The Book of EDD

User Guide and Tutorial for Using the Enhanced Data Display Last updated - 8/6/2013

What is EDD?

EDD, or the Enhanced Data Display is a web-based platform/framework that will serve as a gateway to distribute high spatial and temporal resolution data that NWS forecasters generate. It is envisioned that EDD will have a backend geospatial database that will enable users to query the data forecasters are providing, enabling them to highlight areas of interest at any scale using EDD's mapping capabilities. By using a web-based framework, data can quickly be distributed via mobile and internet technology to our partners regardless of their location. This technology will give users in the field access to the raw data and the means to manipulate the data for their needs. The interface of EDD is designed to keep a lot of data in one place while at the same time being easy and intuitive to use. Most fields are just a click or two away and are clearly labeled into categories that best represent the product. EDD also provides quick access to deterministic and probabilistic forecasts.

To get to EDD go to:

http://preview.weather.gov/edd/

As of early August 2013 version 3.0.1 of EDD is up and running on the preview server and accessible to all users to try out and provide feedback on. Version 3.1, which is the developmental version where Jonathan is experimenting with new features, layers and functionality can be viewed from within the noaa.gov network at:

http://dev.nids.noaa.gov/~jwolfe/mwp/trunk/edd/build/

EDD is still actively under development and will be changing constantly (especially on the dev site). This user guide will be updated frequently, but will likely lag the latest EDD changes. If you find anything broken or have ideas of other things to add please let us know via the *Feedback* button.

An Initial Look at EDD

When you first open EDD the initial page will look similar to the screen capture below. By default the map will be zoomed out to a conus scale view with no layers turned on. If you are in another area like Alaska or Pacific Region...don't worry EDD works there too. The map can be moved around by clicking and dragging with the mouse or using the controls in the upper left of the map pane.



The menu bar across the top contains a variety of information and tools. From left to right, the *weather widget* is a tool that gives you quick access to current and forecast weather conditions at your (or a specified) location when you hover over it. The hourglass or *layer age icon* will let you know how long it has been since EDD tried to query for new data via mouse-over (a few layers such as hazards, radar and storm reports have more frequent update cycles but for the most part the refresh interval can by set using this tool via left-click). The *search* function will find a location on the map by entering the latitude and longitude, city, place or geographic place name (this feature uses the google map search engine so use the same format you would with that). *Tools*, opens up a drop down menu where you can access more functions of EDD such as changing the layer order, switching to the mobile version of EDD, adding kmls and zooming to specific areas and regions. *Legend*, will open up a legend for all the different layers displayed. *Feedback*, lets you send us comments and suggestions...please use this feature often! *Help*, gets you to the help center. This is still under development but contains an ever growing supply of

help, documentation, additional information. It also links to a couple of short videos demonstrating how to use EDD.

Saving Map Configuration and Other Settings

Once you get the map set to the location and zoom of your preference you can save these defaults and whatever layers you have turned on at the time by going to the *Share* button at the bottom center of the page. Clicking this will generate the long and tiny url for your current configuration view. From there you can either cut and paste the url to share it or if you click the *Go to Link* button on the bottom of the dialog box you can then bookmark EDD with your customized saved settings and map zoom.



Tools Menu

The *Tools Menu* along the top right side of EDD accesses a variety of tools and functions within EDD. *Change Layer Order* opens a tool to allow you to switch the order that layers appear in EDD by dragging and dropping them within a menu or utilizing buttons to move the radar and satellite images up and down in the list. The *Configure Profiles* tool was replaced by the *Share* function in version 2.5 build and has been removed. The *Mobile Version* tool switches EDD to a still very under development version optimized to work on mobile devices (this feature has been tested on the iPad 2 but is hit and miss on other mobile devices at this point). The *Zoom* menu will take you to different preset regions and NWS WFO areas of responsibility.



