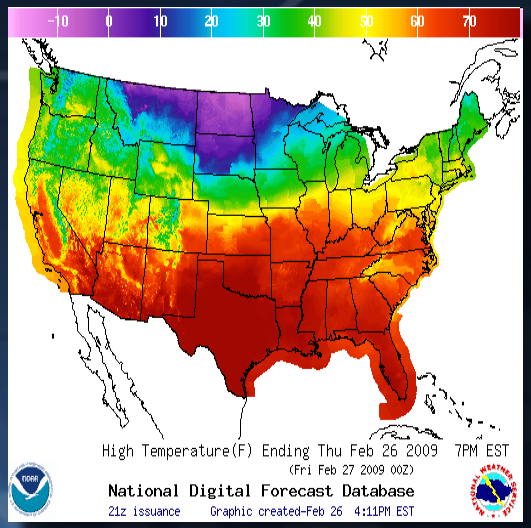
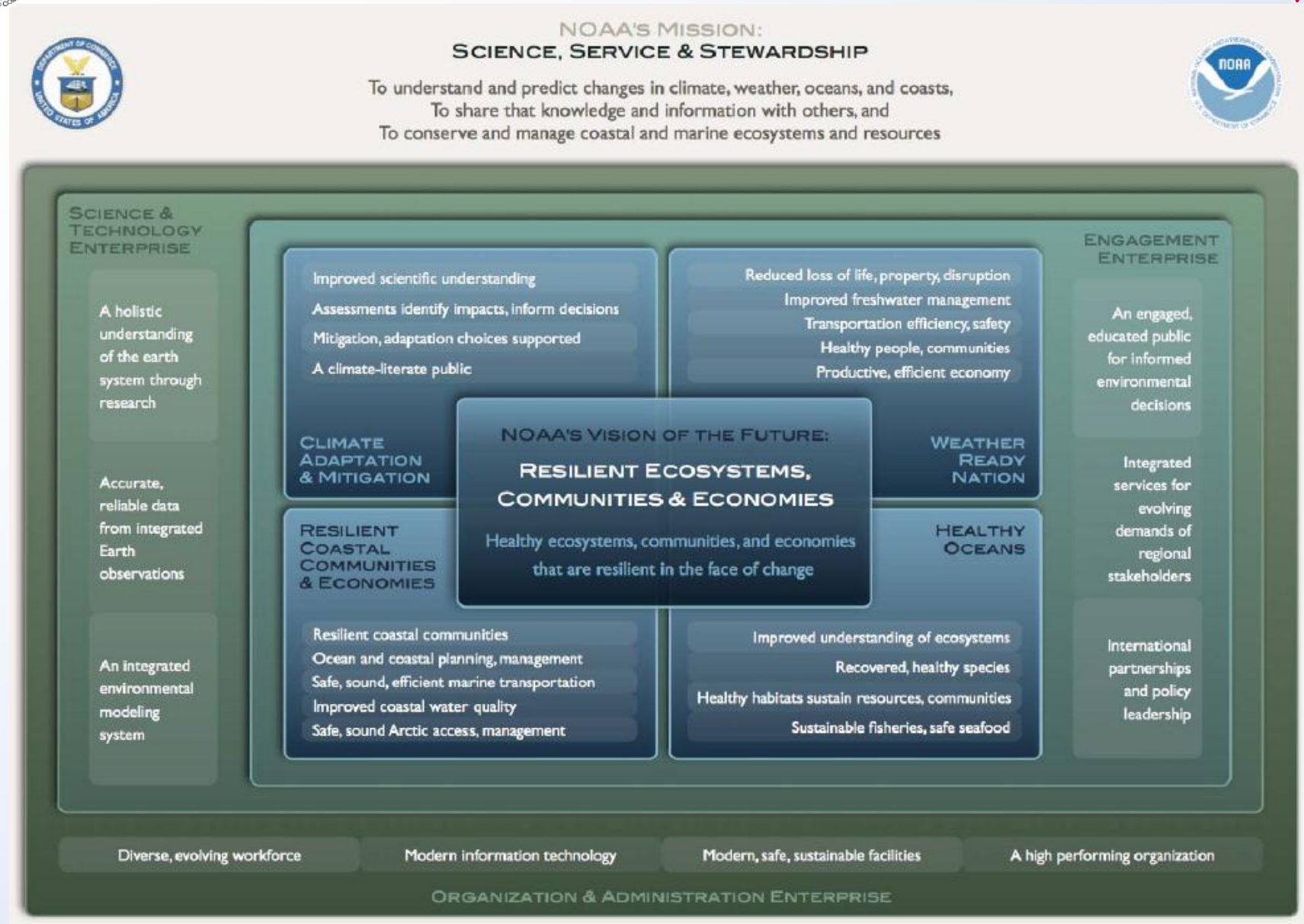


