South Dakota NASA EPSCoR Program Overview

Outline

- NASA EPSCoR National Program
- NASA EPSCoR and NASA Space Grant Program
- Current NASA EPSCoR South Dakota Program (“EPSCoR 2000”)
- Looking forward (“EPSCoR 2007”)
- Accomplishments
- Issues

South Dakota NASA EPSCoR Program Overview

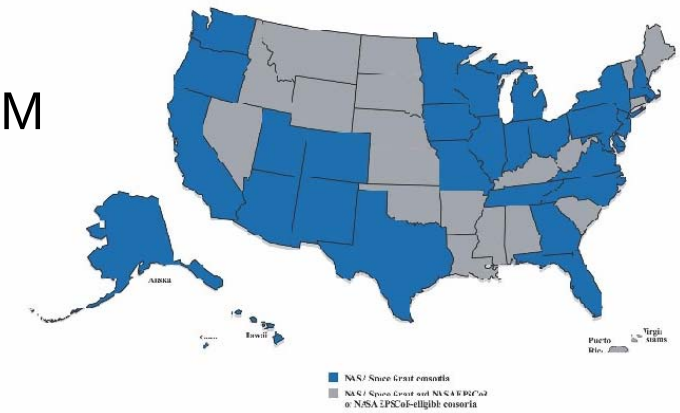
Recent Changes in SD NASA EPSCoR

- May 2007 SD NASA EPSCoR Director added to REACH Committee (non-voting)
- Improved coordination with State EPSCoR Office (Jim Rice)
- Improved coordination with BOR System VP for Research (Scott Meyer)
- Improved coordination with State Director of Commercialization (Mel Ustad)
- Leveraging/sharing EPSCoR program assistant at SDSM&T

South Dakota NASA EPSCoR Program Overview

NASA EPSCoR National Program

- Established 1994
- First full program round “EPSCoR 2000”
- Five year awards 2001-2006
- 20 jurisdictions
- Annual funding of $125K - $700K per jurisdiction
  - $125K “core” infrastructure improvement grant
  - Up to $575K for 1-2 major research projects
- 1:1 non-federal match requirement
- $10M annual budget, except for $12.8M in FY2006

