

# The Quarterly Climate Digest

*and other key products from the*

## EarthNow SOS project

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# An epitaph?



WEATHER & CLIMATE CONNECTIONS FOR 3D SPHERICAL DISPLAYS



Blog About Feature Stories Climate Digest Links Contact



## Climate Digest

The CIMSS Climate Digest was produced monthly for several years, featuring highlights from NCDC global analysis. Our goal was to provide a visually informative summary of the previous month's global weather and climate to encourage environmental intelligence and a Climate-Smart Nation.

Along with creating monthly Climate Digest datasets for Science On a Sphere (SOS) exhibits, the [EarthNow](#) project produced similar [YouTube videos for Internet viewing](#). By watching a Climate Digest, whether on a large spherical display, a computer monitor or mobile device, viewers could get a comprehensive monthly global climate brief in mere minutes.

In 2016 we experimented with quarterly Climate Digest products. The product is currently in review and may be discontinued.

# Project Timeline

## Interpretation of Real-Time Weather and Climate Data for Spherical Displays

2010

2011

2012

2013

2014

2015

2016



Cooperative Institute for  
Meteorological Satellite Studies



Space Science  
and Engineering Center



NOAA Environmental Visualization  
Laboratory

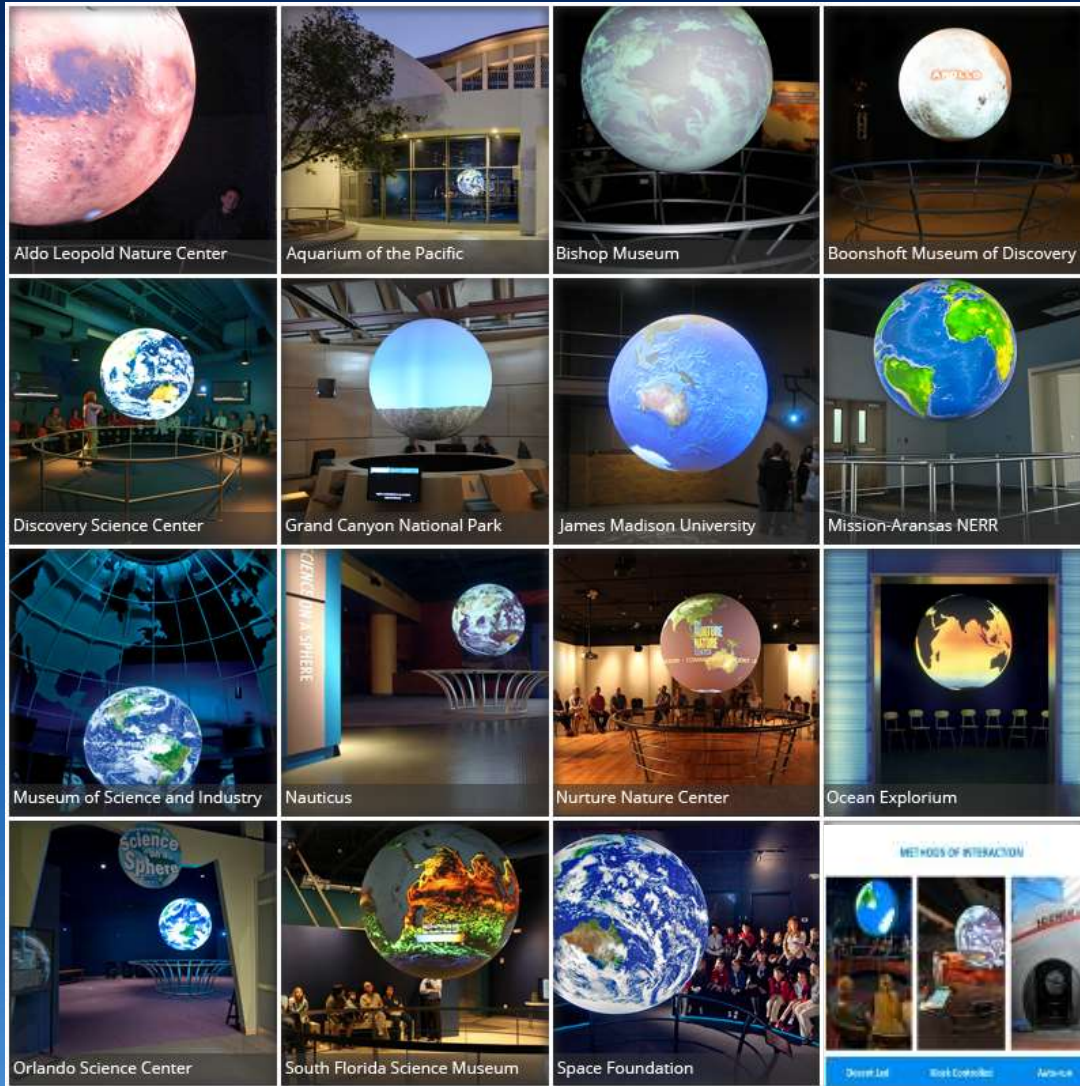


Cooperative Institute for  
Climate and Satellites - Maryland

2010: ELG for Informal/Nonformal Education  
(SEC-OED-2010-002248), Award #: NA10SEC0080015



# Project GOAL – utilize the Science on a Sphere (SOS) Network to enable meaningful interpretation of real-time weather and climate data by museum docents and visitors viewing SOS exhibits. (& smaller 3D systems)



*Magic Planet at CIMSS*



*CIMSS hired Patrick Rowley in January 2011*

## Findings and implications

*Evaluators found ...*

- 1) **There is a strong need for, and interest in, new 'real-time' data sets** because this engages the public and feels relevant to current events.
  
- 2) **There is a strong need for, and interest in, more in-depth information and resources about the data sets**, because presenters don't feel very confident in their knowledge of weather-related topics and they need to do their own background research.
  
- 3) **The challenges for this project are:**
  - presenters don't have a lot of time to spend reading the blog,
  - **they don't want weekly updates,**
  - **they don't change their SOS shows** (with predetermined data sets) **very often,** and they are not in charge of designing new shows for the most part.
  - **Some presenters do not have a science background,** so this is a factor to keep in mind when writing the blogs.

