

Experimental Products and Services

PSL provides and/or contributes to a wide range of experimental research products and services, which are used by research groups, academic institutions, operational entities across NOAA, commercial organizations, decision makers, and the public. In large part they can be accessed via the PSL website. A representative sample is shown below.

Product/Service	Description	Application
<u>Advanced Quantitative Precipitation Information (AQPI)</u>	A system consisting of observations and models to improve monitoring and prediction of precipitation, streamflow, and coastal flooding in the SF Bay area.	Products and services will be made available through web interfaces and other data exchange protocols to local water managers, flood control agencies, NWS, and other stakeholders.
<u>Aleutian Low - Beaufort Sea Anticyclone (ALBSA) Index</u>	ALBSA is a 850mb geopotential height derived index that captures the variability in the North Pacific/Pacific Arctic tropospheric circulation. The purpose is to track the juxtaposition of the Aleutian Low and Beaufort High pressure centers and consequently advection across the Alaska Arctic region. This is important in the understanding and time of springtime sea and snow ice melt.	Used in monitoring ice and ice melting conditions for the Arctic.
<u>Atmospheric River Observatories</u>	PSL operates and maintains a line of seven atmospheric river observatories (AROs) along the U.S. West Coast stretching from NW Washington to SW California. AROs consist of a group of synergistic instruments that characterize the dynamic and thermodynamic properties of atmospheric rivers (ARs). ARs are responsible for as much as 50% of the precipitation that falls in the West Coast states during the wintertime. ARs are also responsible for most of the floods that occur in this region, which cause harm to human life and property.	Used by operational forecasters for situational awareness, to verify NWP forecasts, and to adjust watches and warnings. Used by researchers to gain a better understanding of atmospheric rivers and to evaluate and improve forecast models.
<u>Arctic Observatories Data Browsers</u>	Users can examine data from multiple atmospheric observatories in the Arctic Region. Data from these observatories is used to study weather and climate processes including climate change.	Sites are used to obtain data so that various Arctic related weather and climate processes can be studied.
<u>Assessments</u>	PSL scientists contribute to local, regional, national, and international assessment reports on causes of global to regional climate trends and extreme events.	These reports provide policy and decision makers with best available information for risk management and adaptation decisions in agriculture, water supply, natural resources, health, energy, emergency management, and other sectors.

Atmospheric River Portal	Forecasts of the presence and strength of Atmospheric Rivers using data from the NCEP Global Forecast System (GFS), North American Mesoscale Forecast System (NAM), and Global Ensemble Forecast System (GEFS) models.	Used by researchers and resource managers who need to know the possibility of strong rain events for management purposes.
Climate/Weather Data Animation Page	Users can create custom animations from PSL's gridded datasets. Means and anomalies can be animated and there are a variety of custom plot and area settings.	Used by researchers and others examining specific weather or climate events
Dipole Mode Index (DMI) Timeseries	The DMI is a measure of east/west Indian Ocean SST's that are related to precipitation/drought in adjacent land regions.	Researchers and resource managers who need to know precipitation in the Indian ocean/Tropical Pacific regions.
ENRR Profile Browsers	Users can examine vertical profiles taken from the ground, airplanes, and a ship during the 2016 El Niño Rapid Response field campaign in the Pacific Ocean.	Used to help researchers understand tropical variability.
ENSO Climate Risks (2015)	Plots of the U.S. which show regions have an increased or decreased risk of extreme warm/cold (or dry/wet) seasons during an ENSO event. Running 3 month seasons are available options.	Resource managers and others can check the current ENSO status/season and see what the risk of warm.cold or wet/dry is.
ENSO Dashboard	Page displays a set of ENSO related time-series plots and a set of panel plots comparing current conditions to past El Niño and La Nina events.	Researchers, resource managers, students, etc can monitor the state of the current tropical Pacific's ENSO status and compare to previous events for many ENSO related indices.
ESTCP "Perfect Model" Atlases	Downscaling methods are evaluated using the "perfect model" framework, where one model is treated "as if" it were the truth, both in the present and in the future. The evaluation is done in two phases reflecting two fundamental features underlying many empirical statistical downscaling -- bias correction, and change of spatial scale.	Researchers can easily compare model output.
Evaporative Demand Drought Index (EDDI)	The Evaporative Demand Drought Index (EDDI) is an experimental drought monitoring and early warning guidance tool. It examines how anomalous the atmospheric evaporative demand is for a given location and across a time period of interest. EDDI is multi-scalar, meaning that this period—or "timescale"—can vary to capture drying dynamics that themselves operate at different timescales.	Used by water resource managers/decision makers and their colleagues, researchers studying drought, and the general public.
Experimental Sea Ice Forecasts	0-10 day experimental, sea ice forecasts are produced using a fully coupled ice-ocean-atmosphere model "CAFS" and is forced at the lateral boundaries by 3-hourly GFS forecasts of winds, temperature, and water vapor.	These forecasts are used in support of observational campaigns, in process studies of coupled Arctic weather processes, in evaluating the UFS in the Arctic, and for model guidance for NWS forecasts.

