

Arctic Test Bed

Charter and Terms of Reference

I. Background

The Arctic is a key region with critical influence on the global environment and economy. This has been recognized not only by NOAA but also other U.S. federal agencies as well as the White House and other Arctic nations.

In February 2011, NOAA released its Arctic Vision and Strategy, which provides a high-level framework to address NOAA's highest priorities in the region:

- 1) Forecast Sea Ice
- 2) Strengthen Foundational Science to Understand and Detect Arctic Climate and Ecosystem Changes
- 3) Improve Weather and Water Forecasts and Warnings
- 4) Enhance International and National Partnerships
- 5) Improve Stewardship and Management of Ocean and Coastal Resources in the Arctic
- 6) Advance Resilient and Healthy Arctic Communities and Economies

Through a ten-year National Strategy for the Arctic Region (NSAR), released in May 2013, the White House laid out U.S. priorities for the region as described in an Implementation Plan (published in January 2014) that provides clear guidance and responsibilities to achieve milestones associated with the NSAR. This Strategy addressed a wide range of issues in the Arctic, including national security, transportation, renewable and non-renewable energy development, increased maritime traffic, environmental stewardship, and research. In response, NOAA's Arctic Action Plan (April 2014) describes how each of its six strategic goals (described above) directly supports the Strategy.

And, finally, on January 21, 2015, the White House released an Executive Order (EO) to "Enhance Coordination of National Efforts in the Arctic." It emphasizes the importance of strengthening coordination across Federal agencies, State of Alaska, local, Alaska Native tribal governments and organizations, academia, and the private and nonprofit sectors.

Climate change is transforming the Arctic into an increasingly accessible place for economic opportunity. However, warmer air and ocean temperatures, thawing permafrost, loss of sea ice, and shifts in ecosystems are straining community resilience and presenting significant challenges to public sector decision-makers

and planners. Critical environmental, economic, and national security issues are emerging, many of which have significant impacts for human lives, livelihoods, and coastal communities. Impacts are also being studied outside the Arctic, as NOAA scientists and colleagues work to better understand the Arctic's influence on global weather and climate patterns.

NOAA's science, service, and stewardship mission uniquely positions the agency to provide State of Alaska and Alaska Native partners, industry and community stakeholders, and federal and other local officials with Arctic environmental intelligence—timely, reliable, and actionable information to help them plan for and adapt to economic and ecological impacts, including disasters.

In order to transform our scientific services to meet the emerging requirements in the Arctic, as well as enable the Alaska Region to be an effective component of the NWS integrated field structure, improved focus is needed on operational science and technology advances relevant to this region. The NOAA Arctic Test Bed (ATB) has been designed to meet this gap and enable the fulfillment of NOAA's science, service, and stewardship mission in Alaska and the Arctic.

The ATB will provide a crucial nexus for ensuring NOAA's developers understand Alaska's needs and improve NOAA's responsiveness to its Arctic-related science and service priorities as described above. The ATB will enhance NWS partnership with the other NOAA line offices, especially the Office of Oceanic and Atmospheric Research (OAR). This collaboration will enable better leveraging of other research initiatives and data sources external to NOAA which are particular to the polar region, both domestic and international. This would include, but not limited to, the Office of Naval Research (ONR) Arctic and Global Prediction Program; the Department of Energy (DoE) Regional and Global Climate Modeling Program, which has an Arctic focus; NASA Cryospheric Sciences Program; Department of Interior (DoI) Bureau of Ocean Energy Management (BOEM); and international efforts, such as the World Meteorological Organization (WMO) Polar Prediction Project (PPP) and the World Climate Research Program (WCRP) Polar Climate Variability Initiative (PCVI).

In addition, there are science and technology, and unique service challenges (e.g., sea ice forecasts) and opportunities (e.g., formal and informal agreements with Canada, Russia, Finland, Norway, and other international partners), that can best be worked through Alaska operations. A dedicated test bed will provide a mechanism to transfer technology, research results, and observation advances into operations in a timely and effective manner.

