

# Developing Datasets for NOAA's Science on a Sphere



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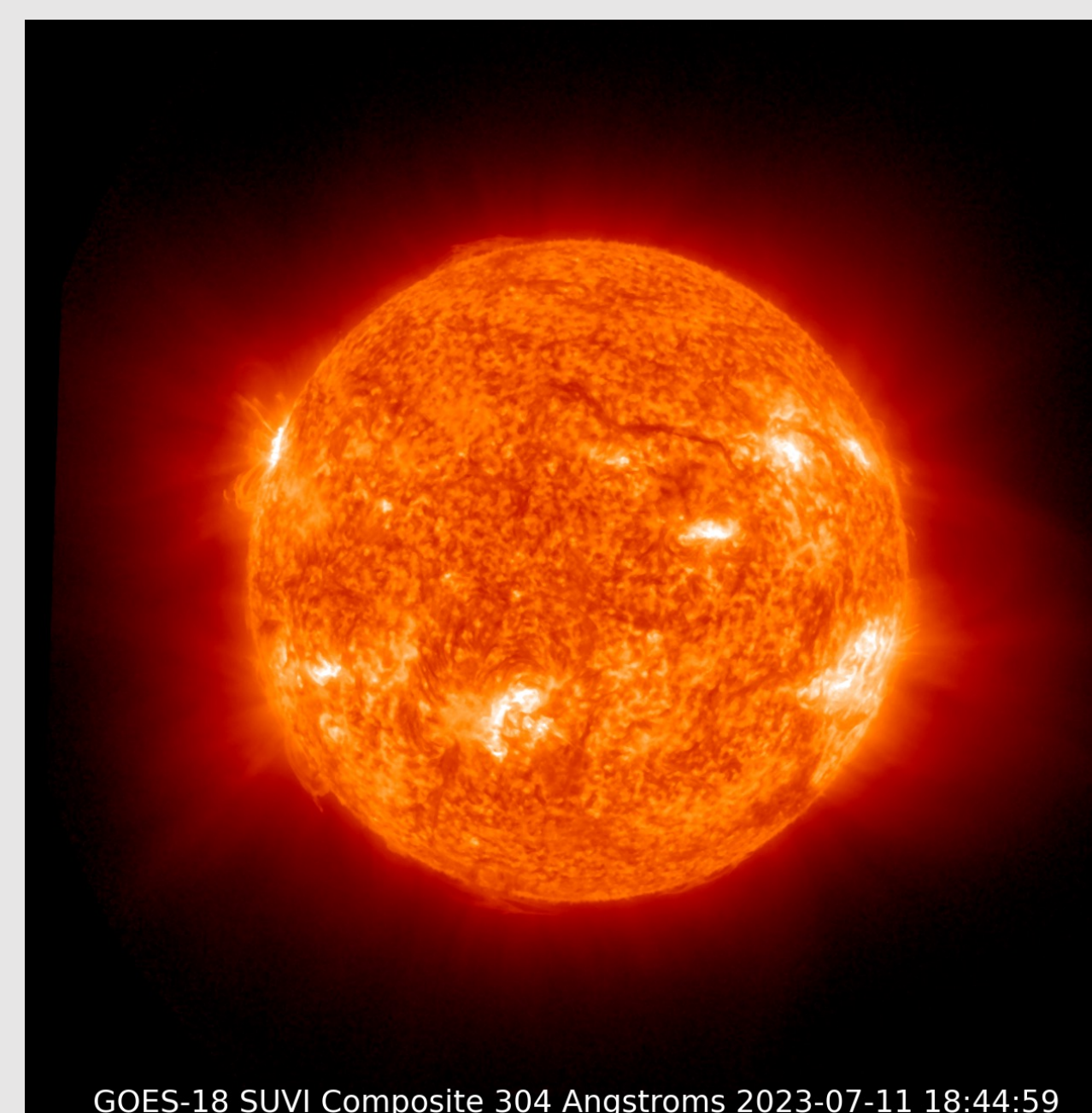
## Introduction

NOAA's Science on a Sphere (SOS) is a room-sized, spherical projection system that allows for the visualization of planetary data in an exciting and interactive way. Sitting at over six feet in diameter, this powerful tool uses computers and video projectors to create eye-catching animations. The SOS is a powerful education and outreach tool that we at NOAA's Space Weather Prediction Center can use to display awe-inspiring and pertinent space weather datasets. As such, we are expanding the accessibility and range of space weather data available to be shown on the SOS. Through dramatic animations and vivid descriptions, the beauty and importance of space weather can be captured by this visually appealing and informative tool.

