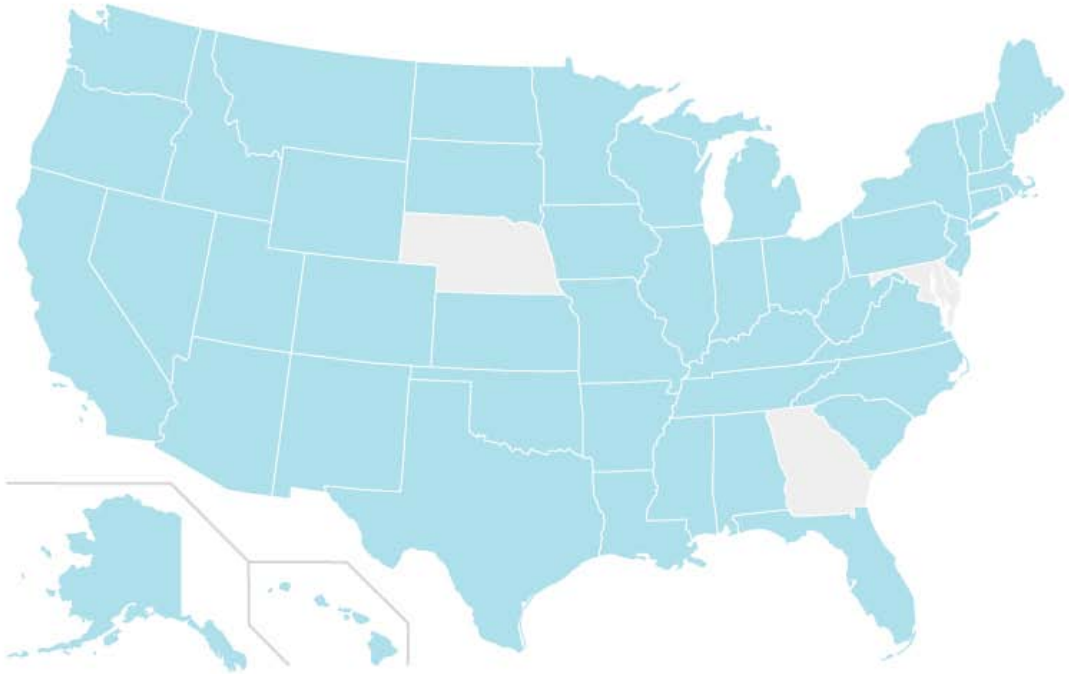
States providing data to NGDS



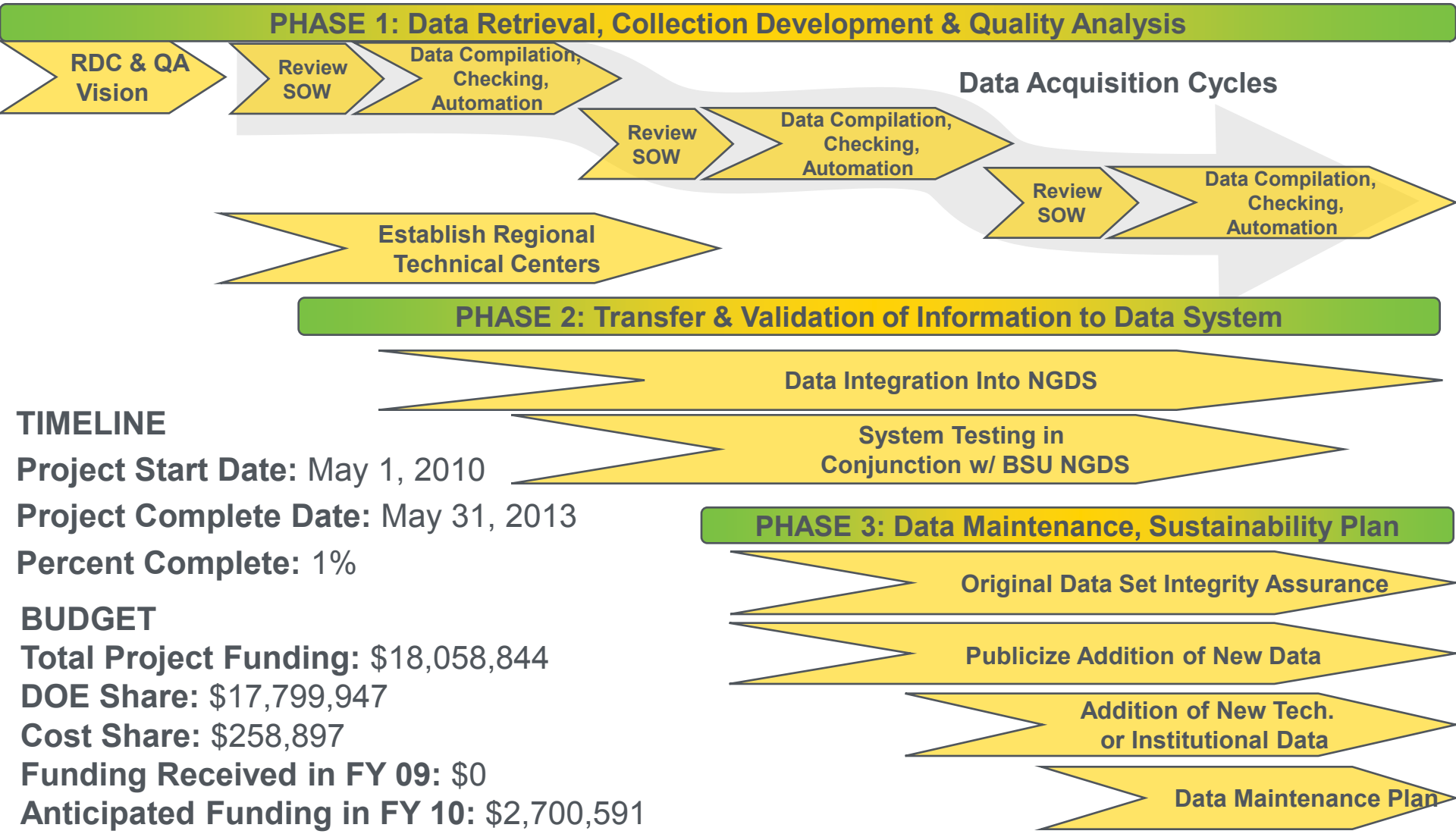
State Geological Survey Contributions to the National Geothermal Data System

May 18, 2010

Principal Investigator
M. Lee Allison
Arizona Geological Survey

Analysis, Data System and Education

Overview



TIMELINE

Project Start Date: May 1, 2010

Project Complete Date: May 31, 2013

Percent Complete: 1%

BUDGET

Total Project Funding: $18,058,844

DOE Share: $17,799,947

Cost Share: $258,897

Funding Received in FY 09: $0

Anticipated Funding in FY 10: $2,700,591

Partners

Alaska Division of Geological & Geophysical Surveys
Geological Survey of Alabama
Arkansas Geological Survey
Colorado Geological Survey
Connecticut Geological & Natural History Survey
Florida Geological Survey
University of Hawaii
Iowa Geological and Water Survey
Idaho Geological Survey
Illinois State Geological Survey
Indiana Geological Survey
Kansas Geological Survey
Kentucky Geological Survey
Louisiana Geological Survey at LSU
Massachusetts Geological Survey
Maine Geological Survey
Western Michigan University
Minnesota Geological Survey
Missouri Geological Survey
Mississippi Department of Environmental Quality
Montana Bureau of Mines and Geology
North Carolina Geological Survey
North Dakota Geological Survey
New Hampshire Geological Survey
New Jersey Geological Survey
New Mexico Bureau of Geology & Mineral Resources
Nevada Bureau of Mines & Geology
New York State Geological Survey
Ohio Geological Survey
Oklahoma Geological Survey
Oregon Dept. of Geology and Mineral Industries
Pennsylvania Geological Survey
Rhode Island Geological Survey
South Carolina Geological Survey
South Dakota Geological Survey
Tennessee Division of Geology
Texas Bureau of Economic Geology
Utah Geological Survey
Virginia Division of Geology and Mineral Resources
Vermont Department of Environmental Conservation
Washington State Department of Natural Resources
Wisconsin Geological and Natural History Survey
West Virginia Geological and Economic Survey
Wyoming State Geological Survey

Microsoft
USGS science for a changing world
NGDS National Geothermal Data System
AASG Association of American State Geologists

