

Mapserver Supplement to FFGS User's Guide

SAsiaFFGS

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4 Dissemination Interface

4.4 Dissemination Interface – Mapserver Overview

The goal of the Mapserver Interface is to take the information presented in Console and some items from the Dashboard Interface and provide for more interactive and informative review by the forecaster. While both the Console and Dashboard Interfaces present system data for review in the form of static visualizations, the Mapserver Interface provides the forecaster with an interactive map offering functionality for zooming and panning for greater detail. Additionally, the Mapserver Interface provides tools to facilitate the creation and saving of more informative and intuitive images including reference layers and identification labels for basins. The Mapserver Interface is comprised of four functionality-specific web pages: the Product Viewer, Product Comparison, FFG Plots, and Basin Time Series Downloads pages. The user can reach these different pages using buttons on the Product Viewer page that will automatically transfer necessary contextual information from the existing date, product and feature selections. Alternatively, each of these four pages can be reached directly using links in the footer area of each page, as shown in Figure 4.21.

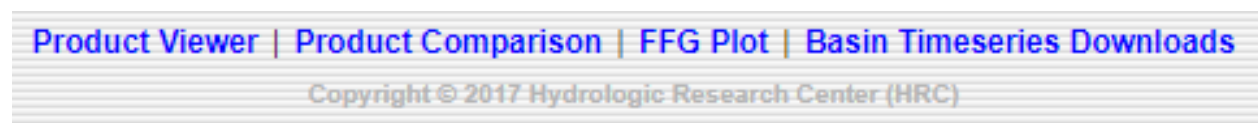


Figure 4.21 Dissemination Interface – Mapserver navigational page footer

4.4.1 Mapserver Interface – Product Viewer Page

The first page the user will encounter when opening the FFGS Mapserver Interface is the Product Viewer Page. The Product Viewer page serves as the primary map-viewer interface, allowing the user to display FFGS output data products overlaid with information layers, such as OpenStreetMap base maps, digital elevation models, regional outlines, and product color scales. See Figure 4.22. This page is comprised of an interactive map in the center panel accompanied by toolbars to the left and right. The top half of the left toolbar contains user-selection options for

Product Date, Country, and Data Product to be displayed. Below the selection options, an informational box provides details following any mouse-click on the map. At the bottom of the left toolbar, buttons for downloading both individual and composited data product output files are provided. The toolbar on the right contains the available layers and their respective visibility options, as well as color scales for the currently selected product and the SRTM DEM. The functionality for both the left and right toolbars is described in more detail in the following sections.