NWS Climate Information and Tools for Decision Support Services

CDPW, State College, MD, July 11, 2013

Marina Timofeyeva, Barbara Mayes, Victor Murphy, Fiona Horsfall, and Annette Hollingshead

NOAA Next Generation Strategic Plan



NWS Strategic Plan

Mission

Provide weather, water, and climate data, forecasts and warnings for the protection of life and property and enhancement of the national economy

Vision

A Weather-Ready Nation: Society is Prepared for and Responds to Weather-Dependent Events

Weather-Ready Nation GOALS
Goal 1. Improve weather decision services for events that threaten lives and livelihood
Goal 2. Deliver a broad suite of improved water forecasting services to support management of the Nation's water supply
Goal 3. Enhance climate services to help communities, businesses, and governments understand and adapt to climate-related risks
Goal 4. Improve sector-relevant information in support of economic productivity
Goal 5. Enable integrated environmental forecast services supporting healthy communities and ecosystems
Goal 6. Sustain a highly-skilled, professional workforce equipped with the training, tools, and infrastructure to meet our mission

Building a Weather-Ready Nation

Becoming a Weather-Ready Nation is about building community resilience in the face of increasing vulnerability to extreme weather.

NOAA's NWS is

- Moving from product services to decision support services
- Improving technology to track and forecast storms with longer lead times
- Expanding its dissemination efforts to achieve far-reaching national preparedness for weather events

Building a WRN - Roadmap

Flexible response to meet contingencies

- **Provide superior decision support and foundational information services**
  - *NWS uses unique, local relationships with Core Partners to help them to better prepare our communities for extraordinary events*
- **Invest in Science and Technology**
  - *NWS uses state-of-the-art technology and cutting-edge science to provide the best service possible*
- **Empower our workforce**
  - *Workforce is trained and equipped to meet America's evolving needs*
  - *Emergency Response Specialists (ERS) are accessible on-site and through remote technologies to provide Impact-based Decision Support Services (IDSS)*