# Project Evolution & Evaluation

## 2011 Launched EarthNow Blog & 1<sup>st</sup> Climate Digest

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### EarthNow

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— Inaugural EarthNow Entry: Ozone Hole Minimum — October Climate Digest —

#### September Climate Digest

Posted on 2011, November 3 by EarthNow Team

Each month, we will provide information regarding the previous month's climate (this post was originally to be done in October, as well as the climate outlook for the coming months). Overall, preliminary data analysis suggests that September was the 8th warmest on record. Major stories include La Niña's return and the Arctic sea ice annual minimum being the second smallest on record. More detailed information follows:

#### September 2011 Major Events

- This dataset highlights some of the major September events from the National Climatic Data Center's (NCDC) monthly **global climate analysis**. The events are noted below with more information.
- El Niño/Southern Oscillation:** Cooler than average waters in the eastern Pacific Ocean mean that La Niña has returned. [Click here](#) for more information about La Niña and how it may impact the outlook for the forthcoming winter season.
- Tropical Storm Lee** was the 12th named storm of the 2011 Atlantic hurricane season, bringing with it rainfall totals of over 10 inches and damaging winds in some parts of the eastern third of the U.S. (Dates: Sep. 1-5)
- Argentina's** northern and west-central regions experienced warmer-than-average maximum temperatures, resulting in the warmest average maximum September temperature in 50 years.
- Hurricane Katie** was the 17th named storm of the 2011 Atlantic hurricane season. After becoming **extratropical**, the storm impacted the **United Kingdom** with strong winds. (Dates: Aug. 23-Sep. 10)
- The **United Kingdom** had its warmest September since 2006 and the 5th warmest in the last 100 years.
- Spain** experienced its driest September since 1988.
- China's** Gansu, Henan, and Shaanxi provinces experienced over a week of heavy rains, leading to deadly floods.
- Typhoon Taisan** brought heavy rain and winds to western **Japan** and is being reported as the deadliest cyclone to hit Japan since 2004. (Dates: Aug. 23-Sep. 5)
- Australia's** September 2011 minimum temperature was the coldest since 1985. Also of note, Australia's daily temperature range was colder than normal.

#### Sea Surface Temperature Anomaly

- The real-time sea surface temperature anomaly dataset is a great way to visualize the cooler than normal waters in the eastern Pacific ocean.
- Remember that the blues indicate cooler than average temperatures and reds indicate warmer than average temperatures (white, average, not simply cool or warm). 3 million degrees is hot, 2 million degrees is also hot, but well below average.

#### Global Temperature Anomalies

- Using the real-time Monthly Temperature Anomalies dataset is a great way to convey where some of the warmer and cooler than average areas were in September.
- The combined global land and ocean average surface temperature for September 2011 was the 8th warmest on record at 15.53°C (59.95°F), which is 0.53°C (0.98°F) above the 20th century average.
- The combined global land and ocean average surface temperature for the January-September period was 0.01°C (0.02°F) above the 20th century average, making it the 17th warmest on record.

WEATHER & CLIMATE CONNECTIONS FOR 3D SPHERICAL DISPLAYS

### EarthNow

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— October Climate Digest — November 2011 Climate Digest —

#### 2011 Atlantic Hurricane Season

Posted on 2011, November 1 by EarthNow Team

November 30th marked the end of the 2011 Atlantic hurricane season. We have compiled some data visualizations to help you convey to your guests the storm tracks, how what actually occurred compares to the predictions, and also some of the reasons why the storms did what they did.

#### 2011 Tropical Cyclone Tracks

- While in dataset
- Play site tracks
- No storm
- 1 hurricane
- 2 hurricanes
- 4 hurricanes
- the first
- NOAA

Showing merged track forecasting due to improved satellite views, however, was somewhat weaker than expected of landfall.

For more information (straight from NOAA), [CLICK HERE](#)

#### Global

- The sea surface Niño index
- This can arrive at
- Further forecasts

For more impacts:

#### Global

- While it only one
- High pressure tropical
- Low pressure to 15 hours
- It should help not

#### Helpful Resources for More Information

- [http://www.noaa.gov/newsroom/2011/11/01/111126\\_earthnow](http://www.noaa.gov/newsroom/2011/11/01/111126_earthnow)
- [http://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/etopo1](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/etopo1)
- <http://www.jrnl.noaa.gov/bulletin/2011-11-01-story.html>
- <http://www.ncdc.noaa.gov/teleconnections/teleconnections-tech.php>

WEATHER & CLIMATE CONNECTIONS FOR 3D SPHERICAL DISPLAYS

### EarthNow

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— November 2011 Climate Digest — 2011 - A Year of Extremes —

#### Happy Holidays!

Posted on 2011, December 20 by EarthNow Team

The next EarthNow update will be published on January 6, 2012. See you in the new year!

#### Snow Globe 2011

For now, here's a gift from CIMSS and The Aldo Leopold Nature Center... a wintry-themed snow globe. Enjoy!

For the snow globe files, [click here](#).

#### Global

- While it only one
- High pressure tropical
- Low pressure to 15 hours
- It should help not

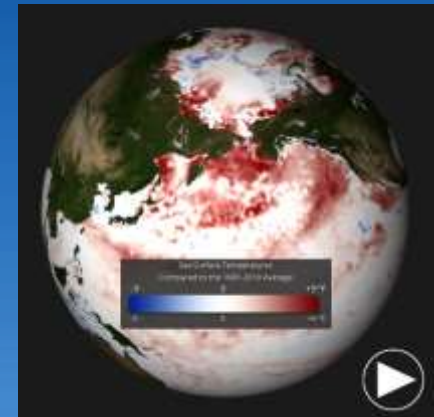
Category: Fun  
Tags: Fun, Snow globe, Winter  
Comments: 0

— November 2011 Climate Digest — 2011 - A Year of Extremes —

# 2012 - Perfecting the Climate Digest Product

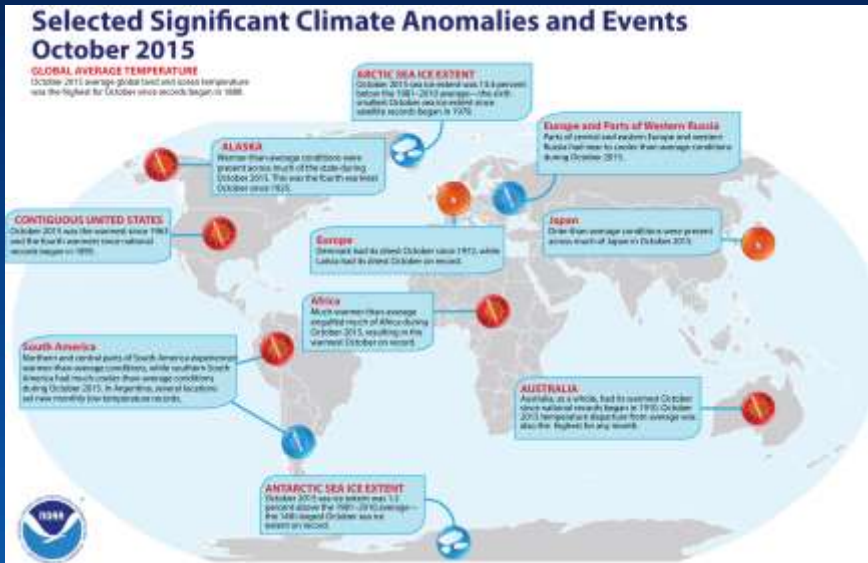
## Create a standardized set of content

- Past Months Weather Highlights
- Air and Sea Surface Temperature Anomalies
- Snow and Ice Extent
- Global Temperature and Precipitation Outlooks
- Drought Monitor