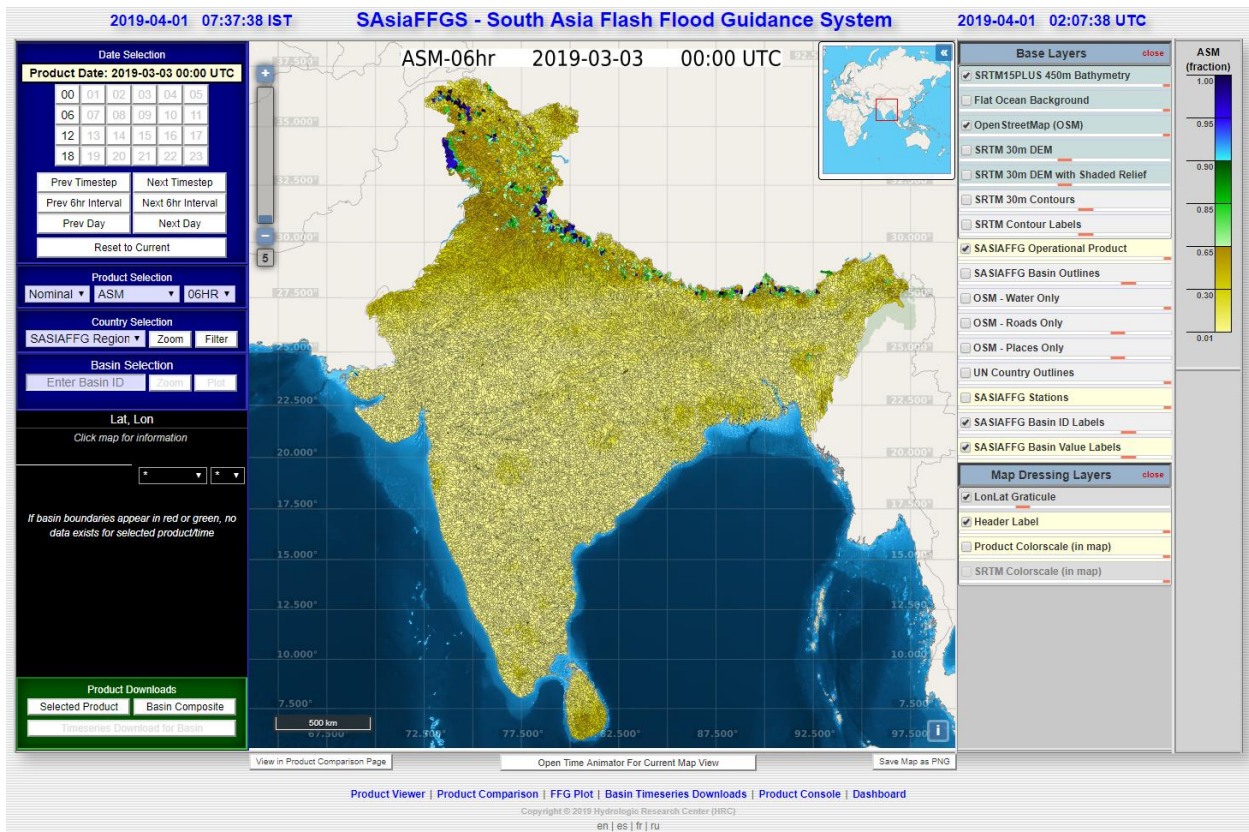


Figure 4.22 Dissemination Interface – Mapserver Product Viewer Page

4.4.2 Mapserver Interface – The Navigation Selection Tools

The product date picker at the top of the left toolbar allows the forecaster to select the date for products shown in the map viewer panel. See Figure 4.23. When the currently selected Product Date is clicked, an interactive calendar will open that allows for quick selection of the desired year, month and day. See Figure 4.24. The dropdown date-field menus at the top of the

interactive calendar can be used to select months and years, whereas the buttons that form a calendar grid below can be used to select the day of the month. The date picker will limit the user from selecting any days that are further into the past than currently available data, as well as from picking any dates beyond the actual current time.



Figure 4.23 Mapserver Navigation – The Product Date Picker

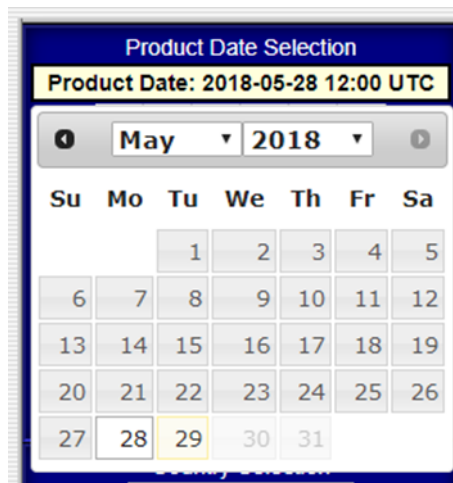


Figure 4.24 Mapserver Navigation – The Product Date Picker Pop-Up Calendar

Below the Product Date indicator, there is a grid of 24 buttons containing numerical values 00 through 23, one for each of the 24 hours in the currently selected date. Clicking on one of these buttons will change the selected time to that hour. (It should be noted that all dates and times throughout the interface are represented using the UTC time zone.) As with the calendar selection, the time selection buttons prevent the user from choosing hours that are invalid for the

currently selected product – e.g., if a 6-hourly product is selected (such as FFG), the forecaster will only be able to select hours 00, 06, 12, and 18. Lastly, the product date picker includes buttons for stepping through time at various intervals. The buttons “Prev Timestep” and “Next Timestep” will navigate to the previous/next valid hour for the currently selected product. “Prev 6hr Interval” and “Next 6hr Interval” will move to the previous/next cardinal hour (00, 06, 12, 18), “Prev Day” and “Next Day” move forward/back exactly 24 hours, and “Reset to Current” will jump to the most recent time where data is available for the selected product.

Below the product date picker, the left toolbar provides three additional options for selecting the content displayed in the map viewer: the Country Selector, the Product Selector and the Basin Selector. The Country Selection dropdown menu allows the forecaster the option of limiting the displayed content to a single country or geographic region. This display refinement is beneficial in that viewing only a subset of system basins reduces the back-end data preparation time as well as the amount of returning data sent over the network, therefore increasing interface performance. This selection will also change the file download links to contain data only for basins within the selected country. See Figure 4.25.



Figure 4.25 Mapserver Navigation – The Country Selection Tool

The Product Selection tool consists of three dropdowns, from left to right: the precipitation option dropdown allows the selection between “Nominal,” “Low” and “High” rainfall condition variants for each product, the data product selector allows the selection of the desired product for visualization, and the DT selector allows the selection of the delta time interval of the product to be displayed. Modifying any of these selection options will automatically update the map to reflect the change. See Figure 4.26.



Figure 4.26 Mapserver Navigation – The Product Selection Tool

The Basin Selection tool contains an input box and two buttons – ‘Zoom’ and ‘Plot’. The input box can be populated with a basin ID by either clicking on a basin in the map, or manually typing in a known numerical basin identifier. When a basin ID is entered, the ‘Zoom’ and ‘Plot’ buttons become available. ‘Zoom’ will zoom in on the selected basin in the map viewer, and ‘Plot’ will navigate the browser to the FFG Plot interface page with the chosen basin ID automatically supplied upon arrival. See Figure 4.27.



Figure 4.27 Mapserver Navigation – The Basin Selection Tool

4.4.3 Mapserver Interface – The Feature Info Box

The large black box in the left toolbar beneath the navigation selection options is called the Feature Info Box. Following a mouse click on any selected and displayed valid data content within the current map view, the Feature Info Box will automatically populate with detailed information about the location of the click. See Figure 4.28. The latitude and longitude for the current location of the user’s mouse pointer within the map is displayed at the top of the Feature Info Box (when the pointer is outside of the map, “Lat, Lon” is shown).