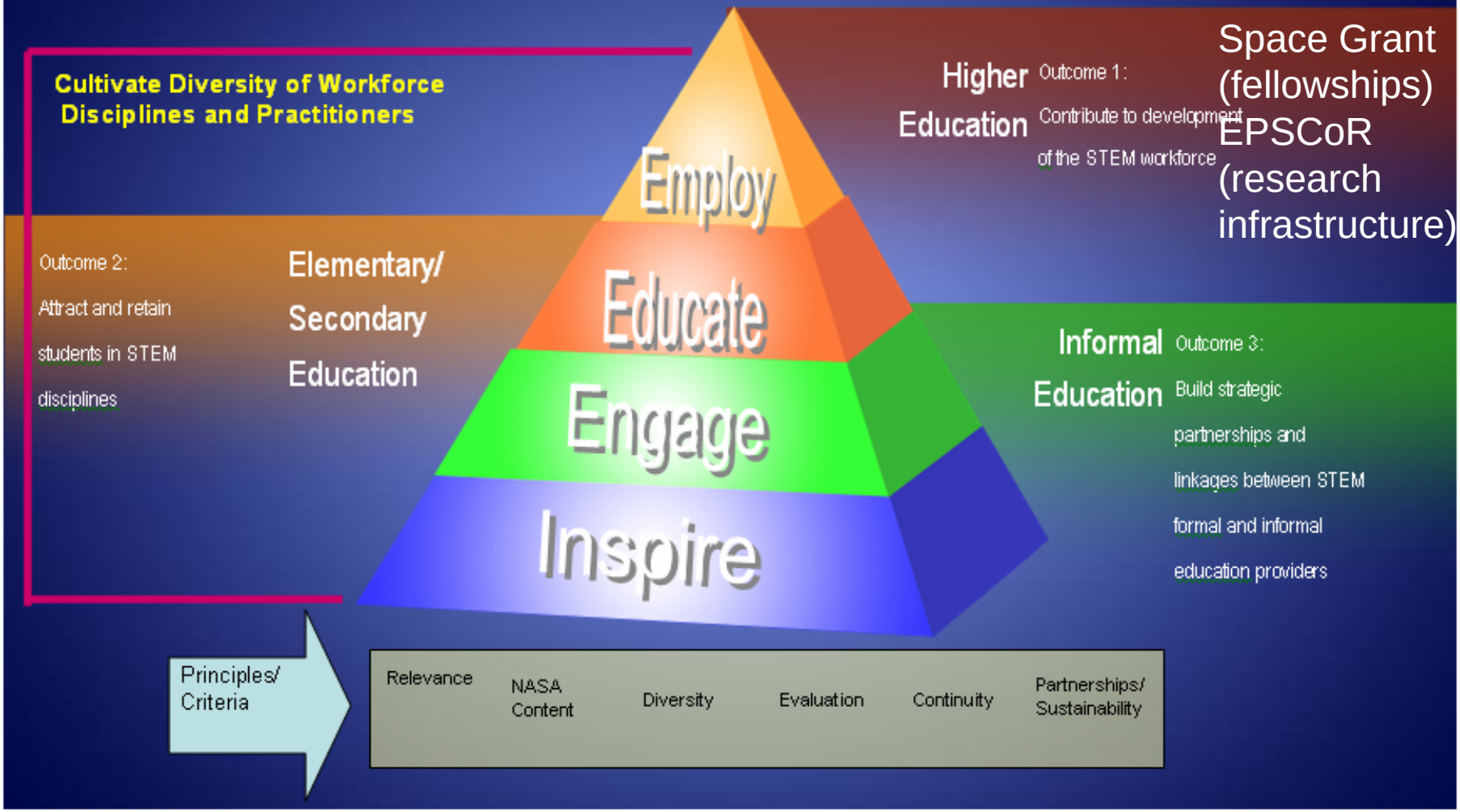


South Dakota NASA EPSCoR Program Overview

NASA EPSCoR and NASA Space Grant Program

- Space Grant authorized by Congress in 1988
  - "National Space Grant College and Fellowship Program"
- South Dakota Space Grant Consortium established in 1991
  - Capability Enhancement grant
- The Space Grant Director is designated the NASA EPSCoR Director in the jurisdiction
- Currently 52 jurisdictions creating a national network of 820 universities, colleges, federal R&D centers, and business partners
- FY2007 budget $29M; FY2008 budget $29M, seeking $35.6M
- About 20% of NASA's education budget
- Key component of NASA's Education Strategic Framework

NASA Education Strategic Framework (Feb. 2006)



South Dakota Space Grant Consortium
26 Members and Affiliates

Institutional Members
South Dakota School of Mines & Technology
South Dakota State University
Augustana College
USGS Center for Earth Resources Observation and Science (EROS)
South Dakota Discovery Center & Aquarium

Higher Education Affiliates