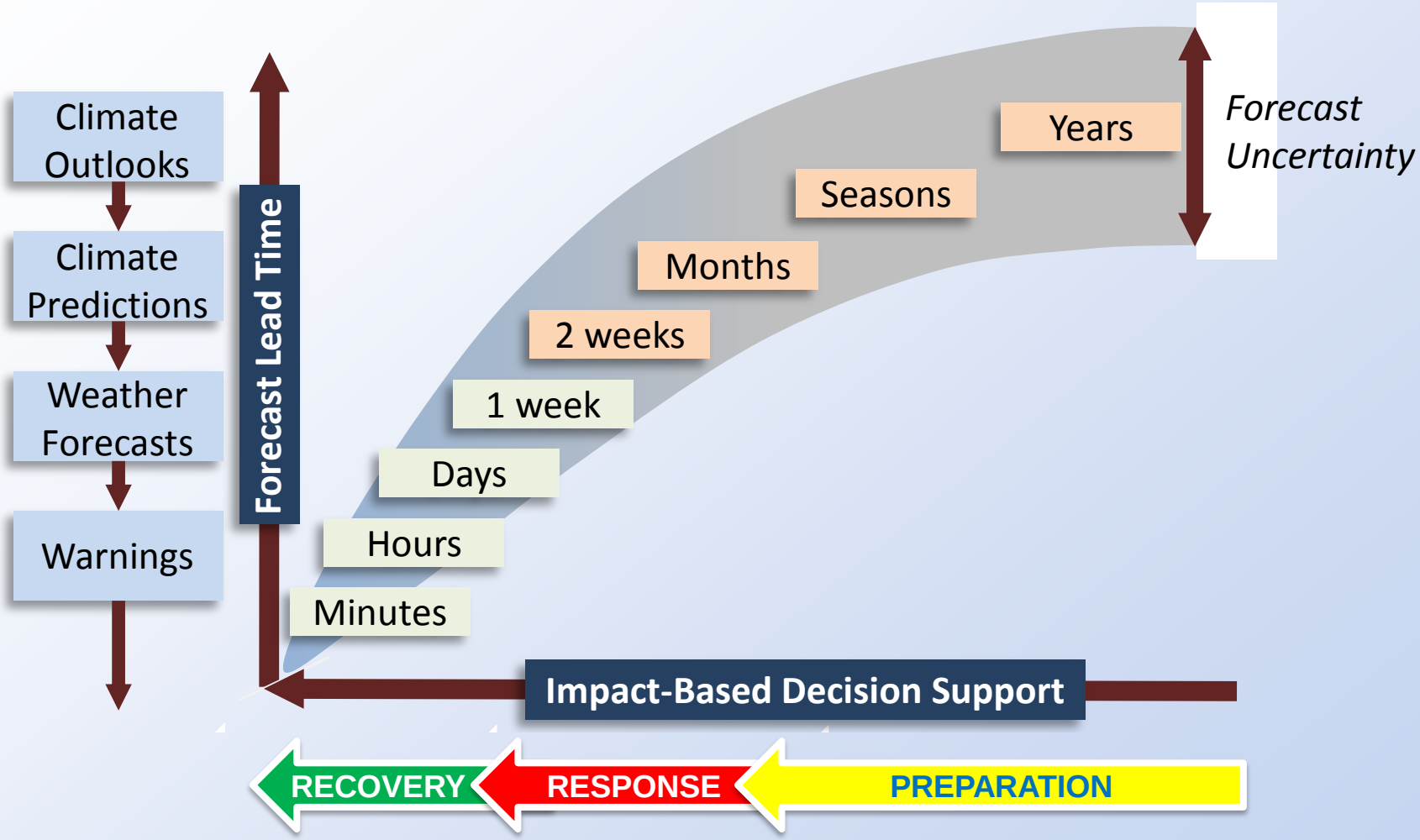
Impact-Based Decision Support Services (IDSS)

Helping America make better preparedness and response decisions in the face of weather and climate events

- NWS provides relevant information and interpretative services to enable core partners' decisions when weather, water, or climate has a direct impact on the protection of lives and livelihoods*
- Additional forecast information on the climate scale (at least a year into the future) will also be included to facilitate IDSS on seasonal projections of weather such as hurricanes, severe weather, winter weather, and flooding*

