

**CROSSING THE VALLEY OF DEATH: THE NOAA TRANSITION OF RESEARCH APPLICATIONS TO CLIMATE SERVICES (TRACS) PROGRAM**

**Josh Foster\***  
**UCAR, Silver Spring, MD**

**1. TRACS MISSION**

The mission of the TRACS Program is to use competitive research grants to transition experimentally mature climate information tools, methods, and processes, including computer related applications (e.g. web interfaces, visualization tools), from research mode into settings where they may be applied in an operational and sustained manner. The primary goal is to generate sustained delivery of useful climate information products and services to local, regional, national, and international decision and policy makers. A secondary goal seeks not only to support implementation of these transitions, but also to learn from partners how to better accomplish technology transition processes for public goods applications and improved risk management.

**2. TRACS EVOLUTION**

How did we get to a point in time when we could establish TRACS? The challenge of bridging the divide between the research, operations, applications, both practically and culturally, is not a new problem. Evidence from 1973 shows a concern from more than 30 years ago particularly between NOAA research laboratories and the National Weather Service.\* In the last five years, momentum in NOAA to establish transition mechanisms has grown as a result of external pressures and internal policy changes.

In 2000, the National Research Council authored a report entitled, "Crossing the Valley of Death: From Research to Operations in Weather Satellites and Numerical Weather Prediction," that at a minimum popularized the phrase. This NRC report made a number of recommendations including the need for NOAA to create a research to operations transition mechanism. Another NRC report entitled, "A Climate Services Vision: First Steps Toward the Future," (2001) also recommended that NOAA should "ensure a strong and healthy transition of U.S. research accomplishments into predictive capabilities that serve the nation." In 2003, the Climate Change Science Program (CCSP) Strategic Plan recommended: "[D]evelop resources to support adaptive management and planning for responding to climate variability and climate change, and transition these resources from research to operational application." Following these external recommendations, in May 2005, NOAA issued an Administrative Order (NAO) 216-105 for a "Policy on Transition of Research to Applications."\*\*

TRACS, formerly known as the NOAA Climate Transition Program (NCTP), was cooperatively established in 2003 by the NOAA NWS Climate Services Division (CSD), and the NOAA Research-Office of Global Programs (OGP) Climate Assessments and Services Division (CASD) (now under the NOAA Climate Program Office (CPO)).\* NCTP was renamed TRACS in 2005 to better evoke the purpose and nature of the program, link to NOAA's emerging climate services priorities, and to respond to the new NOAA Transition Policy.

---

\*Corresponding Author Address: Josh Foster, NOAA Climate Program Office, 1315 East West Highway, Room 12235, Silver Spring, MD 20910; email: josh.foster@noaa.gov

### **3. THE TRACS PROGRAM**

The title of the TRACS program should call attention to three key elements and their interplay. These activities include, transitions (i.e. a focus on partnerships where technology hand-offs occur), research applications (i.e. experimentally developed and tested, end-user-friendly information to support decision making), and climate services (i.e. the routine and timely delivery of that information, including via partnerships). Led primarily from the university and Federal laboratory research communities, TRACS emphasizes engaging with operations, extension, and user communities in “transition partnership projects”. It is also expected that private sector research and development companies will apply for TRACS funding. TRACS is designed to accommodate four types of transition project partnerships: 1) Within NOAA units; 2) From external partners to NOAA; 3) From NOAA to external partners; 4) Among external (NOAA) partners (using NOAA funds).

#### **3.1 WHAT TRACS IS?**

TRACS supports partnerships to transition climate time-scale products and services. TRACS is designed to compliment on-going research partnerships and catalyze interactive learning among researchers, operational entities, extension agents, and end-users developed under the NOAA Regional Decision Support (RDS) Program (including the Sectoral Applications Research Program (SARP) and Regional Integrated Sciences and Assessments (RISA) Programs—or in other similar ventures involving NOAA and its stakeholder communities). TRACS projects should build bridges between decision support research and operations capabilities and partners. TRACS projects should focus on developing means of communication and feedback, and on deep engagement with the operational and end-user communities over a finite period, but should also help establish relationships and trust that will endure over time. TRACS is intended to transition research applications that have been tested

in practice “downstream” of major research activities, have the potential to be reliably applied, and are on the cusp of being ready to “hand-off” for regular and sustained delivery and/or use. TRACS may help facilitate transition into applications of products and services developed in “test-beds”. TRACS projects may focus on local, regional, or national scale decision support tools and systems. TRACS focuses on climate time-scales, but welcomes work on the interaction among climate and weather research and decision-making. TRACS projects should rigorously identify and evaluate the benefits to society of the transition project.

#### **3.2 WHAT TRACS IS NOT?**

TRACS is not an operational or services activity by itself, but by design functions as a bridge to effect research transitions through partnerships with operational entities. TRACS does not support major “upstream” research and development (R&D) for observing, modeling, or forecast systems, including the funding of “test-beds”. TRACS is not intended to be a means to develop “from scratch” end-to-end research applications, to support initial contact with operational or user partners, or to explore more broadly the development of climate services (these activities are supported more generally by the NOAA SARP and RISA Programs, along with the rest of the Climate Program Office portfolio).

#### **3.3 SUMMARY OF PROGRAM**

The objective of TRACS is to fund projects to develop or enhance climate products and services, build capacity among decision makers to understand, access, and use climate-related decision support tools or technologies, and ensure that NOAA and its partners (federal, regional, state, and the private sector) are capable of routinely delivering climate information to the public.