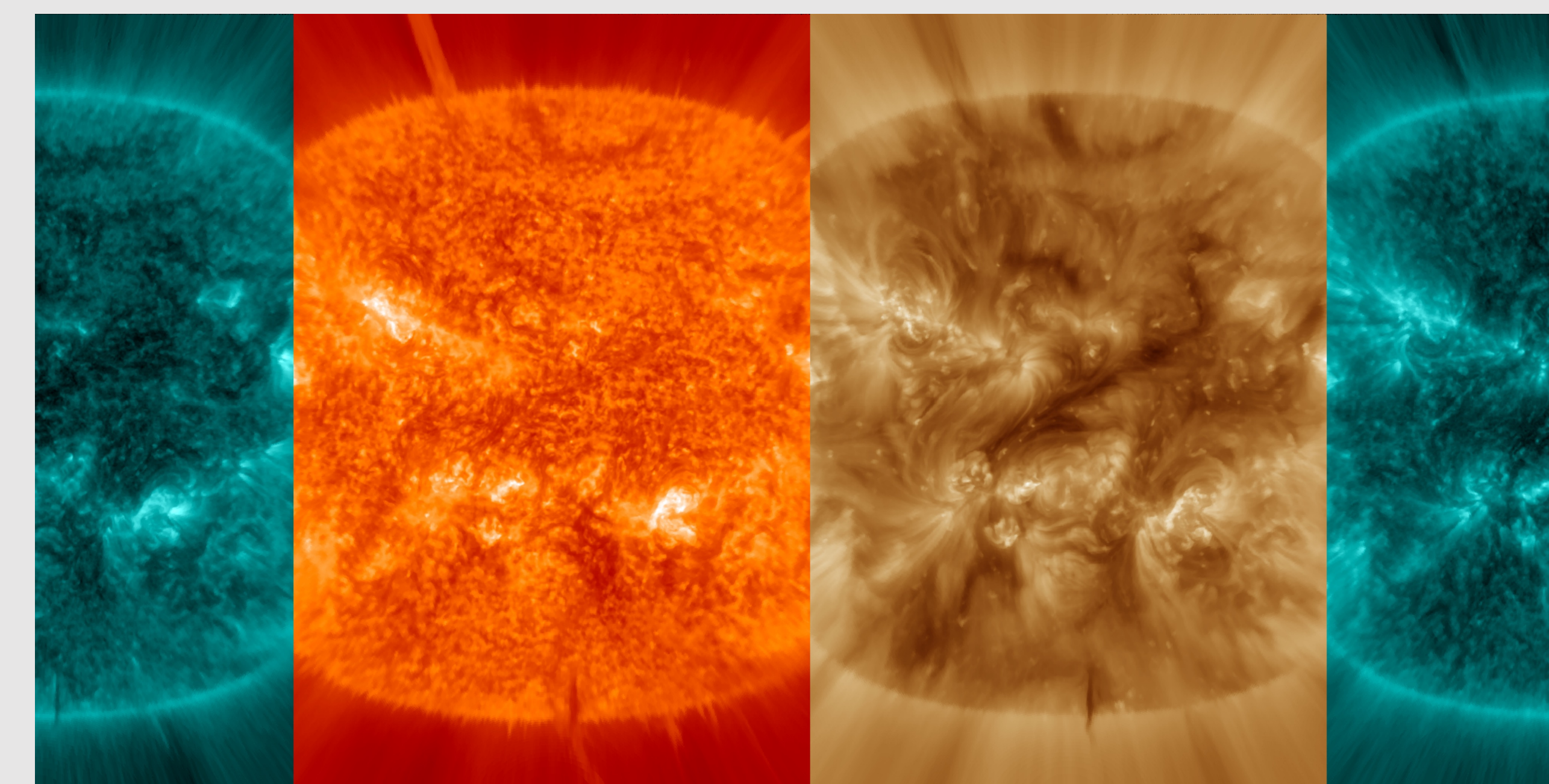


## SUVI – Solar Images

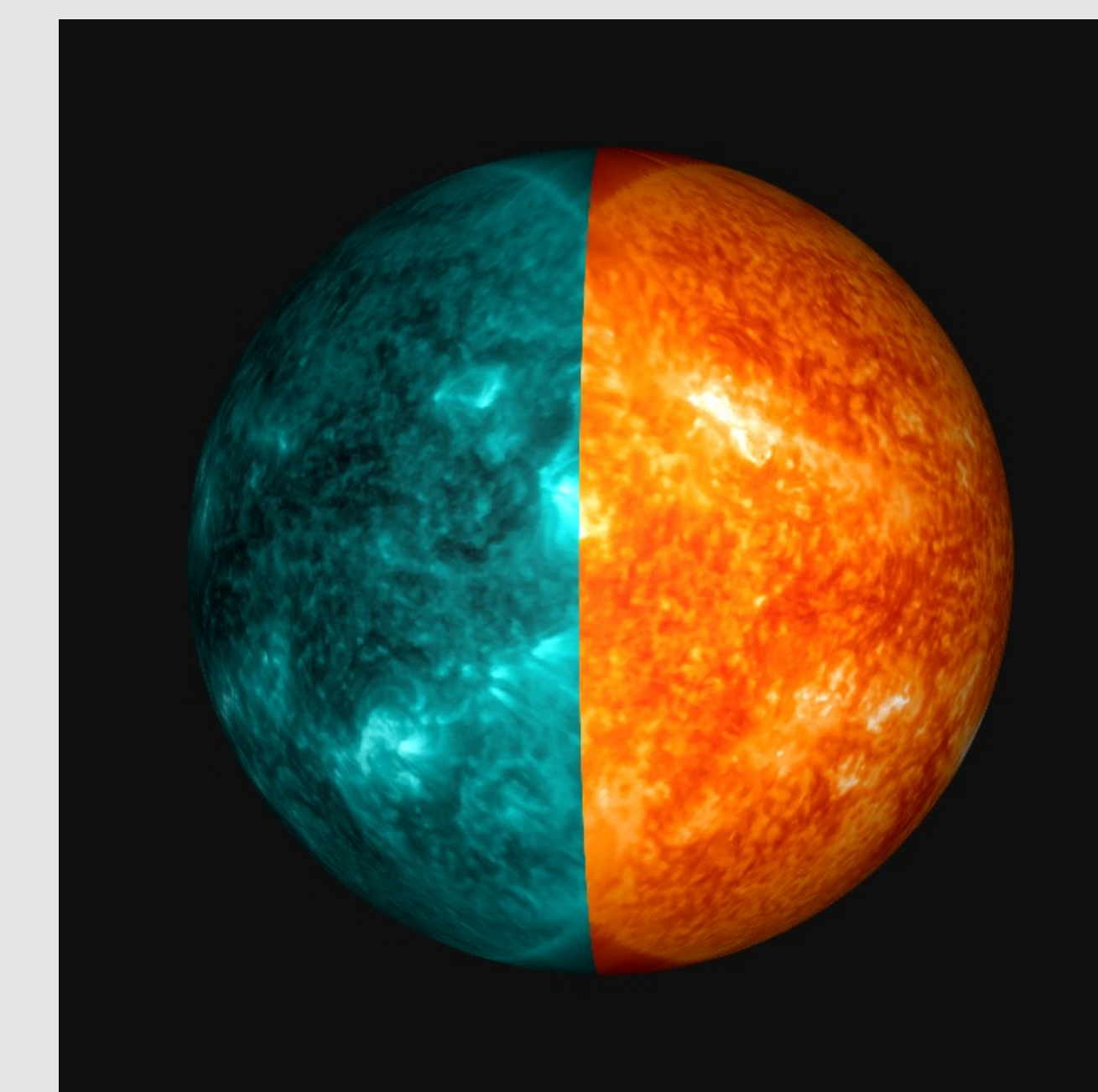
The Solar Ultraviolet Imager (SUVI) is a telescope on NOAA's GOES weather satellite that measures Extreme Ultraviolet (EUV) solar images of the sun at six different wavelengths every four minutes. Converting this circular disk into a full 360° view of the sun is the crucial step, mapping pixel by pixel. We created a product that combines three different wavelength outputs into one complete 360° view of the sun, viewed on the SOS. Many consecutive plots can be combined into a movie displaying different solar features with time.