Help Center



Basic EDD Operations – Quick Layers & Forecast Options

The quick layer menu in the upper left will turn off and on some of the basic features of EDD. Click on the green plus sign to turn on layers and the red minus which then appears to turn them back off. The list icon lets you change the field displayed or the color scale and the slider icon adjusts the opacity of the layer. Multiple layers can be displayed at the same time but depending on your internet connection, too many can slow things down. The image below is from an earlier version of EDD but gives you a basic idea of what the common control buttons within the quick layers do. In the current versions of EDD, looping controls appear when you turn on the radar and satellite layers.



Hazards and Warnings

The Hazards and Warning Layer is a good one to start with to gain a basic situational awareness of current weather concerns. It shows all the National Weather Service watches, warnings and advisories currently in effect. To keep this layer from getting too busy the colors have been simplified into 5 categories which you can find under legends. In general, you will see warnings in red, watches in orange and advisories in yellow. Occasionally you will also see extreme events showing up in magenta and non-weather statements in grey. To see the classic manycolor scale view (NWS webpage color scheme), click on the list box icon to the right of the plus/minus icon and select many colors. You can also chose to display just fire weather or hydrological related hazards through this menu. The legend (accessible from the upper right menu bar) will tell what all the different watches, warnings and advisories are by color. The opacity of the hazard layer can be adjusted using the slider bar to the right of other two buttons. The polygon icon to the right will turn on short fused convective warnings such as severe thunderstorm, tornado and flash flood warnings. The polygon icon with the people on it will display demographic information for the area affected when you hover over the warning area. A pop up box shows information such as the size of and population within the warning or advisory area, number of airports, miles of road and railways.





Radar Data

Basic Radar Quick Layer Controls: Radar data can be displayed in EDD by using the *Radar* **Ouick Layer.** To turn on the radar layer, click on the green plus sign next to the radar layer and a mosaic of all the NWS weather radars will be displayed. The List Icon can be used to choose between base reflectivity and composite reflectivity. The Opacity Slider Bar to the right will adjust the opacity of the layer. Adjusting the opacity can be very handy when overlaying radar data with hazards, satellite imagery, observations or just to see the map layers below more clearly. The next *Individual Radar Site* button to the right with the tiny super cell icon will open an interface to get higher resolution radar data from individual radars and allow access to additional data types. The final Archived Radar Data button on the first line opens up access to archived radar data and storm reports. When the radar layer is turned on, the radar loop controls open below the initial layer control bar. The *Play Button* to the right will loop the radar. The Individual Image Slider Bar to the right can be used to step to individual images and once clicked will let you advance and step backward with the arrow keys. The Loop Speed Slider Bar will adjust the speed of the loop. The **Backup Radar** option pulls radar data from a different source (Iowa State) when checked. Looping features are not available with this data but it can provide a good back up if the main radar data source (the NWS Ridge2 server) is down. Additional backup sources can be found in the more layers, redundant data folder.



Individual Radar Site Data: Clicking on the *Individual Radar button* (the 4th one over on the radar quick layer with the little picture of the super cell on it) will open the *Individual Radar Data Control Window* and add a radar data age layer to the map. The circular sites mark the NWS 88D Doppler radars and the airplane icons the terminal Doppler radars. The number overlaid on the icons is the age of the radar data. To select a site to display radar data for, click on the icon for the desired location and the radar name will appear under site info. Because EDD is now querying radar data from just one site this data will load and update more quickly than the national radar mosaic and is also higher resolution (if you are operating EDD in a limited bandwidth environment and only focused on one area you may want to turn off the national mosaic at this point to improve performance). Use the *Field drop down menu* to select the radar product you would like to view. The choices on the menu will vary depending on what products are available at the given site. Dual Polarization differential reflectivity, hydrometeor classification algorithm and storm total precipitation are available at Dual Pol radar sites. A shortcut to displaying the most recent three hours' worth of storm reports is available by clicking the *Map Storm Reports* button with the lightning bolt icon on it at the bottom of the display.





