

INTEGRATING SURFACE OBSERVING SYSTEMS (ISOS)

IMPLEMENTATION PLAN

A NOAA FIRST STEP

Toward an Integrated National Surface Observing Network

CLIMATE and WEATHER & WATER GOALS

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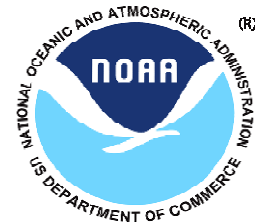


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Requirement Drivers

Fiscal Year 07 Programming and Fiscal Guidance – Serial 3, under the section Climate and Weather & Water: “Working with Weather and Water, (Working with Climate...) develop and include detailed plan for Integrated Surface Observing System (ISOS). Plan should examine current surface observing systems and proposed modernization efforts and look for overlaps and opportunities for consolidation/efficiency. Plan should also identify which programs and goals will ultimately operate the ISOS elements. Provide detail in the additional information section of the program plan.”

Additionally, an ISOS implementation plan is one of the defined deliverables of the July 20-23, 2004 NOAA ISOS working forum sponsored by the Climate (Cli) and Weather & Water (W&W) Goal Team Leaders. This ISOS Plan addresses both of these requirements.

Purpose

In order to maximize the potential value and benefit of observations and observing systems there is the need to integrate the planning, operation, and life cycle support to existing and future observations from NOAA and non-NOAA observing systems.

The purpose of this NOAA Integrated Surface Observing System (ISOS) Implementation Plan is to outline key areas of consideration common to integrating observations and observing systems. This plan identifies a specific Plan of Action and Milestones (POA&M) that demonstrates immediate progress toward integrating NOAA surface observing systems, a first step toward the long term goal of a national NOAA integrated observing network. Lessons learned during the NOAA ISOS process can be applied toward a NOAA integration process for all NOAA and non-NOAA observing systems.

Boundary Conditions

For the purpose of this NOAA ISOS plan the term “surface” observations refers to terrestrial based in-situ (direct measurements) surface observing systems that measure the common near surface atmospheric parameters listed under the Climate and Weather & Water goals. The most notable existing “surface” systems are ASOS, USCRN, and COOP. However, meteorological surface observations associated with other NOAA observing systems, such as PORTS and ocean buoys, will be included as early “deliverables” in this “first step” action plan. Other opportunities supporting Ecosystem (Eco) and Commerce & Transportation (C&T) will be examined to identify early deliverables.

Non-NOAA observing systems, often referred to as mesonets, are excluded from this specific NOAA ISOS plan. The value of mesonet data is recognized in support of NOAA’s mission goals. Integration and contributions of mesonets to an all inclusive and comprehensive Integrated National Observing Network will be addressed at a later time. However, many of the issues described in this plan can be used to evaluate and integrate U.S. mesonet systems into an integrated national network of systems and the national network into the Global Earth Observing System of Systems (GEOSS).

About Integration

Integrating NOAA observing systems is a NOAA Corporate Board high level issue. The NOAA Observing Systems Council (NOSC) in collaboration with the NOAA Ocean Council (NOC) identify and recommend observing and integration issues and related “best business practices” relevant to corporate NOAA. The initial focus on NOAA integration activities needs to be on opportunities to

enhance existing NOAA observation and data management systems. The NOAA challenge is how to improve efficiency and effectiveness in order to optimize the value of the investments in the physical and living sciences observing systems for:

- Existing observations and observing systems
- Future (new) observations and observing systems.

The Art of Integration is an end-to-end process of examination, planning, and execution. It includes, but not limited to defining the requirements, the parameters to be measured, the observing network (sensors, site locations, and other common hardware), and associated data stewardship activities, such as ingesting and inventory reported observations (acquire), data processing, metadata (station history), access (data services), and archiving of NOAA data determined to have long term value to the Nation and users. Detailed engineering design and other documentation are not part of the ISOS plan.

Defining and validating requirements is the starting point for every integration activity. It is not always suitable, feasible or acceptable to integrate all aspects of an observing system (existing or new). Therefore, on a case by case basis, “opportunities” for integration at multiple points within the end-to-end integrated observations and data management system must be examined and evaluated. The goal is to be good stewards of the Nation’s resources by minimizing development and operating costs, providing long term archive and easy and timely access, and maximizing the quality, potential value, and utility of observations.

The integration process, regardless of the level of the integration being examined, depends on having the cornerstones, common core functions and information, in place to be successful. NOAA integration activities need to be pursued concurrently and sequentially, to include early consideration of mesonets, particularly in support of W&W and C&T time sensitive operational requirements.

As a matter of course, consideration needs to be given to how the new observation or observing system address one or more of the societal benefits listed later in this document. The IWGEO has framed a “characterization of priorities” to include numerical scoring criteria as a function of benefits to society. This may be useful to the NOAA process.

Implementation - Integrating Capabilities and Capacities

Risks/Barriers

The Act of Integrating is foremost a management and less a technical challenge. The challenge associated with NOAA forming an integrated network of observing systems is to align as many functions as practical between existing and planned observing systems. Although observing systems often satisfy many of the same requirements, there is often little coordination between the sponsoring Line Offices leading to a network of systems designed and operated to a large degree independently of each other to include the data management functions. Many NOAA observing systems NOAA integrators must examine and ultimately integrate to the maximum extend acceptable observations and observing systems deployed and operated by NOAA, U.S non-NOAA, and other nations.

“Demonstrated small successes built one upon the other, one step at a time.” To be successful requires early execution of select, manageable tasks that can be accomplished in a relatively short period of time and at a modest cost while developing the process as a positive demonstration of the benefits of

cooperation. Long term success requires training of present and future generations of NOAA leaders and managers at all levels of the organization, persistence, perseverance, and commitment.

Potential Barriers to Success:

- Shifting the perspective of observing systems from Line Office centric to a NOAA Mission, Goals, and Programs perspective – An organizational cultural shift.
- Corporate “will” to sustain the “integration” process as a dynamic and permanent part of the NOAA business planning and execution practices – Training and funding.
- Lack of a well defined Research to Operations Transition Process for research/prototype demonstration observing systems that could become operational systems that benefit the Nation – Research activities do not “loss” funding and Operational activities are provided O&M funding.

Vision

Optimize the value of an integrated system of earth observations supporting societal, economic, and environmental benefits that contribute to the long term quality of life on earth.

Goals

- Encourage within corporate NOAA as a matter of routine “best leadership and management practices” regarding coordination and collaboration across the organization.
- Establish a practical and used framework for NOAA Goal Team Leaders, Program Managers, Line Offices, and Observing System Managers (terrestrial, atmosphere, and ocean) to facilitate dialog throughout the year in planning, evaluating, and executing the systematic end-to-end integration of earth observing systems, data management, and data services.
- Reduce and eventually eliminate observing “overlaps and gaps” through greater economy and efficiency.

