A satellite image of Earth showing the Western Hemisphere, with North America and South America visible. The text is overlaid on the image.

Data Management for the North American Carbon Program

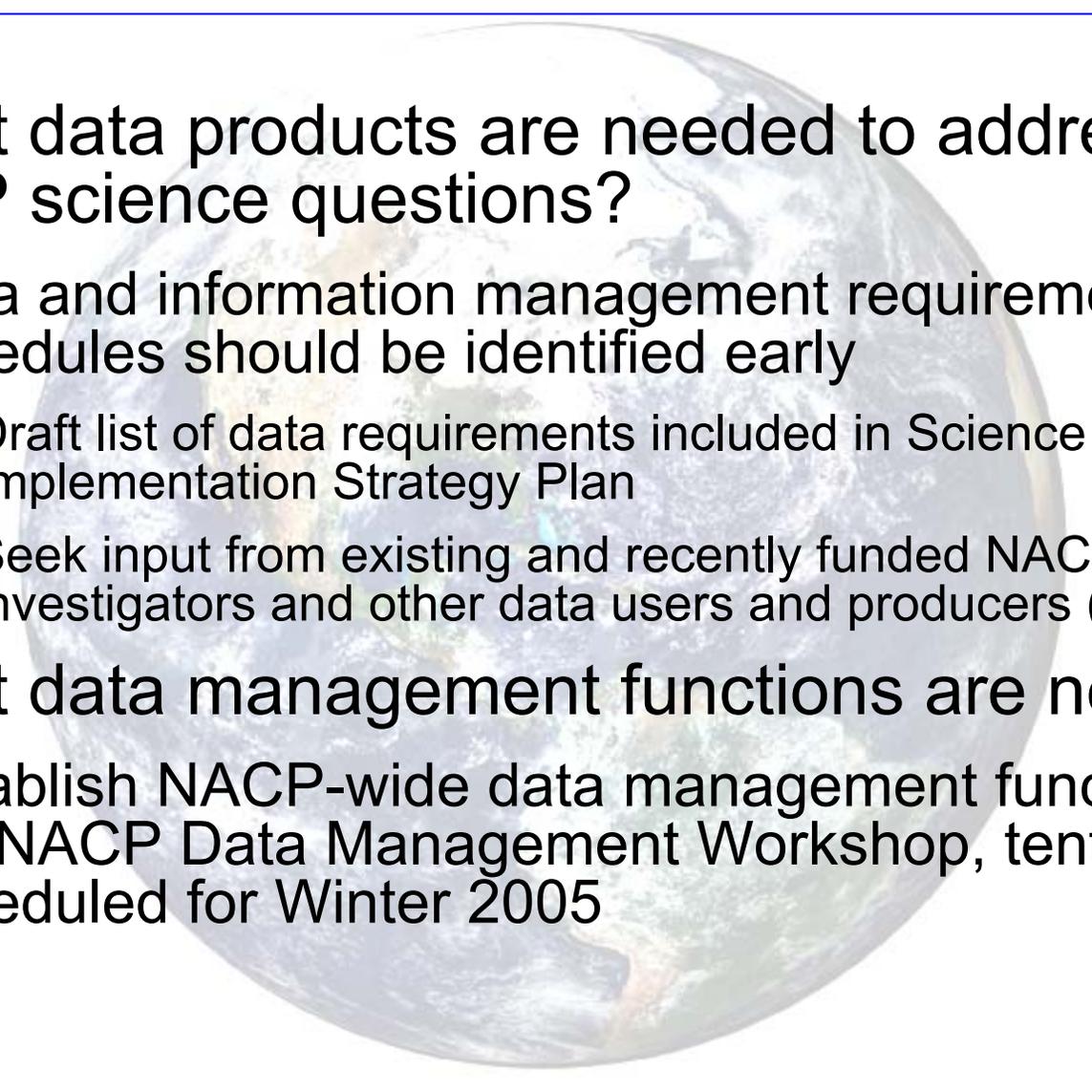
**Bob Cook, Eric Sundquist,
Tom Boden, and Peter Thornton**

**RS in NACP Workshop
Missoula, MT
August 20, 2004**

NACP Data and Information Management

- Goal is to ensure data products required to address science questions are available when needed in a convenient form
- Characteristics of the Data System:
 - Facilitate rapid exchange of large amounts of quality information
 - Integrated system that delivers a suite of diverse products to support the activities of the data users – researchers, modelers, resource managers, and policy-makers
 - Close coordination between the data managers and the producers and users of the data products
 - Process to assure data quality and uncover errors in data early, to allow proper interpretation and use
 - Full and open access to data in a timely fashion (need an effective NACP data policy)

