

Content Creation

Updated for SOS 4.0.1

Members of the SOS Users Collaborative Network often share content that they create with the other SOS sites.

1. Data Organization
 - a. Datasets are organized into folders
 - b. Only two required pieces are the image or images/mp4 and a playlist.sos file
 - i. Labels and color bars, are optional, but nice to have
 - c. Every dataset from NOAA is stored in one of six categories
 - i. Land
 - ii. Ocean
 - iii. Atmosphere
 - iv. Astronomy
 - v. Model and Simulations
 - vi. Extras
 - d. Content created on site should be kept in the **site-custom** folder (writeable by all users) or other folders created by the site (writable only by sos)
 - i. All of the data from NOAA is synced regularly with the NOAA FTP server, so any local changes will be overwritten.
 - e. Any content that is added to the system should be stored somewhere in /shared/sos/media
 - i. Do not store any content on the Desktop or in the sosrc playlist directories
2. Types of Datasets
 - a. Textures are a single, static image that can be set to rotate on the sphere (Blue Marble)
 - b. Time series animate through time and by default don't rotate (IR Sat/Night Lights)
 - i. Can animate at any rate, but 30 frames per second is the recommended speed
 - ii. Frame rate is sometimes limited based on the pixel resolution of the data and the type of data
3. File Format (SOS Coordinate System)
 - a. Images need to be plotted using the Equatorial Cylindrical Equidistant (ECE) projection
 - i. An ECE projection is commonly referred to as a simple lat/lon grid, where the image is a standard cartographic map projection that is twice as wide as it is tall (rectangular)
 - b. Images in the wrong projection format will project on the sphere, but they will not correctly represent the size of the continents
 - c. It is important that the data fill the entire image space to avoid borders and seams
 - d. For textures, **2048x1024** is minimum size, **4096x2048** is recommended
 - e. For animations, **2048x1024** is the recommended size
 - f. Most common image formats such as JPEG, PNG, GIF, TIF, etc work for textures
 - i. Prefer JPEG or PNG
 - ii. To use layers with transparency, use PNG
 - g. For animations, the only acceptable format is MP4.
 - i. Render the video with the MPEG4 video codec at a minimum of 25 mbps

- ii. Be sure to use a constant bit rate
- iii. H.264 codec can cause errors for SOS when used with a variable bit rate

4. Naming Conventions

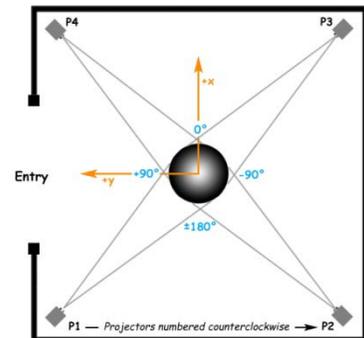
- a. Texture images should be named for their resolution, such as *4096.jpg*.
- b. Time series should be kept in a folder named for the images' resolution
 - i. The image file names should sort in ascending order from earliest to latest
 - 1. Use the date in the name of the file or embed a frame number in the file name, with a sufficient number of leading zeros
- c. Name MPEG4 files with the name of the dataset along with the resolution, such as *ocean_currents_2048.mp4*.

5. System Interactions with Data

- a. When a dataset is projected on the sphere, you are really looking at four images that have been merged together seamlessly around the sphere
- b. The SOS software splits the ECE images that you load using the SOS Stream GUI into four disk images every time you load a new dataset on to the sphere

6. Orientation of Data (SOS Coordinate System)

- a. The maps created for SOS generally are centered on the Prime Meridian, so that 0°N,0°E is the center of the image
- b. The center of the map loads between projectors three and four with the edges of the map between projectors one and two



7. Tools to Create Datasets

- a. Because Science On a Sphere® uses common image and video formats, you can use many tools to create and edit datasets such as:
 - i. Photoshop
 - ii. FinalCut Pro
 - iii. ImageMagick
 - iv. GIMP
- b. Tools like IDL, AWIPS, McIDAS, and other image analysis applications are typically used to create imagery from scientific datasets
- c. 3D modeling applications, such as 3D Studio, can be used to create advanced visualizations