Outcomes

Short Term:

- Improve the use and access to NOAA “surface” observations.

Mid Term:

- Reduced user uncertainty associated with NOAA data
- Improve the use and access to “surface” observations across the Nation.

Long Term:

- National integrated NOAA observing network based on requirements and not distinguishable as either Line Office centric or NOAA Mission Goal specific.
- National integrated observing “network of systems” of NOAA and non-NOAA systems.
- Maximize the NOAA and National contributions to the Global Earth Observing System of Systems (GEOSS).

Objectives

- Integrate at the national level NOAA surface observing systems through a coordinated planning, programming, budget, and execution process.
- Provide a template to integrate other NOAA observing systems that support the NOAA mission goals and sub-goals.
- Provide a template to integrate other federal, state, regional, public, and private observing systems.

Performance Measures (PMs) - ISOS Plan

- Improved NOAA data quality through integrating observations and systems (# systems integrated)
- Increase volume of NOAA data archived and accessible to users (# systems archiving at a NNDC)

The Need Defined

A few recurring themes captured during the six NOAA Constituents meetings held across the country include the following questions from the public: *What data and information can NOAA provide to users? Where are the data and information located? How do I access and retrieve these data? How “good” is the data?* The last question addresses the level of confidence in the data and the degree of risk, defined by uncertainty, the user must consider relative to their respective investments and plans when utilizing NOAA data and information.

Execution

The priority of this NOAA ISOS plan is to first focus on NOAA funded and operated surface observing systems. The following sections in combination with the attached Plan of Action and Milestones (POA&M) list describe actions necessary to support integrating NOAA surface observing systems. This plan also contributes to a more encompassing NOAA Integrating Observing Systems (IOS) concept of operations leading to modernization efforts that identify opportunities for consolidation/efficiency and minimizes (eliminates) observing overlaps and gaps.

Priority Issues/Actions identify immediate high impact benefits to NOAA and the customer that can be readily accomplished with a minimum investment of time and resources. In many cases these are within ongoing “core” mission functions under Climate and W&W Goals, associated NOAA programs, and the Line Offices.

Fundamental Considerations

First, there must be a common understanding of what is meant by *integration*. To be successful, a well defined, understood, and used integrated observing system process addresses first the fundamental issues when examining how best to integrate existing observations and observing systems. Integration can occur at one or more places. Practical limits to integrating existing systems may preclude standardizing sensors but could lead to the acceptance and use of other standards for sampling and calculating recorded measurements, integrating data processing of common parameters from multiple observing systems, improved metadata documentation and access, common access portals, and long term archive and access. Future observations and observing systems planned and implemented as a national or global network of systems will lead to improved data quality available to the public and used in research and applications that address socio-economic and environmental issues now and throughout the 21st Century.

Societal Benefits

The first step in assessing the value of integration is to identify the benefits to society. One approach is to examine strategic focus areas related to the benefits in support of societal needs such as:

1. Improve Weather Forecasting.
2. Reduce Loss of Life and Property.
3. Protect and Monitor Our Ocean Resources.
4. Understand, Assess, Predict, Mitigate, and Adapt to Climate Variability and Change.
5. Support Sustainable Agriculture and Combat Land Degradation

6. Understand the Effects of Environmental Factors on Human Health and Well Being
7. Develop the Capacity to Make Ecological Forecasts
8. Protect and Monitor Water Resources
9. Monitor and Manage Energy Resources

Requirements – Define and Validate

Is the requirement process in NOAA well defined, understood, and practiced? Successful integrated planning and implementation begin with well defined and validated requirements. One of the most significant contributors to program and project failure is related to poor requirements management. Therefore, the question “*What are the validated requirements?*” should be the starting point of all planning activities. An end-to-end requirements management process should include the following:

1. Collection of data and information on mandates, needs, and opportunities.
2. Interpretation and validation of these mandates, needs, and opportunities relative to the NOAA vision, mission, and goals.
3. Identification, prioritization, and validation of Goal Team and NOAA observing requirements.
4. Identify contribution to one or more Societal Benefits.
5. Development of plans and programs to address how to satisfy the validated requirement(s) and where applicable initiate research and analysis to address potential solutions.
6. Selection of the most appropriate solution(s) and development of a prototype procedure/process.
7. Implementation of the solution and life cycle maintenance, as well as routine assessment of the implemented solutions and results.

Decision Support Information - Dialog and Coordination

The NOAA Observing System Architecture (NOSA) database has the potential to provide exceptional information access and decision support tools. It is reasonable to expect that the NOSA database can provide the required information and access capabilities with some additional programming enhancements.

Priority Issues/Actions – Early FY 05 Deliverables

The current level of dialog and coordination across Goal Teams, Program Managers, Line Offices, and Observing System Managers are inadequate. In order to facilitate communications and coordination, three factors have been identified as necessary to the integration decision process.

Issues:

1. NOAA use definitions to facilitate a common language to facilitate discussions.

The NOSA has adopted the use of the Global Change Master Directory (GCMD) List (<http://gcmd.gsfc.nasa.gov>). NOSA requests the use of the term “parameter” when referring to variables to be measured, i.e., temperature, precipitation, etc.

Common NOAA use terms need to be defined and posted at the NOSA web site to supplement the GCMD list. *Surface* can mean on or immediately above (near) or on the surface of land and water, to include atmospheric, terrestrial, and ocean parameters. These measurements can be taken by ground (surface of land and water), airborne, and space-based sensors. *In-situ* can mean observations taken by ground, airborne, and ocean based sensors, not necessarily to include NEXRAD or airborne (aircraft). It may infer “direct” (in physical contact) measurement techniques. *Remote* might include satellites, wind profiler, laser ceilometers, and NEXRAD, and may infer “indirect” measurement techniques.

Metadata may be as basic as FGDC compliant location information (latitude, longitude, and elevation) and/or detailed information on the sensors, calibration, quality control, surrounding landscape, maintenance history, processing algorithms, etc. Define the term *observing system*.

Benefit: Facilitate NOAA discussions and planning.

Actions:

- a. Define NOAA use terms: “*surface*” observations, *In-situ*, *Remote*, *metadata*, *observing system*.
 - b. Data Stewardship Committee (DSC) reviews and recommends to the NOSC.
 - c. Post NOAA use definitions on the NOSA web site.
2. NOAA validated list of atmospheric, terrestrial, ocean, and space physical, chemical, biological, geological, other geophysical and solar parameters and their relative importance (priority) as applied to the strategic societal needs referred to above.

Issue: Validated NOAA Mission Goal parameters with priorities lists not available.