# Global Highlights (Weather & Climate Highlights)

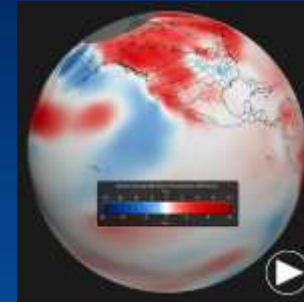
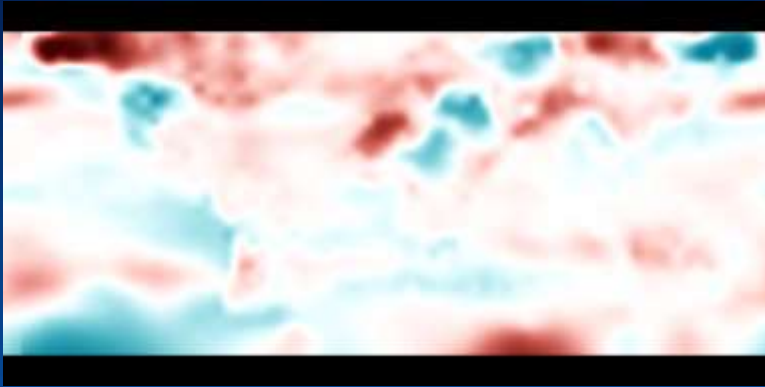
## Data from NOAA Centers for Environmental Information





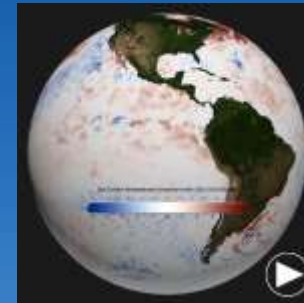
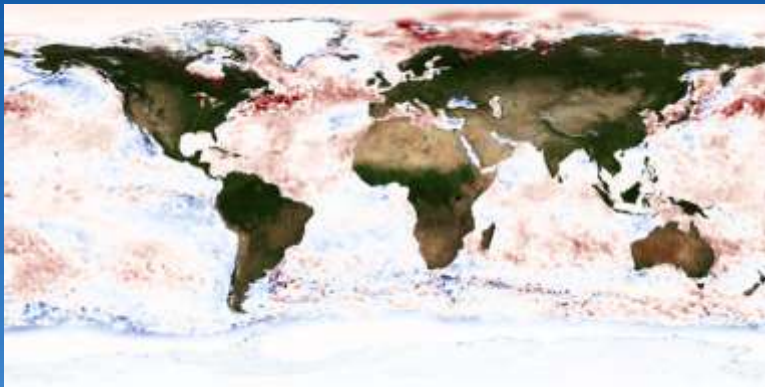
# Global Surface Air Temperature Anomaly

NOAA Environmental Visualization Lab



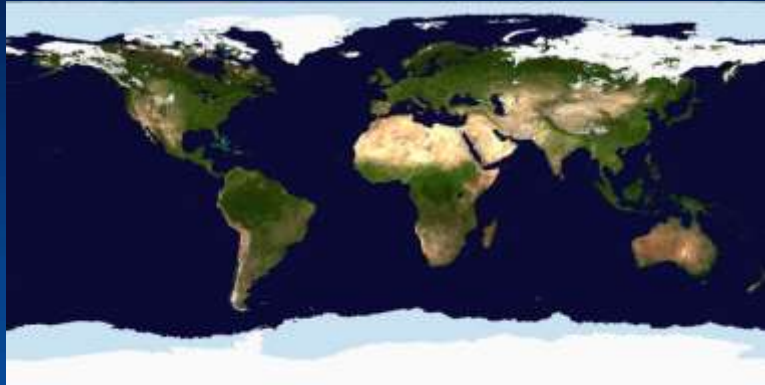
# Global Sea Surface Temperature Anomaly

- NOAA Environmental Visualization Lab



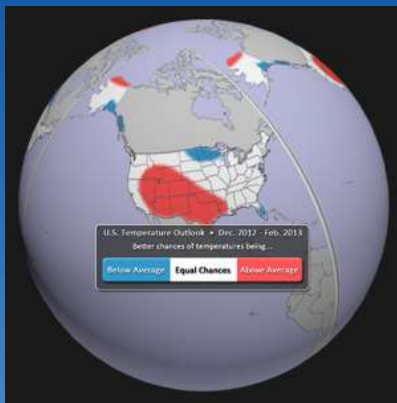
# Snow & Ice Cover Dataset

- NOAA Environmental Visualization Lab



# Temperature and Precipitation Outlooks

- NOAA Climate Prediction Center



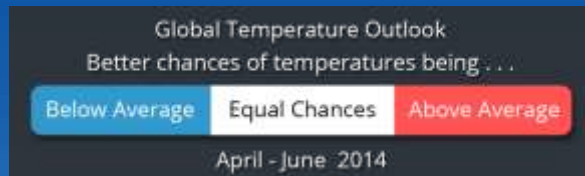
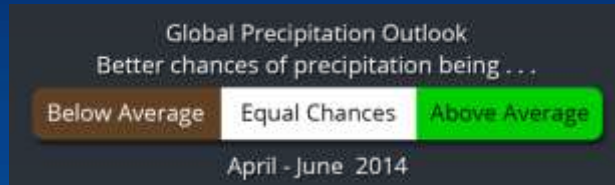
# Global Temperature Outlook

- International Research Institute for Climate and Society (IRI)