Archived Radar Data and Storm Reports: To access archived radar data and storm reports from past events, click on the *Past Weather Data Button* which is the furthest to the right on the radar quick layers line. The *Archived Radar Tab* on the interface which opens will allow you to display radar data for the last two years. Chose the valid date and time you wish to view then click the check box next to display radar. If you change the date and/or time after this point you will need to click apply to load the new data. If nothing is happening when you click the apply button, verify that the display radar check box is selected and the time period you have selected is within the past two years (if it is older, the image from 2 years ago will appear). *Storm Reports* can be displayed using the storm reports tab. To query these select start and end dates and times for the event of interest then check the display LSR box. Do note that there is a 500 storm report limit and only the first 500 will be displayed so narrowing times may be necessary.

Additional Radar Layers: But wait there's more...additional radar parameters and fields can be displayed through the *Layer Tree* by clicking the *More Layers Button*. Multi-Radar Multi-Sensor data as well as additional radar layers are available in the radar folder, radar derived precipitation totals can be found in the observations folder and additional back up sources for radar data found redundant data folder (hint: search 'radar' using the more layers search function to find all the radar data).

Overlaying the radar with hazards will allow you to see when warnings are issued in association with specific storms. If hydrology is a concern, flash flood guidance (under the rivers folder in more layers) as well as the river level observations and forecasts (in the rivers quick layer) can also be combined to monitor where flooding is possible or occurring.







Viewing Observations in EDD

When you turn on the *Observation Layer* in EDD by clicking on the green plus sign next to it in the quick layers menu, an *Observation Controls* window appears. The observation *Density Slider Bar* at the top will control number of observations displayed. If you chose to turn this up to maximum, it works best to zoom into your area of interest first, otherwise you may end up loading a huge number of surface observations bogging the system down badly. The *Units Radio Button* lets you choice between knots and mph for wind speed. The *Icon Size* pull down menu lets you adjust the size of the surface observation which can be helpful for briefings. Clicking *Ship Observations* turns ship observations on. Pointing and hovering over an observation pops up the current conditions, left clicking on an observation opens graphical and tabular outputs of weather observations as well as station information.

The images below illustrate the use of observation display and filter tools. Screen shots are from an earlier version of EDD so not all features of the interface and the layout of the graphical and tabular data are identical to the latest build but the basic functionality remains the same.



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Fields and Filters

Clicking the green plus signs by *Fields* and *Filters* turns two more menus on within the Observation Controls. *Display Fields* lets you pick which fields are plotted and *Filters* lets you choose to display observations that meet thresholds you define. Some fields such as wind and relative humidity are color coded to highlight thresholds of note.

The filter tool can be very handy as both a meteorological watch and briefing tool. Note that if you choose multiple filters, all the criteria you select must be met to display the observation. Filters can be cleared by clicking the paintbrush icon next to the filter control button in the Observation Display menu.

Use caution in the number/density of observations you load. If you try to run complex queries on large map scales with the observation density set to max it may significantly slow down EDD and can cause script error messages to pop up.



Satellite Imagery Quick Layer

To overlay satellite imagery in EDD, click the green plus sign to turn the *Satellite layer* on. This will also open up looping controls below. Use the *product list icon* to change between GOES visible, infrared and water vapor satellite imagery and the VIIRS fog product. The slider bar will adjust layer opacity. The *looping controls* follow the standard play/pause functionality with the ability to step forward and backward through the loop or jump to the first or last image. The loop speed slider bar will adjust the looping speed. Checking the *include radar precipitation type box* overlays radar derived precipitation information on top of the satellite imagery. Selecting the 3, 6, 12 or 24 hour loop radio button adjusts the length of the loop. Additional layers such as state and county boundaries can be found in the boundaries folder of the More Layers control panel to help with geographic orientation. Satellite imagery may be combined with other image layers such as radar, observations, hazards or tropical.



Rivers Layer

The *River layer* provides current and forecast river levels. The *pull down product list menu* lets you choose between observed and forecast data as well as allowing you to filter rivers that are meeting or exceeding different action or flood stages. The river points are scaled by both color and size based on river stage. Green points are below flood stage, yellow points are at action/bank full stage, orange points indicate minor flooding, red points moderate flooding and purple major flooding.