Benefit: Integration planning and execution based on validated requirements

Actions:

- a. Cross reference and validate the Climate and W&W Goals observing requirements (parameters) documented in NOSA and the respective lists in the draft 10-year plan blueprint Global Earth Observing System of Systems at <http://earthobservations.org>.
 - b. Post validated lists on the NOSA web site.
3. Decision support tools and information are critical to dialog and planning.
The NOAA Observing System Architecture (NOSA) should be the central repository and portal for easy and convenient access to NOAA observing requirements and details on observing systems.

Issues:

- NOSA can not currently provide easy and convenient access and retrieval to select decision support information.
- NOSA database requires additional information to support decision support planning needs.

Benefit: Easy access to decision support information to facilitate dialog and planning.

Actions:

- a. Goal Teams, Program Managers, Line/Staff Offices, and Observing System Managers meet with NOSA and provide the top most type decision support tools and information needed to facilitate ISOS planning.
- b. NOSA prioritize and structure “data calls” based on the above action item.
- c. Enhance NOSA databases and capabilities to provide easy and convenient “point and click” access to “canned” and “on the fly” sorts and information such as:
 - List (table) of all NOAA existing and planned observing systems to include Goal, Program, and lead LO (system manager).
 - Above list (table) capable of: Sort by Line Office, Sort by NOAA Mission Goal, and Sort by NOAA program.
 - Mission Goal parameters list (indicate primary and supporting parameters).

- Mission Goal parameters list with assigned priority for each parameter.
- Map one or more parameters against NOAA observing systems for comparison, overlaps, and opportunities to partner.
- Map NOAA observing systems observations (and metadata) to the NOAA National Data Centers (NNDC) for long term archive and access.
- Easy and convenient access (link) to the GCMD list and the supplemental NOAA use terms/definitions list.

Integration Specifics

National Environmental Policy Act (NEPA)

NOAA surface observing systems must comply with NEPA guidelines. NOAA compliance coordinators should review existing and new surface observing systems to ensure NOAA is meeting its obligations.

Issue: Observing systems, particularly those using potentially harmful (hazardous) materials, such as oil and antifreeze with precipitation gauges, need to be identified and reviewed for compliance.

Benefit: NOAA is a good environmental steward and compliant with federal and local regulations.

Actions:

- a. NOAA establishes a reference list of materials and a process for Program managers and Observing System managers to use to ensure satisfying NEPA guidelines and regulations.
- b. Review existing NOAA surface observing systems for a completed NEPA compliance review.

Standards

Using standards and practices to the maximum extent possible by NOAA observing systems reduces preventable “design induced” data biases. The WMO endorsed Climate Monitoring Principles for ground and space based observing systems increase the quality and confidence in data. Place sensors at a common 1.5m height above the ground (WMO climate guide), reduces potential engineering design induced data differences. Enforce the FGDC standards per NAO 212-15 and NOAA Executive Order 12906. Where suitable, utilize traceable instrument calibration standards (NIST has many).

Issue: Find, develop, and use accepted engineering design, calibration, operating procedures, and algorithms.

Benefits: Reduces engineering design and process introduced instrument and observing biases.

Actions:

- a. Establish a NOAA Master Library of standards and procedures (easy access and use).
- b. NOSA maintain the NOAA Master Library and database for each system.
- c. Access the NOAA Master Library through the NOSA web site.
- d. Capture this information in the metadata files and the NOSA database for each system

Distribution of Observing Stations (Spatial Distribution)

Visualizing and mapping observing systems distribution and observed parameters greatly assists in identifying existing “stations of opportunity” and identifies potential overlaps and gaps. Needs include defining any given geographically sized area, selectively query by observing system the location of each observing station/platform (distribution and location) identified by observing system, and a search listing by parameter(s).

Issue: Capability and availability needs further development.

Benefit: Improves planning through easy and common access to information on existing stations and associated observations to facilitate “piggy back” of new sensors, eliminate overlaps, and fill gaps.

Action: NOSA provide this mapping capability for NOAA land and ocean based observing systems.

Sensors

Whenever feasible, use the same manufacturer make and model sensors and associated support equipment. Where suitable, use accepted traceable calibration standards for sensors measuring key (primary) parameters. This improves the quality of and confidence in NOAA observations.

Issue: Reduce/Prevent “instrument induced” data discontinuities in the climate records.

Benefits:

- a. Reduces (eliminates) instrument related measurement differences (biases).
- b. Reduces uncertainty regarding the data reported by the different observing systems.
- c. Greatly contributes to increased use and confidence in the data.
- d. Reduces NOAA costs of procurement, operations and maintenance, archive, and analysis.
- e. Reduced costs to users.

Actions:

- a. Expand the sensor comparison studies currently done for common COOP-M, USCRN, and ASOS sensors to similar sensors used by other observing systems.
- b. Develop instrument related transfer functions between common sensors.
- c. Identify acceptable and traceable calibration standards.
- d. Place standards in the NOAA Master Library.

Recording and Reporting Observations

To the maximum extent possible, standardize the sampling rates of measurement, algorithms used to compute the record values, and the time period of recorded and reported vales (i.e., 1, 5, 15, 30 minutes, hourly values) for at least the most common parameters measured. Most observing stations use an on-site data logger making this standardization relatively straight forward.

Issue: Reduce/Prevent operating “process induced” data discontinuities in the climate records.

Benefits:

- a. Reduces recorded and reported data differences between observing systems.
- b. Reduces uncertainty regarding the data reported by the different observing systems.
- c. Greatly contributes to increased use and confidence in the data.

- d. Reduces NOAA costs of procurement, operations and maintenance, integrated data processing and use in models (standardize time intervals), archive, and analysis.
- e. Reduced costs to users.

Actions:

- a. Identify and use, where suitable and feasible, existing common procedures and algorithms.
- b. Establish acceptable procedures and algorithms.
- c. Place these standard procedures and algorithms in the NOAA Master Library.

Quality of Data

What does it mean: How “Good” is NOAA data and information?

“Quality of data” is divided into two categories for consideration: Information about the Data (Metadata/Station History) and Data Processing.

Information About the Data (Data about Data/Metadata/Station History)

Priority Issues/Actions – FY 05 Deliverables

The value of and confidence in NOAA data are greatly diminished when little is known about how the data was collected and processed. Metadata coupled with the observations constitute a comprehensive long term archive and significantly increase the economic and research value of NOAA data and information. Observations without metadata/station history data are always subject to higher levels of uncertainty and risk and lower probability of use and certainty when investing in present and future business and policy ventures. Several levels of metadata, as well as how rapidly they change, need to be documented. Slowly changing metadata is commonly referred to as “static”, often associated with fixed location observing stations. Metadata that needs to be transmitted with every data packet is referred to as “dynamic” and most often associated with moving observation platforms such a drifting buoys, radiosondes, aircraft, UAVs, and satellites.