Experimental Tropical SST Forecast Products	SST forecasts provided (maps and time series) are made using the Linear Inverse Modeling (LIM) technique and are a useful indicator of the status of El Niño Southern Oscillation (ENSO).	Used by the ENSO forecasters at NOAA/CPC as a contribution to the NOAA ENSO forecasts.
Experimental West Atlantic Hurricane Forecasts	Forecasts of West Atlantic accumulated cyclone energy (ACE) at lead times of 3-4 weeks. Forecasts are made two ways: a statistically-based method using SST, and a long range dynamical model.	Useful for resource managers and government officials looking to see the near term probability of hurricane activity.
Facility for Climate Assessment Resources FACTS	FACTS is a freely-available resource that provides the science community with analysis tools, multi-model, multi-forcing climate model ensembles, and observational/reanalysis datasets for addressing a wide class of problems on weather and climate variability and its causes.	Researchers use the FACTS website to quickly probe science questions through interactive analysis and visualizations, and if desired download model and observational data for additional analysis. Educators use the site for illustration of basic concepts of weather and climate variability.
FEWS NET	Lead subseasonal-to-seasonal forecasting activities used to craft food security scenarios	Food security scenarios are used to mobilize food aid in over 30 of the world's most food-insecure countries.
Precipitation Hazard Detection Tool	Measurements from several collocated instruments are used to monitor the atmospheric conditions that produce precipitation-related hazards, such as heavy rain, snow, and freezing rain. This real time product is available at geographic locations where PSL operates these instruments and where low-level, cold-air mass intrusions are prevalent, and is updated on an hourly basis.	Weather forecasters use this tool to monitor the depth of the cold air surge and to verify precipitation type forecasts.
International Arctic Systems for Observing the Atmosphere (IASOA)	IASOA is an end to end consortium that has organized observations, data access, research and development of services across Arctic Observatories operated by the 8 Arctic nations.	Facilitate not only international collaborative foundational research but also develop needed services to support agreements implemented by the Arctic Council. (Search and Rescue, Oil Spill Response, Research Collaborations in the Arctic) and the Central Arctic Ocean Fishing Agreements
International Surface Pressure Databank ISPD locations , and monthly and annual counts of pressure observations available for the 20CR Reanalysis Project	Users can select maps from 1836 onwards of surface pressure observations available to the current and past 20CR reanalyses. Users can also see what observations that are actually used.	Used by researchers and weather enthusiasts to see how observations were assimilated into 20CR. also used to show how the number of pressure measurements have changed over time.

