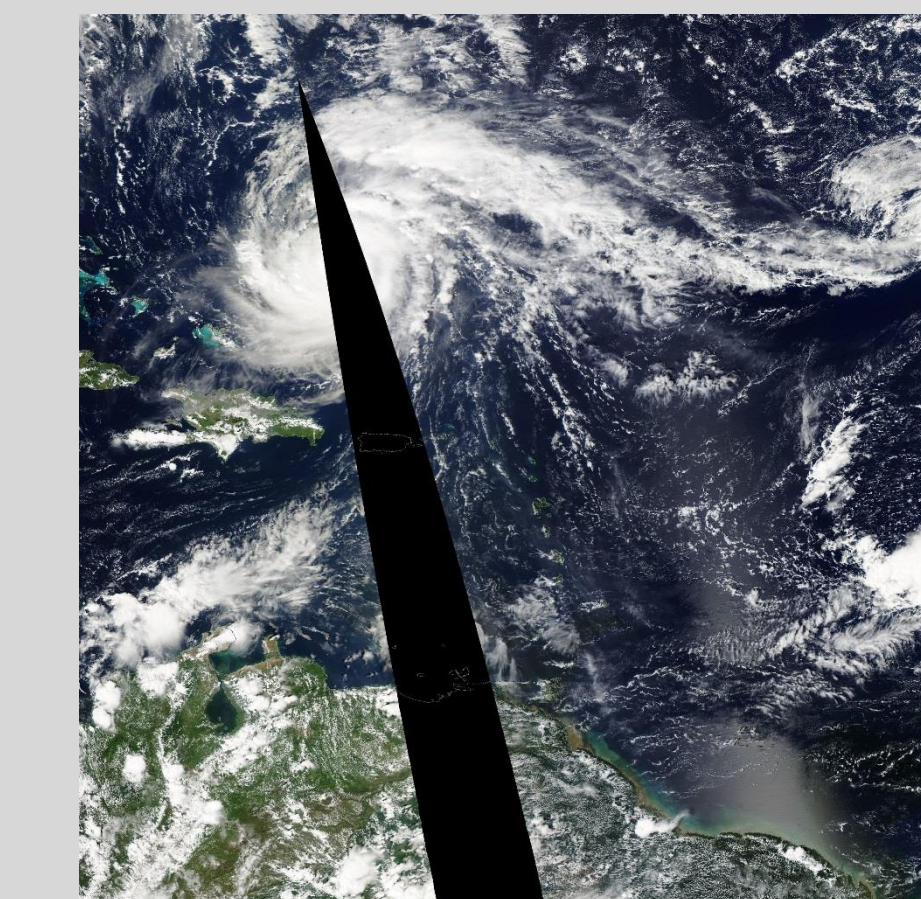
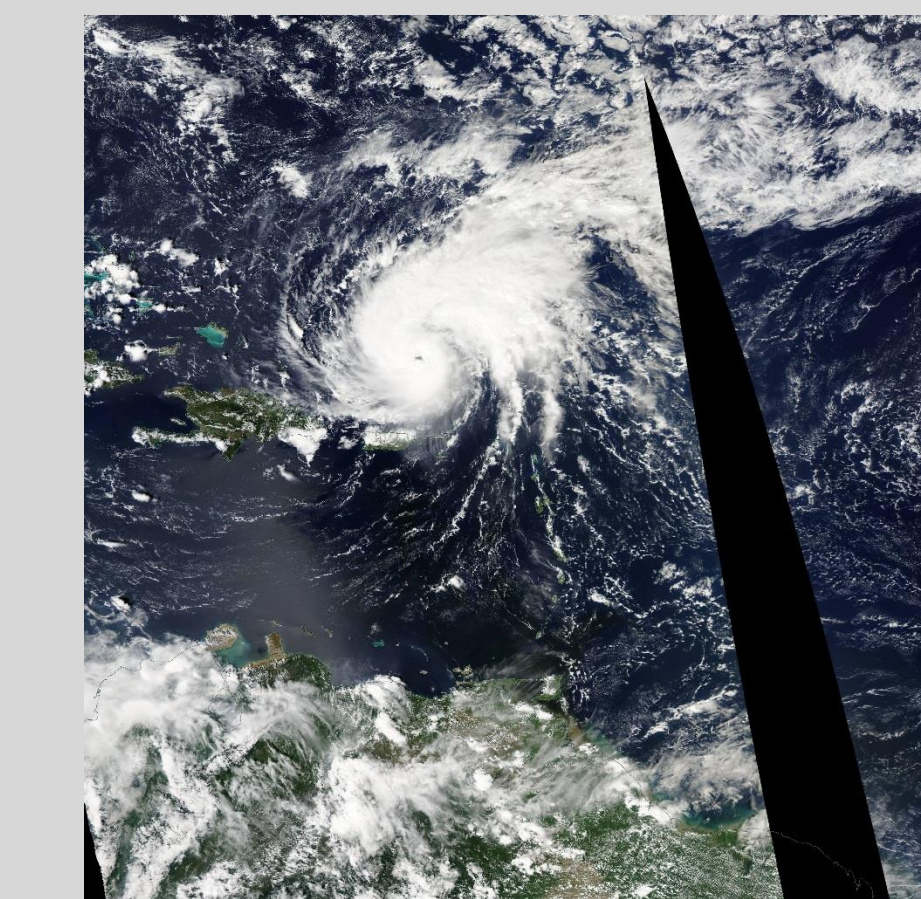


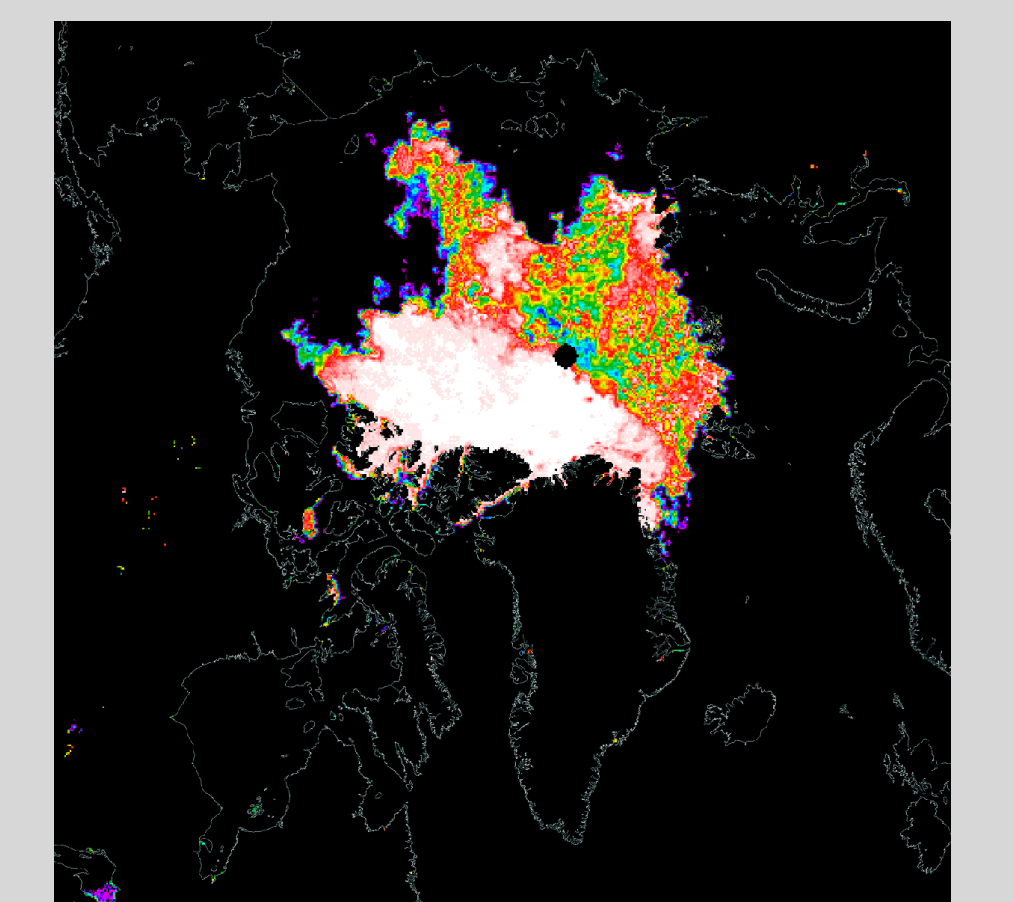