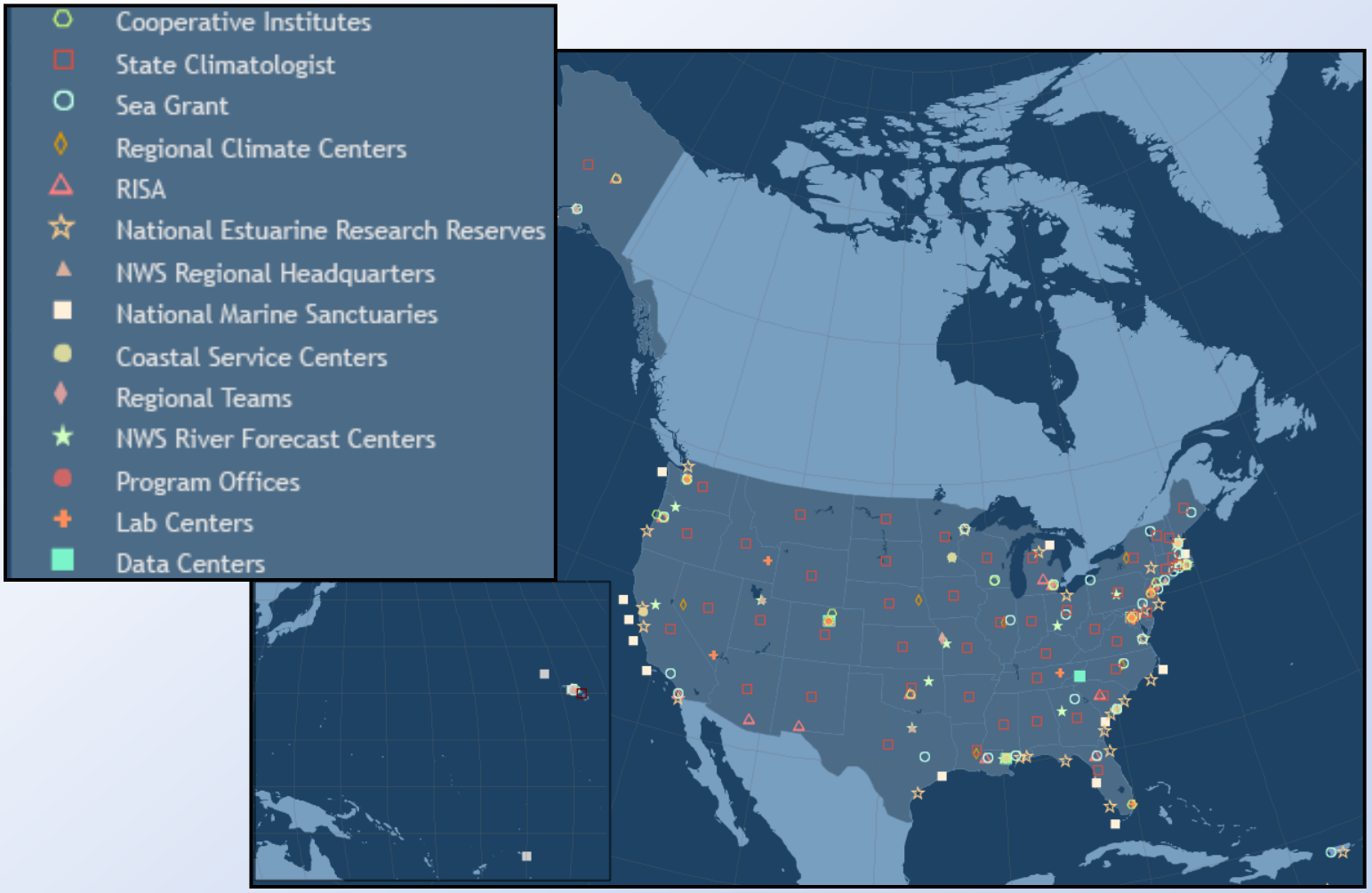
*** From NWS Weather-Ready Nation Roadmap**