<u>Landscape Evaporative Response Index (LERI)</u>	LERI provides a high spatial resolution assessment of the landscape evaporative response to land-surface moisture and evaporative demand. It represents the anomalous state of land-surface moisture (i.e., soil moisture) that is readily accessible to plants (for transpiration) and the atmosphere (for evaporation). Users can look at recent and historic products over different time scales.	Stakeholders, resource managers, farmers, and the interested public can examine drought and obtain early guidance on water and growing conditions.
<u>MJO Indices</u>	PSL has created a set of MJO time series that quantify current and historic MJO activity available for download.	Researchers can look at the MJO using a consistent index and examine relationships to climate features such as rainfall and ENSO.
National Water Model - Flood Application	Development of ensemble streamflow products for extreme flooding events.	Demoed at Hydrometeorology Testbed Flash Flood and Intense Rainfall Experiment at NWS/WPC.
National Water Model - Drought Application	Development of prototype drought monitoring products - soil moisture anomaly. Hosted at the National Water Center, but not yet available to the public.	Used as a resource for NIDIS, CPC, and the National Drought Monitor.
<u>NCEP GEFS Reforecast2 Dataset</u>	Users can access a dataset of historical weather forecasts generated with a fixed numerical model, using the 2012 version of NCEP's Global Ensemble Forecasting System. This Reforecast V2 dataset consists of an 11-member ensemble of forecasts, produced every day from Dec 1984 to present. Among the advantages associated with this long reforecast dataset is that model forecast errors can be diagnosed from the past forecasts and corrected, thereby dramatically increasing the forecast skill. No longer funded as of September 2020.	Used by anyone interested in 0-3 week forecasts of products such as rain, temperature, and other variables over the US. Probabilistic-based forecasts.
<u>NOAA Climate Change Portal</u>	The Climate Change Portal accesses and displays a selection of the climate and Earth system model output that informed the IPCC. The global climate model experiments used have been coordinated through the Coupled Model Intercomparison Project (CMIP) and includes versions CMIP5 and CMIP6. Users have access to a variety of model output and weather statistics including new dynamically downscaled ocean conditions in the Gulf of Mexico and U.S. East Coast.	Researchers, resource managers, and others can examine climate predictions for many variables including extremes.
<u>Precipitation Analysis Tool</u>	Allows forecasters and other end users to compare radar reflectivity and other parameters collected by PSL's vertically pointing precipitation profilers and disdrometers with NWS WSR-88D radars and Multi-radar Multi-sensor (MRMS) precipitation products	Researchers and forecasters to evaluate NWS precipitation products.

<u>Profiler Network Data & Image Library</u>	Provides web-interface access to real-time, hydrometeorological observations that are acquired from a variety of remote sensors and in-situ instruments. These research-grade data and image products improve the spatiotemporal depictions of the physical processes that are relevant to hydrometeorologically impactful weather events, and are used to advance hydrometeorological research, enhance situational awareness for operational decision making, and augment the weather and hydrology forecasting process.	Specific end users have recently included PSL researchers, the CHEESEHEAD and VORTEX-SE research communities, weather and hydrology forecasters at the NWS Weather Forecast Offices and River Forecast Centers, air-pollution forecasters at CA air pollution control districts, helicopter pilots at the U.S. Coast Guard, CA state climatologists, and water resource managers at Sonoma Water and the CA Department of Water Resources.
<u>PSL Weather/Climate Map Room</u>	Pre-generated maps and animations are available online of the current and recent state of the atmosphere and ocean (means and anomalies). NCEP "spaghetti" plot forecasts are also available.	Used by those interested in current weather and climate.
<u>Radar Wind Profiler Sub-Hourly Wind and Temperature Displays</u>	Sub-hourly data from PSL's wind profiling sites. Winds can be viewed with 15-minute resolution and RASS temperatures can be viewed at 30-minute resolution. Motivated by request from VORTEX-SE investigators.	Allows users to view higher time resolution data from PSL's wind profiling radars and RASS, which is particularly useful for convective initiation and development of rotation in tornadoes.
<u>Scanning Radar Tool</u>	Interactive display for comparing loops of radar reflectivity from AQPI X-band scanning radars and NWS WSR-88D radars.	Allows researchers and forecasters to see the benefits of AQPI's X-band gap-filling radars.
<u>Snow Level Verification Tool</u>	Available from sites where PSL operates any type of vertical profiling radar. The tool allows forecasters and other end users to compare observed snow levels with the snow levels predicted by operational weather forecast models for current forecasts and historical forecasts over the past year. The tool was recently updated to include the GFS, allowing for longer lead-time, snow-level predictions.	Used by weather and river forecast offices in the Western U.S.
<u>Sounding Display</u>	Display of PSL wind profiler and surface meteorology data in a Skew-T type diagram to help forecasters and VORTEX-SE investigators visualize and summarize the data in a known meteorological format.	Allows researchers and forecasters to view atmospheric conditions from PSL's VORTEX-SE site in Courtland, Alabama.
<u>TPI Time Series</u>	Tripole Index of the Pacific Interdecadal Oscillation - a measure of the interdecadal variability of the Pacific Ocean.	Used for monitoring by climate scientists and others.
<u>Tropical Diagnostic Tool Kit</u>	A set of locally-generated python code for the Tropics. It is maintained on GitHub and intended to be shared globally.	It is used for consistent analysis of specific diagnostics and also to provide easy to use plotting code of those diagnostics.