Additional hydrologic related layers include a *100 year flood inundation zone* map that can be turned on by clicking the right most button on the rivers quick layer with the little flooded house picture. This layer only shows up at very high zoom levels. When you turn the 100 year flood inundation layer on a dialog box appears asking if you want to zoom into the level necessary to see the boundaries. If you say yes, you will zoom super far in to wherever your map is centered (use with caution), if you say no, a layer appears showing color coded data availability (turn on the legend to see what the different colors/patterns represent).

Radar estimated precipitation amounts for the various time periods can be found in the Layer Tree (click the More Layers button to open the Layer Tree) in the **Observations folder**. **Gridded Flash Flood Guidance** for 1, 3, 6, 12 and 24 hours is available in the **Rivers folder** of the Layer Tree. Also within the Layer Tree under the Storm folder, Quantitative Precipitation Forecasts (QPF), QPF from HPC as well as the flood outlook potential can be found. Drought forecasts have been moved into the Climate folder. A variety of hydrological related map boundaries such as watersheds and basins of different sizes can be found in the Boundaries folder. Tide observations and forecasts are located in the Marine folder. Coastal and inland flooding tropical impact statement graphical layers are available in the Tropical folder.

Tropical Layer

The *Tropical layer* shows the location and forecast path cone for any tropical depressions, storms or hurricanes. If there is no tropical activity, nothing appears on the map when you turn it on. The slider bar works similarly to other fields, adjusting the layer's opacity. A number of other tropical layers are available in the *Tropical folder* of the *Layer Tree* (click More Layers). A Hurricane Evacuation Route layer can be turned on. Probability of wind speeds greater than 34, 50 and 60 knot graphics can be shown as well as a variety of new tropical impact statement graphics.



Upper Air

Upper Air Soundings are available via the *Upper Air Quick Layer*. Turning this layer on plots green push pins on the EDD map marking all the locations that sounding data is available. Once you turn the layer on, date and time options open in the Quick Layer menu allowing you to view data for the past 10 days or so. By default the most recent available time shows up. Left clicking on the green push pin will open the sounding up for the site. Clicking on the PW Climatology tab will take you to a graph of the precipitable water (the cumulative amount of water in the column of air) from the sounding compared to climatology. This is a good way to judge how moist it is compared to both seasonal normal for that site and the maximum and minimum precipitable water measured there. Precipitable water is a handy thing to look at for both heavy rain/flooding scenarios and for wet vs dry (vs any) thunderstorm forecasting. A similar plot for 850 mb temperature compared with climatology is available on the third tab.





Model Spread

The *Model Spread Layer* accesses the model spectrum tool through a point and click interface allowing users to see the range (as well as a bunch of other statistical and climatological data) of numerical model and NWS forecasts for specific forecast locations. Turning the layer on adds blue push pins to the EDD map at all the sites where model spectrum data is available. Left clicking on one opens a window to view and interact with the Model Spectrum data. Additional detailed information on this tool can be found in the *Help Center* under the *Model Spread/Spectrum tab*.

Webcams

The Webcam layer displays a variety of web cameras from an external 3rd party site. Acknowledge the do you really want to question when you turn this layer on, then small web cameras appear on the EDD map within a distance of around 200 miles from the center of the map. If you are looking at a camera dense area, zooming in will cause more pictures to appear. Hovering over a camera will bring up a bigger image. Some of the web cameras are mislabeled and occasionally show up in the wrong state so use this feature with caution.