Climate - Weather Linkage



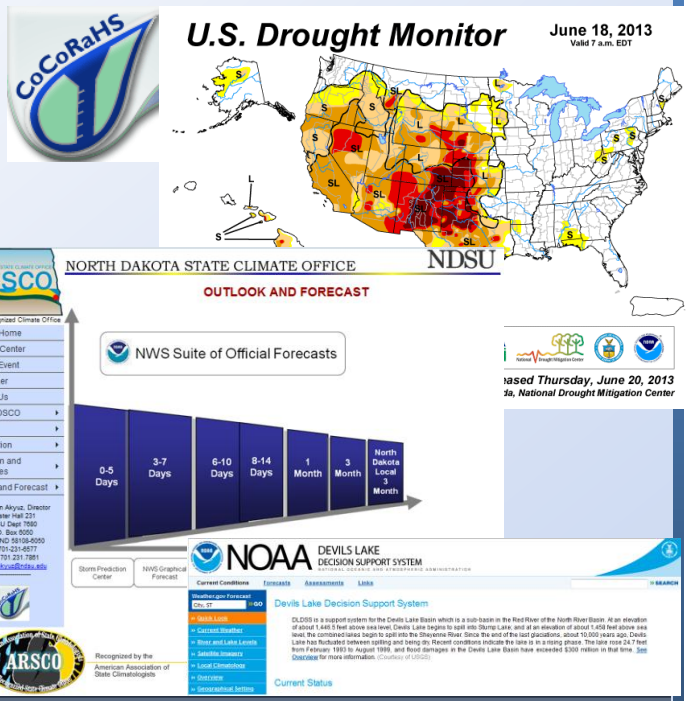
Regional and Local Focus of IDSS

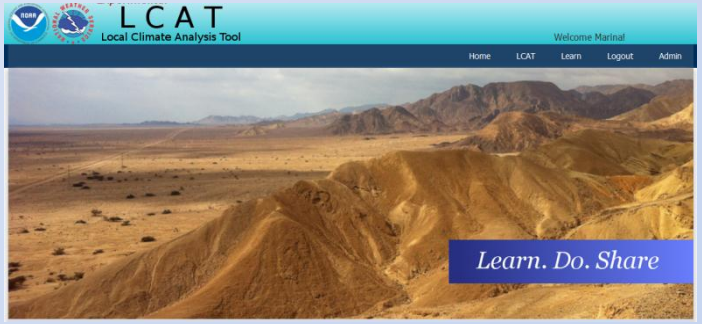
NOAA works nationally and internationally, but most climate decisions are local or regional, and NOAA is structured to have multiple entry points at regional, state, and local levels.



NWS Climate Services

- Ensure climate quality of weather records
  - *Applying 10 Principles of Climate Monitoring*
  - *CoCoRaHS coordination in WFO*
  - *Network of Networks*
- Climate Product Development and Delivery
  - *Coordination on State Climate Extremes and other questions*
  - *Local and national products delivery*
  - *WFO / SC office coordination on services*
- Developing common knowledge of climate information applications
  - *Climate Predication Application Science Workshop*
  - *Climate Diagnostics and Prediction Workshop*
- Use of common tools for consistency of climate services
  - *ACIS (xmACIS, SCACIS, NOWData)*
  - *LCAT*
- Information exchange





LCAT
nws.weather.gov/lcat/

LCAT uses principles of Artificial Intelligence to connect humans with computing capability to apply data and scientific techniques

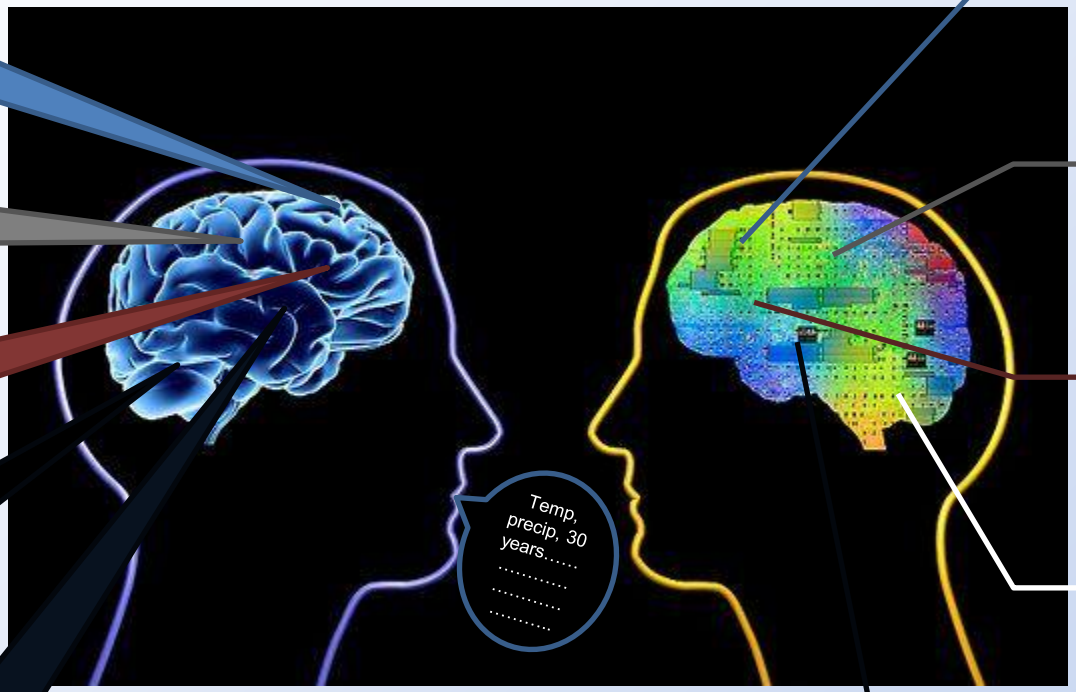
How is the temperature in my town changing?