Black Hills State University & NASA ERC*
Dakota State University
University of South Dakota
Lower Brule Community College
Oglala Lakota College
Sinte Gleska University
Lake Area Technical Institute

* NASA Educational Resource Center
Management Team 2007 (eight members)

Informal Education Affiliates
Black Hills Astronomical Society
Badlands Observatory
The Journey Museum
Kirby Science Discovery Center & NASA ERC*
Teaching SMART
Imagination Station

Industrial Affiliates
Cynetics Corp.
Honeywell (MD)
Horizons, Inc.
Raven Industries/Aerostar International
RESPEC
SAIC (Science Applications International Corp.)

Government Affiliates
South Dakota Office of Aeronautics
National Weather Service, Aberdeen

SD Space Grant Consortium 2007 Funds

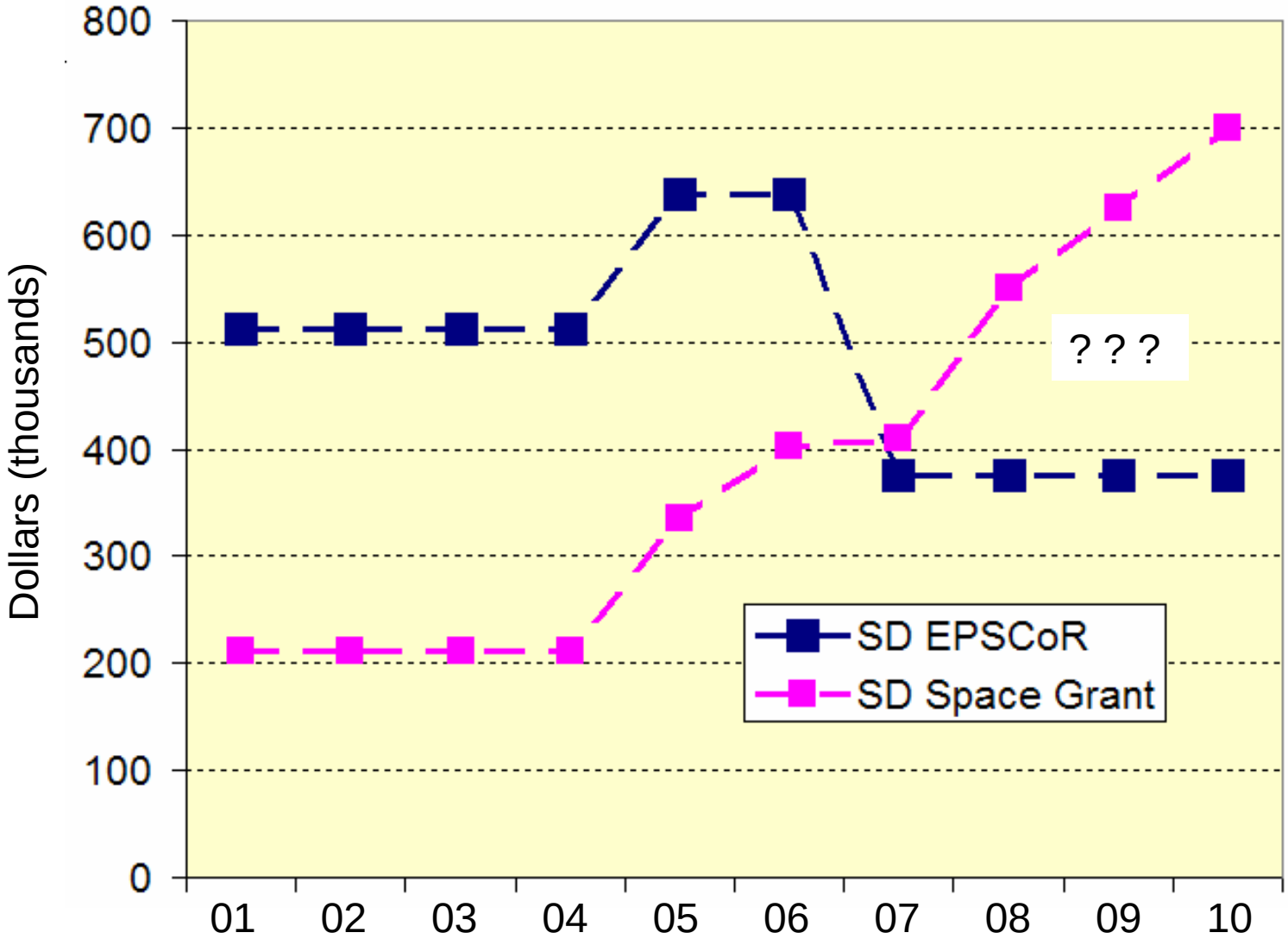
- FY2007 proposed funding $410K
  - $104K fellowships/scholarships
  - Remaining $306K must be matched 1:1
  - $123K subawards to SDSU, Augustana, SD Discovery Center, St. Francis Indian School
  - $29K undesignated pool for new proposals
- Seeking increase to $550K in FY2008