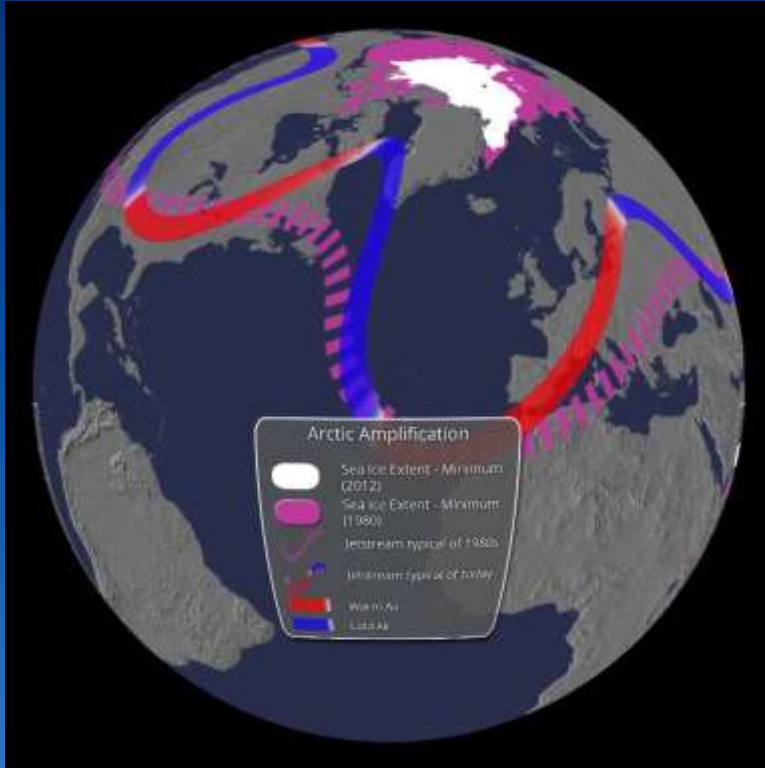
# Increase Resolution & information on Labels

- Initial 3 color scheme was not intuitive

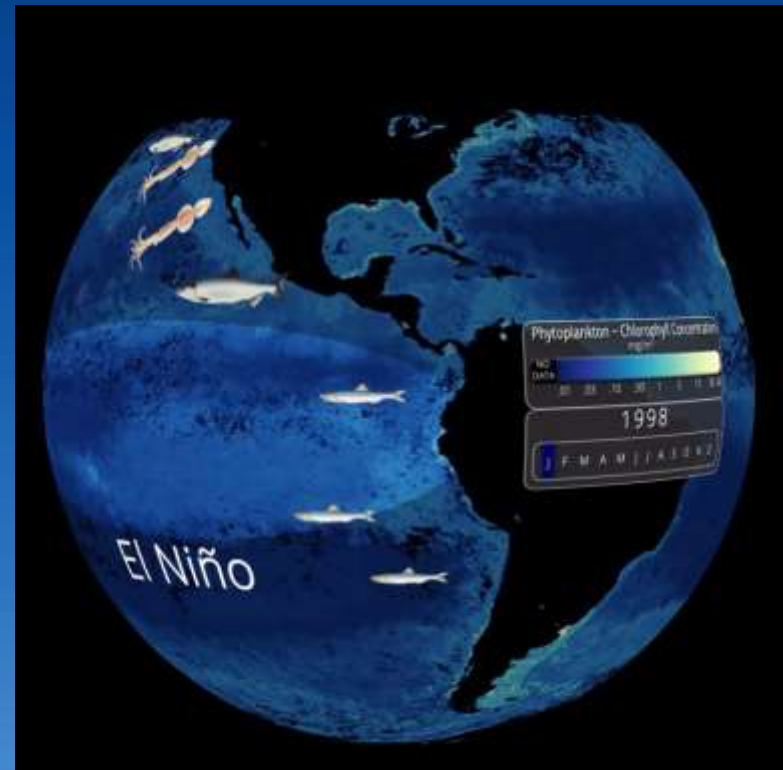


# Feature Stories - 2012

How does the Arctic Affect Extreme Weather? (Arctic Amplification)

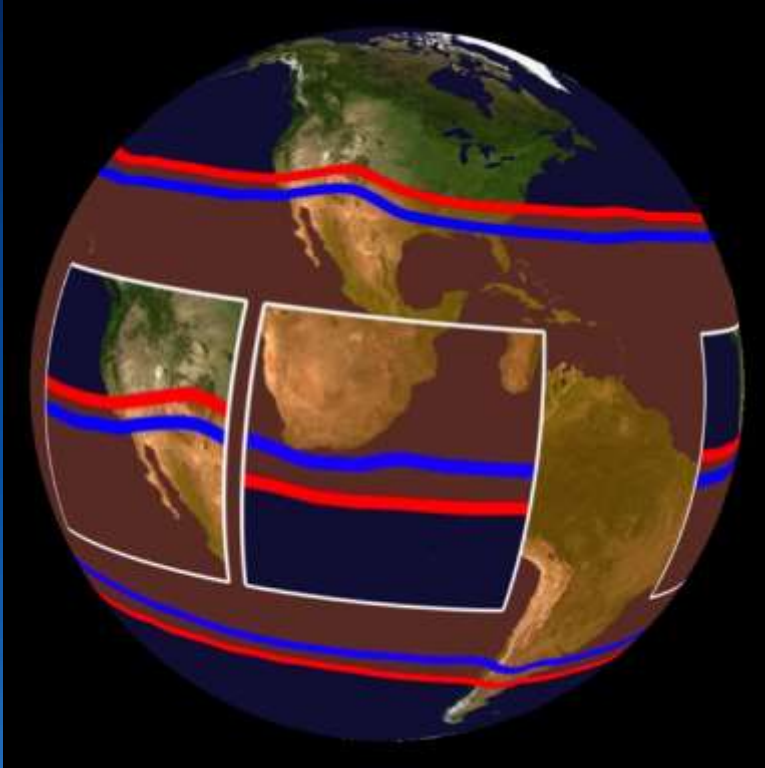


Effects of El Niño and La Niña on Phytoplankton and Fish



# Feature Stories - 2013

## Causes and Effects of Tropical Widening



What does Fracking mean to you?



# Also in 2013 & 2014 – Docent Trainings

The EarthNow team announced a special opportunity in April 2013 to provide onsite trainings and on-going consultancies to four SOS installations. 15 sites applied for training! Due to the close proximity of places that applied, six trainings took place.

Goals included:

- Demonstrate use of EarthNow stories and products in live and auto-run programs.
- Teach practical skills for accessing and implementing datasets, and build playlists.
- Solicit feedback from SOS sites to tailor EarthNow products to user needs.



Space Foundation

Selected sites (in order of trainings conducted):

- Aldo Leopold Nature Center (Monona, WI)
- Nauticus (Norfolk, VA)
- Space Foundation (Colorado Springs, CO)
- National Park Service (Grand Canyon, AZ)
- Ocean Explorium (New Bedford, MA)
- Museum of Science and Industry (Chicago, IL)



Grand Canyon Visitor Center

# Feedback garnered from Site Training Evaluations

- 98% felt more confident in their ability to implement EarthNow dataset visualizations into their SOS programs.
- 91% of attendees felt more confident in their ability to talk about timely subjects, including answering questions about weather & climate science.
- Lots of Ideas for new feature stores (water vapor, extreme weather, air quality etc...)