Below the location coordinate is a field for retaining the Latitude and Longitude coordinate of the pointer at the time of the last click within the map; the Data Product and DT indicators that were actively displayed at the time of the last click are also retained. To the right of this information-retention field are two dropdown menus providing optional selections of data product and delta time. By default, these dropdown selectors contain ‘*’, meaning the Feature Info Box content will show values for the data product and delta time of the active map content. Changing either or both of these dropdowns will correspondingly alter the information shown in the Feature Info Box, regardless of the actively displayed product in the map.

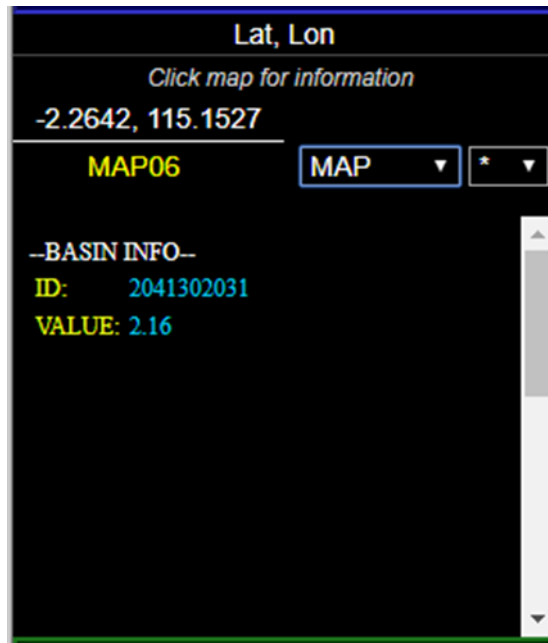


Figure 4.28 Mapserver Interface – The Feature Info Box

In the area below these controls is where the information for the clicked location appears. If a basin product is displayed, the basin ID and product value will be displayed. If a raster product is displayed, the pixel value for the clicked location will appear. If a station was clicked, all information about that station will appear. (Note that precise “aim” might be required when clicking to properly select an intended station. Zooming the view closer to the station’s location might ease the sensitivity.)

4.4.4 Mapserver Interface – The Product Downloads Tool

Located at the base of the left toolbar in a green box is the Product Downloads Tool, containing three buttons: Selected Product, Basin Composite, and Timeseries Download for Basin. See Figure 4.29.



Figure 4.29 Mapserver Interface – The Product Downloads Tool

Clicking on the “Selected Product” button, will generate a file-download prompt for the currently selected product. If the currently selected product is a basin product, a CSV-formatted file will be provided containing the basin ID and product value pairs for each basin in the product layer. If the currently selected product is a raster product, a gzipped *.grd (GRASS ASCII grid format) file will be provided containing the data for the selected raster. Clicking on the “Basin Composite” button, a CSV-formatted file will be provided containing every basin ID in the system paired with the product value for every basin product in the system for the currently selected product date. Finally, by clicking on “Timeseries Download for Basin” button, a new browser tab will open to the Basin Timeseries Downloads page for the currently selected basin. Note that this button is disabled when no basin is currently selected in the Basin Selection Tool.

4.4.5 Mapserver Interface – The Interactive Map Panel

The main focus of the Product Viewer Page is the interactive map view panel in the center. See Figure 4.30. This map panel provides the functionality for navigating the current display using intuitive and standard web-mapping user interaction. For example, the user can double-click to zoom, click and drag to pan, as well as pinching and spreading on multi-touch devices to zoom in and out (a mouse wheel may also be used for zooming). The zoom level slider in the top left of the map view panel displays the current zoom level in a box at the bottom (this slider itself may be used for zoom control). The overview map thumbnail in the top right of the map view panel displays a wider, contextual view of the map area. There is a map scale in the bottom left of the map and an information button in the bottom right for displaying or hiding content attributions for visible layers.