Relevance/Impact of Research

- Nationwide deployment of NGDS (46 States to date)
- Population of NGDS with state-specific and state-relevant data
- NGDS will be deployed with a node in every state
  - Provides access to other state-based data sources
- Ground-breaking geoscience data compilation-integration effort
- NGDS model is scalable, transferable
  - Validated as data integration model across US Geological Survey
  - Metadata development for upstream petroleum industry
  - Broader adoption brings more resources, greater use
- Sustainable business model evolving

Scientific/Technical Approach

Build on a decade of advances in cyberinfrastructure and community practice

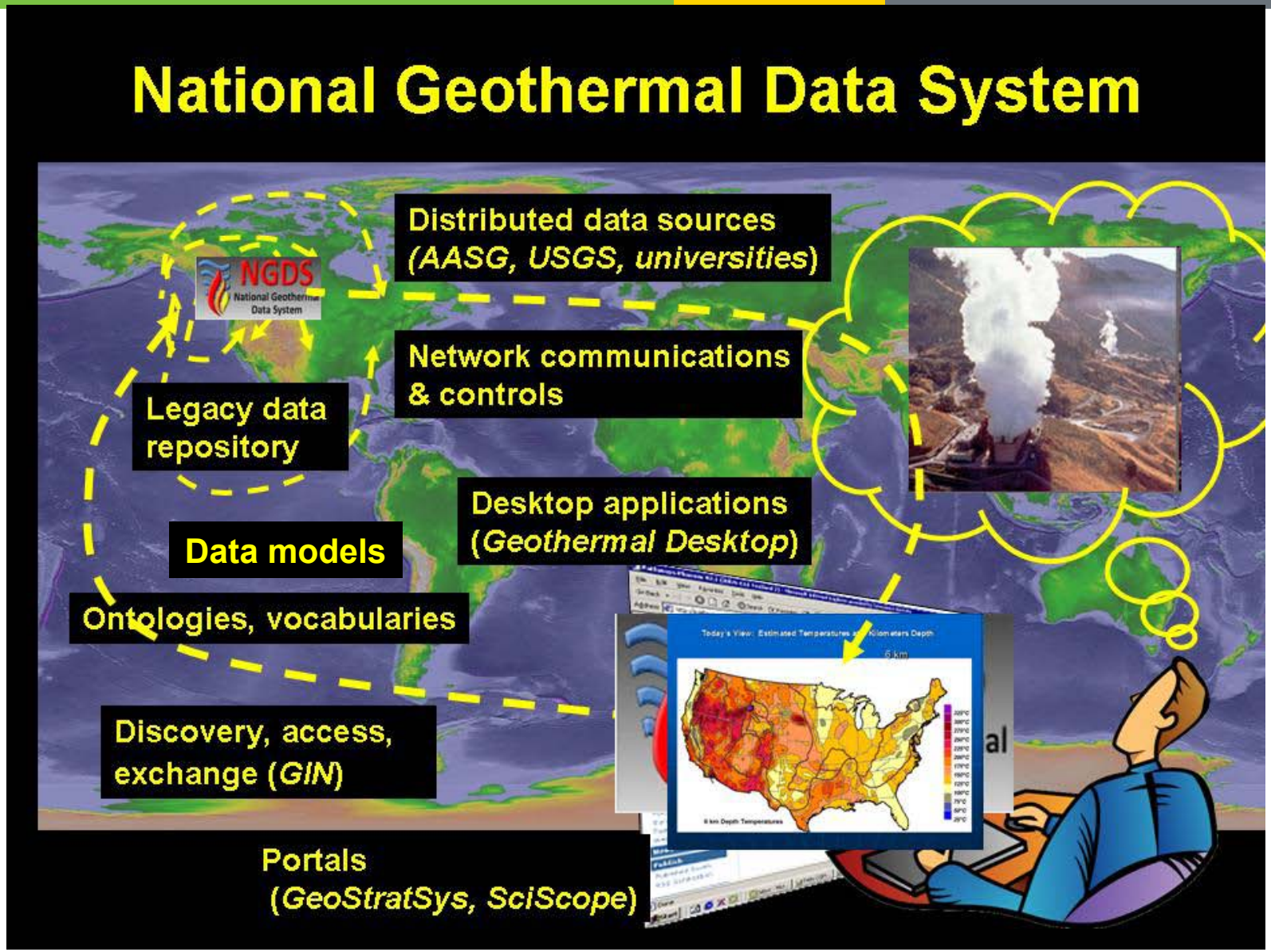
- Web-based
- Distributed
- Interoperable
- Open sourced