# Feedback garnered from Formative Evaluation

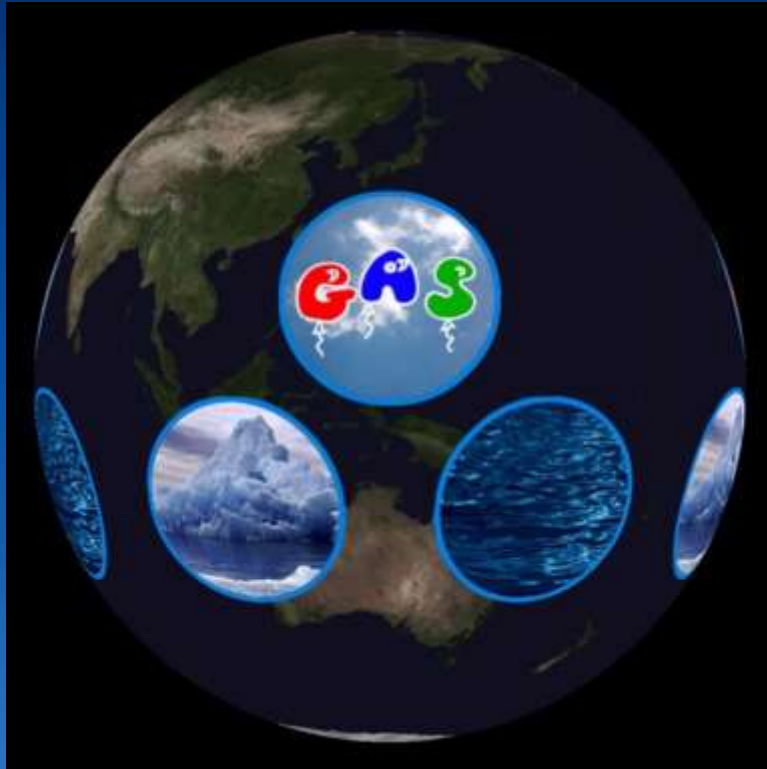
- Audio on Climate Digest was below most SOS-site standards (alternating male & female college students in an attempt to be colloquial)
- Content was “boring”, SOS visitors didn’t care about non-U.S. climate statistics &/or events
- Viewers preferred weather extremes to climate facts





# Feature Stories – 2014 & 2015

## Extreme Weather & Climate Change



## State of our Lakes





**Albedo:** The brightness of the Earth system determines how much incoming solar energy is reflected back to space. [More information](#)



**Monsoons:** During summer when land heats up, the winds in some tropical areas reverse and bring a large-scale sea breeze and rain over land. [More information](#)



**El Niño:** A change in wind and ocean circulation along the equator in the Pacific that impacts weather patterns around the world and disrupts the marine food web. [More information](#)



**Carbon Dioxide:** Measurements from the Mauna Loa observatory since 1958 and recent satellite imagery show an annual cycle plus a long-term rise in atmospheric CO<sub>2</sub> levels. [More information](#)



**Fast Carbon, Slow Carbon:** A banana and a chunk of coal are examples of fast and slow carbon cycling between the air and land. [More information](#)



**UV Index:** The strength of ultraviolet radiation received at the surface of the Earth, or UV index, varies by month, sun angle, clouds, air pollution and land elevation. [More information](#)



**Ozone Hole:** The annual thinning of the ozone layer above Antarctica is slowly improving, thanks to the Montreal Protocol that limited the use of ozone depleting chemicals. [More information](#)



**Ozone Layer:** A chemical made of 3 oxygen atoms, ozone in the stratosphere is important because it absorbs harmful UV radiation from the sun, protecting life on Earth. [More information](#)



**Solar Radiation:** Most energy on Earth comes from the Sun as radiation. Lightbulbs are used to illustrate primary wavelengths of solar radiation received: infrared, visible, UV. [More information](#)



**Air Quality:** We all breathe air. Monitoring Earth's air pollution from space shows how humans have a big effect on air quality and how it changes over time. [More information](#)

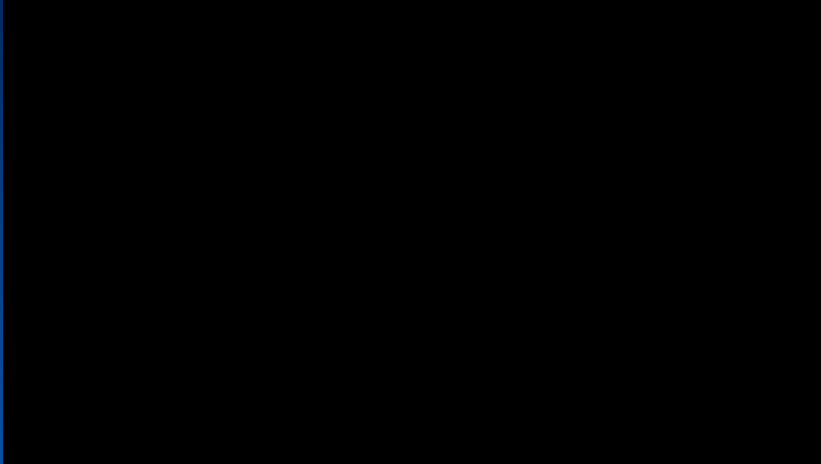


The ClimateBits video on **El Niño** with colorful ocean circulation patterns has over 11 thousand views on YouTube, the largest Internet viewership for content developed by this project.

It epitomizes 3 key ingredients for successful SOS content:

- 1) short length (less than 2 minutes),
- 2) timely topic (released during a strong El Niño year which was frequently in the news), *and*
- 3) stunning global graphics produced by NASA Goddard.

# Also in 2015 – CIMSS experimenting with GOES-R data



GOES-R, A glimpse into the future of Weather Satellites (2015)

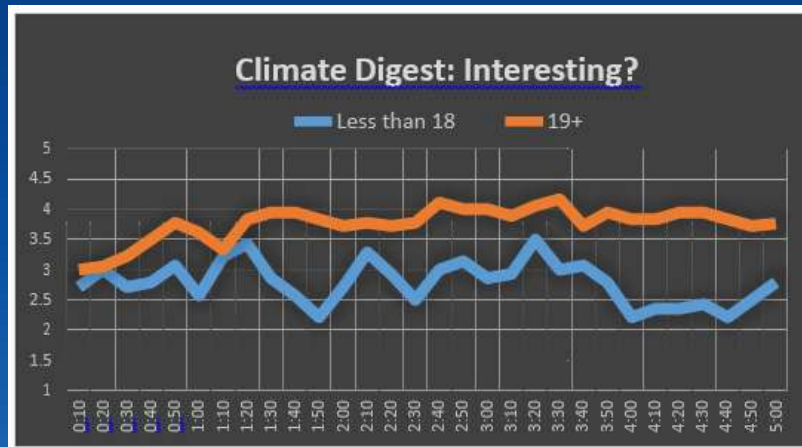


Weather Satellites – past, present and future (2016)

# Summative Evaluation

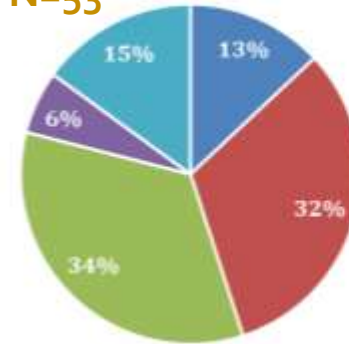
N = 556 respondents  
(325 adults, 241 < age 18)

Utilized *hand-held audience response devices*



Are you using EarthNow in your institution's programming?