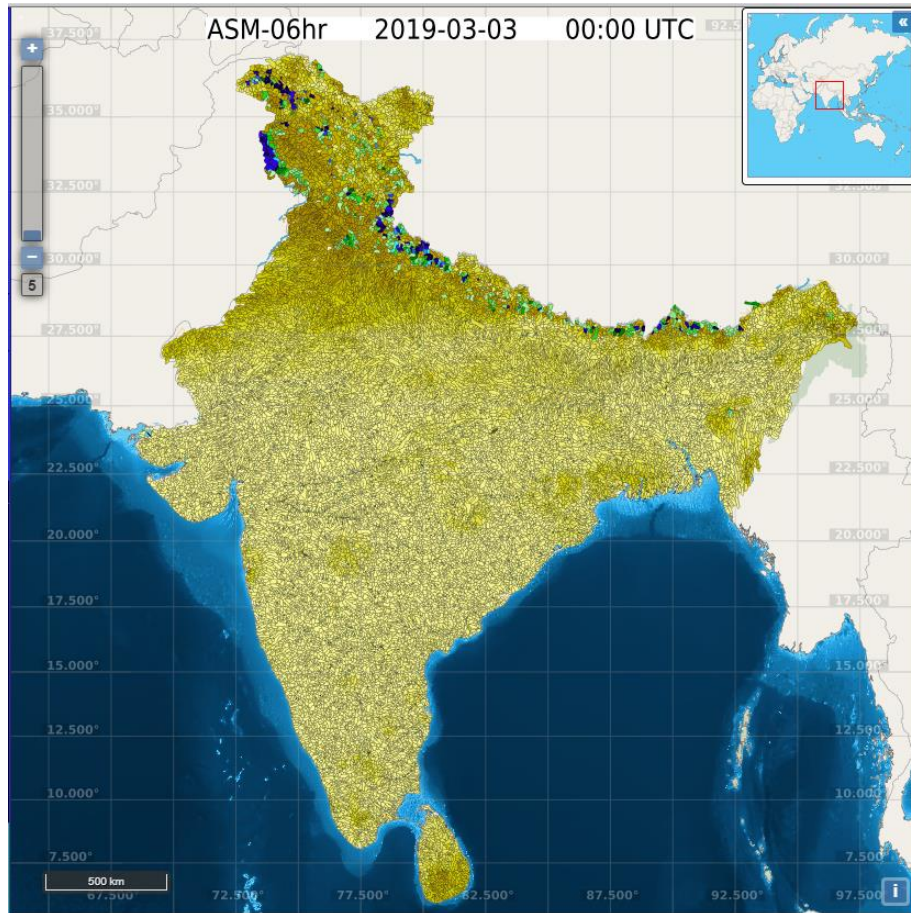


Figure 4.30 Mapserver Interface – The Map View Panel

4.4.6 Mapserver Interface – The Map Layers Panel and Color Scales

To the right of the interactive map is the layers panel. See Figure 4.31. This construct will be familiar to users of GIS software, as layers are typically handled in a similar fashion. Each layer has a checkbox next to the layer name to toggle visibility of that layer. Each visible layer is sent to the browser from the server as an image and stacked according to its relative position in the layer list. The stacking order places images from layers at the top of the list underneath images from layers further down the list. For example, the default layers shown in Figure 4.30 above will be ordered with the OpenStreetMap layers on the bottom, with the operational product layer over that, the Latitude and Longitude graticules over the operational product and, finally, the product label resting at the top of the stack. The order of layers is not user-adjustable.



Figure 4.31 Mapserver Interface – The Map Layers Panel

Within each item slot of the layers panel is an opacity slider, which allows the user to make any layer more or less opaque. When the slider is all the way to the right, the layer is 100% opaque; inversely, the layer is 0% opaque (invisible) when the slider is all the way to the left. It should be noted that some layers, by convention, will not be appear at all (regardless of opacity) until a certain zoom threshold has been reached – this is done to avoid over-cluttering of the map when using layers such as basin IDs and other labeling information. The respective zoom level required for each layer to appear can be found in a tooltip that appears when the mouse pointer hovers over the layer name in the list. Each item slot in the layer list is color coded. An item with a yellow background is one that is affected by changes to the product and/or date selection. A layer with a grey background is a static reference layer, and a layer with a blue background is a base map layer.

To the right of the layers panel are two color scales. The color scale on the top is dynamic and will change according to the product selection. See Figure 5.32. The color scale

on the bottom is static and is used for the SRTM DEM (Digital Elevation Model) layers, though it is only visible when one of the SRTM DEM layers are toggled on. See Figure 4.33.

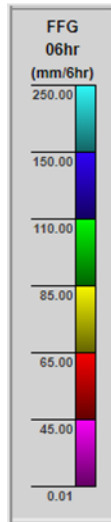


Figure 4.32 Mapserver Interface – The Active Product Color Scale

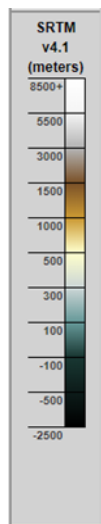


Figure 4.33 Mapserver Interface – The SRTM DEM Color Scale

4.4.7 The View Product Comparison and Product Animator Buttons

Located below the interactive map view panel is a button labeled “View in Product Comparison Page.” This button, when clicked, will open the Product Comparison Page

(discussed in the next section) and will carry forward all selected options of the active display from the Product Viewer Page. See Figure 4.34.



Figure 4.34 Mapserver Interface – The View in Product Comparison Page Button

Also located below the map panel is a button labeled “Open Time Animator for Current Map View”. See Figure 4.35. When this button is clicked, all controls outside of the animator controls and the footer links become disabled (indicated by a pad-lock-style mouse pointer) and the last 24 time steps for the selected product begin loading for animation. (Please note that the animator is only available when the “Operational Product” layer is toggled on.) Each time step of the animator is represented by one of 24 squares, and the loading status of that time step is indicated by the color of the square: grey means loading, green means successfully loaded, and red means failed to load. Once a single frame successfully loads, the animation begins automatically. Clicking on any square will jump directly to that “frame” in the animation, while positioning the mouse pointer over any square will display the date and time information for that frame’s corresponding data content. See Figure 4.36.



Figure 4.35 Mapserver Interface – The Open Time Animator Button

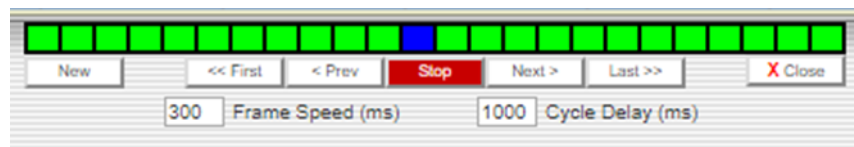


Figure 4.36 Mapserver Interface – The Time Animator Controls

Below the frame indication squares are animation tools for stepping through time. In the center of the middle button group is a dynamic Start/Stop button, which changes according to the

state of the animation feature (showing “Stop” when running and “Start” when idle). Next to that on either side are “Prev” and “Next” buttons, allowing the user to step forwards or backwards one frame at a time. Next, are the “First” and “Last” buttons, which jump to the first and last frames of the sequence, respectively.