Standards, such as the FGDC and ISO 19115, address specific aspects of metadata documentation. Each observing network must specify the particulars of the metadata required and a general taxonomy should be established. An example of complete taxonomies of metadata, refer to the EOSDIS documentation. A generic taxonomy can be found in the Open Archive Information System reference model (http://ssdoo.gsfc.nasa.gov/nost/isoas/ref_model.html) recently adopted as ISO 14721. Another reference of particular value is the Guidelines on Climate Metadata and Homogenization, WMO Technical Document No. 1186 (also WCDMP No. 53), December 2003. Go to: (<http://www.wmo.ch/web/wcp/wcdmp/html/wcdmpreplist.html>). NOAA Administrative Order (NAO) 212-15 addresses documenting metadata information.

Issues:

1. NOAA defined minimum metadata (station history) requirements to include adoption of standards.
 - a. No standards or guidelines exist for Program managers and observing system managers to review and follow when defining the metadata requirements for a NOAA observing system.
 - b. Metadata documentation for NOAA observing systems varies greatly, inadequate, and often incomplete or nonexistent.
 - c. NOAA observing and data management systems need to be FGDC compliant.

Benefits:

- a. Increased value and use of observations and information for climate and ecosystem monitoring and evaluation.
- b. Improve Climate and W&W forecasts and model predictions and projections.
- c. Users can more readily assess data quality issues and apply improved risk management techniques to business decisions and investments.
- d. Improved user confidence (lower uncertainties).
- e. Reduced user analysis costs and time.

Actions:

- a. Develop NOAA metadata standards such as WMO Technical Document No. 1186 and comply with FGDC standards.
- b. Establish minimum metadata requirements and a tiered level of documentation as a function of the observing system type, purpose, and goal(s) needs.

2. Easy and convenient means of documenting, updating, and submitting metadata.

A successful collaborative effort between NWS and NESDIS/NCDC produced a web server based station history data entry form (digital data entry and transmission form replaced the COOP B-91 paper form). The COOP web server based metadata form is in operational use (accessed, completed, updated, and electronically submitted for review and digital approval) from any location via the Internet. When approved the data are automatically entered into the station history database at the NCDC and NWS MIRS system.

Issue: Web server based digital form currently used only by the COOP observing system.

Benefits:

- a. Improved metadata documentation because it is easy and convenient to accomplish.
- b. Increased use and value of NOAA data and information.
- c. Reduced expenditure of personnel time and resources for NOAA and other users.

Actions:

- a. Modify the COOP web form for USCRN and ASOS.
- b. Modify the web form for all NOAA observing systems.

3. Convenient “one stop” comprehensive metadata (station history) database archive and access.

An accompanying relational database was developed in coordination with the COOP web form. The database was specifically designed to be enhanced to accommodate new fields of information and other observing systems. This database, Metadata Integration and Improvement Initiative (MI³), resides at the NCDC and a mirror database is part of the NWS MIRS. The combination of the web-based form and MI³ is now referred to as the NOAA Stations Metadata System 1. Direct access to detailed station history in this database is currently available through <http://cdo.ncdc.noaa.gov> and <http://www.ncdc.noaa.gov/crn.html>.

NOSA and NOAA Centers of Data, such as FSL, HADS, MIRS, NNCDC, NSIDC, NOHRSC, etc. maintain various levels of metadata that meets the immediate needs of the users. Centers of Data provide a critical service to users. However, there are associated management costs, often no standards of documentation, and no obligation to long-term archive. Far too often users must search high and low and long and hard to find even the most basic station location metadata. Examples abound:

AWOS sites – NCDC manual search of many different paper documents; NWS MIRS and HADS operations; and NOHRSC (<http://www.nohrsc.nws.gov/>): 2 staff months/yr, four different metadata sources, no metadata found for 1,950 stations reported over NOAAPort, unable to use 2.4M obs/yr.

Long term data management services required to preserve and provide access to past, present, and future NOAA metadata and observations is the legislated responsibility of the NOAA National Data Centers. There is no need for NOAA program and system managers to expend precious resources (time and intellect) maintaining station history databases or users seeking out these data from many individual and disbursed metadata databases.

Issues:

- Existing metadata for NOAA observing systems difficult to locate, access, and retrieve.
- NOAA metadata is often not archived at a NOAA Data Center and subject to loss over time.

Benefits:

- a. Reduce NOAA operating costs.
- b. Reduce costs to users.
- c. Increased confidence in, value of, and use of NOAA data.

Actions:

- a. Climate and W&W Goal Teams use of the Stations Metadata System 1, web-based station history digital entry and reporting form and associated MI³ system, for USCRN and ASOS.
- b. Expand to other NOAA observing systems managed under these two goals.
- c. Expand use of the NOAA Stations Metadata System 1 to all NOAA observing systems.

Data Processing

Traditionally, observations from observing systems have been processed within the context of each observing system and subsequently inventoried, archived, and provided to customers as an observing system data set. Information technology (IT) advances provide the opportunity (capability and capacity) to reengineer this approach to data processing. Specifically, the same parameter (air temperature, precipitation, etc.) measured by different observing systems can be processed through an Integrated Data Processing (IDP) system. One example of integrated data processing is the NWS HADS - 10,500 stations, 34,000 observations per hour (1.5 million/day) from over 23 national, state, and foreign systems are regularly processed, converted into a standard format, and available in less than four minutes from data receipt. Go to: www.nws.noaa.gov/ohd/hads and hadssystem@gateway2.nws.noaa.gov. Another example, the FSL Meteorological Assimilation Data Ingest System (MADIS), provides access and visualization capabilities of integrated surface observations including ASOS, COOP, maritime, SAO, and mesonet observations. Go to: <http://www-frd.fsl.noaa.gov/mesonet> and <http://www-sdd.fsl.noaa.gov?MADIS>.

NCDC has operationally implemented an IDP system that updates an Integrated Surface Dataset (ISD) (<http://cdo.ncdc.noaa.gov>) that includes data from many of the surface observing systems typically processed and archived by individual observing systems. The emphasis thus far has been on the U.S. and global hourly data, and some daily parameters. It will continue to expand to integrate additional daily and monthly parameters and data sources. Taken to a mature concept, integrated processes can be employed to include other observation systems/parameters from NEXRAD, satellites, etc.

Issue: IDP offers the opportunity to reduce data discontinuities, the product of different processing systems and procedures.