Modular approach – build a network by adopting and linking existing capabilities

Use off-the-shelf technology

Emulate the WWW – 3rd parties will build applications to take advantage of vast integrated data resources

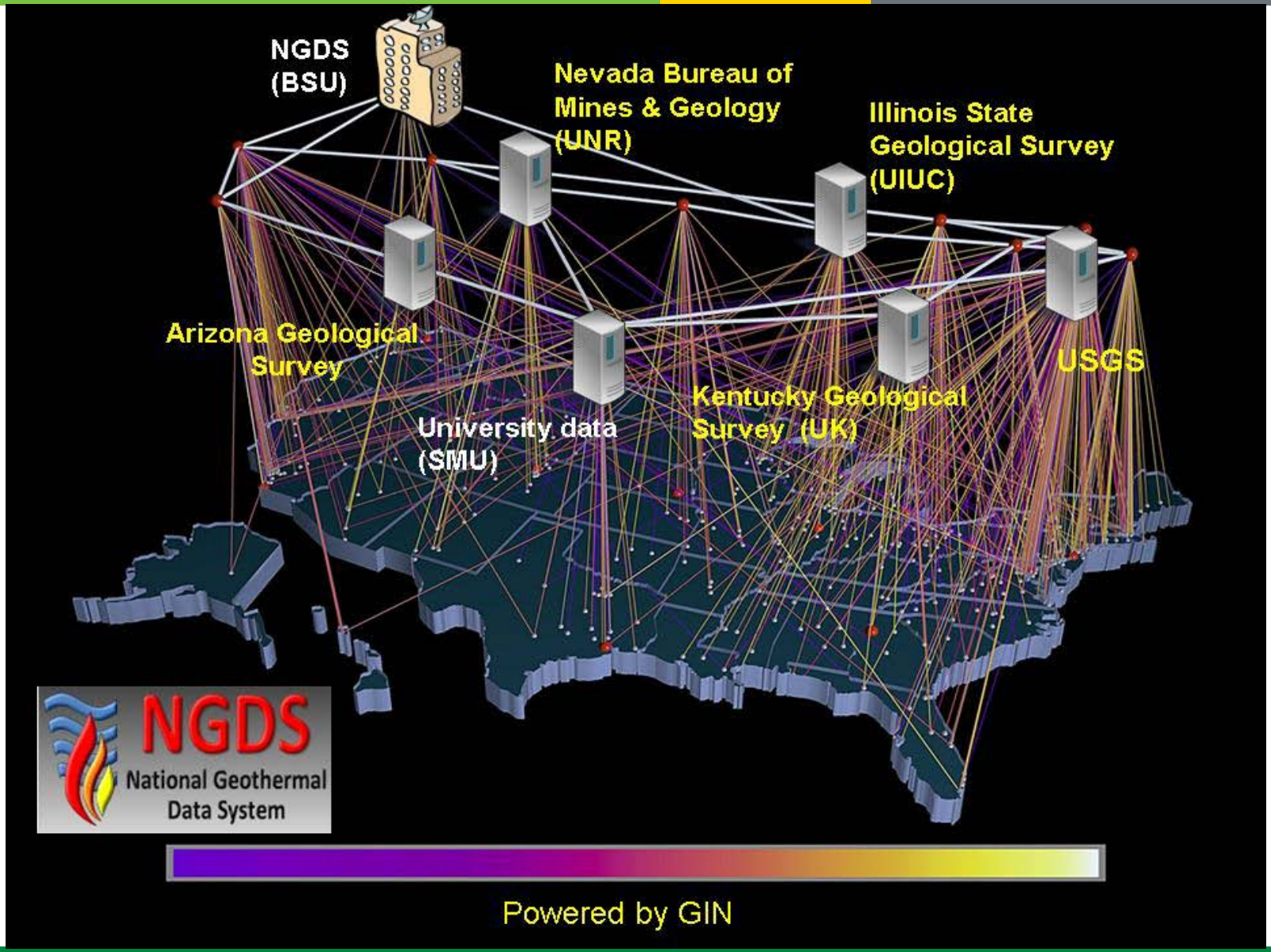
Scientific/Technical Approach: NGDS system model