Below the stepping-control buttons is a box for “Frame Speed,” which defines animation duration of each frame in milliseconds. To the right of that is the “Cycle Delay” control, which defines the duration of pause the last frame before restarting the animation loop at the first frame.

Returning attention to the row of buttons, on the far right side is the “Close” button, used to close the animator tool and unlock the rest of the interface. On the far left side is the “New” button, which will open a new (interactive) Product Map Viewer window using the same product selection and map view shown but for the specific date and time of the current frame.

Since the animator loads the last 24 time steps for the selected product, the period of time covered by the animation varies depending on the delta time characteristic of the product selected. For instance, if an hourly product is selected, the animation will cover exactly one day (24 frames x 1 hour each). If a 6-hourly product selected, then the animation will cover a period of 6 days (24 frames x 6 hours each / 24 hours).

4.4.8 Mapserver Interface – The Product Comparison Page

The Product Comparison page shares many similarities with the Product Viewer page and features similar tools that operate analogously to those of the Product Viewer Page. The Product Comparison Page is intended to replicate the functionality of the Product Viewer page with the primary difference of providing four smaller, independently-controlled map-view panels instead of single large panel. Each of these four map-view panels includes its own associated layer selection panel, zooming tool, and product selection tool. The two maps on the left share a single product date picker while the two panels on the right share a second product date picker. The Product Comparison page does not contain the full suite of interactive mapping tools that are present in the Product Viewer Page in order to simplify the user-interaction for the comparison of data products. See Figure 4.37.

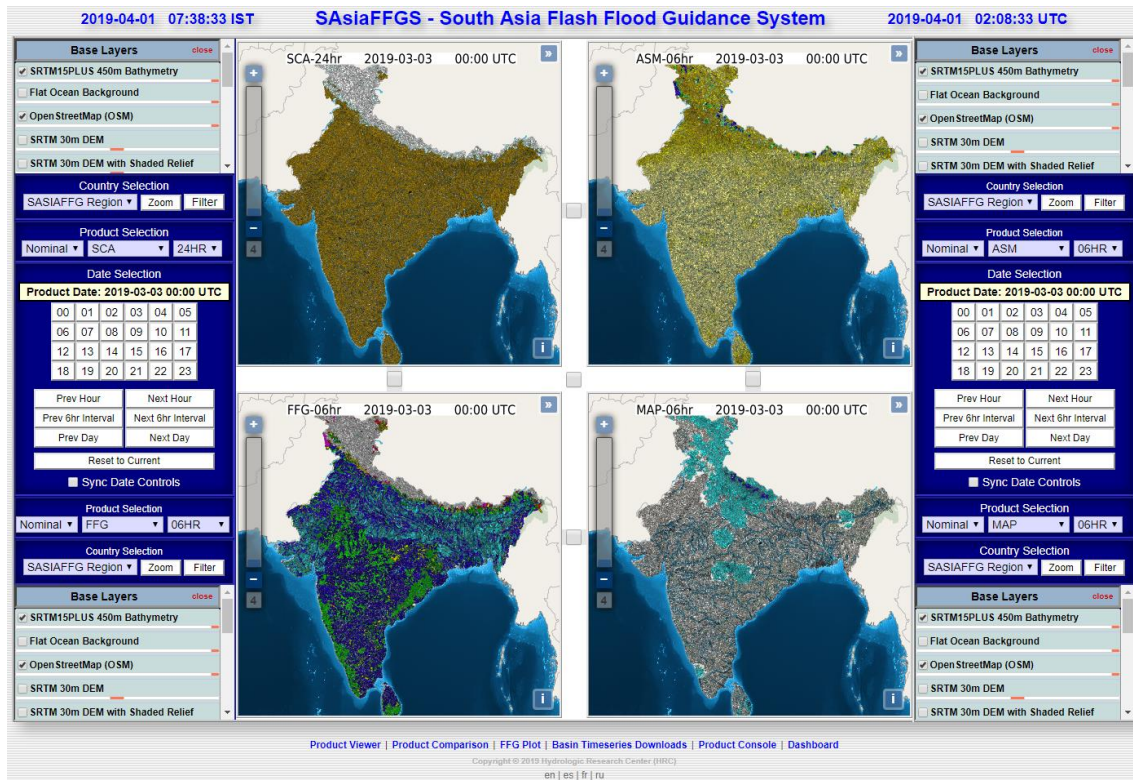


Figure 4.37 Mapserver Interface – The Product Comparison Page

As the name implies, the purpose of this page is to compare multiple products across different times or map views at the same time in a common interface. By default, all four maps have independent views. The user can synchronize the maps by clicking the checkboxes found between the individual map panels. The maps can be linked together in any combination, with the exception that maps in opposite corners cannot be linked without having a third map linked as well. In Figure 4.38, note that the top two maps are linked together while leaving the bottom two maps independent.

Clicking either the center checkbox or any three pairing checkboxes will link the control of all four maps together. To unlink the maps, the center checkbox may be unchecked. By default, the left product date picker tool controls the left two maps and the right product date picker tool controls the right two maps, independently. Either date picker tool can be used to control all four maps by clicking the “Sync Date Controls” checkbox found at the bottom of either product date picker.

