PSD Annual Operating Plan

PSD Strategic Plan (2011-2015)

PSD developed a strategic plan in 2010 that synthesized higher level guidance into five long-term goals to guide PSD research from 2011 through 2015. These goals are:

1. Improve observations and understanding of the Earth system processes
2. Integrate climate, weather and water research
3. Understand, attribute and predict extremes in a variable and changing climate
4. Advance understanding of regional processes and develop applications related to climate variability and change
5. Conduct research and develop prototypes to improve NOAA environmental information and services

PSD Implementation Plan

PSD's strategic goals were implemented through 5-year strategic objectives aligned with the three former PSD branches:

1. Climate Analysis Branch
2. Water Cycle Branch
3. Weather and Climate Physics Branch

The corresponding objectives are:

1. Climate Analysis Branch
    a. Advance intraseasonal to interannual predictive capabilities
    b. Improve representation of tropical dynamics in models
    c. Assess the causes and potential predictability of decadal climate variations
    d. Extend historical reanalyses and contribute to the development of an integrated Earth system analysis capability
    e. Establish a climate attribution capability
2. Water Cycle Branch
    a. Advance hydrometeorological sciences and services through HMT
    b. Develop a HydroClimate Testbed (HCT) and associated "Extreme Precipitation Portal" (XPP) using lessons from HMT and NIDIS
    c. Develop, deploy, and operate state-of-the-art observations for water cycle research and HMT prototyping
3. Weather and Climate Physics Branch
    a. Advance understanding of key Arctic processes that impact the region's weather and climate and determine teleconnections with other regions

b. Improve the characterization, understanding, and capability to predict boundary layer structure and phenomena through application of expertise in remote sensing, boundary layer physics, and numerical modeling

c. Work toward a unified theoretical framework for geophysical scale interactions, including physically based descriptions of stochastic variability for use in climate analysis and prediction systems

d. Develop a unified physically-based parameterization of air-sea fluxes of meteorological, trace gas, and particle fluxes

e. Advance observing technology in boundary-layer and air-surface interaction to promote Branch goals, emphasizing innovative remote sensing and highly advanced direct turbulence observation methods

f. Continue to advance the capabilities of the Boulder Atmospheric Observatory as a world class climate, weather, and water monitoring facility

PSD Annual Operating Plan/Milestones

Progress towards meeting PSD's strategic objectives were monitored through an annual operating plan (AOP) defined by a set of annual milestones. The Office of Policy, Planning and Evaluation (PPE) of the NOAA Office of Oceanic and Atmospheric Research (OAR) initiated the annual milestone process through an OAR-wide call every August, with milestone updates requested quarterly. The table and the end of this document summarizes PSD's 2010-2014 milestones.

Evolution of Milestones

Annual milestones track progress toward meeting key objectives. Choosing meaningful milestones is not easy. Although the tables that follow show progress in completing a large number of specific tasks, a clear milestone sequence towards meeting a specific objective is not always evident. The milestone process within PSD is evolving, with a greater emphasis being placed on fewer key milestones that are more directly aligned with objectives. An example is shown in a separate document highlighting PSD 2015 milestones.

PSD Strategic Pan (2016-2020)

PSD has reorganized and drafted a new strategic plan that spans 2016-2020. The plan identifies two overarching goals:

1. Develop new knowledge and capabilities to explain observed weather and climate extremes, variations, trends, and their impacts to inform risk management and adaptation decisions

2. Identify new sources of predictive skill and improve predictions of weather, water, and climate through observations, understanding and modeling of physical processes and phenomena of the coupled Earth system

and three priority research goals:

1. Rigorously characterize and predict weather, water, and climate extremes and their uncertainties to inform decision-making
2. Develop new process understanding, observing, and modeling capabilities to predict conditions associated with too much or too little water for early warning, preparedness, resource management, and adaptation
3. Increase process understanding of the coupled Arctic system and Arctic-lower latitude interactions to improve NOAA weather, climate, and sea ice forecasts

It also identifies research objectives and indicators for success (not repeated here). PSD will use this plan to generate AOP milestones for 2016 and beyond.