Scientific/Technical Approach

- Data integration by development of 'profiles'
  - Shared interchange schema, syntax and vocabulary
  - Use existing specifications (WFS, NetCDF, GML, GeoSciML…)
  - Develop profiles as needed--based on data that will be delivered
  - Coordinate with Boise State Geothermal Desktop development
- Standardize metadata and catalog search to facilitate discovery (ISO 19139 profile, OGC CSW 2.0.2):
- Milestones 2010:
  - First participant Statement of Work (SOW) review
  - First data service profile released
  - First data service goes live!

Scientific/Technical Approach - NGDS server hubs



Accomplishments, Expected Outcomes and Progress

- Project builds on efforts under way since March, 2007
  - NSF-funded Geoscience Information Network (GIN)
  - DOE-funded National Geothermal Data System, Boise State
  - Metadata content guidelines (http://lab.usgin.org/profiles/usgin-iso-19139-profile)
  - Prototype catalog service implemented (http://catalog.usgin.org/geonetwork)
  - Prototype document repository and metadata production tool for registering online documents (http://repository.usgin.org/)
- Current year development
  - Demonstration Web Feature Service for heat flow data
  - Work with state partners to get Statements of Work in place and work under way
  - Design and implement services for Data Acquisition Cycle 1 data products

Project Management/Coordination

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Management Advisory Board (MAB)

Managerial Responsibilities

- State Geologists coordination
- Strategic planning
- Sub-contractors
- Coordination with NGDS

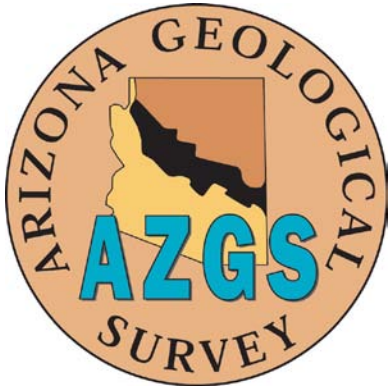
Technical Advisory Board – (TAB)

Technical Responsibilities

- Network development
- Technical standards
- Data models
- Quality assurance

Co-PI

PI & PM



PI & Co-PI

Department of Energy (DOE)