South Dakota NASA EPSCoR Program Overview

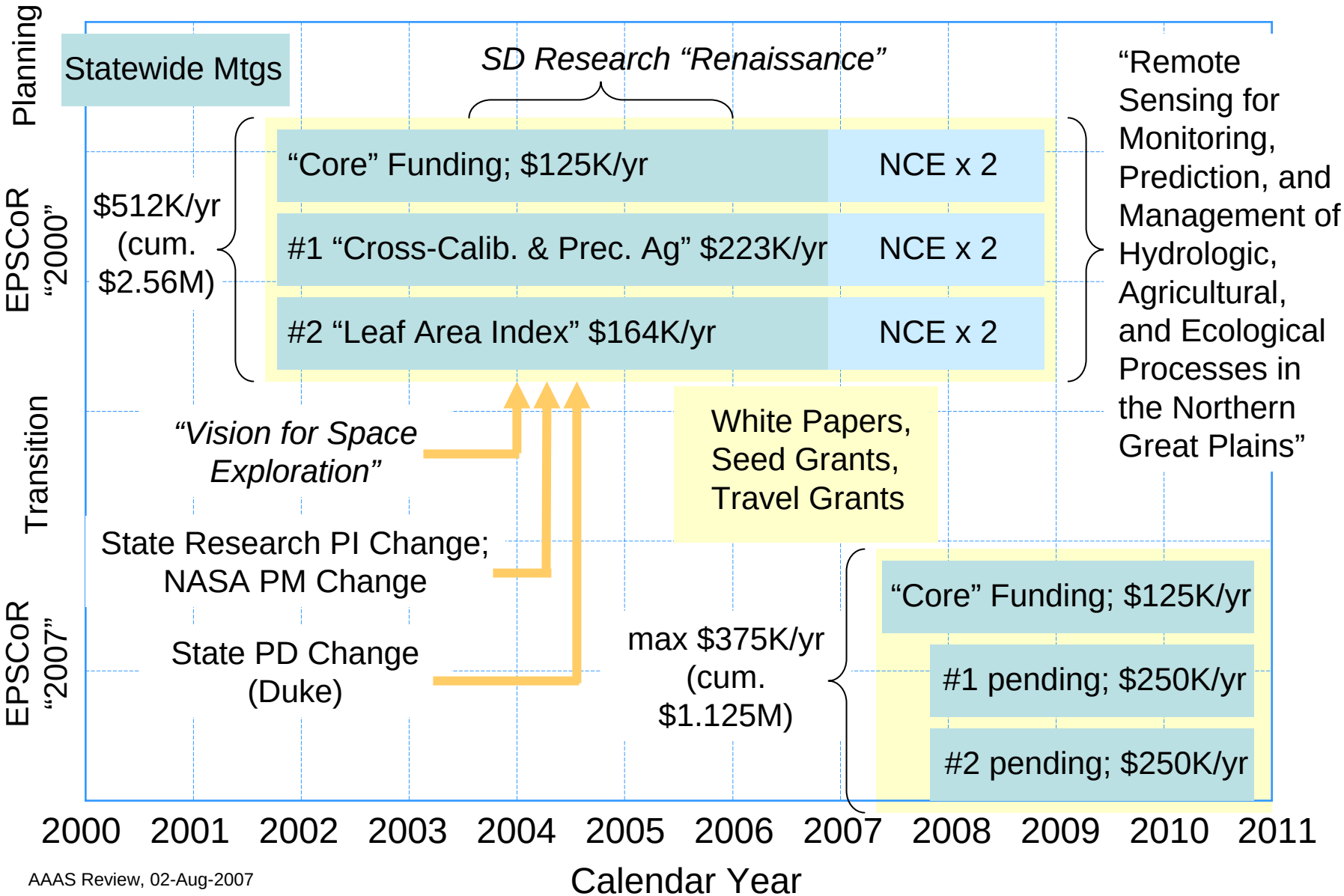
SD Space Grant Consortium Programs

- Higher Education and Research Infrastructure
  - $108K, 36 students, 4 inst., 17 aerospace interns (2006-07)
- Precollege Education
- Informal Science Education
- Overarching Themes
  - Support for Native American STEM programs ($152K, 2005-07)
  - Support for college and precollege Robotics programs

South Dakota NASA EPSCoR Program Overview



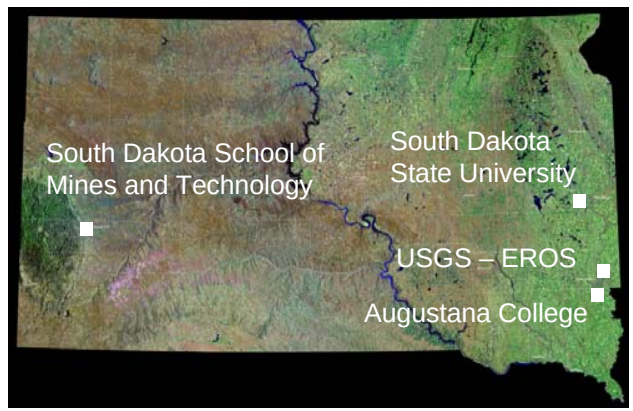
South Dakota NASA EPSCoR Program Overview



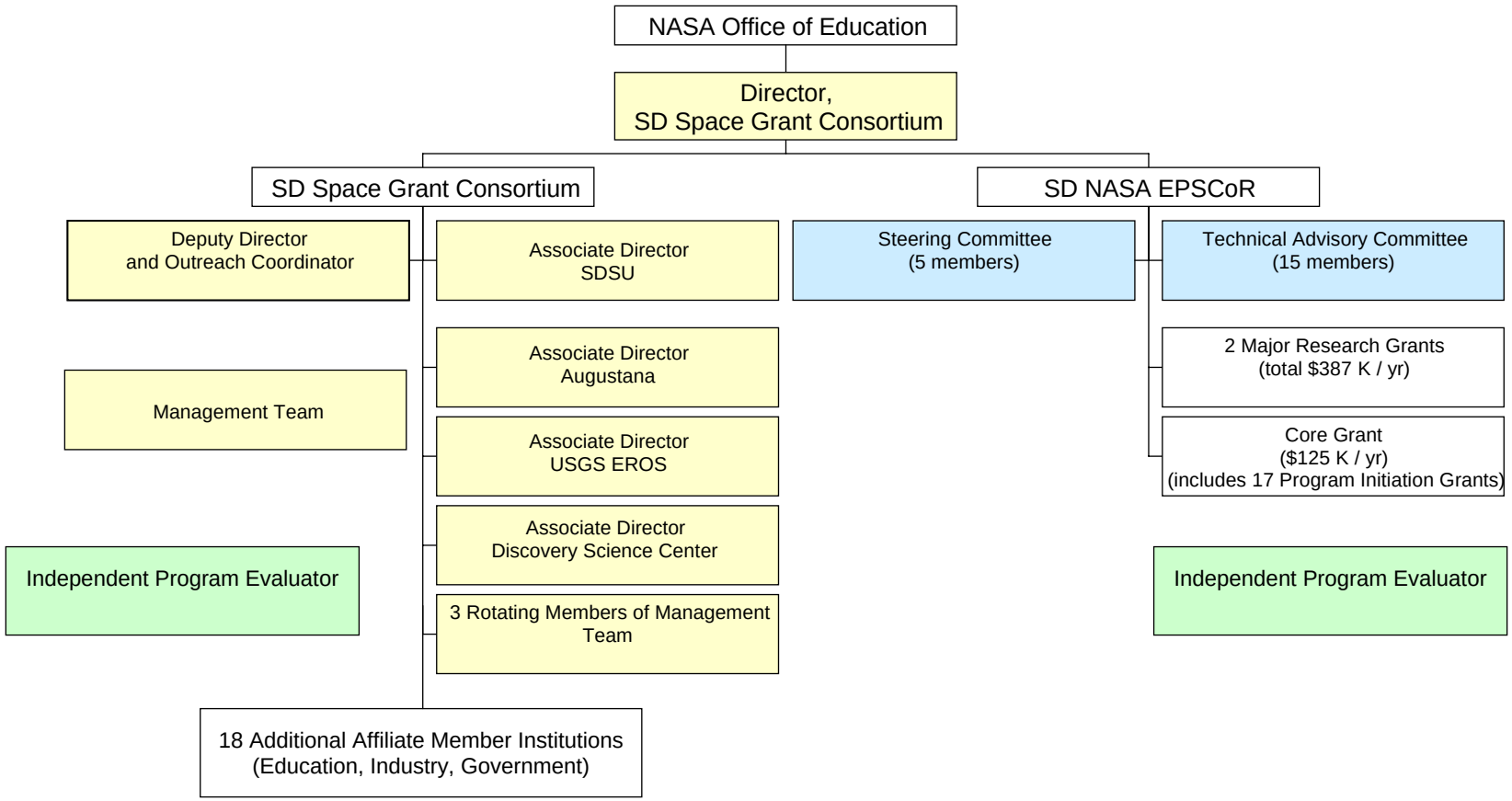
South Dakota NASA EPSCoR Program Overview