Benefits:

- a. Offers the advantages of a single "platform" for data processing, quality control, on-line access, and application development and can be applied to any time frequency of data recording and reporting.
- b. IDP system applies the same level of quality control and data processing to specific parameters from several different observing systems, e.g., ASOS, AWOS, USCRN, COOP, PORTS, Buoys (fixed and drifting), etc.
- c. Produces a more uniform, comprehensive data set that has a wider range of applications and improves the confidence level of the QC processed data (along with the associated metadata).

Actions:

- a. Continue to test, expand, and operationally implement IDP to include other parameters and observing systems.
- b. Create and provide access to integrated datasets.

Integrated Suite of Data and Information Services

There are several levels of data and information services that contribute to NOAA's integrated Quality of Services. It is essential that NOAA continue to provide this multi-level of operational and data management services.

NOAA access portals share many common and unique capabilities and capacities for the user to browse, select, and retrieve NOAA data. Individual efforts demonstrate initiative and innovative actions. There is no intent to discourage this level of access and creative GIS and data visualization development in support of customers. However, NOAA can greatly improve these capabilities by pooling NOAA GIS intellectual resources (NOSA, NNDC, NNCDC, CSC, RCCs, PMEL, NWS, FSL, etc.) into a coordinated and collaborative process in support of common user needs.

Access

Data access includes direct access (and retrieval) to the most current observations and archived historical data, as well as simple links to the associated metadata. NOAA Centers of Data, such as FSL, HADS, MIRS, NOHRSC, NDBC, WFOs, etc., provide a level of data management and offer critical time sensitive data services and access in direct support of well defined operational needs. The NOAA Data Centers provide a wider range of data services and access for a worldwide clientele to new and archived (historical) data, information, and metadata. The Nation is well served by this tiered suite of services.

Visualization

It is not always necessary for NOAA to develop and offer visualization tools. A companion strategy should include identifying industry groups that have developed visualization tools tailored to support their specific needs, such as recently demonstrated during the Federal Highway Administration National Hydraulic Engineering Conference (www.fhwa.dot.gov/bridge/hyd2004.htm). A key consideration for NOAA is to provide the means for the access/delivery of NOAA data to these industry developed tools.

Issues:

1. Potential duplication of effort in designing access tools, such as GIS/Visualization capabilities.
2. “Look and feel” for NOAA users of GIS maps and associated layers differ.
3. Maximize direct “point and click” link from map to individual station data (most recently reported and historical observations and metadata).
4. Select and retrieve one or more parameters from one or more observing systems in a defined geographically bounded area.
5. Identify opportunities to partner links/access with industry groups and other agencies.

Benefits:

- Contributes to reduced training and contractor support costs while accelerating improved access and visualization tools.
- Enhanced customer support services (browse, access, and retrieval).
- Reduce development and operational costs for NOAA and users.
- Expand use of NOAA data.

Actions:

- Implement a baseline set of maps and overlays at NOAA portals.
- Climate and Weather & Water Goal Teams host an access and visualization “focus group” consisting of at least the NOSA group, NWS, FSL, and the NOAA National Data Centers (NCDC, NGDC, and NODC) to review the current status of GIS data access and visualization development and future short and mid-term collaboration and plans.
- NOAA Data Centers, Centers of Data, and NOSA form a “core” standing working group to coordinate and develop an integrated plan of actions regarding web based development, testing, and implementation (same entry level “look and feel”) for search, access, retrieval, and maps (GIS tools/capabilities).
- Identify industry-based GIS and visualization capabilities that would benefit from the easy and convenient access and links to NOAA data and information.

Value of NOAA Observations to the Nation (Long term Archive and Access)**Priority Issue/Action Items: FY 05 – 06**

With the exception of special research observing systems (limited purpose and duration), NOAA must document and provide long term archive for data and information that has intrinsic and enduring value to the Nation. Centers of Data maintain a database of specific observations but are not held to NARA standards or funded to provide long term (in perpetuity) archive and access capabilities and services. The expectation is that NOAA will provide users with easy and convenient access to and retrieval of new and historical NOAA observations and associated metadata. NOAA meets this Congressional legislated (mandated) obligation as a designated Federal Records Center (FRC) by operating, in accordance within NARA guidelines, a national archive and access capability for the Nation’s environmental observations, as well as data from other countries. The mission and responsibilities of the three NOAA National Data Centers (NCDC, NGDC, and NODC) are to preserve the Nation’s ocean and atmospheric observations, provide access to these data and information, and conduct objective assessments using these data.

Issues:

1. Not all NOAA operational observing systems send the observations to a NOAA Data Center. NAO 212-15 directs the sponsoring Line Office and observing system managers to determine where, when, and how NOAA observations, designated “corporate assets”, are to be archived. Under the PPBES, this responsibility extends to the Goal Team and associated NOAA program manager.
2. No inventory list identifying by NOAA observing systems, data archived at a NOAA Data Center. Some observing system managers can not state with certainty whether the observations are archived at one of the three NOAA Data Centers.

Benefits:

- a. Improved access, retrieval, and use of NOAA data.
- b. Lower NOAA operating costs.
- c. Reduced costs to users.
- d. Maximize NOAA investment in observations by not “losing” data.

Actions:

- a. Data Stewardship Committee (DSC) develop a NOAA review process to assist NOAA Program Managers, LOs, Observing System Managers, and the NOAA Data Centers determine the “long term value to the Nation” of observing system data and associated metadata, and forward the decision to archive or not to archive at a data center to the NOSC for endorsement.
- b. NOAA data and information determined to be of long term value to the Nation must be archived at one of the three NOAA Data Centers.
- c. Climate and W&W Goal Program managers survey respective LOs and observing system managers to determine if the surface observations are archived at a NOAA Data Center.
- d. Climate and W&W Goal Teams establish a priority list and implementation schedule for all current surface observing systems to deliver (preferred in real time) observations and metadata to a NOAA Data Center.
- e. NOSA expand the survey to all Goals and all NOAA observing systems.
- f. NOSA provide easy access to and maintain a NOAA wide inventory identifying which NOAA observing systems deliver and do not deliver observations and metadata to one of the three NOAA Data Centers. This NOSA database needs to be capable of a sort by observing system name, Data Center name, goal, program, and LO.

Unique Opportunities

NOAA is entering a unique “period of opportunity” to exercise and refine the techniques and activities associated with integrating surface observing systems (ISOS) associated with the Climate and Weather & Water Goal Teams. Specifically, the ASOS is preparing for a significant life cycle upgrade project, USCRN is a new system being deployed that is designed to capitalize on the Ten Climate Monitoring Principles, and a modernized COOP observing system is being designed to deploy automated hourly reporting observing stations. A separate implementation plan with defined schedules is being developed that is directed at maximum integration of design and operating procedures for these three observing systems into an integrated surface “network of systems.” Another emerging opportunity is the development of a NOAA Integrated Data Management Plan. This plan will discuss and define many of the above issues and more.