Original Data



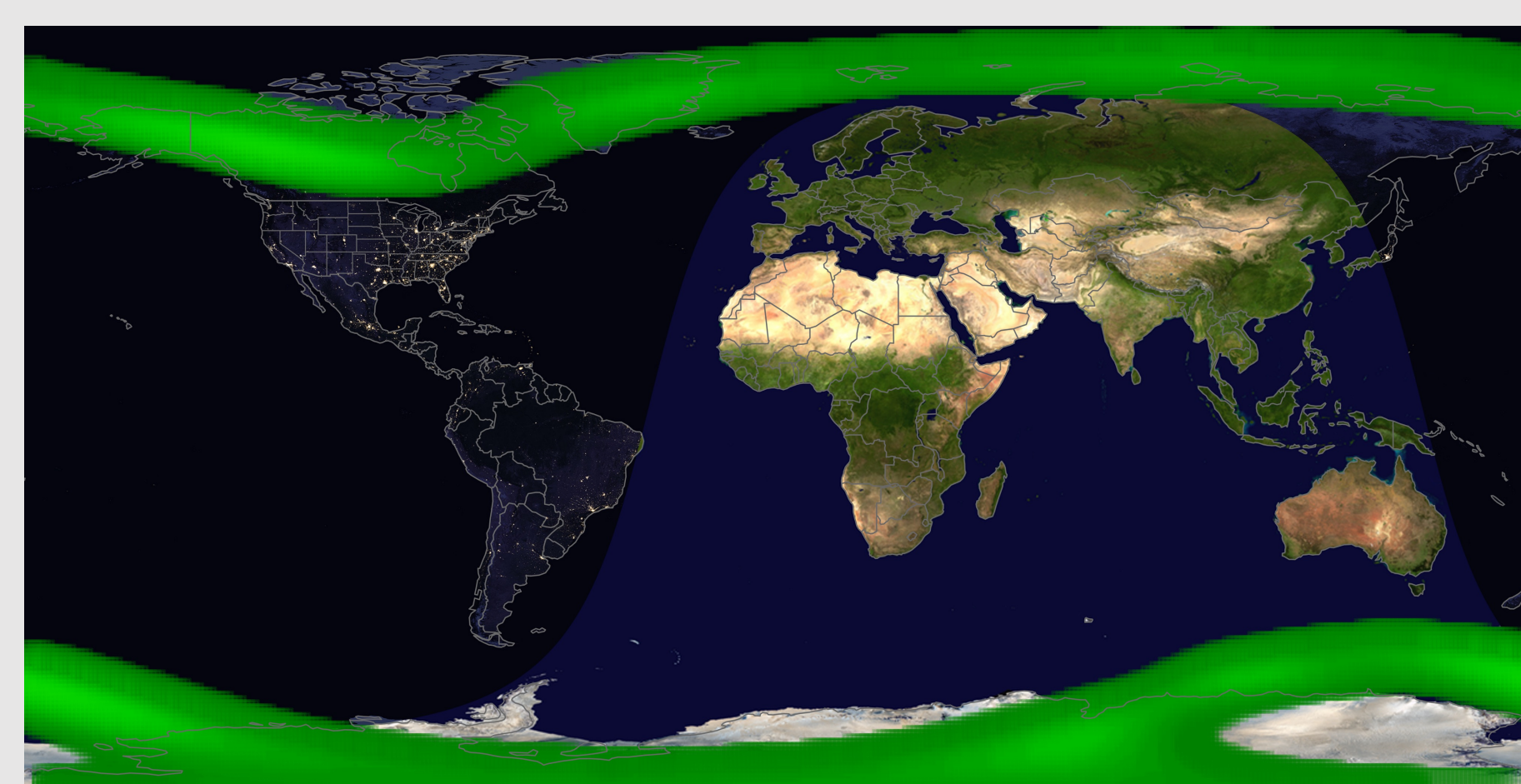
Conversion to SOS-format and Wavelength Combination