Current South Dakota NASA EPSCoR Program

- Planning grant 1999-2001
- Admitted to NASA EPSCoR in 2001 (“EPSCoR 2000”)
- Five year award 2001-2006
- Total annual funding of $512K (2/3 research projects funded)
  - $125K “core” infrastructure improvement grant
  - $387K for 2 major research projects
- Principal institutions: SDSM&T, SDSU, Augustana, USGS-EROS
- NASA partners at Goddard and Stennis



South Dakota NASA EPSCoR Program Overview



South Dakota NASA EPSCoR Program Overview

Current South Dakota NASA EPSCoR Program

"The Use of Remote Sensing for Monitoring, Prediction, and Management of Hydrologic, Agricultural, and Ecological Processes in the Northern Great Plains"

- Research Project #1 "Cross-Calibration of Landsat and IKONOS Sensors for Use in Precision Agriculture"
  - SDSU
  - Electrical Engineering and Computer Science, Physics, Plant Science
  - USGS-EROS, Stennis Space Center
  - $223,100/yr for 5 years ($1,115,500)

South Dakota NASA EPSCoR Program Overview

Current South Dakota NASA EPSCoR Program

"The Use of Remote Sensing for Monitoring, Prediction, and Management of Hydrologic, Agricultural, and Ecological Processes in the Northern Great Plains"

- Research Project #2 "Leaf Area Index for Fire Chronosequences of the Black Hills and Southern Siberia: A Comparative Study"
  - SDSM&T, Augustana, U. of Idaho
  - Atmospheric Science, Terrestrial Ecology, Computer Science, Biology
  - USGS-EROS, Goddard Space Flight Center
  - $164,000/yr for 5 years ($820,000)

South Dakota NASA EPSCoR Program Overview

	Cross-Calibration and Precision Ag	Leaf Area Index
Institutions and Programs	SDSU Electrical Engineering and Computer Science, Physics, Plant Science	SDSM&T, Augustana Atmospheric Science, Terrestrial Ecology, Computer Science, Biology
New Collaborations	USGS-EROS, NASA-Stennis, Upper Midwest Aerospace Consortium (NASA), various Ag producers and organizations	USGS-EROS, NASA-Goddard, U. of Idaho, Upper Midwest Aerospace Consortium (NASA), Horizons Inc., Aquilavision Inc.
New Grants	NASA, USDA, UMAC (NASA), SD DENR, SD Wheat and Corn Councils, Raven Industries	NASA, NSF, UMAC (NASA)
Major Impacts	Researchers on NASA Landsat science teams, new research on UAV sensors, UMAC AgPARC, UMAC EdPARC	New collaboration with U. of Idaho, UMAC ForestPARC, installation of long-term monitoring sites
Research Centers	Geographic Information Science	
New Ph.D. programs	Geospatial Science and Engineering, Electrical Engineering	Atmospheric and Environmental Science