Governance

An Integrated Surface Observing System Advisory Panel (ISOS-AP) operating under the NOAA Science Advisory Board (SAB) will provide scientific oversight and review of ISOS activities.

The NOAA Observing System Council (NOSC) and the NOAA Ocean Council (NOC) provide a forum for policy formulation and recommendations to corporate NOAA.

The Data Management Committee (DMC), under the NOSC, provides a vehicle for a variety of discussions and subsequent recommendations to the NOSC, such as NOAA use definitions, defining metadata standards, and establishing a process for reviewing and evaluating the “long term value of NOAA data to the nation” and subsequent recommendation for long term archive and access at one of the NOAA National Data Centers (NNDC). The DMC role in support of observing systems integration activities should expand over time.

The Climate and Weather & Water Goal Team Leaders in association with the respective Mission Goal Program Managers are responsible for developing and executing the various stages of ISOS planning and programming for these two NOAA Mission Goals. The other Goal Team Leaders, NOAA program managers, LO/SO AAs, and observing system managers are responsible for coordinating their respective integration activities and plans across corporate NOAA. As part of the PPBES process and best business practices, a cross cutting ISOS working group is recommended to facilitate continual integration discussions and implementation and identify and prioritize decision support information and access capabilities to be provided by NOSA.

Funding

Currently, ISOS activities are supported out of existing “core” funding in both the Climate and W&W goals and associated programs. Some Integrate Surface Observations (ISO) related activities/functions are a normal part of all the Line Offices and subordinate organizational mission “core” operations.

Action Taken: The Climate Goal reprogrammed from existing Climate program funds \$0.5M beginning in FY 06 in direct support of ISOS related activities.

Climate and W&W Goal Teams do not currently propose a “FY 07 Program Adjustment” specific to ISOS activities (per respective goal FY 07 PPI/PA&E PIRS budgets).

What is Next?

“Network of Networks,” “Network of Systems,” and “Systems within a System” are terms being used to describe integrated observing systems. Much has been done since the first Global Earth Summit. The U.S. Interagency Working Group on Earth Observations (IWGEO) was formed (<http://IWGEO.ssc.nasa.gov/>). The Global Earth Observing System of Systems (GEOSS) is associated with the Group on Earth Observations (GEO) (<http://earthobservations.org>). There is the Earth Observation Fact Sheet, Benefit Sheets for all 50 states, Washington, D.C. and Tribal Nations (<http://www.epa.gov/geoss/benefits>). An interesting article to read is “Managing Requirements for a System of Systems”, Ivy Hooks, Journal of Defense Software Engineering, June 2004, (<http://www.stsc.hill.af.mil/crosstalk/2004/08/0408Hooks.html>). The NOSC published the Strategic Directions for NOAA’s Integrated Global Environmental Observations and Data Management, July 2004 (<http://www.nosc.noaa.gov/>) which outlines NOAA’s vision for an integrated end-to-end

observations to archive and access data management enterprise system. There is the first ever draft plan to monitor the Earth currently open for public review and comment, draft 10-year plan blueprint Global Earth Observing System of Systems (<http://earthobservations.org>) and the draft Strategic Plan for the U.S. Integrated Earth Observation System (<http://iwgeo.ssc.nasa.gov/draftstrategicplan.asp>).

There are many ongoing parallel NOAA integration planning and related activities. There is the Integrated Surface Observing Systems (ISOS) Plan which includes a specific ISOS plan for ASOS, COOP-M, and USCRN. Planning for the Integrated Upper Air Observing System (IUOS) has begun. There is the extensively developed Integrated Ocean Observing System (IOOS) Plan (<http://www.ocean.us/>) and the associated Data Management and Communications (DMAC) plan. The Data Management Committee (DMC) and NOSC have been tasked to develop a NOAA Integrated Data Management Plan. The Ecosystem Goal Team has created a NMFS/NOS Line Offices collaborative team to plan and implement the most comprehensive source of biological information on the Nation’s Living Marine Resources (LMRs) and their habitats as part of the Ecosystem Observing Program (EOP). The Ecosystem Research Program (ERP) has partnered with the Weather & Water and Climate Goal Teams/Programs to begin integrating biological and non-biological information to fully parameterize ecosystem models and to develop synoptic forecasts using all physical and biological data. The U.S. GCOS Plan provides the roadmap and actions for establishing global surface (GSN) and upper air (GUAN) networks with a present focus on Africa, Central and South America, and the Pacific Islands (<http://www-ocean.tamu.edu/GOOS/publications/sw/appendix3.html>). There are also the Arctic Ocean Observing System (AOOS) and an Alaskan Ocean Observing System plans.

The wide range of activities presents a serious challenge of coordination and effective use of NOAA personnel and resources. NOAA is already an active participant and leader in developing plans with national and international partners. A defined systematic process within NOAA will assist Goal Team Leaders, Program Managers, and LO/SO Staffs to move from a NOAA to a national and then to a global perspective of integration. To be effective, NOAA starts by acting on tangible and manageable tasks and delivering meaningful and measurable results. The figure below provides a simple outline of the layered (tiered) approach toward a National Integrated Observing Network and a Global Earth Observing System of Systems (GEOSS).

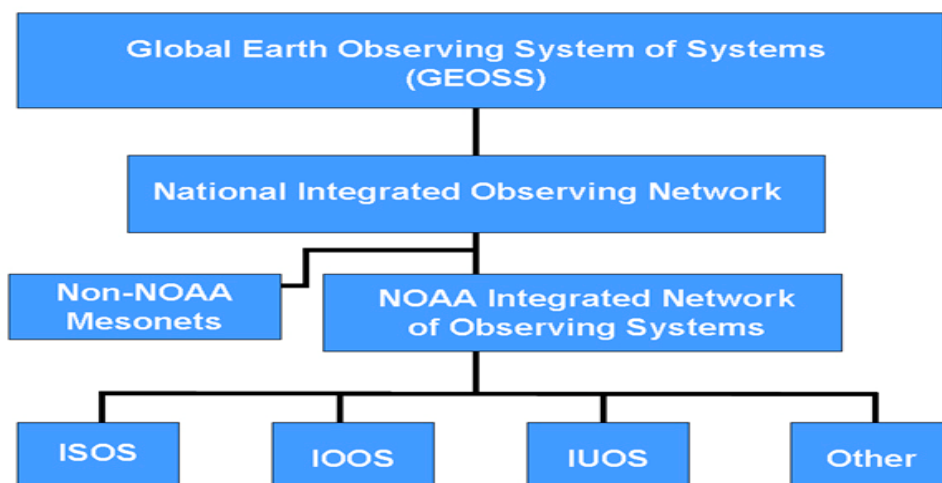


Figure 1. An approach to an Integrated NOAA, National, & Global Network of Observations

EXECUTION AND IMPLEMENTATION

Plan of Action and Milestones Plan (POA&M)

Deliverables (“Low Hanging Fruit”)

A focus on Climate and Weather & Water NOAA surface observations, in particular COOP, USCRN, and ASOS systems. Action Items were identified as “doable” with little or no additional funding, but do require a commitment and in some cases a refocus of priorities. It is recognized that detailed POA&Ms will be required/used to support and monitor the completion of the action items listed below.