N=53



- Yes, we use specific datasets in auto-run mode
- Yes, docents use Earth Now datasets in presentations
- No, but we are interested in using them
- No, and we are not interested in using Earth Now datasets
- N/A (Not aware of Earth Now)

45% indicated they use EarthNow products

Audiences are less likely to be “wowed” by material that is perceived as ordinary rather than dramatic (e.g., a recap of last month’s weather if uneventful when compared to extreme weather)  
This is particularly true for children.

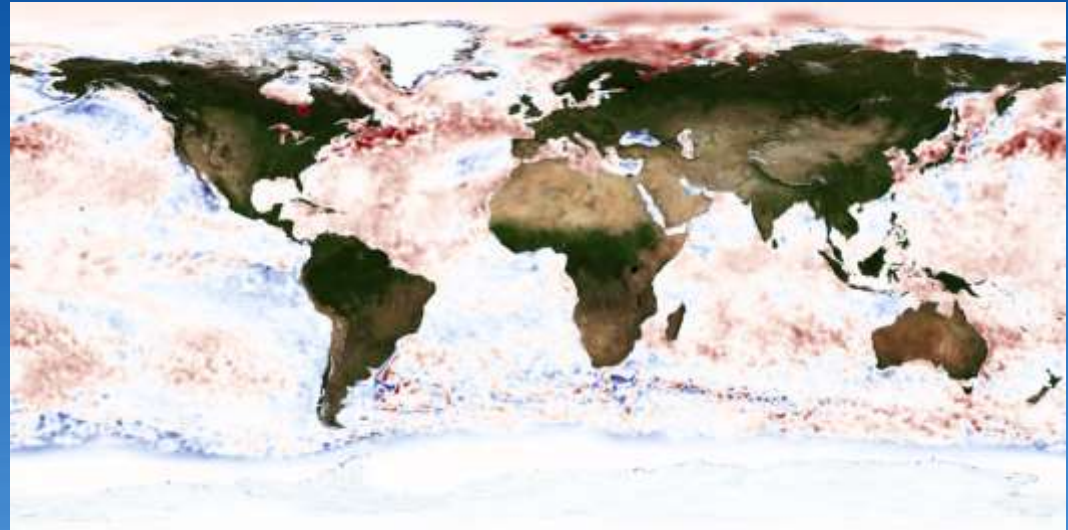
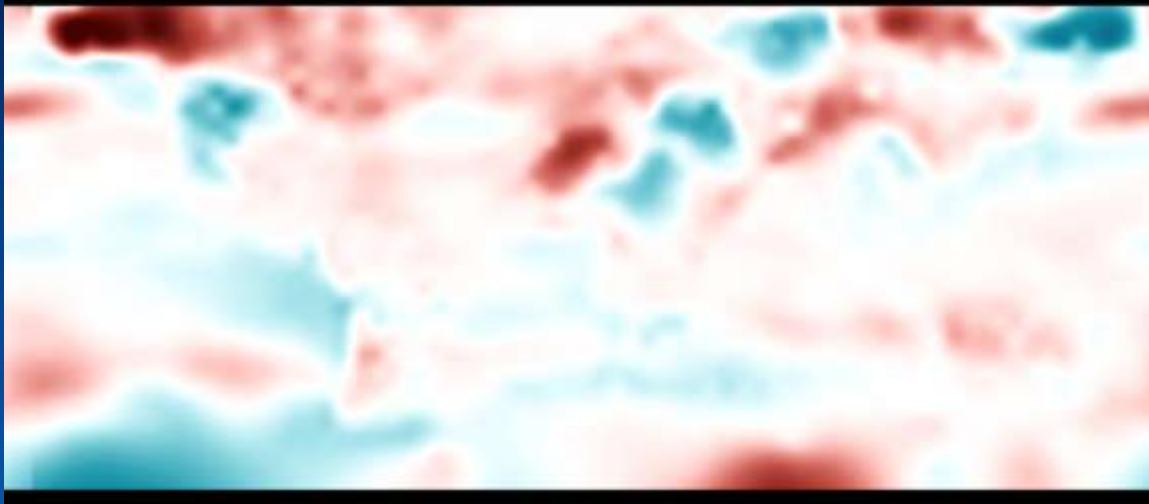
# 2016 – Perfecting the Quarterly Climate Digest as a possible legacy product

## Meteorological Season Products

- Land/Sea Surface Temperature Anomalies
- Sea Surface Temperature Anomalies
- United States specific seasonal products
- North America Drought Monitor
- Notable Global Weather Events
- Global Temperature and Precipitation Outlooks