Should we expect floods during La Nina events?

How severe is the drought in my region this year?

Which climate model performs best in my region?

What are the projections for climate in my region?



Data: Homogenized station maximum temperature
Analysis: best practices for trend; rate of change
Output: statistics, plots, metadata

Data: Homogenized precipitation and river flow
Analysis: composites, risk assessment
Output: statistics, plots, metadata

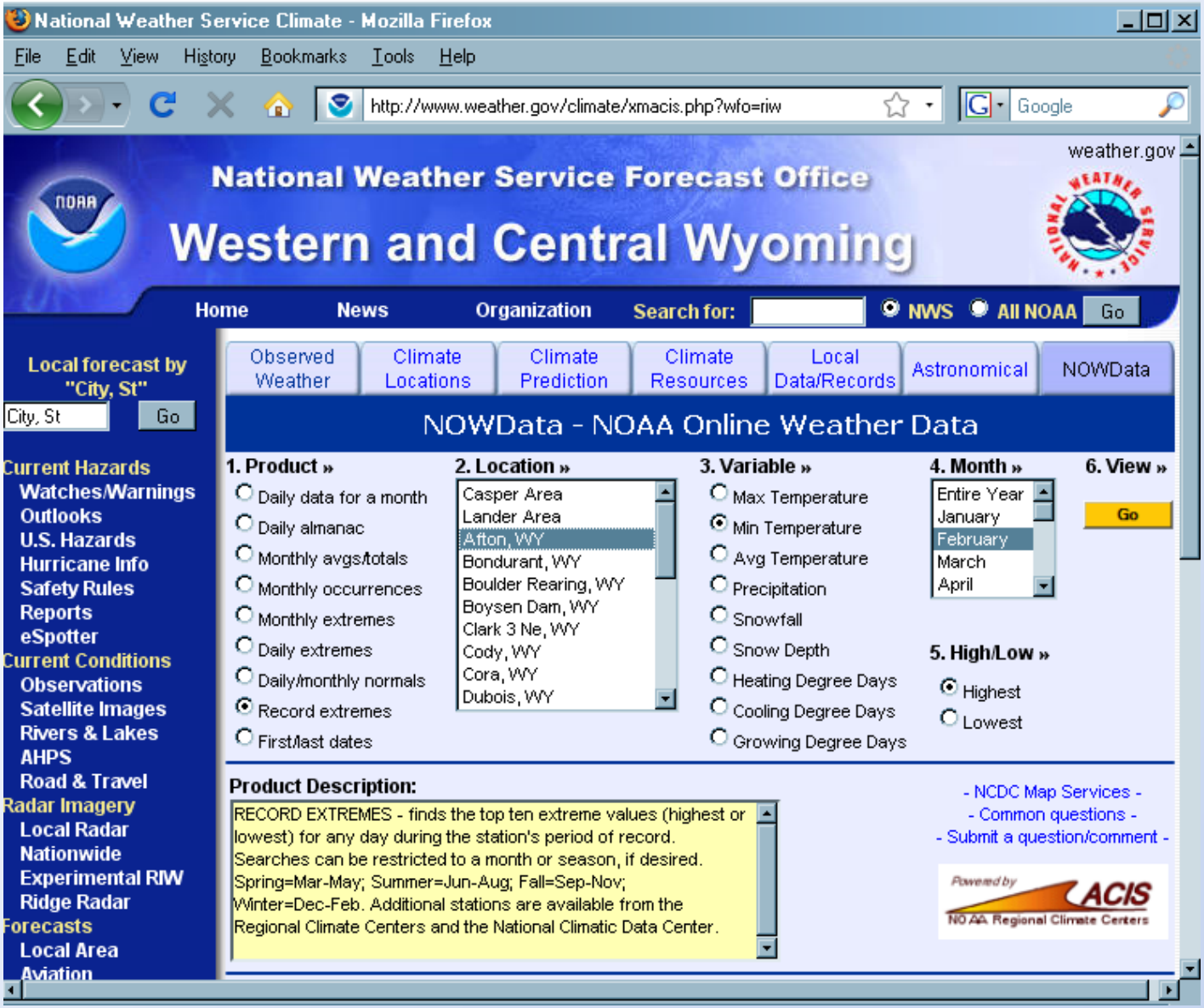
Data: Drought indices
Analysis: time series analysis
Output: statistics, plots, metadata