Fiscal Years 2005-2006

<u>Action Item</u>	<u>Lead Person</u>	<u>Completion Date</u>
Establish co-chaired Climate and W&W ISOS (COOP-M/USCRN) Integration Team	Crawford/Easterling	Done 10/04
Integrated Executive Plan for COOP-M/USCRN/ASOS	K. Crawford (W&W) Dave Easterling (Cli)	Done 10/14
Identify common sensors, standards, procedures, and algorithms as part of planning/execution of plan for COOP-M/USCRN/ASOS (as feasible & acceptable)	K. Crawford (W&W) Dave Easterling (Cli)	FY 05
PA&E requested DMC to define NOAA <i>Data Management</i> and distinguish it from the term Data Stewardship. Definition to be used to update NAO 212-15 and needed for Int. NOAA Data Mgmt. Plan	DMC/NOSC	Dec '05
NOSA define the term <i>observing system</i> as used in the NOSA data calls and databases. Post on NOSA web site.	NOSA	Jan '05
NOSA review/update/validate the current list of NOAA <i>observing systems</i> posted at the NOSA web site (per NOSA definition above).	NOSA	Jan '05
NOSC provide a clear definition of <i>integration</i> as used by NOAA.	NOSC	Jan '05
Cli and W&W teams using the validated NOSA list of NOAA <i>observing systems</i> , identify each observing system by goal and program. Using the NOSA definition of observing system add any missing current or planned observing system.	Goal Teams Cli POC (J. Jensen) W&W POC (D. Green)	Jan '05
Meet with NOSA and define the top most type decision support tools and information needed to facilitate ISOS planning.	Cli/W&W Teams	Jan '05
NOSA prioritize and structure “data calls” based on above meeting.	NOSA	Jan '05

Establish the ISOS Advisory Panel under the Science Advisory Board (SAB)	T. Karl/F. Kelly/ C. Koblinski/ NOSC/NEP/NEC	Jan-Feb '05
NOSA provide easy and convenient “point and click” access to “canned” and “on the fly” decision support info - List of Existing/Planned NOAA Obs Systems (Sort by Goal, Program, LO) - Cli/W&W Mission Goal parameters list (indicate as primary and supporting) - Mission Goal parameters list with assigned priority for each parameter - Map one and more parameters against NOAA observing systems for comparison, overlaps, and opportunities to partner - Link to the GCMD list, NOAA use terms/definitions, and other info - Map NOAA observing systems observations (and metadata) to a NOAA Data Center (long term archive and access) Aug '05	NOSA	Jan-Feb '05
List NOAA <i>observing systems</i> grouped under the current categories: ISOS, IOOS, and IUOS.	NOSA	Feb '05
Validate Cli and W&W Goals observing requirements parameters/priorities. Post on NOSA web site.	Cli/W&W Teams	Feb '05
DMC review/NOSC endorse definitions of “research” and “operational” as applied to defining NOAA <i>observing systems</i> . (NRC 10/04 draft definitions under review.) Post on NOSA web site.	DMC/NOSC	Feb '05
Draft definitions, DMC review, NOSC endorse additional terms: “ <i>surface</i> ” <i>observations</i> , <i>In-situ</i> , <i>Remote</i> , <i>Metadata</i> and other common terms that facilitates dialog/discussions.	Cli (J. Jensen) W&W (D. Green) DMC/NOSC	Feb '05 Mar '05
Training on use of the NOSA	NOSA	Mar '05
Cli and W&W Goals survey respective observing systems, determine which archive data/metadata at a NOAA Data Centers. Provide to NOSA	Cli (J. Jensen) W&W (D. Green)	Apr '05
Web-based metadata digital form operational for USCRN (Mar '05), ASOS (MAY '05), AWOS (Jul '05)	NWS ST&I/NCDC	Mar-Jul '05
Enhance the MI ³ comprehensive NOAA station history database for USCRN, ASOS, AWOA	NCDC Faas/Schumbera	Feb-Jul '05
U. S. Army ASOS stations obs digitally deliver in near real time to the FCC via the USAF AFCCC partnership. (Pam Clark, U.S. Army Research Lab and Jon Whiteside, USAF AFCCC)	AFCCC	Feb '05
Cli and W&W Goal Teams review, update, and provide NOSA respective validated list of parameters and identify each with a priority. Identify principal (P) and supporting (S) parameters. Access via NOSA.	Cli/W&W Teams	Mar '05

Cli and W&W schedule collaborative “focus group” meeting between at least NOSA, NWS, NOAA Centers of Data and Data Centers, FSL, PMEL, NDBC, NNCDC, etc. to examine and capitalize on current GIS/Visualization capabilities and plans.	NOSA/T. Habermann	Mar ‘05
Develop near term plans with specific deliverables for future developments.		May ‘05
Examine suitability and make a decision regarding the archiving of the HADS output files at a NOAA Data Center. (Geoff Bonnin/Larry Cedrone – NWS OH and Wayne Faas/Gus Shumbera – NCDC)	W&W/NWS/NCDC	May ‘05
Establish working group to review and report on existing IDPs. Determine the purpose, value, similarities, and differences of each. (Steve DelGreco – NCDC Lead, Ken Crawford/Larry Cedrone/Paul Moersdorf/Joe Facundo – NWS, Pat Miller – OAR/FSL, others)	Cli/W&W Teams	Jul ‘05
DMC develops guidelines and review process to evaluate “long term value” to the Nation of NOAA data and metadata for archive at one of the NOAA Data Centers.	DMC	Jul ‘05
First candidate test case: PORTS meteorological observations	NCDC/R. Edwing	Aug ‘05
NOSA survey all NOAA observing systems, determine which archive data and metadata at a NOAA Data Centers. Access list via NOSA.	NOSA	Aug ‘05
Define minimum level of metadata documentation for NOAA observing system within the Cli and W&W Goals/Programs. (Ken Crawford/Tim Ross – NWS, Krisa Arzayus – OAR, and Wayne Faas/Gus Shumbera/Steve DelGreco/Howard Diamond – NESDIS/NCDC)	Cli/W&W Teams	Aug ‘05
DMC review. NOSC endorse metadata guidelines/standards.	DMC/NOSC	Sep ‘05
Ensure the MI ³ station history database is FGDC compliant to The maximum extent possible	NCDC/Shumbera	Sep ‘05
Web-based metadata forms: Develop a priority list and delivery schedule for other NOAA surface observing systems i.e., PORTS, SURFRAD, Upper Air, NEXRAD, Profiler, Buoys, etc. (Use NOSA ISOS list of observing system)	Goal Teams/ Prg. Mgrs./ Ob. Sys. Mgrs.	Sep ‘05
Include in IDP system surface air temperature and precipitation observations from all ASOS, AWOS, and USCRN stations	NCDC DelGreco/Lott	Sep ‘05
Complete framework and procedures for the NOAA Master Library. NOSC endorses. Establish NOAA Master Library.	DMC/NOSC/ NEP/NEC	Oct ‘05
Begin populating NOAA Master Library w/COOP-M/USCRN. NOSA maintains database and provides access.	NOAA/NOSA NOSA	Oct ‘05