2010-2014 Performance Measures and Milestones

2011 Milestones	Responsible Individual(s)
Climate Analysis Branch	
Introduce one experimental research product into an operational setting	Robert Webb
Develop one experimental climate research product intended to inform decision making	Robert Webb
Produce an assessment of the regional impacts of a changing climate on marine ecosystems	Robert Webb Michael Alexander
Demonstrate new experimental hurricane forecast products with the goal of accelerating improvements in operational forecast skill for hurricane track, intensity, storm surge.	Jeffrey Whitaker Thomas Hamill Robert Webb
Produce an assessment of the importance of intraseasonal variability on tropical climate and forcing	George Kiladis Robert Webb
Develop experimental attribution assessment of recent high impact climate events of interest to policy and decision makers.	Robert Webb Martin Hoerling
Produce climate reanalyses using current generation model NOAA Global Forecast Models that includes time varying carbon dioxide atmospheric concentrations, solar variability, and volcanic aerosols.	Robert Webb Jeff Whitaker Arun Kumar (NCEP)
Water Cycle Branch	
Deploy and operate Mobile Atmospheric River Monitoring System to Westport, WA for HMT-Northwest research, and supporting flood warnings on the Green River (Howard Hanson Dam) Washington.	Timothy Schneider Martin Ralph
Deploy to HMT-West 2010 (California) and execute field project.	Timothy Schneider Martin Ralph
Publish several peer-reviewed journal articles on Snow-level forecast performance (White et al.) and Sierra barrier jet climatology (Neiman et al.)	Allen White Martin Ralph
Complete HMT-West 2010 field work; collect, quality control and archive data for all cases.	Timothy Schneider Martin Ralph
Install a ¼-scale 449-MHz wind profiling radar system on San Nicolas Island in support of Navy operations and NOAA Weather-Climate Connection studies	Allen White Martin Ralph
Complete HMT-Northwest 2010 (Westport, WA) field work; collect, quality control and archive data for all cases.	Timothy Schneider Martin Ralph
Write requirements documents for new performance measures on extreme quantitative precipitation estimates (QPF) and snow level (in collaboration with NWS-OCWWS)	Allen White Martin Ralph
Publish several peer-reviewed journal articles on Atmospheric rivers tropical tap (Ralph et al.) and Extreme rainfall forecast performance (Ralph et al.)	Allen White Martin Ralph
Develop specialized displays (high time resolution wind profiles, wind shear detection, boundary-layer height) for the wind profiling radar system on San Nicolas Island to support aviation weather and winter storm watch/warning program & write annual report to document project performance	Allen White Martin Ralph
Publish several peer-reviewed journal articles on Hydrometeorology Testbed overview (Schneider et al.); NOAA's atmospheric river observatory (White et al.); Atmospheric river water vapor flux forecast performance (Neiman et al.)	Timothy Schneider Martin Ralph
Weather and Climate Physics Branch	
Acquire new GPS-based data from P-3 and G-5 FY10 for storm surge measurement evaluation	Christopher Fairall
Repackage W-band radar for installation on P-3 for sea spray measurements; test flights if space available	Christopher Fairall
Participate in NOAA/CCPA VOCALS Science Team research using data from aircraft and ships in the stratocumulus cloud region off Chile	Christopher Fairall

Deploy PSD mobile seagoing flux reference system for two cruises (NOAA/OCO)	Christopher Fairall
Submit review paper on the ocean as a source of salt aerosols	Christopher Fairall
Submit paper on evaluation of the SURFA NWP air-sea flux archive at selected Climate Reference Buoys	Christopher Fairall
Install and evaluate climate process sensors at the new SEARCH site in Tiksi, Siberia	Taneil Uttal Christopher Fairall
Make available preliminary results from PSD participation in several 2008 IPY field programs	Christopher Fairall
Submit a paper on remote sensing of the ocean surface wind by acoustic measurements of the directivity of the ocean ambient noise.	Alex Voronovich Christopher Fairall
Modernize the Linear Inverse Modeling procedure for simulating weather and climate processes to keep pace with current computing abilities	Cecile Penland Christopher Fairall