South Dakota NASA EPSCoR Program Overview

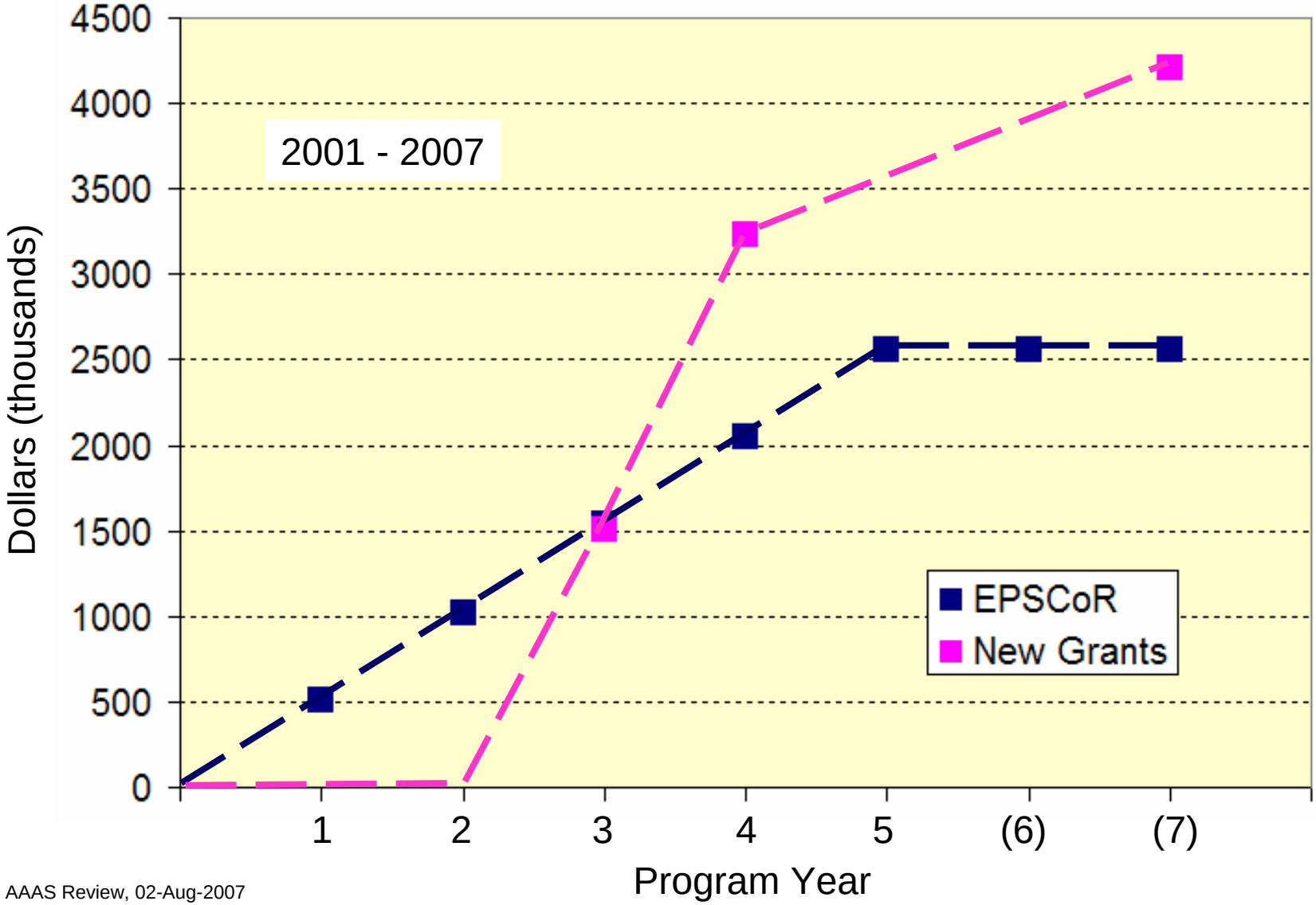
Current South Dakota NASA EPSCoR Program (2001-present)

Patents and Publications				New Grants	
Peer Review Pubs.	Other Pubs.	Present.	Patents	New Grants	New Grants Value
65	62	156	0	38	$8,949,638

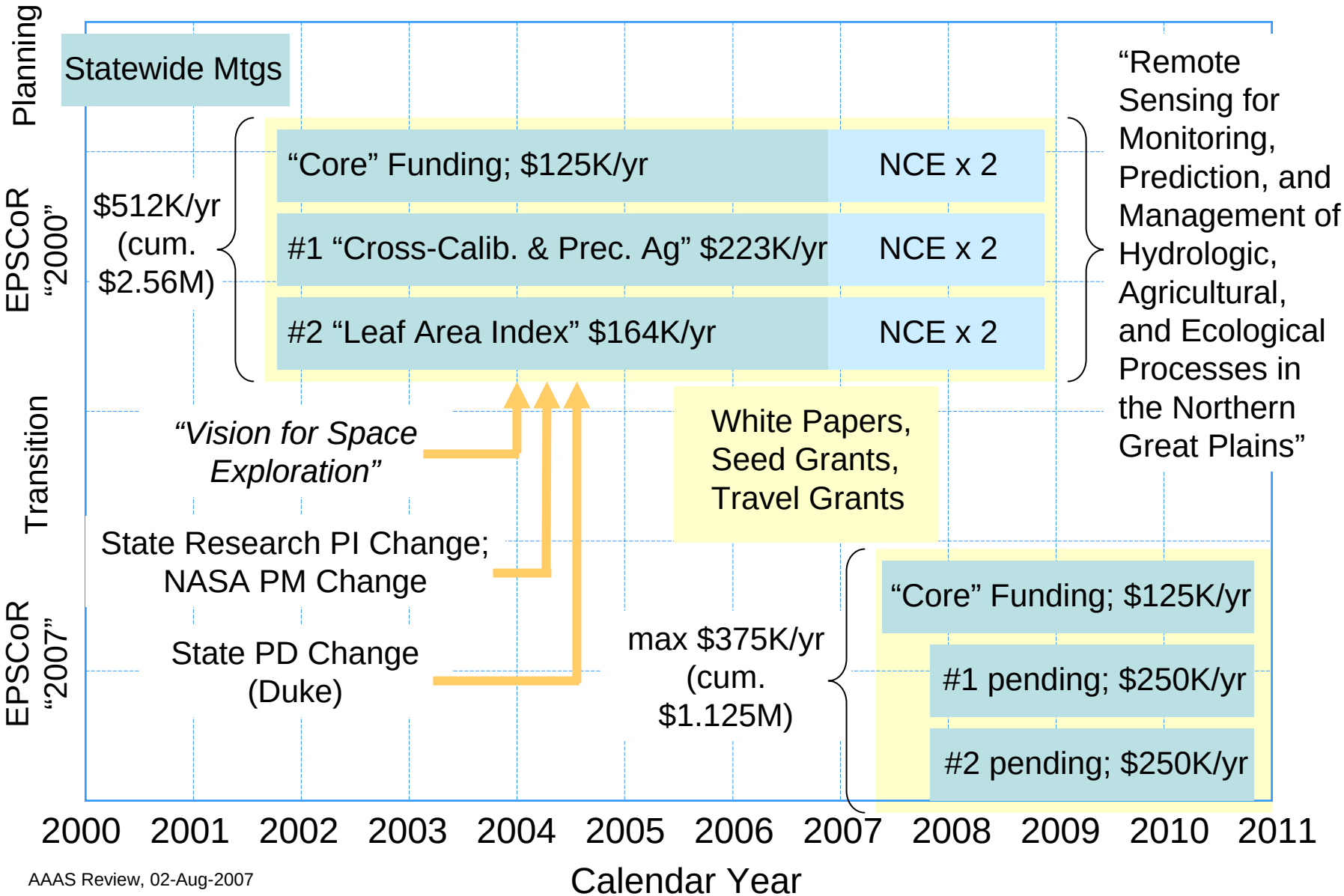
Participants				Collaborations		
Under-grad Students (cum)	Graduate Students (cum)	Post-Doctoral	Faculty	Collabs. w/ NASA Centers	Collabs. w/ Industry	Collabs. w/ Others
43	39	1	48	10	23	212