The test bed is an appropriate setting to address mitigation science and technology gaps in the Arctic as well as forecast challenges, such as:

- Scarcity of *in situ* observations (e.g., wave, ocean, and ice buoys, weather observation platforms, river gauge) in the Arctic;
- Performance concerns with weather, water, ocean and wave prediction models in the Arctic region as compared to the rest of the US;
- The lack of maturity of tactical and medium range weather and sea ice modeling capabilities.

II. Vision Statement

NOAA's Arctic Test Bed ensures that relevant operational scientific and technology advances are made to support the mandates of our core partners with weather, water, and climate information and predictions and associated impacts related to the people, infrastructure, and environment of Alaska and the Arctic.

III. Purpose

Focus NWS Alaska Region development efforts to maximize service delivery effectiveness in Alaska

Facilitate and improve the transfer from research to operations (R2O) of new and improved products and services that fulfill new and emerging decision-support requirements

Partner with, and leverage ongoing NESDIS High Latitude Satellite Proving Ground activities as well as other NOAA Test Beds and Proving Grounds to ensure efficient and timely distribution of new Arctic-related products and data to support the NWS Weather Ready Nation

Provide a platform to on-board and test R&D from external parties (e.g., Environment Canada, PPP, PCPI, NRL, ONR, etc.)

Integrate and synergize high latitude and Arctic activities among federal, state, industry and other stakeholders such as Alaska native communities and tribal councils

IV. Roles and Responsibilities

A. NOAA

a. Facility

The Arctic Test Bed will be located at the NWS Alaska Weather,

Water, and Ice Center (AWWIC) in Anchorage, Alaska. It will be co-located with the Weather Forecast Office (WFO) Anchorage, the Alaska-Pacific River Forecast Center (APRFC), and the Alaska Aviation Weather Unit/Volcanic Ash Advisory Center (AAWU/VAAC). The Arctic Test Bed will have a dedicated physical space and dedicated computer resources. Though the major focus will be in-situ testing at the AWWIC, the test bed will entertain opportunities to collaborate externally.

Core staff as well as the Arctic Test Bed Director will be housed at the AWWIC. However, it is understood that research partners as well as customers and end users may be distributed both geographically and organizationally.

b. Organization

Overall responsibility for the Arctic Test Bed (ATB) falls under the NWS/Alaska Region Headquarters (ARH) within the Environmental and Scientific Services Division (ESSD). Day to day operations, direction, execution, and administration for the Arctic Test Bed is the responsibility of the ATB Director. Final testing, validation, and deployment of algorithms, codes, and products on operational systems will be the responsibility of the ATB staff. Long-term maintenance of the new product will become the responsibility of the operational, and/or regional offices, or national centers depending on the scope of use, with scientific and technical support provided as needed by the ATB

c. Executive Oversight Committee (EOC)

An ATB Executive Oversight committee is composed of the Alaska Region Director, Chief of ESSD, ATB Director, a representative from NCEP/CPC and NCEP/EMC, a designated representative from OAR knowledgeable of Arctic and Alaska issues (e.g., CPO), two representatives from the research community, and one representative from a stakeholder in the Alaskan community. The responsibilities of the Arctic Test Bed EOC include, but are not limited to:

- *ATB director serves in ex-officio capacity*
- *Makes recommendations on ATB strategic priorities, and facilitates funding availability*
- *Oversees the scope of ATB activities*
- *Provides input as a knowledge resource on Arctic science-based service issues to ATB*

- *Provides guidance on testing metrics for Research to Operations (R2O) activities*
- *Oversees project selection for inclusion into the ATB based upon recommendations by ATB management*
- *Reviews and oversees recommendations for a capability's successful transition to operations*
- *Reviews recommendations from stakeholders for products and services that meet their needs*
- *Members external to NOAA will rotate every two years*

d. ATB Management Team

The Test Bed Director is a permanent, supervisory, GS-14 position on the ESSD staff, reporting directly to the Chief ESSD. The responsibilities of the Arctic Test Bed Director include, but are not limited to:

- *Provides scientific leadership and direction for all activities and programs within the test bed*
- *Ensures test bed outcomes are aligned with NWS regional and national priorities*
- *Releases Announcements of Opportunities (AOs) for projects to be considered by the ATB. The AOs will clearly state the criteria against which the projects will be reviewed and be guided by priorities developed by the EOC, field office needs, and resources available for a specific testing cycle. Depending on the scope of the projects, the AOs will be open to a combination of or all of the following: The U.S. scientific community including the NOAA Line Offices (LOs); Federal laboratories; Universities; and the Private sector. Partnerships with the international scientific community are also encouraged.*
- *Develops a cadre of subject matter experts to evaluate responses to AOs based upon predetermined criteria, recommending the top project candidates to the EOC for selection*
- *Represents the ATB to the NOAA Test bed Coordinating Committee and participates in annual workshops hosted by the Coordinating Committee*
- *Coordinates with the other NOAA Test Beds and Proving Grounds, particularly the GOES-R Proving Ground, the Climate Test Bed, and the NWS Operational Proving Ground (OPG)*
- *Coordinates support of ATB activities through the NOAA Cooperative Institute for Arctic Research (CIFAR) in Fairbanks, AK*
- *Coordinates test bed activities with US and international Arctic-related research programs/projects, and is responsible for the*

resources required

- *Manages and administers the test bed staff in a manner consistent with agency policies and guidelines*
- *Works with the Chief ESSD to prepare test bed Annual Operating Plan; test bed milestones, goals and objectives; review proposals; and prepare quarterly and annual reports*
- *Identifies data, forecast applications, and numerical/statistical modeling needs to accomplish appropriate transitions to operations*

Science Infusion and Technology Transfer Meteorologist (SITTM) is a permanent GS-13 position, reporting directly to the Arctic Test Bed Director. The responsibilities of the SITTM include, but are not limited to:

- *As part of the ATB management team, acts as test bed Deputy Director*
- *Assists the director in all aspects of test bed operations, and serves as Acting Director in his/her absence*
- *Provides oversight to routine ATB activities and programs, including but not limited to experiments, training, model and ensemble post-processing and verification, and a visiting scientist program.*
- *Maintains awareness of scientific advances and new techniques being developed nationally and internationally to identify improved, real-time, data-analysis techniques, forecast models, and observational systems that have potential for significantly improving the forecast guidance provided to weather and ice forecasters in the high latitudes.*
- *Coordinates with Geographic Information Network of Alaska (GINA), and NOAA Test Bed Liaisons*
- *Prepares or assigns ATB related documentation including test plans, reports and science-based strategic planning*
- *Develops or integrates new data sets, tools, and concepts for examination and validation in the ATB*
- *Assists in evaluation of data sets, tools and concepts for further testing in real-time operations, and permanent transfer into operations*

e. Other ATB Staff

In addition to the Director and SITTM, the ATB will consist of one Research Meteorologist, one Service Delivery Meteorologist, and two Science Developers. Responsibilities of these staff includes but are not limited to:

- *Initial evaluation of promising observations, codes, algorithms, and products emerging from the research community by performing the early steps of testing to demonstrate the potential of new science and technologies for possible use in operations*
- *Complete tests of the algorithms, codes, products, and observations in a quasi-operational information technology environment subject to metrics that mandate good scientific performance while meeting ease-of-use criteria and time constraints*
- *Prepare documentation, training materials, and evaluations of performance characteristics of successful products to facilitate their deployment on operational systems and their use in the forecast process*

B. External Stakeholders/participants

Participation of partners and stakeholders with a vested interest in successful outcomes from the ATB is critical to the success of the test bed beyond traditional performance metrics. Objectives of the ATB are focused beyond improved workflow and forecast operations to enhance end-to-end delivery of services, measure the effectiveness of risk communication, and the quality of internal and external collaboration, etc.

For instance some test bed activities may include active participation by representatives from core stakeholder agencies (e.g., USCG, BOEM, USGS/AVO, etc.), the emergency management community and the State of Alaska, media partners, and representatives from the Alaska Native communities. Others may include observers who bring added value to the process by offering specialized expertise in risk characterization/assessment, crisis communication skills, social science insight, and Traditional Environmental Knowledge (TEK).