2011 Milestones	Responsible Individual(s)
Climate Analysis Branch	
Introduce one experimental research products into an operational setting	Robert Webb
Develop one experimental climate research products intended to inform decision making	Robert Webb
Produce an assessment of the regional impacts of a changing climate on marine ecosystems	Robert Webb Michael Alexander
Run the ESRL/PSD -developed experimental ensemble prediction system based upon the operational NCEP global forecast system model (GFS) and an Ensemble Kalman Filter (EnKF) data assimilation system in near real-time during the 2011 hurricane season, and initiate transitioning the system to NWS operations at NCEP.	Jeffrey Whitaker Thomas Hamill Robert Webb
Generate a multi-decadal intraseasonal reforecast data set using a modern version of NCEP's Global Forecast System model and the Climate Forecast System Reanalysis. Demonstrate improved probabilistic forecast products from using post-processed reforecasts.	Thomas Hamill Jeffrey Whitaker Robert Webb
Produce an assessments of the impact of equatorial waves on tropical intraseasonal climate variability	George Kiladis Robert Webb
Develop experimental attribution assessment of recent high impact climate events of interest to policy and decision makers.	Martin Hoerling Robert Webb
Produce climate reanalyses using current generation model NOAA Global Forecast Models that includes time varying carbon dioxide atmospheric concentrations, solar variability, and volcanic aerosols.	Robert Webb Jeffrey Whitaker
Use the 20th century reanalysis to understand four high impact historic climate events of national interest -- the March 1925 tornado outbreak, the September 1900 Galveston Hurricane, the 1930's dust bowl drought, and the July 1936 North American Heatwave	Robert Webb Jeffrey Whitaker Arun Kumar (NCEP)
Water Cycle Branch	
Deploy and operate field equipment for HMT-West (winter 2010/2011)	Clark King James Jordan
Deploy and operate field equipment for CalWater (winter 2010/2011)	Clark King James Jordan
Deploy and operate field equipment for Washington State/Howard Hanson Dam (winter 2010/2011)	Clark King James Jordan
Deploy and operate field equipment for DOE Wind Energy Project (Upper Midwest; summer 2011)	Clark King James Jordan
Deploy and operate field equipment for DWR/EFREP (soil moisture, snow-level radars, AROs)	Clark King James Jordan
Purchase parts and build a new atmospheric river observatory for Eureka, CA	James Jordan
Submit all necessary materials to acquire a new C-band scanning radar	James Jordan
Publish Howard Hanson Dam rapid response paper in BAMS	Allen White