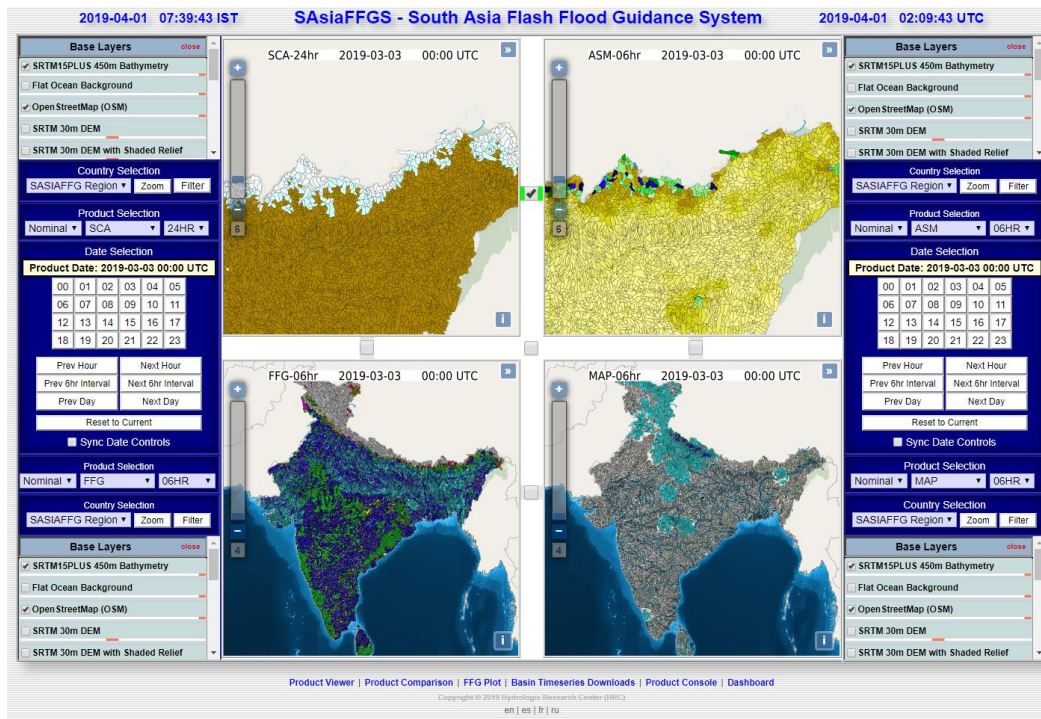


Figure 4.38 Mapserver Interface – Map Linking in the Product Comparison Page

4.4.9 Mapserver Interface – Date Navigation on the Product Comparison Page

When the user moves the mouse over an individual navigation tool, the interface will highlight the single map panel or linked map panels that are controlled by that toolbar. In Figure 4.38, we see that when the mouse is moved over the left date picker tool, the left two maps are highlighted as the left date picker tool only controls these two maps while unlinked with the right date picker tool.

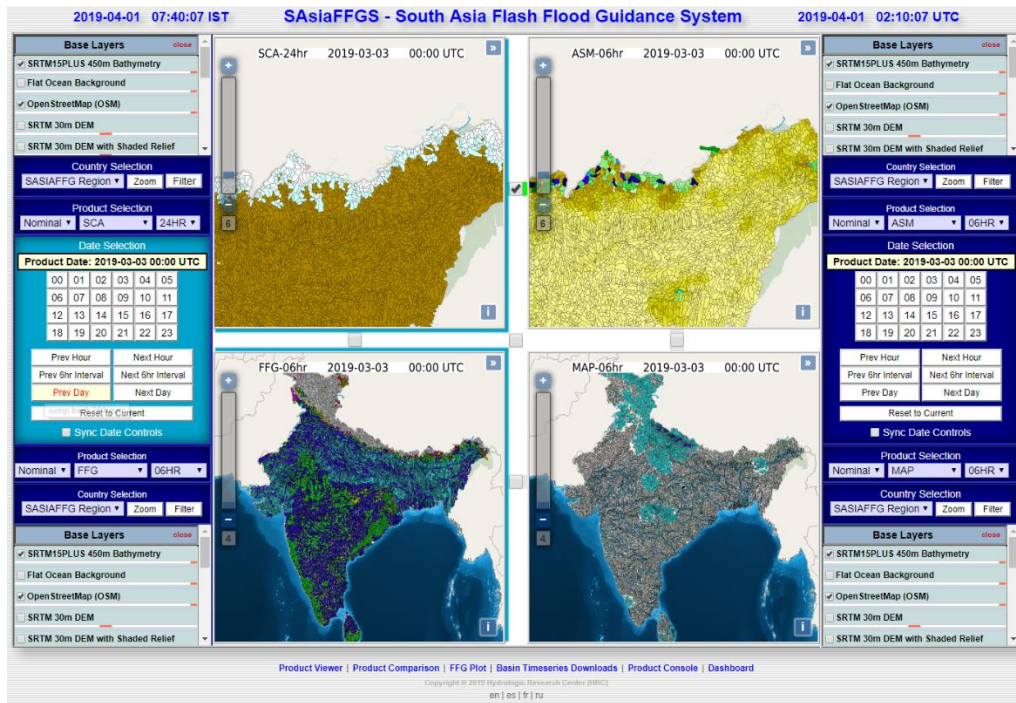


Figure 4.39 Mapserver Interface – Navigation Tool Highlighting with Panel Linking