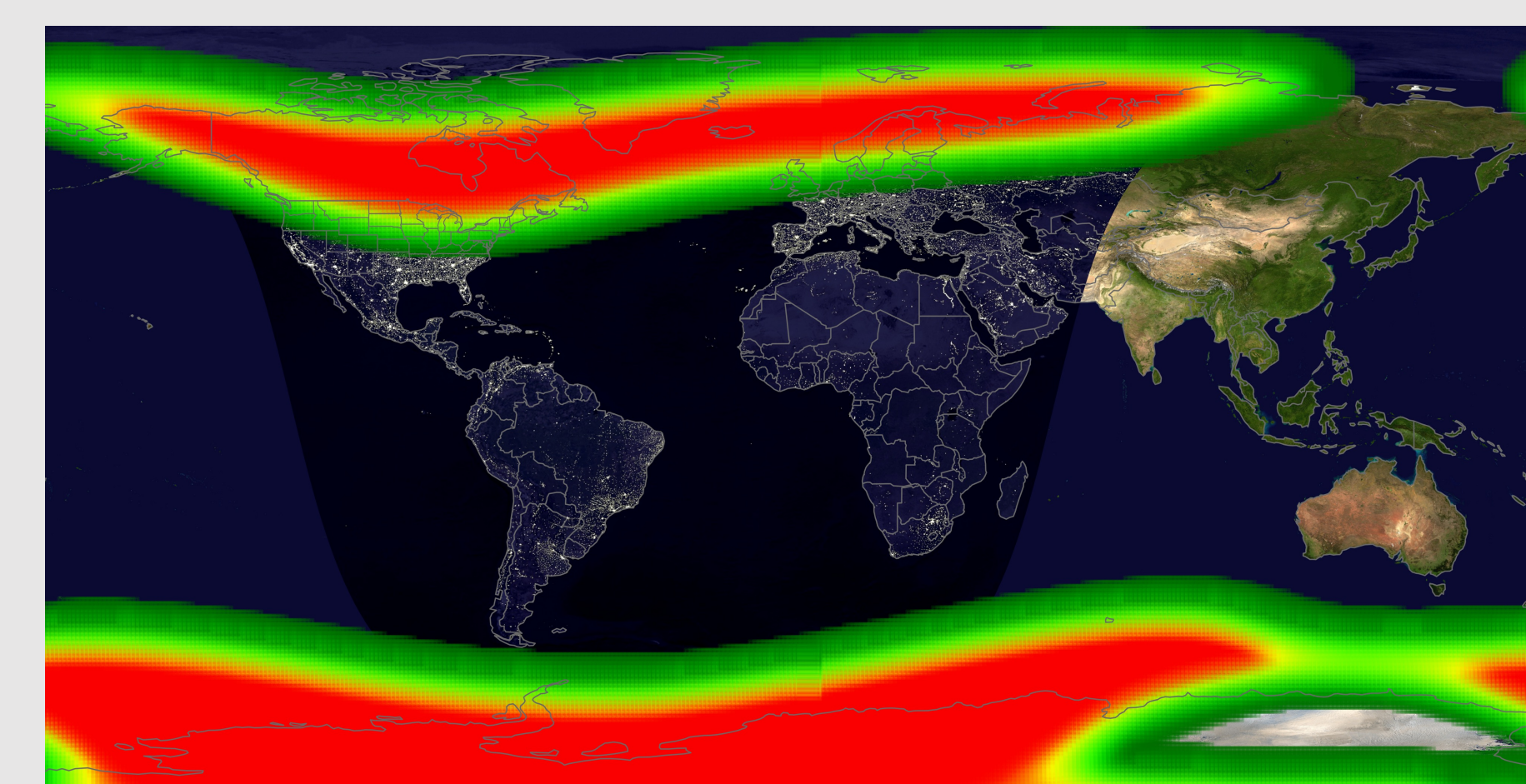
Spherical Wrapping

## OVATION – Aurora

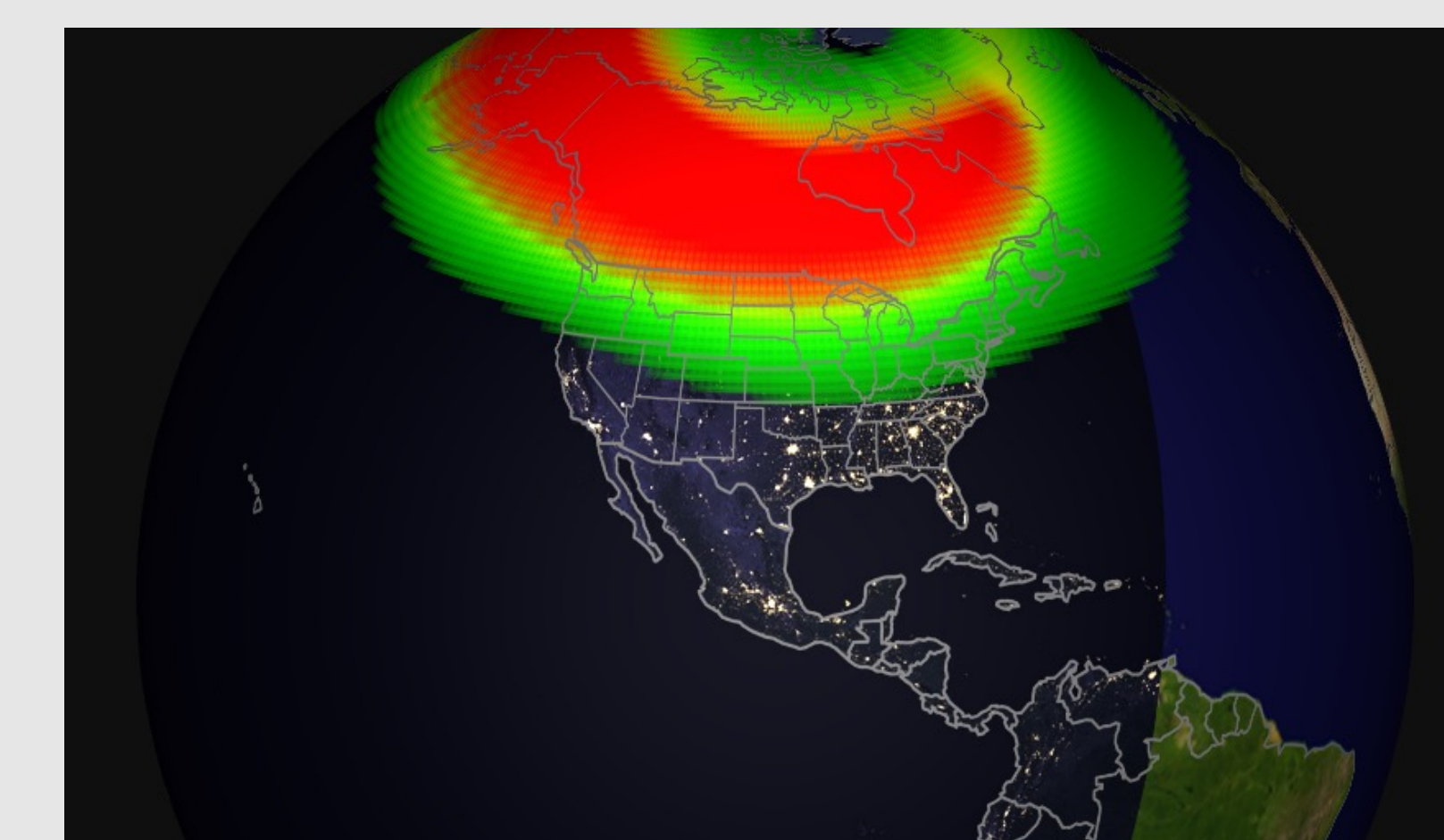
The OVATION Prime model is a tool used to predict the likelihood of aurora, creating a 30-minute aurora forecast that updates every 5-minutes. This output was smoothed and plotted on top of a basemap split by a day/night terminator. We worked specifically with aurora events from October 2003 and April 2023, times when it was particularly active. This process would loop for 24-hour's worth of aurora data, producing 288 plots, one every 5-minutes. All these plots are then sorted according to date, and combined into a movie that displays how the aurora changes with time. Ultimately, we will apply processing to a real-time aurora forecast.