Implement year-3 of DWR EFREP Tier-1 project per project plan from Sept 2010	Allen White
Execute tier-2 ARO project plan	Allen White
Implement wind energy field study in summer 2011	Allen White
Provide real-time access to PSD experimental observations via the internet	Allen White
Implement next steps in conducting an HMT/IWRSS pilot study on the Russian River	Allen White
Carry out initial steps on 3 of 6 transition topics that emerged from the HMT-West Annual Meeting: (1) snow-level information, (2) training, and water vapor flux methods and tools, including atmospheric river and barrier jet	Allen White
Complete HMT-SE Science Plan	Timothy Schneider
Complete NOAA/ESRL-PSD HMT-SE implementation plan, with focus on initial 3-years	Timothy Schneider
Prepare a white paper describing the experimental design of water cycle budget experiment	Timothy Schneider
Submit a peer reviewed publication on the extreme QPF verification baseline covering all contiguous US RFC domains (Ellen Sukovich lead; USWRP sponsored)	Timothy Schneider
Establish a working implementation of HL-RDHM for the North Fork of the American River Basin (CA) in CHPS/FEWS (WRDA & DWR sponsored)	Timothy Schneider
Carry out initial steps on 3 of 6 transition topics that emerged from the HMT-West Annual Meeting: (1) QPF verification, (2) QPE vision and evaluation of MPE and PRISM, and (3) hydrologic applications with NWS/OHD	Timothy Schneider
Develop plans for an IWRSS pilot study on the Russian River	Lynn Johnson
Establish a data interoperability plan with NWS/OHD and key partners	Lynn Johnson
Establish a working implementation of hydrologic modeling for the Russian River and for the North Fork of the American River Basin (CA) in CHPS/FEWS (WRDA & DWR sponsored)	Lynn Johnson
Demonstration of Global Hawk UAS dropsonde system	Gary Wick
Publish SST or air-sea flux paper	Gary Wick
Demonstrate and apply a refined objective technique for identifying atmospheric rivers in satellite and model data (submit formal journal article)	Gary Wick
Complete initial diagnostic analysis of Atmospheric river and Sierra barrier Jet events observed during CalWater 2009/10 and CalWater 2010/2011	Paul Neiman
Submit formal journal article on atmospheric river dynamics, forecasting, and/or hydrometeorological impacts	Paul Neiman
Advise on the development of new mesoscale diagnostic capabilities using gridded reanalysis and model data, and demonstrate application to atmospheric river and/or barrier jet research	Paul Neiman
Weather and Climate Physics Branch	
Develop plan for PSD/AOML joint research effort	Christopher Fairall
Submit paper on effect of surface processes in GFDL hurricane model	Jian-Wen Bao
Submit plan for NOAA participation in DYNAMO MJO project. - Fairall	Christopher Fairall
Submit 2 papers on VOCALS-REX field program	Christopher Fairall
Complete two cruises in support of Office of Climate Observations flux reference buoys	Christopher Fairall
Submit paper on ensemble data assimilation	Jian-Wen Bao
Monthly updates of ICOADS data base and web portal	Sandra Lubker
Submit paper on remote sensing by airborne GPS bistatic backscatter	Valery Zavorotny
Submit paper on SEARCH observatories	Taneil Uttal
Complete business plan and NOAA-Roshydormet agreements for TIKSI	Taneil Uttal
Report results of numerical simulations of cross-polar scattering in strong winds	Alex Voronovich
Provide Kalman filter based ozone bias correction for 1 year of CMAQ predictions	James Wilczak
Site and deploy instruments for wind forecasting study	James Wilczak
Complete report on PSD3 flux data collected during ICEALOT 2008 cruise	Daniel Wolfe
Help organize the 3rd International Workshop on Advances in the Use of Historical Marine Climate Data	Scott Woodruff

2012 Performance Measures and Milestones	**Responsible**

	Individual(s)
Measures	
Number of ESRL-PSD peer-reviewed publications	Richard Lataitis
Demonstrate improved Regional River Flood Warning Lead Time and absolute timing error (change from baseline in hours/hours)	Martin Ralph
Develop one science & technology product per quarter (publication, sensor design, etc.) related to PSD water cycle research	Martin Ralph
Cumulative assessments of climate extreme events, anomalies and trends	Martin Hoerling
Milestones	
Climate Analysis Branch	
Publish article assessing role of atmospheric rivers in Washington State Flooding (Neiman et al. JHM)	Martin Ralph
Document usage of HMT tools in NOAA's Rapid Response to the Howard Hanson Dam Crisis in WA State (White et al. BAMS)	Allen White
Produce an assessment diagnosing the role of atmospheric rivers in global water cycle using modern reanalysis (Newman et al. J.Clim)	Martin Ralph
Conduct preliminary assessment on the ability of gap filling radars to augment legacy observing systems (e.g. NEXRAD) in the west to provide better precipitation and water supply information.	Robert Cifelli
Produce an assessment of the impact of equatorial waves on tropical intraseasonal climate variability	George Kiladis
Produce an assessment diagnosing the moisture sources for extreme precipitation events in the intermountain west	Michael Alexander
Assess the seasonal prediction for and the seasonal predictability of the 2010/11 South Central U.S. drought	Martin Hoerling
Partner with the Southwest Climate Alliance in an assessment of evolving climate conditions over the Southwest United States	Martin Hoerling
Partner with NWS to implement an operational global Ensemble Kalman Filter (EnKF) system at NCEP (an EnKF is a data assimilation technique for making atmospheric analyses and forecasts).	Jeffrey Whitaker
Water Cycle Branch	
Conduct preliminary assessment on the ability of gap filling radars to augment legacy observing systems (e.g. NEXRAD) in the west to provide better precipitation and water supply information.	Robert Cifelli
Implement at least 1 community hydro model, and test and evaluate at ESRL	Robert Cifelli
Couple ensemble precipitation forcing to hydrological models for two key watersheds.	Lynn Johnson
Deliver a preliminary report on quality of national precipitation forecasts.	Martin Ralph
Weather and Climate Physics Branch	
Archive and assess 7 years of process study oriented climate data for the two SEARCH observatories from Alert and Eureka CANADA	Taneil Uttal
Develop full partnership operations plan for the NOAA-Roshydromet International Observatory in Tiksi Russia and Archive and assess first year of climate data supporting GAW, BSRN, AMAP, CRN and AeroNET	Taneil Uttal
Provide International leadership in developing a Pan-Arctic network of 9 Flagship climate/weather observatories including the Russian drifting stations through the IPY legacy project IASOA www.IASOA.org	Taneil Uttal
Make public version 10 of the PSD hurricane flux algorithm.	Christopher Fairall
Generate data archive of ship and aircraft observations from participation in the NOAA/NSF DYNAMO field program in the Indian Ocean.	Christopher Fairall
Prepare the PSD W-band radar for deployment on the NOAA P-3	Christopher Fairall