Explore inclusion in IDP other NOAA surface met obs, such as SURFRAD, PORTS, buoys, etc.	NCDC DelGreco/Lott	Nov '05
U. S. Navy ASOS stations digitally deliver in near real time observations to the FCC (CDR Ken Schwingshagl, CNMOC and LT Brian Riverbark, FLENUMMETOC, Asheville, NC)	USN/NCDC	Dec '05
Examine additional U.S. Army and Navy observing system data sources not yet included in the FCC ISD database. (Pam Clark, U.S. Army Research Lab and LT Brian Riverbark, USN).	NCDC/AFCCC	Dec '05
Explore observations from the COOP-M Northeast Region demonstration project when they become available. (Ken Crawford/Steve Pritchett/Tim Ross – NWS, Wayne Faas/Gus Shumbera/Steve DelGreco – NCDC)	Cli/W&W Teams	Jan '06
Develop a list (and order of priority) of networks and future parameters for inclusion into IDP system. (W. Faas/S. DelGreco/N. Lott – NCDC in cooperation with the Goal Teams and Program Managers.)	NCDC/Prg. Mgrs.	Jan '06
Establish minimum metadata documentation standards for all NOAA observing systems.	Goal Teams/Prg Mgrs DMC/NOSC	Mar '06
Establish a schedule for operational implementation for web based digital metadata form for all NOAA observing systems.	NWS/Obs. Sys. Mgrs.	Apr '06
NWS Training Center - training on metadata digital web forms.	NWS	Ongoing
Complete station history updates and submissions within 24 months after a web-based form is provided and the associated database fields are updated.	NOAA Prg. Mgrs. LOs/Obs. Sys. Mgrs.	Ongoing
Incorporate COOP-M observations into IDP as stations become operational. (W. Faas/G. Shumbera/S. DelGreco – NCDC)	NCDC	As it occurs

Fiscal Years FY 2006-2011

Evolves with successes in FY 05, action items from other plans, and needs of NOAA and the Public.

<p>Develop as part of ground based integrated spatial distribution plan benchmark site locations (COOP-M/USCRN and others) that will optimize the number of surface locations per day that can be used to monitor satellite based sensor performance and provide correlated transfer coefficients to improve the utility and confidence of the satellite ground (surface) measurements. (John Cunningham, NESDIS IPO, EROS Data Center, W&W Ken Crawford, D. Easterling CLI/NCDC, possibly J. Calder/M. Johnson – Ocean Obs, Howard Diamond GCOS locations.)</p>	<p>Goal and Sub-Goal Teams</p>	<p>FY 05-07</p>
<p>Move forward with IOOS/DMAC plans</p>	<p>NOAA</p>	<p>FY 05-11</p>
<p>NOAA Integrated Data Management Plan completed. Begin implementing as suitable and feasible.</p>	<p>Goal Teams/Prg Mgr/ LOs/Ob Sys Mgrs.</p>	<p>Ongoing</p>
<p>Complete Alaskan ISOS plan</p>	<p>AK Integration Team</p>	<p>FY 05-06</p>
<p>Coordinate activities with IPY</p>	<p>Arctic/AK Team</p>	<p>FY 05-08</p>
<p>IUOS planning and implementation w/national and international parties. (Dave Helms – NWS, Dian Seidel - OAR, Howard Diamond – NESDIS/NCDC, and others)</p>	<p>Cli/W&W Teams</p>	<p>FY 05-06</p>
<p>Continue to upgrade/deploy GCOS GSN/GUAN</p>	<p>H. Diamond</p>	<p>FY 05-11</p>
<p>Develop criteria for mesonets (documentation of the observing stations/sensors, etc.) to use when evaluating relative contribution to the four NOAA mission goals. Determine the suitability and acceptability of including mesonet data as part of the permanent archive at one of the NOAA Data centers.</p>	<p>DMC/NOSC</p>	<p>FY 06-07</p>
<p>Establish schedule for review of observing systems not currently archiving obs/metadata at a NOAA Data Center. Make a decision on “long term value” to the Nation. Establish a schedule to establish the archive and execute regular delivery to a NOAA Data Center.</p>	<p>Goal Team/Prg. Mgr. LO/Ob Sys Mgr. DSC/NOSC LO/Ob Sys Mgr/Data Center</p>	<p>FY 06 -07</p>
<p>Address metadata and processing documentation for buoys, Fixed/drifted, coastal and open ocean) to include QC processing performed at the National Buoy Data Center (NBDC) before delivery of data to the NOAA Data Center, NODC and/or NCDC.</p>	<p>Goal Teams/Prg. Mgrs/ LOs/Obs Sys Mgrs</p>	<p>FY 06</p>

Execute Action Items listed in ISOS (COOP/USCRN/ASOS), AK ISOS, IOOS/DMAC, AOOS, IUOS, GCOS, Integrate NOAA Data Management Plan, and others	Goal Teams/LOs	FY 06-11
OFCM assists with developing and facilitates topic specific ad hoc focus group discussions particularly between federal agencies, much like the NWS Lightning detection planning group meetings. (Lt Col Bob Rizzo, Assistant OFCM coordinator/Sam Williamson OFCM Director)	OFCM	As Needed
Expand the ground truth benchmark site at the EROS Data Center to include more surface based observing systems. - Continue experience with correlating satellite surface observations with land based benchmark sites. (NPP/NPOESS/GOES-R series/EOS, etc. - Develop/implement operationally real time monitoring procedures. - Develop observation transfer functions for satellite sensors to improve use with ground based observations. (Mike Crane, EROS, J. Cunningham – NESDIS/IPO, NCDC/NWS)	Cli/W&W/ Sat Sub-goal/EROS	FY 06-11