8. Basic Options in the Playlist

- a. There are two places where you can modify a dataset: in your individual playlist (such as *weather_overview.sos*) or in the *playlist.sos* file
 - i. Modifications to a dataset in your individual playlist the changes will only apply in your playlist
 - ii. Modifications to a *playlist.sos* file, then every playlist that points to that *playlist.sos* file will reflect those changes

9. Texture Datasets Playlist Options (can be used for time series too)
 - a. Animate (**Japan Earthquake/Tsunami Combo**)
 - i. Set whether the dataset rotates/animates immediately or when play is pressed
 1. animate = 0 (rotate/animate when play is pressed)
 2. animate = 1 (rotate/animate automatically)
 - ii. The default is for the dataset to automatically start rotating.
 - iii. In autorun, the dataset will start playing automatically, regardless of what is set
 - b. Setting the Tilt (**Sept Ice Animation**)
 - i. Set the tilt of the dataset along the x, y, z axes
 - ii. Have many Earth textures set to load at a 23.5° tilt to resemble the Earth's tilt
 - iii. Use the keywords "tiltx," "tilty," and "tiltz" set to the number of degrees
 - c. Frame Rate (**SeaWiFS**)
 - i. The optimal playback speed is chosen based on the number of animation frames and the degree of change between each frame in the sequence
 - ii. We typically try to create data so that they look smooth and animate well at 30 fps
 - iii. If a dataset is coarse, then use a lower rates 10 – 15 fps
10. Time Series Datasets Playlist Options
 - a. Dwelling on Frames (**SSHA**)
 - i. "firstdwell" is amount of time the first frame is shown before animating
 - ii. "lastdwell" is amount of time the last frame is shown before looping
 - iii. The default is zero seconds
 - iv. Time is in milliseconds, so "firstdwell = 4000" dwells on frame for 4 seconds
 - v. If "lastdwell" is not set, the dataset loops continuously without pausing
11. Shortening a Dataset (Katrina)
 - a. Set "startframe" and "endframe" to the frame numbers you want to start and end on
 - b. The "endframe" can be a negative number, which counts back from the end
 - c. Another way to shorten a dataset is to set the "skip" option, which allows you to set a skip factor
 - d. When "skip" is set to one, it skips every other image, and when it's set two, it plays every third image
12. Stopping a Dataset
 - a. To stop an animation you can simply press the "A" button on the remote
 - b. Use "stopframe" to set a specific frame that you want to pause
13. Rotating a Dataset (**Sea Surface Currents and Temperatures**)
 - a. Rotation of an animating dataset can be turned on with Z-Rotate on the remotes
 - b. When "zrotationenable" is set to 1, then the dataset will rotate about its z axis while it animates
 - c. Use "zfps" and "zrotationangle" to set the frames per second of rotation for the dataset and the angle at which the dataset rotates.
 - d. Dataset will only rotate while it animates

14. Autorun Datasets

- a. Specify the amount of time dataset is shown by setting “timer” to the number of seconds desired
- b. If this is not specified, then each dataset is shown for 180 seconds
- c. If “timer” is specified and you are not showing the playlist in Autorun mode, then “timer” will be ignored
- d. It’s important to use “timer” when you also have accompanying audio tracks so that the dataset is shown for the length of the audio track.

15. Audio Datasets (Rita)

- a. Set audio for each dataset by specifying the desired track with the “audio” keyword
 - i. The audio tracks must be compatible with the Linux Mplayer such as .mp3, .mp4, .wav, or .ogg. Picture in a Picture
- b. To have audio loop, the “duration” must be set to length of dataset

16. Picture in a Picture Information (NOAA Logo)

- a. Picture in Picture (pip) allows you to display single pictures (any of the previously mentioned image formats works), a directory of images, or videos (MPEG4 only) on top of any dataset
- b. This feature can be used to display any image, but is commonly used to display color bars, charts and graphs, and other images that supply supplemental information
- c. Images that are going to be used as pips can be stored with the dataset

17. Pipstyle

- a. There are three different styles for pips: projector, room, and globe.
 - i. “pipstyle = projector” is the default, where the pip is replicated four times and placed with the default position centered in front of each projector
 1. As the sphere is tilted and rotated, this pip remains stationary relative to the room, with the sphere data sliding underneath it
 - ii. “pipstyle = globe” places one pip on the globe, by default with latitude and longitude both zero (NOAA Logo Room)
 1. As the sphere is tilted and rotated, this pip moves with the globe - this allows you to use pips as geo-referenced markers
 - iii. “pipstyle = room” places one pip on the globe, by default with latitude and longitude both zero (SOS Locations)
 1. As the sphere is tilted and rotated, this pip remains stationary relative to the room, with the sphere data sliding underneath it