<u>Twentieth Century Reanalysis Version 3</u>	Using a state-of-the-art data assimilation system and surface pressure observations, version 3 of the NOAA-CIRES-DOE Twentieth Century Reanalysis (20CR) project has generated a four-dimensional global atmospheric dataset of weather spanning 1836 to 2015 to place current atmospheric circulation patterns into a historical perspective.	Dataset and plotting/analysis tools used by the scientific community.
<u>US Climate Division Page</u>	Online tool for plotting means, anomalies, climatologies and other statistics of the U.S. climate division data V2. Tmin, Tmax, and various Palmer Drought Indices have been added.	Allows users (researchers, public, students, managers) to examine current and past climate.
<u>Water Vapor Flux Tool</u>	This award-winning tool has developed over time and is derived from data collected at atmospheric river observatory sites. It combines observations with numerical weather forecasts to provide forecasters with situational awareness on atmospheric rivers (ARs) and to adjust their forecasts, watches, and warnings. The tool is important because forecasters along the West Coast do not have any detailed observations of ARs in the lower atmosphere upstream over the Pacific Ocean. It was recently updated to include the GFS model to give forecasters a longer lead-time view of the conditions related to incoming ARs.	Used by researchers to improve understanding of atmospheric rivers and their impacts and to diagnose bias or errors in numerical weather prediction models. Used by forecasters to verify forecast models and to make adjustments to their forecasts, watches, and warnings.
<u>Web-based Reanalyses Intercomparison Tools (WRIT)</u>	WRIT is a set of atmospheric and ocean analysis tools for analyzing and comparing reanalysis datasets, observational datasets, and climate time series. Users can examine specific climate and weather events or trends easily without downloading data. New features include an Ocean WRIT component, and a tool for examining vertical profiles and vertical time-section from reanalysis datasets at any grid.	Researchers, educators, resource managers, students, and the public are among the users. Site can be used to determine best reanalysis for different cases, to look at climate processes, to see how models compare to observations, to look at changing climate, and many other functions.
<u>WFIP2 Model Forecast Tool</u>	WFIP2 is a DOE and NOAA funded public-private partnership whose goal is to improve NWP model forecast skill for turbine-height winds in regions with complex terrain. Users can choose plots of the different observation sites and compare them to different model forecasts of wind and related variables.	The tool has been used in real-time to monitor instrument health and status, and in real-time and retrospective mode to quantify model errors. It has been used to develop field program event logs, highlighting particular days of interest for later analysis.