Due to the fact that multiple products in the Product Comparison Page are controlled through the shared application of the same date picker tool and that each product of the FFGS is generated and valid at different time intervals, there is no guarantee that the selected date and time is valid for all of the selected products controlled by that date picker tool. To address the situation where the selected date is not valid for a particular selected product, each affected map panel will display the most recently valid product date for the selected product prior the selected date. For example, suppose two map panels, one displaying MAP and one displaying FFG, are linked to use the same date picker tool which is set to 2018-07-05 13:00 UTC. While the most recent valid product date for MAP is at 2018-07-05 13:00 UTC as selected, the most recent valid product date for FFG, which is generated only every 6 hours, is 2018-07-05 12:00 UTC. Any time a product is being shown for a time that is previous to the selected time, the header label for that map will turn a brown-orange color.

4.4.10 Mapserver Interface – The FFG Plot Page

The FFG Plot of the Mapserver Interface page shows time series data in the form of line plots for system products over a user-defined scope for any individual basin for which FFG values are derived. On the left side of this page is a product date picker tool similar to those previously described, followed below by a time series scope field, and finally the basin identifier field. To the right is the interactive time series plot. See Figure 4.40.

There are two methods to reach the FFG Plots page – by clicking on the footer link or by clicking the Plot button found in the Basin Selection tool on the Product Viewer page. It is recommended to navigate to the FFG Plot Page by first clicking on a basin of interest in the Product Viewer Page and then clicking on the Plot button. This navigation method will open the FFG Plot Page with the selected basin and time parameters already defined. When navigating to this page using the footer link, a prompt to “Enter a Basin ID” will appear, with the plot remaining blank until a basin ID is provided. By default, the page will open with a scope of 5 days. The user may enter a scope value with any integer number of days then press <Enter> or click “Update” to generate the plot for their specified scope. A default scope value of 5 was implemented to help moderate the processing time required to generate the plots. Selecting a longer scope will require longer processing times before the plot is displayed.

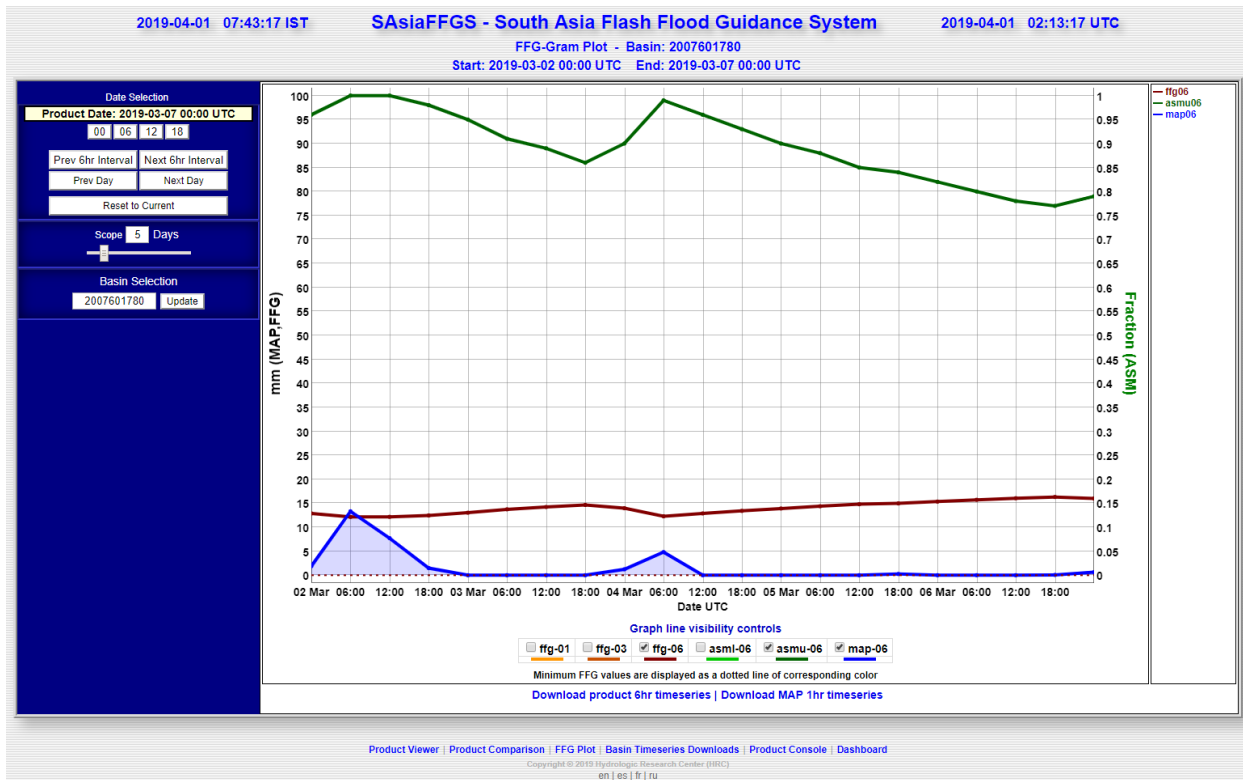


Figure 4.40 Mapserver Interface – The FFG Plot Page

There are several options for tailoring the display. Positioning the mouse over any of the plot traces will dynamically generate a dot at the corresponding x-axis (date) position of all traces. The y-axis (product) values for each of the traces at that position can be viewed in the legend on the right. When no traces are highlighted by mouse positioning, only the product names will be visible in the legend. Clicking on a particular trace will lock the plot focus on that trace. This will show the selected trace on top of all other traces and persistently highlight that trace's value in the legend. Clicking again will release the focus lock.