18. Pip Timing

- a. “piptimer” sets (in seconds) the amount of time a pip is displayed
- b. If “piptimer” is set to 0, then the pip will be displayed for the duration of the dataset
- c. You can delay the appearance of a pip by using “pipdelay,” which is in seconds.
- d. Use “pipfadein” and “pipfadeout” to fade the pip in/out in a specified number of seconds (The time to fade in and out a pip is excluded in the total amount of time allotted in for the “piptimer”)
- e. By default, a series of pips will play through only once. You can set “duration” to a given number of seconds and the pips and underlying dataset will loop based on the set duration.

19. Pip Size

- a. Set the “pipwidth” and “pipheight” in degrees latitude and longitude to adjust size
- b. If you set just the height or the width, the software will automatically scale the image
- c. To adjust the position of the pip, use “pipvertical” and “piphorizontal”
 - i. Both of these are in degrees
 - ii. “pipvertical” is the vertical position of the image relative to the equator, with positive degrees above the equator
 - iii. “piphorizontal” is the horizontal position of the image relative to the center of the projector with positive degrees east of the projector
 - iv. Pips will warp when placed near the poles (NOAA Logo with pipvert)
- d. “pipcoords,” set in degrees latitude and longitude, is another way to position pip
 - i. Benefit of using “pipcoords” is that there is no warping of the images, even near the poles (NOAA Logo with pipcoords)
- e. “pipcoords” is also used with “pipstyle” “room” and “globe” to position the pip

20. Miscellaneous Pip Notes

- a. When a pip is a mp4 file, the default playback speed is the frame rate of the dataset on which it is overlaid
 - i. If you want to control the frame rate of the pip, then use “pipfps” to set a new frame rate
- b. “pipalpha,” is used to set the transparency or opacity
 - i. Adjust the opacity of the image from 0, which is completely transparent to 1, which is completely opaque

21. Annotation Icons (Shipping Routes)

- a. The SOS Remote app, through the annotation feature, gives presenters the ability to draw on the sphere and place icons on the sphere
- b. To create your own icons, use a transparent PNG with a minimum resolution of 256x256
- c. Custom icons can either be specified for specific datasets, or made available in the default icon library
 - i. Add an **icons = value** keyword/value pair to the dataset’s playlist file and place the icon in the dataset directory - Note that you can specify more than one icon by making a comma separated list with **no** spaces
 - ii. Add an **icons = value** keyword/value pair for a clip to your personal playlist, however, the pathname of the icon file must be specified relative to the location of the clip’s playlist.sos file
- d. A general set of icons to be used frequently can be added to the directory **/shared/sos/etc/AnnotationIcons/**

22. Layers (Hurricane Isaac Radar over Satellite)

- a. The layering capability in SOS allows presenters to dynamically turn layers on and off
- b. By using the Layers tab in SOS Remote, the user can toggle individual layers on and off, adjust the level of transparency of each layer, or delete a layer
 - i. Any labels or PIPs associated with a clip are now automatically placed in dedicated layers named Labels and PIPs
- c. Each use of a “layer = name” keyword/value pair within a dataset definition defines a new layer and specifies the name of the layer
 - i. Each new layer specified appears visually on top of any previous layers.

- d. "layerdata" keyword is repeated for each layer to specify the corresponding data file for the layer
- e. "layervisible = no" keyword/value pair specifies that the layer is not initially visible.
- f. "layeralpha" keyword pair specify the initial opacity of the layer
 - i. An alpha value of 0.0 means that the layer is totally transparent, and 1.0 means the layer is totally opaque

Note: For compatibility with versions of SOS prior to SOS Version 4, a default layer is created when the "data = " playlist keyword is seen in a playlist before the "layer = " keyword. The name of this default layer will be the same as the name of the dataset, given by the "name = " keyword.