Gridded NDFD Forecasts

NDFD (National Digital Forecasts Database) Gridded Forecast Graphics are available under the Grid Forecast Quick Layer. Turning this layer on will display a variety of forecast office and national center generated weather elements. When you click the green plus to turn the layer on, additional layer controls open below. Select your area of interest from the *Region* pull down window, then the weather field to view from the *Field Menu*. Note that at this point only one NDFD Gridded weather field can be displayed at a time (though they can still be overlaid and combined with other sorts of layers within EDD). The Valid Time slider bar steps through the various time steps of data available, alternatively once you have selected the slider bar you can use the arrow keys to view the different time periods. The interval available will vary depending on which weather element you are view. Depending on your zoom level and internet speed, these layers could take a little to appear so be patient as these layers load...once you do have them in the image cache (you have to go through and view each) they will load more quickly as you step forward and backwards through the images. The Show Point Values feature can be turned off and on by clicking the check box next to it. It displays sample points from the gridded weather field you are looking at. Do note that these points are forecasts rather than observations...to get a sense of how well the forecast is doing in the short term, the Observation Quick Layer can be overlaid onto the Grid Forecast Layer.







Forecast Options

The pull down menu under Mouse Click Control allows you to set what sort of forecast you get when you click on the EDD map. The first option, Public/Marine Forecast will return a public formatted point forecast when you click over land and a point forecast with marine weather elements when you click over a marine area. Note that in both these instances a 2.5 by 2.5 km square is being queried to return the forecast values so the precise location which you click can have a very big impact in areas of steep or complex terrain. Also note that the elevation of the grid box selected may not exactly match the underlying topography so it highly recommended that you check the elevation of the point forecast (by scrolling down to the bottom of the forecast on the *Point (Text Only*) selection or on the right for *Point (Text and Images)*) to see if it is representative of your area of interest. Click the **Zone Forecast** tab to get the associated marine area (or land based zone) average forecast in which the point falls. The Hourly Graph tab will take you to an interface to plot various forecast elements for the point selected and the *Forecast* **Discussion** tab will bring up the Area Forecast Discussion from the forecast office the point location falls within. Fire Forecast and Mariner Graph mouse click options are also available and will be discussed further in their respective sections. The EM, drawing and measure tools (and any others Jonathan might add in the near future) are still under development.





The Many Layers of EDD

But wait there is more! ... The *More Layers* section. When you click on the *More Layers Button*, the *Layer Tree* opens below the *Quick Layers* section providing access to the currently 244 additional data layers available in EDD. The data layers within the *Layer Tree* are organized in a general category based folder structure. Opening the folders will display the layers within them. Clicking on the individual layer names will activate the layers and turn the grey circle to the left of the name green, indicating that it is being displayed on the map. Clicking a second time will turn the layer back off again or alternatively you can click the *Clear Layers* button with the little broom icon at the top of the *Layer Tree* to clear all the selected layers. The *Opacity Slider Bar* also at the top of the *Layer Tree* controls the opacity of the layer you currently have selected. A *Color Palette Selector* button as well as line width and font size pull down menus will appear when you select a layer that has these options. Like the *opacity slider bar*, these options apply just to the layer you have highlighted in the *layer tree*.

Layers within the *Layer Tree* are organized by either weather/hazard type (such as Aviation, Climate, Fire Weather, Marine, Rivers, Storms, Tropical or Winter), data source type (Radar, Satellite, Models, Observations, Experimental) or function (Boundaries, Demographics and Redundant (i.e. backup data sources)). If you are not sure which category the data layer you are looking for falls into or are curious which layers are in EDD, the *Layer Filter Search Tool* is very handy. Type what you are looking for into the *Search Filter Bar* near the top of the *Layer Tree Panel* and EDD will show all the layers whose name contain what you entered or are tagged to fall into that category.



Maps and Map Related Tools

EDD has a wide variety of map and background options. By default EDD loads using the Google Terrain background. As you zoom further in more detail appears including shaded relief and contour lines. Other Google background layers such Grey, Dark, Street and Hybrid (the aerial photography/satellite imagery view) are available using the *Background* pull down menu at the bottom of the *Quick Layers section*. Other options in the *Background* quick layer menu include a simpler national map with features like roads, cities, rivers and various political boundaries, a couple of Open Street Map layers and a blank map option. Further map and background options are available under *More Layers*. Under the *Boundaries folder* in the *Layer Tree* you can find a wide variety of state, county, NWS Forecast Office, River Forecast Center, hydrologic (river and stream basins of various sizes), FEMA and US Army Corp of Engineer boundaries. The *Topography* layer overlays USGS topography maps. Initially fairly coarse maps are displayed; however as you zoom in the resolution increases to 24,000:1 scale quad maps. *Nautical charts* are available within the *Marine folder*.