Financial Responsibilities

- Financial planning & reporting
- Budgets
- Accounting
- Procurement

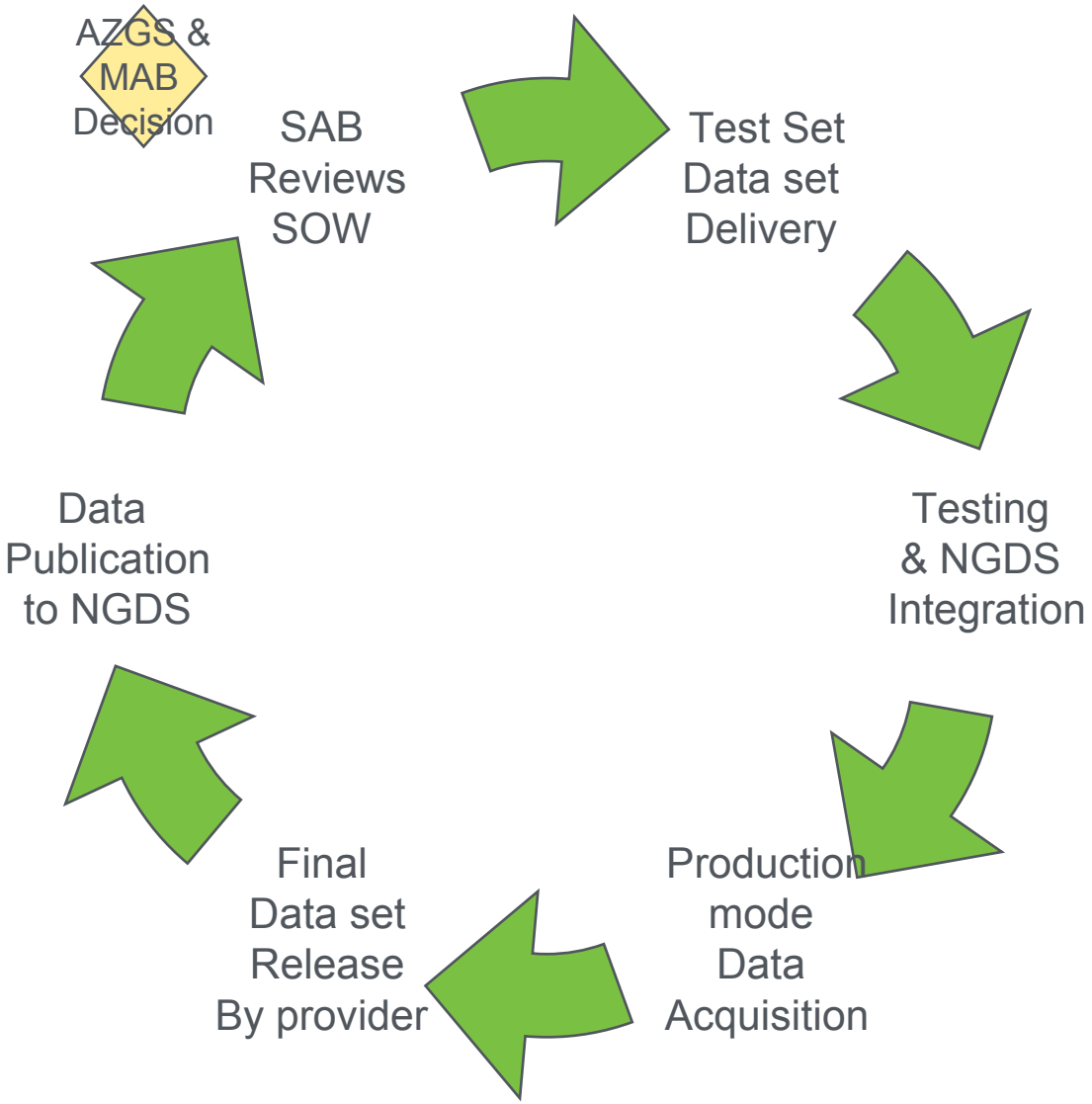
CFO & PM

Science Advisory Board (SAB)