Does not include year 5 of "Leaf Area Index" project

South Dakota NASA EPSCoR Program Overview



South Dakota NASA EPSCoR Program Overview



South Dakota NASA EPSCoR Program Overview

Transition – Recent Initiatives in SD NASA EPSCoR

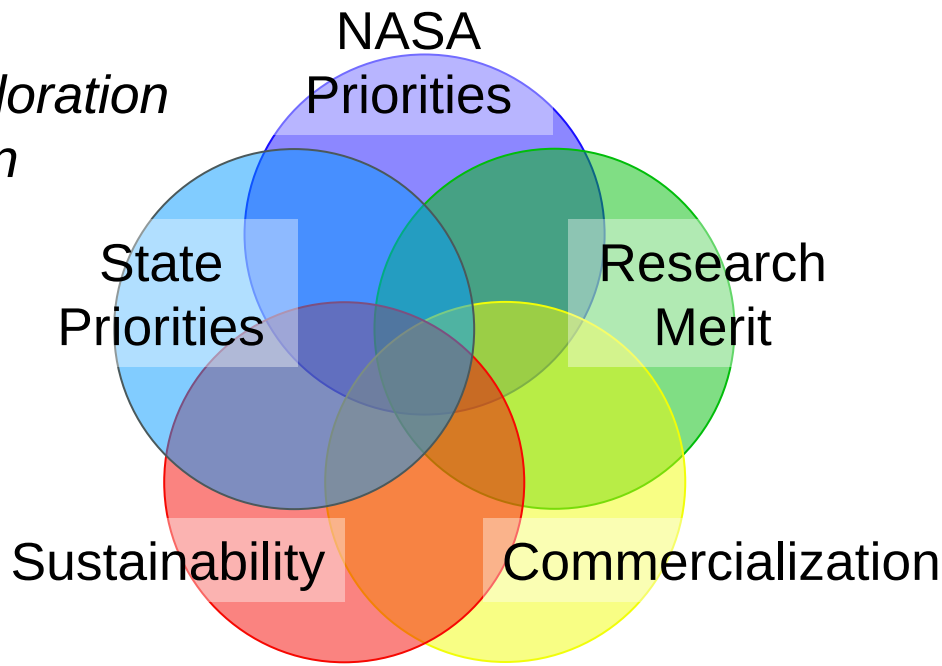
- In 2005-2007, 53 seed grant proposals or concept papers ("white papers") have been generated in attempt to refocus and identify new areas of collaboration with NASA
  - New communications between SD researchers at six different universities and eight of the NASA Research Centers as well as NASA Headquarters.
- Total funding for seed grants: $129,617
- Additional support includes $16,442 for travel to NASA Centers and graduate fellowships)
- Alignment with NASA and aerospace industry, state research goals, 2010 Research Centers, new Ph.D. programs

SD NASA EPSCoR 2006-07 Research Seed Grants (in progress)