Data: Reanalysis and GCM fields
Analysis: downscaling, sensitivity tests
Output: statistics, plots, metadata

Data: GCM outputs
Analysis: downscaling
Output: statistics, plots, metadata

LCAT
nws.weather.gov/lcat/

ACIS/xmACIS/NOWData



Pilot Projects

- **NWS Operations Center (NOC)**
  - *NWS Headquarters, Silver Spring, MD*
- **Regional Operations Center (ROC)**
  - *Southern Region Headquarters, Fort Worth, TX*

Pilot Projects

- **IDSS in a Coastal Environment** WFO New Orleans, LA
  - *Supporting operation of 7 major ports and river transportation, outdoor activities (Navy Week, Super Bowl, Mardi Gras, etc.), clean up and recovery of HAZMATs incidents*
  - *Providing planning and operations support, training emergency managers*
  - *Local climate data and forecasts guide advance preparedness with weather information updates minimizing the potential impacts*
- **Integrated Environmental Studies** WFO Tampa, FL
  - *Provide operational decision support services for emergency responders*
  - *Local climatological data of extreme weather events and climate outlooks guide decisions on timing of algal bloom, environmental conditions for oysters and shellfish, citrus growing and vegetable farming, freshwater availability*
- **Mesoscale Meteorology Science to Ops.** Charleston, WV
  - *Prototype operational applications of emerging mesoscale meteorology and modeling research, deploy enhanced web-based geospatial display of mesoscale forecasts, exploit emerging storm-scale model capabilities to improve severe local storm and flash flood warnings*
  - *Local climatology information of storms and severe weather events will guide advance planning and preparations*

Examples

- **Ecosystem DSS: Algal blooms and red tide are frequently**
  discharge of fresh water from rivers into the Gulf of Mex
  - ***Climate products: used in combination with ENSO condition***
    composites to provide input or DSS with regard to increase
    the occurrence of these algal booms and red tide months in
    probabilities of above/below normal precipitation in the ri
- **Ecosystem DSS: Drought and resultant decreased stream**
  Louisiana, Mississippi, Alabama, and Florida results in de
  Gulf of Mexico. In turn, this leads to increased salinity le
  where oysters develop.
  - ***Climate products: used in combination with ENSO condition***
    composites to provide input or DSS with regard to the likeli
    flow months in advance.
- **Ecosystem DSS: Abnormally cold outbre**
  near the coast can result in fish kills and
  some ponds and lakes in Florida.
  - ***Climate products: segregate ENSO condi***
    events are more apt to occur. These can
    stress in these shallow waters.
- **Agriculture DSS: The Florida peninsula a**
  vegetables grown in the United States.
  of US grapefruit production comes from
  the USA with 11% of the fresh market v
  production is valued at $1.145B.
  - ***Climate products: correlating ENSO cond***
    probabilities for extreme wet or dry ano
    growing season will be extremely valua

Support

- **Training modules**
- **Online guidance**
- **Dynamic interpretations**
- **Help documents**

We use “3H” approach:

- **Head** – provide scientifically-sound information
- **Hand** – provide application examples, guidance
- **Heart** – show compassion / make it easy