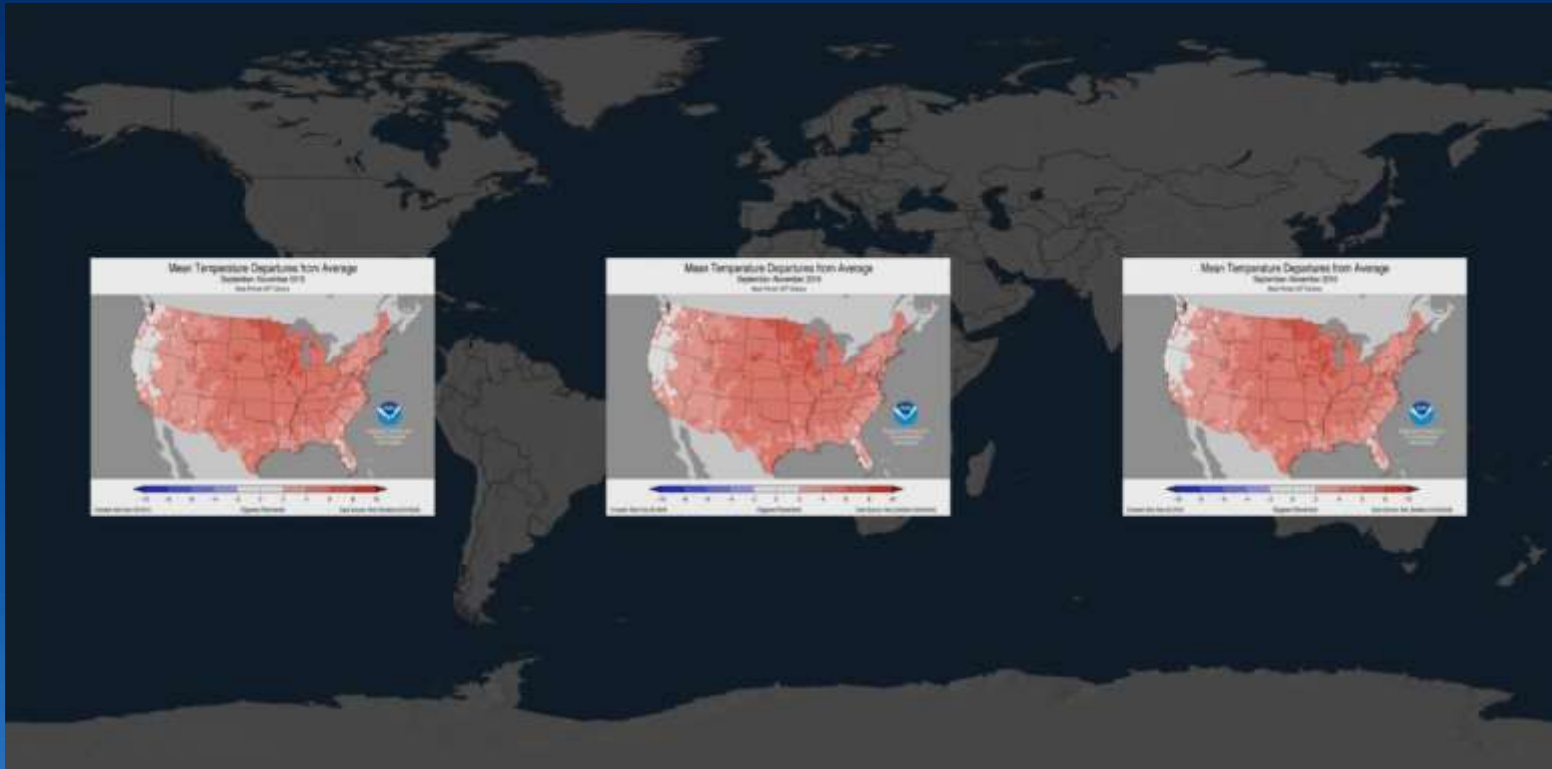


# Global Air & Sea Surface Temperature Anomalies over 3 months via NOAA Environmental Visualization Lab



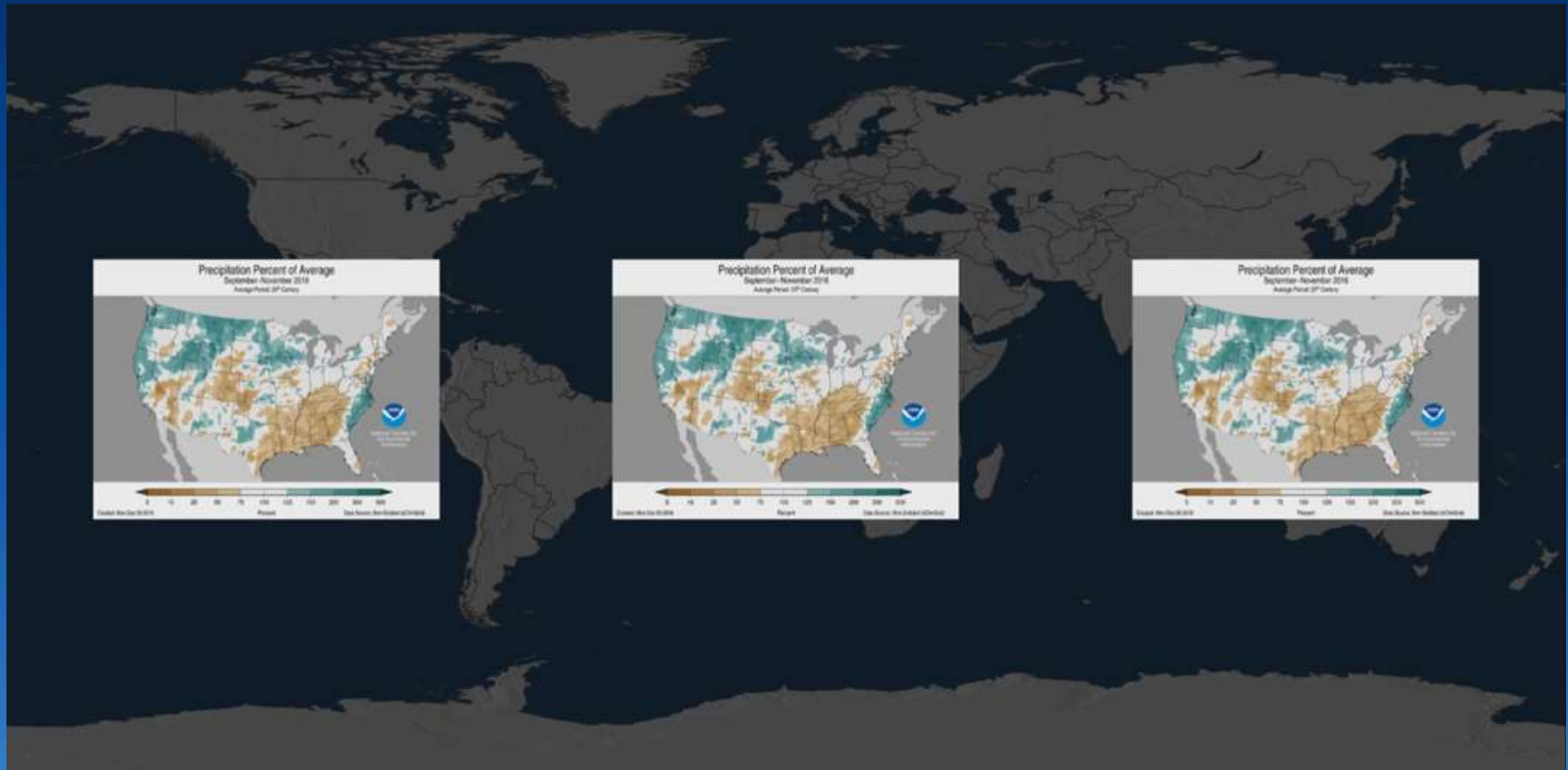
# 3 Month Continental United States Temperature Anomaly

NOAA Centers for Environmental Information – State of the Climate (SOTC)