October 30, 2003



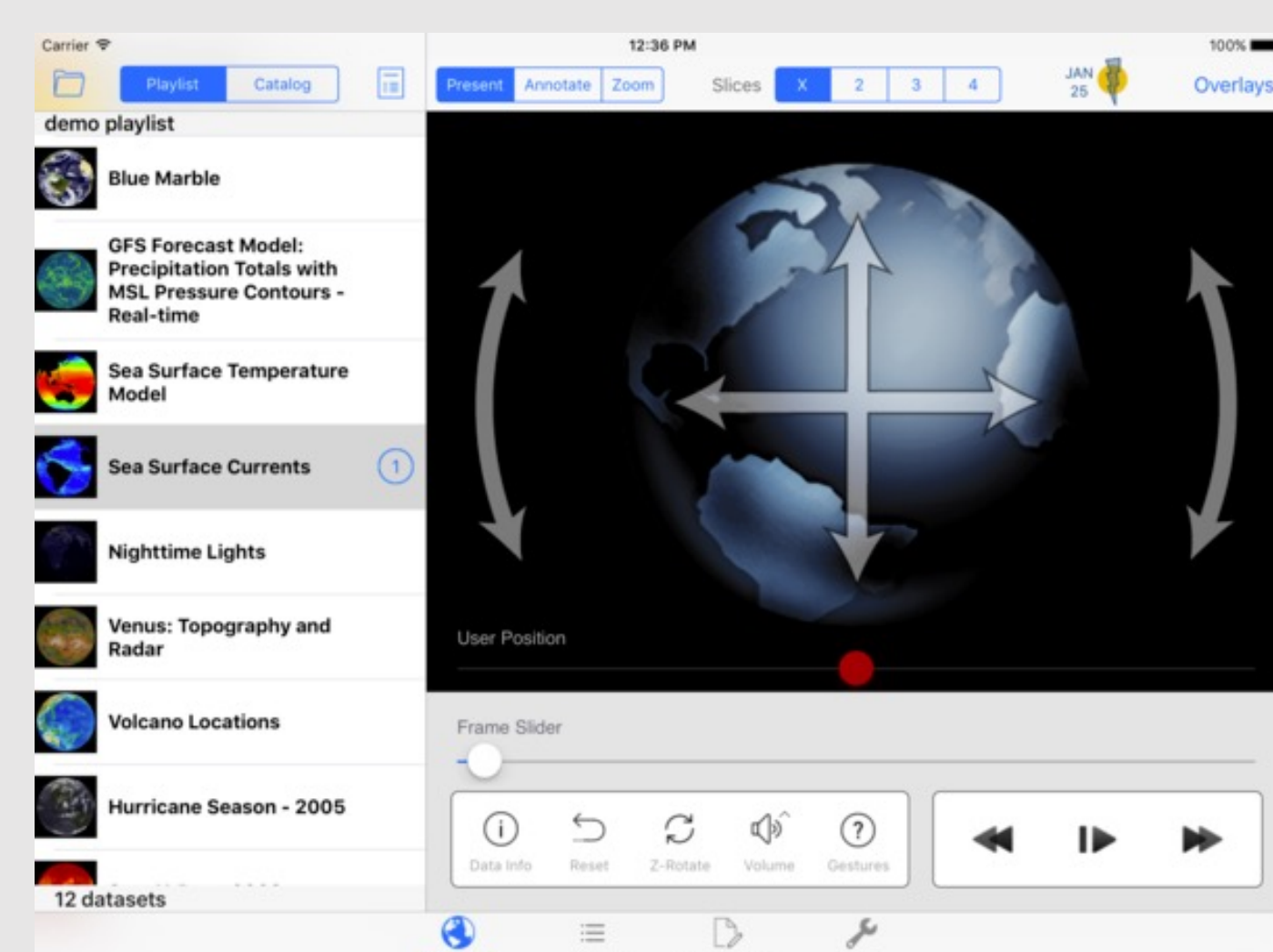
October 31, 2003



Spherical Wrapping

## SOS Formatting

Precision is key – size, pixel registration, and resolution must be spot on. Other pieces, including a separate colorbar, .txt file containing labels or titles, and a typed description of the animation are also created. A display can then be produced on the SOS, with labels, colorbars, and descriptions appearing as overlays for the operator.



Typical SOS Operator Controls

## Future Work

We strive to implement real time aurora and solar images as a regular part of the SOS database. The foundation is built, but we need a way to store and replace new images/movies as they are created, and automatically push them out to SOS databases. This way, a viewer will be able to see a complete picture of the aurora and sun: what is happening now, what is forecast to happen in the future, and what interesting things have happened in the past. There is also an SOS Explorer mobile app, where eventually people will be able to access these datasets from their personal electronic devices, anywhere and anytime they please.



## Acknowledgements

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NOAA SOS Team: Hilary Peddicord, Beth Russell, Shilpi Gupta, Alexander Kirst

## Resources

<https://www.swpc.noaa.gov/communities/aurora-dashboard-experimental>  
<https://www.swpc.noaa.gov/products/goes-solar-ultraviolet-imager-suvi>  
<https://sos.noaa.gov/catalog/>

## Conclusions

Education and outreach is a part of NOAA's mission, and expanding resources for this is an important and rewarding task. Building more datasets in a visually appealing and descriptive manner with up-to-date data is vital to keeping the public informed and interested in space weather. As we develop more advanced technology and rely on it more continuously, space weather impacts continue to grow, making the availability and understanding of this data even more vital. Soon, these updated and real-time datasets will be coming to an SOS near you!