## **4. FUNDED PROJECTS**

Beginning in 2005, TRACS has funded the start of projects involving universities working with a range of partners, including but not limited to, Regional Climate Centers, State Sea Grant, emergency and coastal managers, the Naval Ice Center, and agricultural extension agents. Transition projects have involved a number of decision support tools, including a distributed interactive access and resource interface for fine scale climate data known as WESTMAP, the capability to forecast sea ice in the Arctic on weekly to seasonal timescales, a tool linking east coast seasonal winter storm track forecasts to planning and management of storm surge, and climate forecast decision making tools for farmers. TRACS expects the first transition projects to be completed in 2008 defined as a sustained hand-off of a fully functional climate decision support application to an operational partner.

### **4.1 CURRENTLY FUNDED TRACS PROJECTS (2005-07)**

#### **4.11 STORM SURGE:**

Transitioning an Assessment of Impact-Producing East Coast Winter Storms to Decision-Support Tools for Emergency Management and Coast Restoration  
Partners: Cornell University to NWS Northeast Regional Climate Center (NERCC)

End-User: Sea Grant managers, coastal and emergency managers (Long Island, NY)  
Transition hand-off in: 2008

#### **4.12 FORECASTING:**

A Distributed Interactive Access and Resource Interface for Fine Scale Climate Data

Partners: University of Arizona to NWS Western Region Climate Center (WRCC)  
End-User: land and resource managers and planners  
Transition hand-off in: 2008

#### **4.13 AGRICULTURE:**

Transition of Weather and Climate Forecasts Into Effective Decision-Making Tool

Partners: University of Nebraska-Lincoln to NWS High Plains Regional Climate Center (HPRCC)

End-User: agricultural extension agents, farmers

Transition hand-off in: 2008

#### **4.14 ICE FORECAST:**

Forecasting the Condition of Sea Ice on Weekly to Seasonal Time Scales

Partners: University of Washington to Naval Ice Center (NIC)

End-User: Navy ice forecasters, resource managers, navigators, hunters

Transition hand-off in: 2008

#### **4.15 AGRICULTURE:**

Transition From Research To Operations for AgClimate - An Internet-Based Decision Support System For Minimizing Agricultural Risks Associated With Climate Variability  
Partners: University Of Florida to Florida (UFL) Cooperative Extension Services, Particularly The Florida Agricultural Weather Network (FAWN)

End-User: Agriculture, Forestry (Fire), Pasture & Livestock Sectors

Transition hand-off in: 2009

#### **4.16 MONITORING:**

AZ Instituting Multi-Scale Hydroclimatic Indices in Drought Monitoring and Mitigation

Partners: University Of Arizona (UAZ), Arizona State University (ASU), AZ State Climatologist to AZ Dept Of Water Resources, Salt River Project (Arizona Drought Monitoring Committee (ADMC))— Integrated Group

End-User: numerous

Transition hand-off in: 2009

#### 4.17 FIRE:

Implementation of a Climate-Vegetation Based Early Warning and Prediction System for Interagency Fuels Management  
Partners: Desert Research Institute/Climate, Ecosystem and Fire Applications (DRI/CEFA), Oregon State University (OSU), NOAA/ESRL Climate Diagnostics Branch (CDB) to DRI/CEFA (CEFA Operations and Forecast Facility (COFF)—already funded by land management agencies  
End-User: NIFC (BLM, USDA-USFS, NPS, USFWS, BIA)  
Transition hand-off in: 2009

#### 4.18 SOCIETAL IMPACTS:

Transitioning the Drought Impact Reporter into an Operational System  
Partners: NDMC, University of Nebraska-Lincoln (UNL), University of Arizona (UAZ) to NDMC  
End-User: Numerous  
Transition hand-off in: 2010

#### 4.19 MONITORING:

Adding Daily Solar Radiation and Dew Point Temperature to Historical Weather Records of the U.S. Cooperative Observer Network in the High Plains Region  
Partners: UNL, High Plains Regional Climate Center (HPRCC) to HPRCC  
End-User: Crop Consultants, Extension Educators, Producers And Other Industry Professionals, As Well As Scientists Are Using This Program (Hybrid-Maize Model); Marketing, Agribusiness, Grain, Ethanol Production, Crop Insurance  
Transition hand-off in: 2008

#### 4.20 FORECASTING:

Transition of Downscaled Probabilistic Precipitation Forecasts into NOAA Centers for Environmental Prediction (NCEP) Operations  
Partners: ESRL CDB to NCEP NCO and HPC  
End-User: NWS River Forecast Centers and Bureau of Reclamation reservoir managers  
Transition hand-off in: 2009

#### 4.21 MONITORING & PREDICTION:

Real-Time Soil Moisture, Snow And Runoff Products For Drought Assessment And Prediction In The Continental U.S.  
Partners: University of Washington to CPC, (NCDC), NDMC, National Resources Conservation Service (NRCS)  
End-User: Myriad—Users Of Drought Monitor And Drought Outlooks  
Transition hand-off in: 2010

#### 4.22 FORECASTING:

Operational Multiscale Forecast and Reservoir Management in Northern California  
Partners: The Hydrologic Research Center (HRC) and the Georgia Water Resources Institute (GWRI) to the California Nevada River Forecast Center (CNRFC) and the California Department of Water Resources (DWR)  
End-User: Reservoir Managers—River System Managers  
Transition hand-off in: 2010

---

\* "Bridging Presentation" from Gordon Little, ~1973; Director, Wave Propagation Lab 1967+, predecessor to NOAA Environmental Technology Lab (ETL), predecessor to ESRL/PSD)

\*[http://www.corporateservices.noaa.gov/~ames/NAOs/Chap\\_216/naos\\_216\\_105.html](http://www.corporateservices.noaa.gov/~ames/NAOs/Chap_216/naos_216_105.html)

\*Credit to Fiona Horsfall (NWS) and Harvey Hill (OGP)