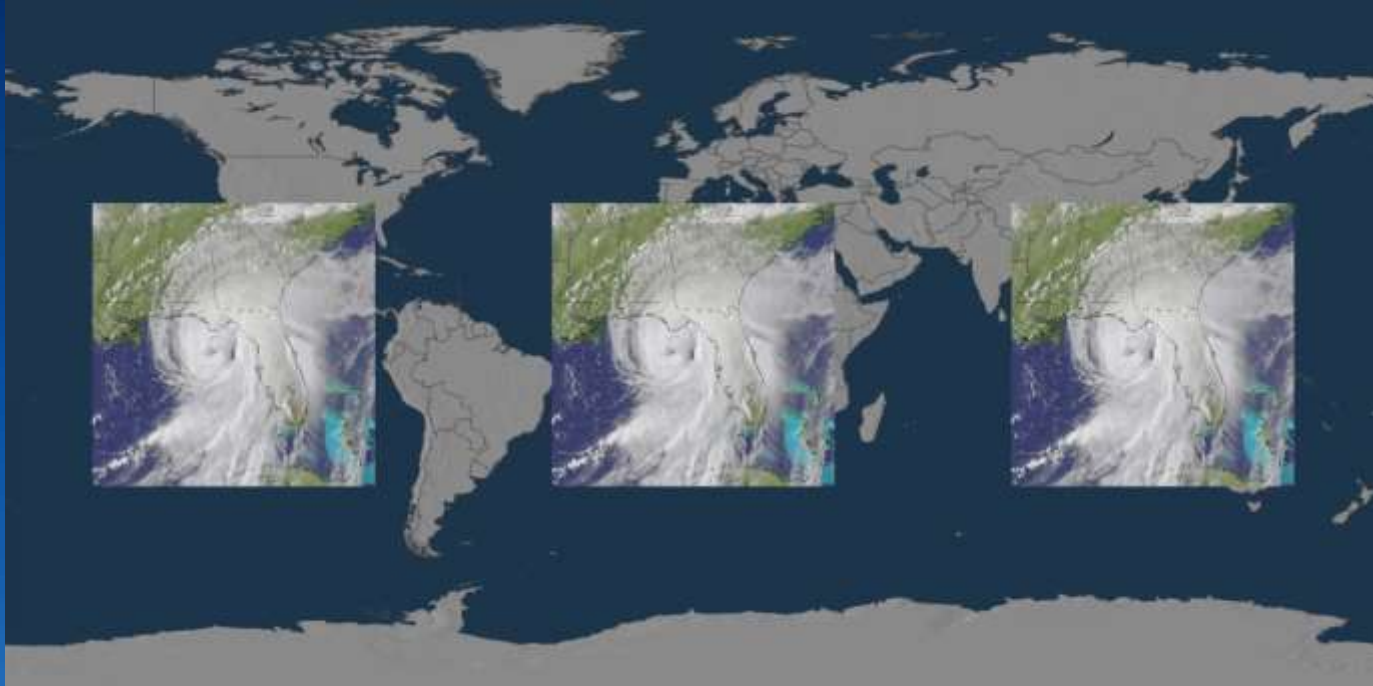
# 3 Month Continental United States Precipitation (% average)

NOAA Centers for Environmental Information – State of the Climate (SOTC)



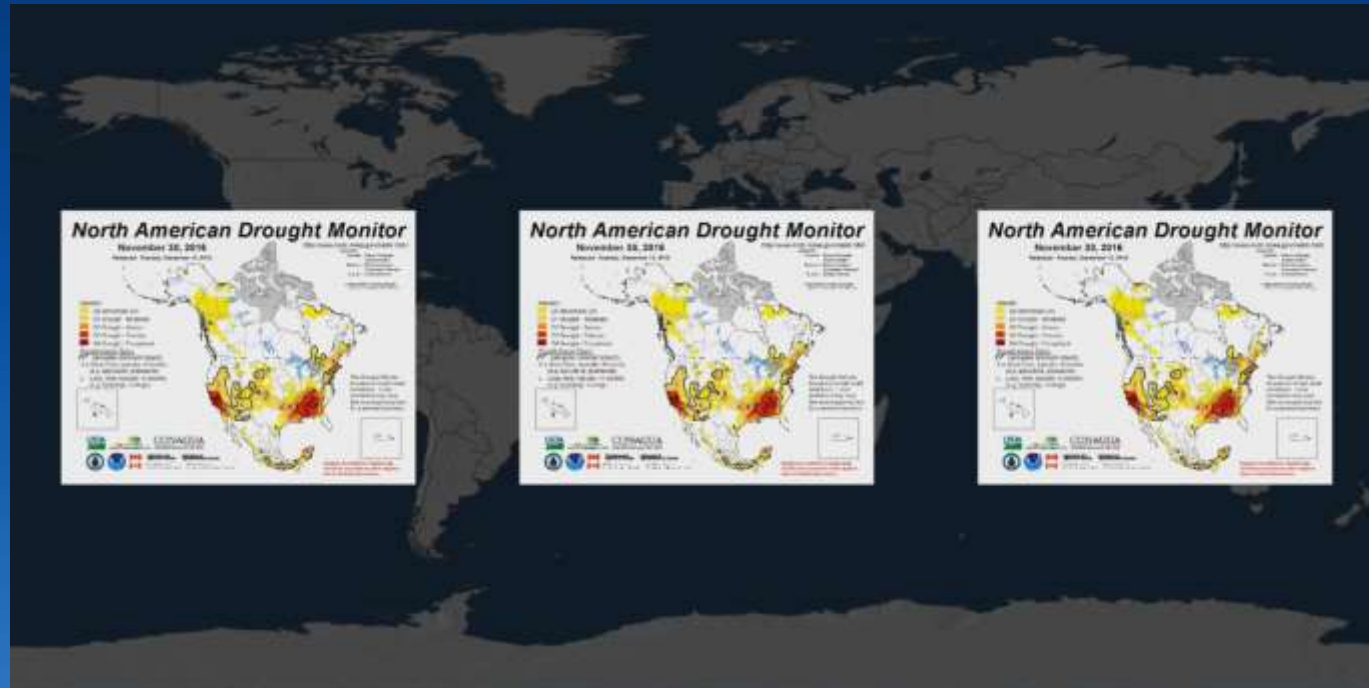


# Significant Weather Event of the season (anywhere)



# North American Drought Monitor (last day of last month in season)

- NOAA Centers for Environmental Information  
State of the Climate (SOTC) —



# Autumn 2016 Climate Digest



# Audience participation – determine the fate of the Quarterly Climate Digest

<https://pollev.com/margaretmoon500>



Respond at **PollEv.com/margaretmoon500**



Text **MARGARETMOON500** to **22333** once to join, then **A or B**

- 1) Should CIMSS revive the Quarterly Climate Digest product for SOS?
- 2) Would your institution show the Quarterly Climate Digest on your SOS?



# Finale - GOES-16 data



**Thank-you!**

Enjoy the rest of the SOS conference.