In the lower right hand corner of the EDD window there is a latitude and longitude read out linked to the location of the mouse pointer. Clicking the *Show UTM/USNG button* will expand this tool to additionally display USNG and UTM grid coordinates as well as datum information. Maps and other data in EDD are plotted with Open Layers which utilizes WGS_1984. If you zoom in too far while using the Google Terrain background layer a quirk with the associated coordinate grid (if you click and drag the map around the grid doesn't follow correctly) makes the latitude and longitude read out unreliable and a red warning message will appear. Either

zoom back out or select another background map to solve this problem. Alternatively if you want to see fine detailed terrain and use the coordinate read out tool at high zoom levels you can use the *Topography layer* under the *Boundaries folder* in *More Layers* to display the USGS quad topo maps instead of the Google Terrain.





Another handy map related tool is the *Measure tool* under the *Mouse Click Control menu*. The tool will either measure the length of a line or path you click across the map or the area of a polygon you draw. Use the radio buttons at the bottom of the measure tool to switch between length and area mode.

The *Drawing Tool*, also in the mouse click control menu, will allow you to draw points, lines and polygons which could be used mark key locations of concern or otherwise annotate the map (do note though, that what you draw will only affect your local display and will not be saved or transfer across if you use the *Share function*). The *Add KML* tool under the *Tools Menu* will let you add a kml to the map so long as it originates from a .gov domain (currently this function only works for kmls and not kmz files).

In addition to the various political boundary layers available in the *Boundaries folder* of the *Layer Tree*, population density layers can be found in the *Demographics folder*. The *Night Lights Layer* provides satellite imagery shot showing the night time illumination on a clear night and when zoomed out at larger scales paints a good picture of where people and industry are concentrated. The *Population Density layer*, also in the *Demographics folder*, shows shaded population density estimates which become higher resolution as you zoom in (though will eventually become unavailable if you zoom too far in). The traffic light icon to the right of the Background Quick Layer pull down menu will add the *Google Traffic Layer* to the EDD map when you click that button. Combining this layer with the population density layer is a good way to get a sense of both ongoing and potential impacts of weather based on where the concentrations of people are located.



Specialty Sections in EDD

The more specialized, discipline specific weather products and related layers are located in the Layer Tree (click More Layers) sorted into their respective folders. Currently these include numerous Aviation related products in the Aviation folder. Climate outlook, drought and agriculture related products in the *Climate* folder. Fire weather and fuels related products in the *Fire Weather* folder. Nautical charts, current and tide data, sea surface temperatures, ice extent and other marine related layers are located in the Marine folder. Interfaces to load BUFKIT meteograms, Wave Watch 3 data and GFS, NAM and RAP model data can be accessed from the *Models* folder. The *Observations* folder contains accumulated precipitation grids of various time scales, RTMA layers of current temperature and winds and observed earthquake data from the USGS. MRMS (Multi radar multi sensor) products are available in the *Radar* folder. Hydrologic specific data including current flash flood guidance and 100 year flood boundaries are available in the *Rivers* folder. The *Satellite* folder contains numerous satellite images and satellite derived products. Storm Prediction Center and other convection related products can be found in the Storms folder while hurricane related products are in the Tropical folder. Winter weather specific products such as snow fall rates, snow totals and snow on ground depth products are located in the Winter folder.

Future versions of the EDD Users Guide will contain additional sections describing the discipline specific products and layers in more detail.

EDD Data Sources

An excel spreadsheet listing the sources of all the data being brought into the Enhanced Data Display can be found at:

http://www.erh.noaa.gov/rlx/edd/EddData.xlsx