Scientific Responsibilities

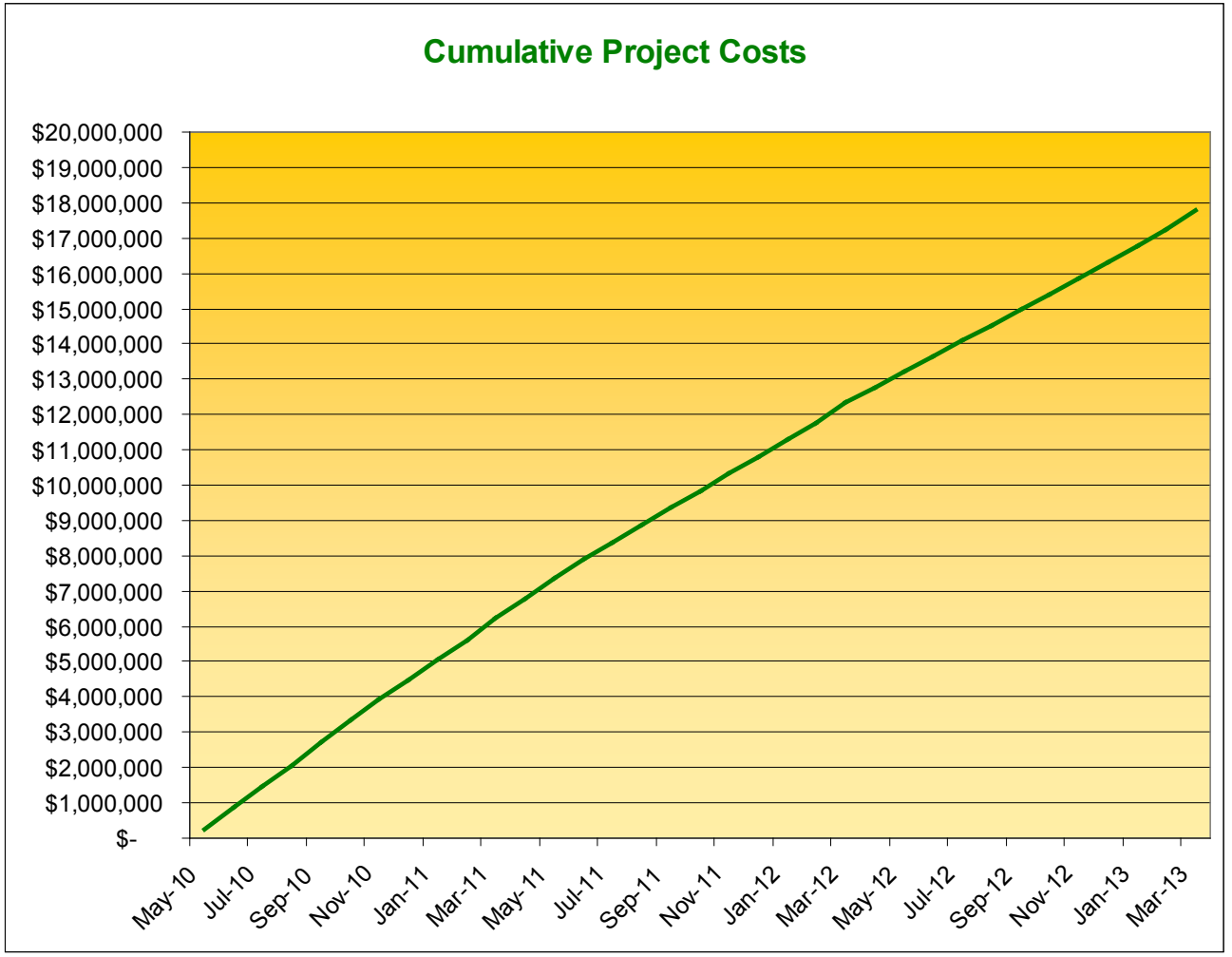
- Ensure scientific stds. & procedures
- Develop criteria for data
- Prioritize data acquisition

Data Cycle Annual Schedule



Budget / Spend Plan

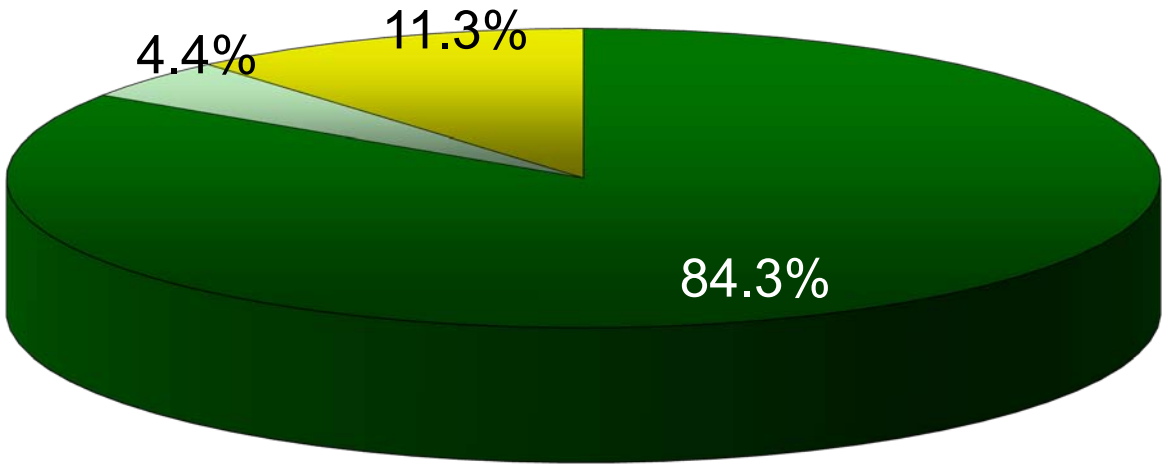
FY 2010	$ 2,747,550
FY 2011	$ 6,751,642
FY 2012	$ 5,684,370
FY 2013	$ 2,875,282
TOTAL	$18,058,844



Budget / Spend Plan

Total Project Budget: $18,058,844

State Data Compilation	$ 15,215,862	84.3%
Network Development	$ 2,043,330	11.3%
Management	$ 799,652	4.4%