Data Management Components



1. What data products are needed to address NACP science questions?
 - Data and information management requirements and schedules should be identified early
 - Draft list of data requirements included in Science Implementation Strategy Plan
 - Seek input from existing and recently funded NACP investigators and other data users and producers (Survey)
2. What data management functions are needed?
 - Establish NACP-wide data management functions at the NACP Data Management Workshop, tentatively scheduled for Winter 2005

Key Data Dependencies (U.S. Agencies)



USDA

- Forest & soil inventories
- Agricultural, forest and range management
- Carbon sequestration



NOAA

- Meteorological observations
- Ocean surface temperature and land cover observations
- Atm. CO₂ flask/tall tower network
- Weather models (NCEP)
- Air-Sea CO₂ exchange studies
- Integrated carbon modeling
- Ship-based ocean CO₂ surveys



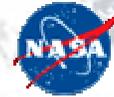
DOE

- Fossil fuel emissions
- AmeriFlux
- FACE and other CO₂ expts.
- Carbon databases (CDIAC)
- C modeling & C sequestration
- ARM Project



USGS

- Landsat data & data products
- Topography & land cover maps
- Stream gauge network
- Hydrography



NASA

- Remote sensing: satellite time series (Landsat, SeaWiFS and EOS); airborne sensors
- Remote sensing research
- Field campaigns— NACP, LBA
- Ocean, land, atmosphere and coupled carbon-climate modeling;
- ESTO, Data sets & DIS



NSF

- Earth science research
- Ocean field campaigns
- Process studies
- NCAR, NCEAS, LTER
- CyberInfrastructure Initiative

1. What data products are needed?

- Existing data products that meet NACP requirements
 - Establish data coordinating agreements between NACP and the agencies / data centers
- Existing data products do NOT meet NACP Requirements
 - Can they be modified to meet NACP needs?
 - Additional parameters; changes in spatial resolution or temporal frequency; improved measurement techniques, precision, or accuracy; inter-site calibration, etc.
 - Change format, projection, or gridding; gap-filling; inclusion of uncertainty and other quality information
- Are there key data products that are not available or are not being produced?
- Identify new data products that will be generated by NACP investigators
- Are there integrated data sets that need to be assembled for data fusion / data assimilation?

NACP Data Management Challenge

Many of the required [high priority] data streams exist today, but are not produced consistently at the time/space resolution needed, and the data are not assembled into an integrated set for data fusion. Because of the diversity of data and multiple temporal and spatial scales, it will be a significant challenge to make these data available for data assimilation activities and for public use. Hence, enabling activities are needed in this area.

NACP Report (Wofsy and Harriss, 2002, pg. 25)

2. Data management functions?

- NACP Data Management Workshop tentatively scheduled for Winter 2005
- Objective of the workshop is to develop a design for a comprehensive data management system for NACP
- Charge for the workshop approved by Carbon Cycle – Interagency Working Group
- Workshop Steering Committee established
 - Rich Birdsey, Bob Cook, Scott Denning, Bill Emanuel, Dave Glover, Bev Law, Ken Masarie, Eric Sundquist, Peter Thornton, and Sharon Waltman

NACP Data Management Workshop

- Topics to be covered at the workshop include:
 - Overall Data Management Strategy;
 - Data acquisition;
 - Standards for data and documentation;
 - Quality assurance reviews;
 - Data processing;
 - Distribution and sharing;
 - Tools to facilitate data acquisition, subsetting, visualization, and analysis; and
 - Preparation of value-added data products.
 - Workshop Report will include recommendations to the CC-IWG about the data management system design; the resources required; interfaces between agencies and data centers; and how to exert oversight and management of the NACP Data Management Program.
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Data Management: Concluding Thoughts

- Dedicated financial support for data management is essential for both individual projects and NACP
- Communication among those making measurements, data managers, modelers, and other users is critical
- Data manager(s) must be an integral part of the team leading NACP
- Team leading NACP needs to establish:
 - Data coordinating agreements between NACP, NACP investigators, and the agencies and data centers
 - NACP Data Policy (data sharing, coordination, and enforcement)
- Periodic data management coordination through annual or semi-annual modeling / analysis workshops conducted by NACP