2013 Measures and Milestones	Responsible

	Individual(s)
Measures	
Number of ESRL-PSD peer-reviewed publications (target 80/year)	Richard Lataitis
Develop one science & technology product per quarter (publication, sensor design, etc.) related to PSD water cycle research - HMT	Martin Ralph
Cumulative assessments of climate extreme events, anomalies and trends (target 2/year)	Martin Hoerling
Cumulative site-years of data collection for cryospheric, boundary layer mean and turbulent properties, hydrometeorological, and oceanic process studies (Target 10/years)	Christopher Fairall Allen White
Milestones	
Climate Analysis Branch	
Develop a new web portal capability to serve the CMIP5 data for the diagnosis and explanations of changes in the frequency and amplitude of extreme climate events	Michael Alexander
Conduct a climate assessment of the atmospheric dynamics the led to the 2011 Missouri River Basin Flooding and produce a seasonal predictability assessment for the basin	Robert Webb
Assess the utility of various existing and proposed metrics of the Madden-Julian Oscillation to characterize tropical intraseasonal variability	George Kiladis
Partner with NWS to develop a hybrid ensemble-variational data assimilation system for the Hurricane WRF operational hurricane prediction system.	Jeffrey Whitaker
Partner with NWS to develop new parameterizations for model uncertainty for use in the global ensemble forecast system (GEFS).	Jeffrey Whitaker
Water Cycle Branch	
Deploy three snow-level radars as part of the joint NOAA/CA Department of Water Resources 21st-century observing network	Allen White
Deploy two atmospheric river observatories as part of the joint NOAA/CA Department of Water Resources 21st-century observing network	Allen White
Deploy ten soil temperature/moisture and surface meteorology stations as part of the joint NOAA/CA Department of Water Resources 21st-century observing network	Allen White
Publish journal article on California's 21st century observing system	Allen White
Publish CalWater publication on the geographic distribution of warm rain	Allen White
Deploy a sodar and sfc met station in support of a frost prediction project with Sonoma County Water Agency	Allen White
Submit to NOAA management Water Cycle Grand Challenge Workshop Report	Martin Ralph
Publish journal article on the emergence of testbeds	Martin Ralph
Publish journal article documenting the impact of atmospheric river duration on precipitation	Martin Ralph
Develop CalWater II Science Plan	Allen White
Establish HMT Southeast Pilot Study observing network	Robert Cifelli
Establish MOU with San Francisco Public Utilities Commission to provide improved quantitative precipitation information for their wastewater enterprise	Robert Cifelli
Perform calibration of KPIX radar using radar, rain gauge, and disdrometer observations provided by PSD	Robert Cifelli
Compare lumped and distributed hydrologic simulations on the Russian River using best possible quantitative precipitation forcing	Robert Cifelli
Conduct sensitivity analysis of ensemble precipitation forcing to hydrologic model for two key watersheds	Robert Cifelli
Weather and Climate Physics Branch	
Publish journal article documenting the Global Hawk Arctic dropsonde system	Janet Intrieri
Complete initial analysis of Wind Forecast Improvement Project (WFIP) study	Jim Wilczak
Test fly W-band sea-spray radar on NOAA P-3 aircraft for hurricane observations and modeling	Christopher Fairall
Submit journal article on CO_2 and other trace gas flux measurement technology	Christopher Fairall