Plans to seamlessly integrate with the National Geothermal Data System

1. **NGDS-Boise State Univ**: AZGS is subcontractor to design and build data discovery, access, and integration component

2. **NGDS-Boise State Univ**: PI (Snyder) is on Management Advisory Board

3. **SMU**: Draft MOU for collaboration and data integration

4. **USGS**: Multiple partnerships for data integration (e.g., Geoscience Information Network, National Geological & Geophysical Data Preservation Program, National Cooperative Geologic Map Data Base)

Future Directions

- Major projected end results:
  - Review and compilation of data for the entire United States (e.g. example data sets):
    - Borehole thermal data (> 700,000 locations)
    - Thermal water sources (>6600 sites)
    - Catalog of subsurface core and cuttings (>540,000 locations)
  - Gulf Coast geo-pressured zone descriptions
  - Direct use geothermal site descriptions
  - Geothermal resource maps for eight states
  - Metadata catalog for all relevant information resources
- FY10: get workflow up and running to work with state subcontractors for first data compilation and publication cycle.
- FY11: second compilation and production cycle. Focus on improving data delivery services
- Advisory boards in place for decision points on management, science, and technology

Summary

The Project:

- Brings many terabytes of key digital data and tens of thousands of reports and maps to the geothermal community desktop through NGDS at no cost to users
- Deploys and populates NGDS nationwide
- Makes available data for all forms of geothermal energy: EGS, hydrothermal, geopressured, direct-use, space heating
- Has integral ties with the other NGDS participants (BSU, SMU, USGS) to help assure success
- Leverages a decade of technical development and community consensus-building
- Helps create a data network that is scalable and transportable
- Engages the community in management, science, and technology aspects
- Brings strong involvement from the private sector and other federal programs

Supplemental Slides

Publications & Presentations

Allison, Lee, Ian Jackson, Linda Gundersen, Jerry Hubbard, and Stephen Richard, 2009, "Towards a global data network for the geosciences," *Eos* Trans. AGU, 90(52), Fall Meet. Suppl., Abstract # IN43E-05 (722604): [presented December 17, 2009, AGU Fall Conf., San Francisco, CA]

Allison, Lee, Testimony to the Arizona Legislature Ad Hoc Committee on Mining Regulations, Phoenix, AZ, November 16, 2009, [live webcast is archived at http://azleg.granicus.com/MediaPlayer.php?view_id=13&clip_id=6253]

Allison, M. Lee, "AASG Update," American Institute of Professional Geologists (AIPG) Mid-year Board Meeting, February 12, 2010, Tucson, AZ

Allison, M. Lee, "AZGS Update," AIPG Arizona Chapter Annual Meeting, February 13, 2010, Tucson, AZ

Allison, M. Lee, "Towards a Global Data Network for the Geosciences," SME Environmental Division scholarship luncheon, SME Annual Meeting, March 2, 2010, Phoenix, AZ

Allison, M. Lee, "Building a Global Data Network for the Geosciences," Project Management Institute, Tucson Chapter, dinner meeting, March 9, 2010, Tucson, AZ

Allison, M. Lee, Ian Jackson, Linda Gundersen, Jerry Hubbard, and Stephen Richard, "Building a Global Data Network, Arizona Hydrologic Society, April 13, 2010, Tucson, AZ

Allison, M. Lee, "Geothermal Energy Potential in Arizona," Black Canyon City Rockhounding Group, April 15, 2010, Black Canyon City, AZ

Richard, Stephen M., "Metadata for the USGIN and NGDS", ASIS&T Research Data Access and Preservation Summit, Phoenix, AZ, April 10, 2010

Richard, Stephen M., "Web services to assemble pieces of a Geoscience Information Network", USGS, Menlo Park, CA, April 15, 2010

Allison, M. Lee, and Stephen M. Richard, "Everything Digital, Online, and Integrated," Arizona Geological Society, May 4, 2010, Tucson, AZ

Allison, M. Lee, "Data Integration in the U.S.," YES (Young Earth Scientists) Networking Conference, Roundtable on *OneGeology* and the Future of Mapping, European Geological Union, May 7, 2010, Vienna, Austria [virtual participation]