23. Orienting Layers

- a. In order for layers to overlap properly, it is important to make sure that the maps are oriented identically
 - i. Set "layereast," "layerwest," "layernorth," and "layersouth" to specify the geographic extent of the data within the layer
 - ii. They specify the east and west edges of the data in degrees east longitude, and the north and south edges in degrees north latitude

24. Overlays (Earth Vegetation)

- a. Library called overlays which is located in the /shared/sos/media/ directory, and which will show up as a library category on SOS Stream GUI and on the iPhone/iPad
- b. Contains useful earth-related transparent layers (specified as datasets in a standard clip playlist.sos file format)

25. Labels and Color bars

- a. Using Color Bars and Labels (Aerosols – Black Carbon)
 - i. While color bars and labels can be added directly to the images that you create, it is not recommended
 - ii. You can externally add the color bars and labels, which adds flexibility and convenience
 - iii. If they are part of the image, then make sure that they are sized appropriately for the sphere and positioned so that they don't warp too much
- b. Color Bars
 - i. Color bars are added as pips
 - ii. We typically save them as color_bar.jpg in order to keep them separate from other images
 - iii. Make sure that color bars are big enough that they appear clear on the sphere
 - iv. If you include units, those need to be legible on the sphere
 - v. We prefer vertical color bars, but it's up to your site how you make your colorbars
- c. Labels (2005 Hurricane Gray IR)
 - i. Labels are just a simple text file that we name labels.txt
 - ii. In the text file, there is one line for each image in the time series
 - iii. Labels typically include the date and maybe a name or model run
 - iv. You can make the labels using any text editor that you prefer
- d. Label Position

- i. The default position of the labels is (-0.3, -0.5)
 - ii. The position of the labels can be changed by using “labelposition,” which is set by the x and y position as a pair of coordinates (x,y)
 - iii. X and Y can vary from -1 to 1
 - iv. Negative is south of the equator and west of the projector
- e. Label Options
 - i. The default color of the labels is white, but that can be changed using “labelcolor”
 - ii. “labelcolor” can be R, G, B, Alpha, or the symbolic names: white, black, red, green, blue...
 - iii. If “label = default” then the image file names are used as the labels
- f. Labels and Titles (2009 Ice Animation)
 - i. Titles can be included as part of the labels
 - ii. If you want more font, color and size options then you can include the title as a pip

26. Playlist Editor

- a. When you use the playlist editor, changes you make will affect only your individual playlist that you are editing
- b. The playlist.sos file is the master copy of how the dataset is displayed, so if you make changes in the playlist.sos files, the changes will appear in everyone’s playlists
- c. To edit a dataset with the playlist editor, simply double click on a dataset in your playlist to open a window that has all of the options listed or select a dataset in your playlist and click the “Edit Clip” button at the top of the window
- d. There are three tabs across the window that will pop up
 - i. “Sphere Display” - display options, animation speed, tilt, endframe, stopframe
 - ii. “Commentary” – can add an audio file and any notes
 - iii. “Picture in Picture” - add and modify new pips

27. Adding New Datasets

- a. The SOS computers are configured to download new content from the NOAA FTP server once a week and update the library catalog in the SOS Stream GUI
- b. For new datasets created by your site, there are just a couple of steps to follow to get the dataset on the sphere
 - i. First you need to find a place to store the file on the primary computer, such as your site’s personal folder, /shared/sos/media/site-custom
 - ii. At very minimum the folder you create for a new dataset should contain the raw image or images or mp4 and a playlist.sos file
 - iii. In the playlist.sos file, make sure to specify the category.
 - iv. To view your new dataset you can either make a playlist that contains it, or you can update the library and find it the category that you specified
- c. See the Content Submission Guidelines online
<http://sos.noaa.gov/Docs/SOSContentGuidelines.pdf>

28. Real-time Datasets

- a. There is a collection of over 30 real-time datasets that are provided by NOAA.
- b. SOS computers come configured to download just the five most popular datasets

- c. In /shared/sos/media/playlists are various real-time dataset playlists that vary from just a few datasets to all of the real-time datasets
 - d. You can also create your own playlist of the real-time datasets that your site is interested in using
29. Sharing Datasets (Frozen)
- a. Sites are encouraged to provide the datasets that they create to the NOAA library so that all of the other SOS sites can use them as well
 - b. A SOS users group has been created as a Yahoo Group - this is a place to ask questions, get advice and work with other sites.