Publish review article on high latitude surface flux observation requirements	Christopher Fairall
Submit reprocessed flux, radar, and microwave data from DYNAMO R/V Revelle	Christopher Fairall
Establish Joint Projects agreement with Russian Federation to operate climate observatory in TIksi Russia	Taneil Uttal
Publish paper on network based Arctic climate observations	Taneil Uttal
Represent NOAA on development of the implementation plan for the OSTP Interagency Arctic Research Policy Committee	Taneil Uttal

2014 Measures and Milestones	Responsible Individual(s)
Measures	
Number of ESRL-PSD peer-reviewed publications (Target 80/year)	Richard Lataitis
Develop one science & technology product per quarter (publication, sensor design, etc.) related to PSD water cycle research - HMT	Allen White
Cumulative assessments of climate extreme events, anomalies and trends (Target 2/year)	Martin Hoerling
Cumulative site-years of data collection for cryospheric, boundary layer mean and turbulent properties, hydrometeorological, and oceanic process studies (Target 10/year)	Christopher Fairall Allen White
Milestones	
Climate Analysis Branch	
Conduct two attribution assessments that would provide an understanding and explanation of recent extreme weather and climate events7	Martin Hoerling
Assess the marine biological implications for North Atlantic Climate Variability and Change in the CMIP5 models	Martin Hoerling
Double the number of climate model ensemble simulations available to asses extreme weather and climate events (from 30 to 60)	Martin Hoerling
Conduct a predictability assessment of the skill and reliability of model forecasts and predictions of recent extreme weather and climate events	Martin Hoerling
Develop an experimental reforecast-based heat watch warning system.	Martin Hoerling
Produce a next-generation Historic Climate Reanalysis at a higher resolution and base on more land and marine observations back to the early 19th century	Martin Hoerling
Water Cycle Branch	
Write a report providing recommendations for locating precipitation monitoring equipment near San Francisco as part of the project to improve quantitative precipitation information for the SFPUC wastewater enterprise	Robert Cifelli
Demonstrate visualization of coupled high resolution precipitation and distributed hydrologic runoff response in at least one selected watershed	Lynn Johnson
Submit a paper for publication on a climatology of extreme precipitation events in the southeast U.S.	Kelly Mahoney
Submit a paper for publication on the impact of gap-filling radar in the Russian River watershed	Rob Cifelli
Develop plan for quantifying natural and water management flows in the Russian River watershed	Lynn Johnson
Develop prototype model to downscale precipitation climatology information in time and space using meteorological inputs	Chengmin Hsu
Submit publication on dual frequency retrieval technique to quantify attenuation at X-band	Sergey Matrosov
Submit journal publication on the impact of atmospheric river flow through the Carquinez Strait on precipitation observed in the northern and southern Sierra foothills	Allen White
Conduct site surveys, obtain site leases, and install three 915-MHz wind profiler observing	Clark King

sites to support HMT-SEPS and Sandy Supplemental project on atmospheric rivers and extreme events	
Conduct site surveys, obtain site leases, and install up to three vertically pointing precipitation profilers in the Russian River watershed to improve quantitative precipitation estimation	Clark King
Weather and Climate Physics Branch	
Develop and IASOA Data Portal	Taneil Uttal
Prepare a publication assessing the potential of the Tiksi Observatory as a GAW station	Taneil Uttal
Finalize Interagency Agreement (IA) with NWS & BOEM for improved sea ice forecasts through observations and improved model information	Janet Intrieri
Complete WFIP final report to DOE	James WIlczak