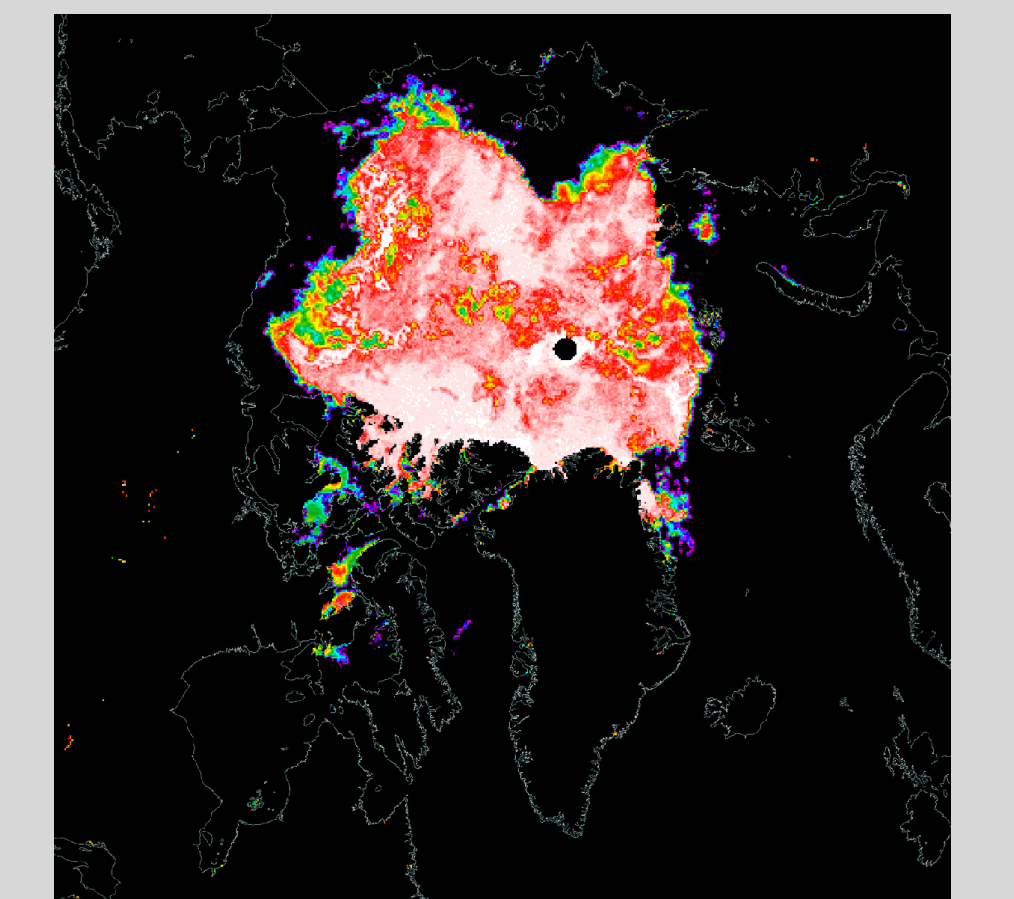
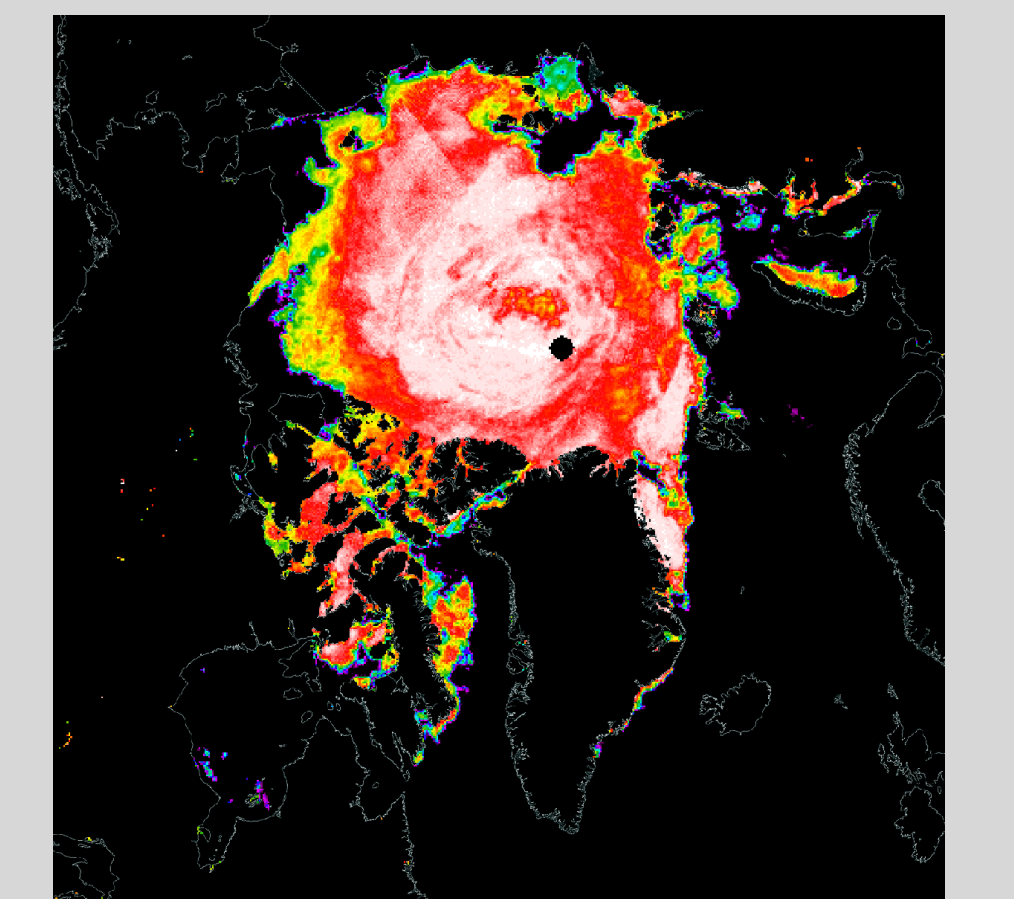
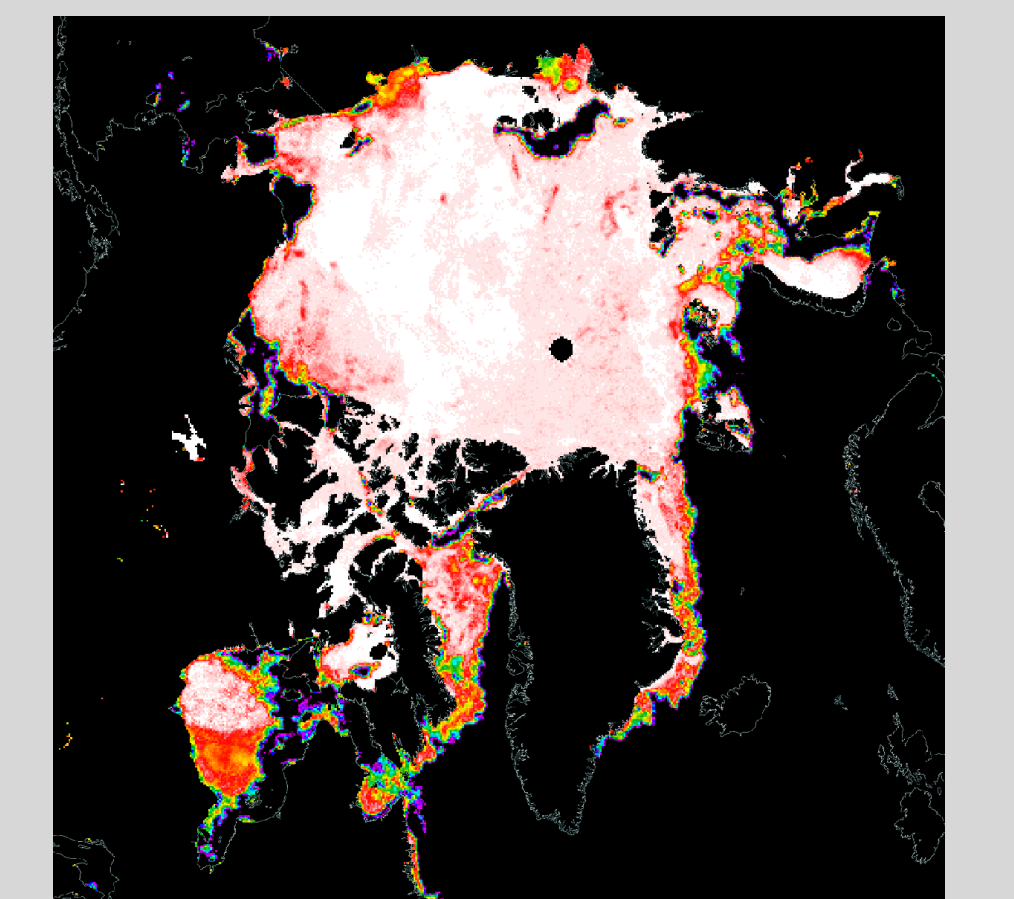
Fig. 4: Viewing the GIF Animation

Animated Events

Hurricane Gonzalo over the Caribbean, October 13-16 2014



Sea Ice Concentration in the Arctic, May to August 2010



Acknowledgments

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