The view of the plot can be tailored by zooming on either axis. To adjust the y-axis zoom, click and drag vertically; to adjust the x-axis zoom, click and drag horizontally. To reset the zoom back to the original plot view, double-click anywhere in the plot.

In order to simplify the plot content, the visibility of each plot trace can be controlled by toggling the corresponding checkbox below the plot. When a trace is turned off, it will likewise disappear from the legend on the right.

At the bottom of the plot panel are two time series download links that provide CSV downloads of the data shown in the plot. The 6hr time series download provides all of the data used to generate the plot as shown. The MAP 1hr download provides additional data (only for MAP) that is not shown in the 6-hourly plot.

4.4.11 Mapserver Interface – The Basin Time Series Download Page

The final page of the FFGS Mapserver Interface is the Basin Time Series Download Page. This page provides time series data for pre-determined basin products corresponding to a single basin ID specified by the user. Once generated, the time series table may be downloaded as a CSV-formatted text file. The product date picker tool for the Basin Time Series Download Page functions analogously to the previously described interface pages with the exception that only 6hr intervals are selectable. Below the product date-picker is a scope selection tool that allows a range of 10 to 210 days relative to the specified end product date. Below the scope selector is the basin selector, where the numerical basin ID may be entered to specify the source of the time series data. Once selections are completed, clicking ‘update’ will begin the data assembly. The ‘Download Selected Range as CSV’ button will be enabled when all selections have been made and the data table has finished populating. The specified start date, end date and basin ID for the pending download are displayed for confirmation above the download button. The time series data contents of the pending download may be reviewed in the data table shown. Clicking the “Download Selected Range as CSV” button will initiate the download. See Figure 4.41.

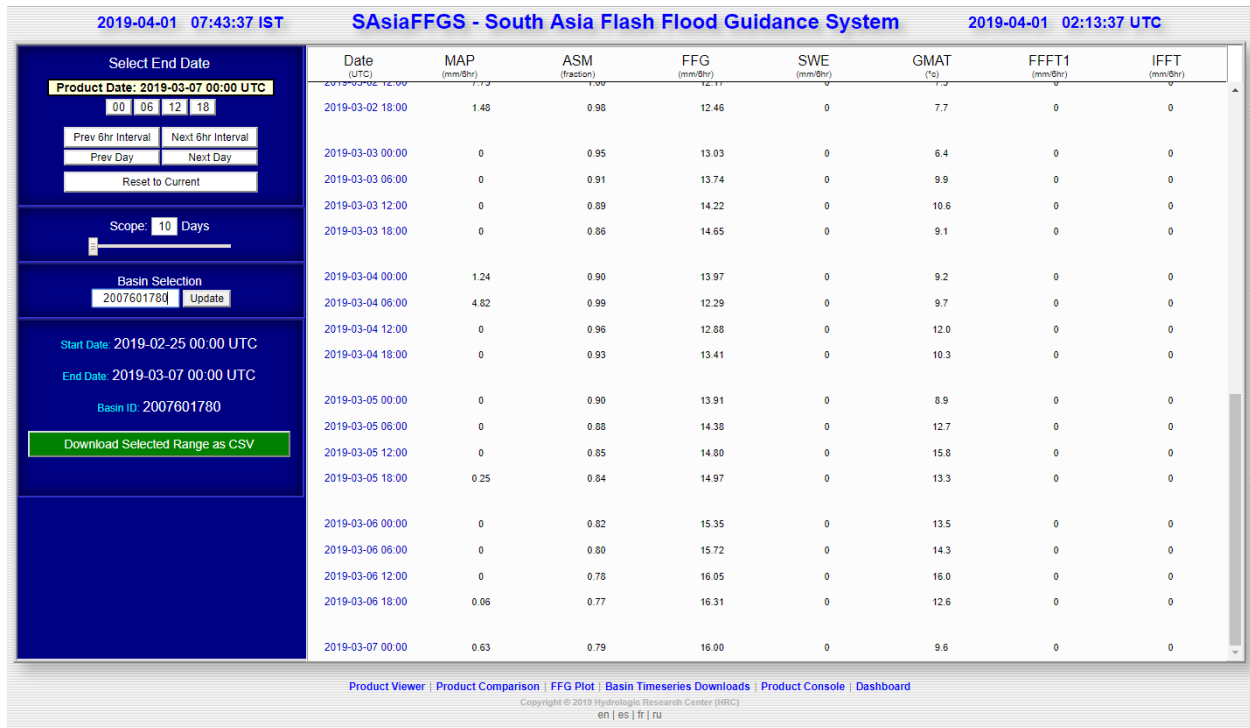


Figure 4.41 Mapserver Interface – The Basin Time Series Download Page