SD NASA EPSCoR Research Seed Grant	NASA and other Collaboration
Continuous Nano Carbon Fibers with Superior Mechanical and Electrical Properties for Aeronautics and Astronautics Applications (SDSM&T)	NASA Ames Research Center, Boeing, North Dakota State Univ.
South Dakota High Altitude Balloon Research (SDSU)	NASA Goddard Space Flight Center, Aerostar International (SD)
Using the Mars Reconnaissance Orbiter (MRO) to Analyze Lava Flow Surface Structures: A First Step in Determining Volcanic Flow Rates and Implications for Life in Extreme Environments (BHSU)	NASA Jet Propulsion Laboratory, Malin Space Science Systems (CA)
Efficient Virtual Prototyping of Space Dynamical Systems (SDSU)	NASA Jet Propulsion Laboratory
Testing the Composite Runoff Index Geographic Model Using Medium-High-Resolution Digital Imagery & GIS for Urban Rainfall-Runoff Estimation: The Rational and the NRCS-CN Methods, Las Vegas, NV (SDSU)	NASA Goddard Space Flight Center
Microbial Diversity in the Deep Subsurface Environment of Homestake Mine, Lead, South Dakota (SDSM&T)	NASA Ames Research Center
Develop Reinforced Membrane Structures with SWNTs (single-wall carbon nanotubes) (SDSM&T)	NASA Ames Research Center, NASA Glenn Research Center, NASA Johnson Space Center
Measuring Visual Acuity of Stalk-Eyed Flies to Study Optomotor Deficits of Space Travel (USD)	NASA Ames Research Center
Lidar Remote Sensing Towards Vegetation Classification Applications (SDSU)	NASA Goddard Space Flight Center, USGS/EROS, University of Nebraska, Penn State

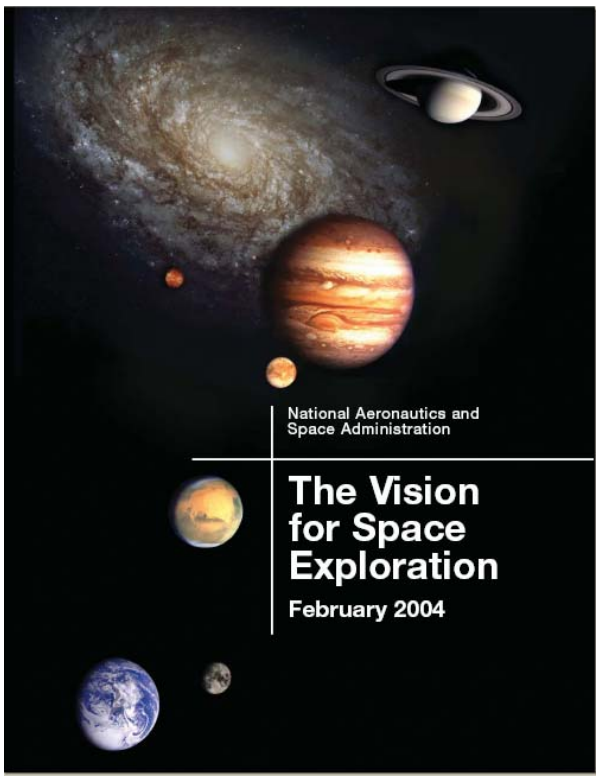
Looking Forward – NASA "EPSCoR 2007"

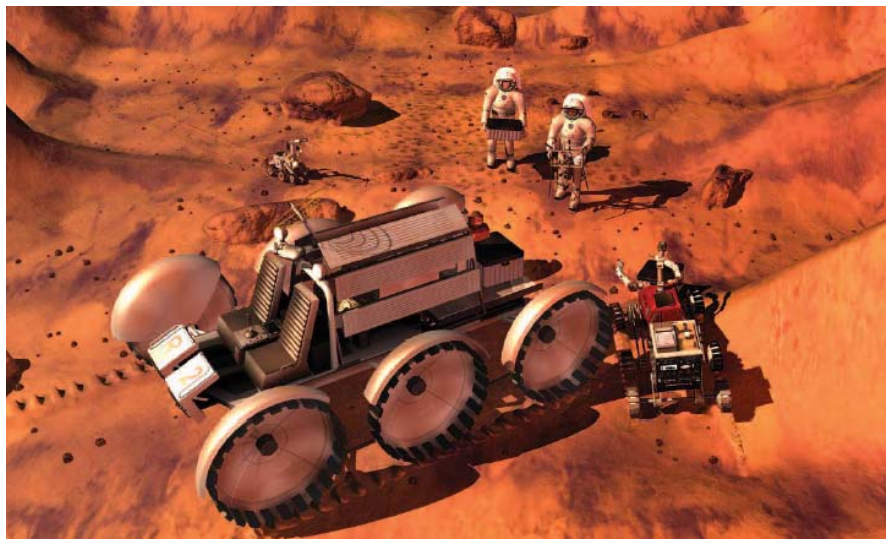
- NASA Priorities
  - *The Vision for Space Exploration*
  - *2006 NASA Strategic Plan*
  - Four Mission Directorates
  - 10 Research Centers
- State Priorities
  - *2010 Initiative* Goal 3
  - NSF EPSCoR RII
  - EROS and DUSEL
  - Research 2010 Centers and new Ph.D. programs
  - *A 2010 Vision, The Future of Research and Technology in South Dakota, A State Plan* (Feb. 2006)



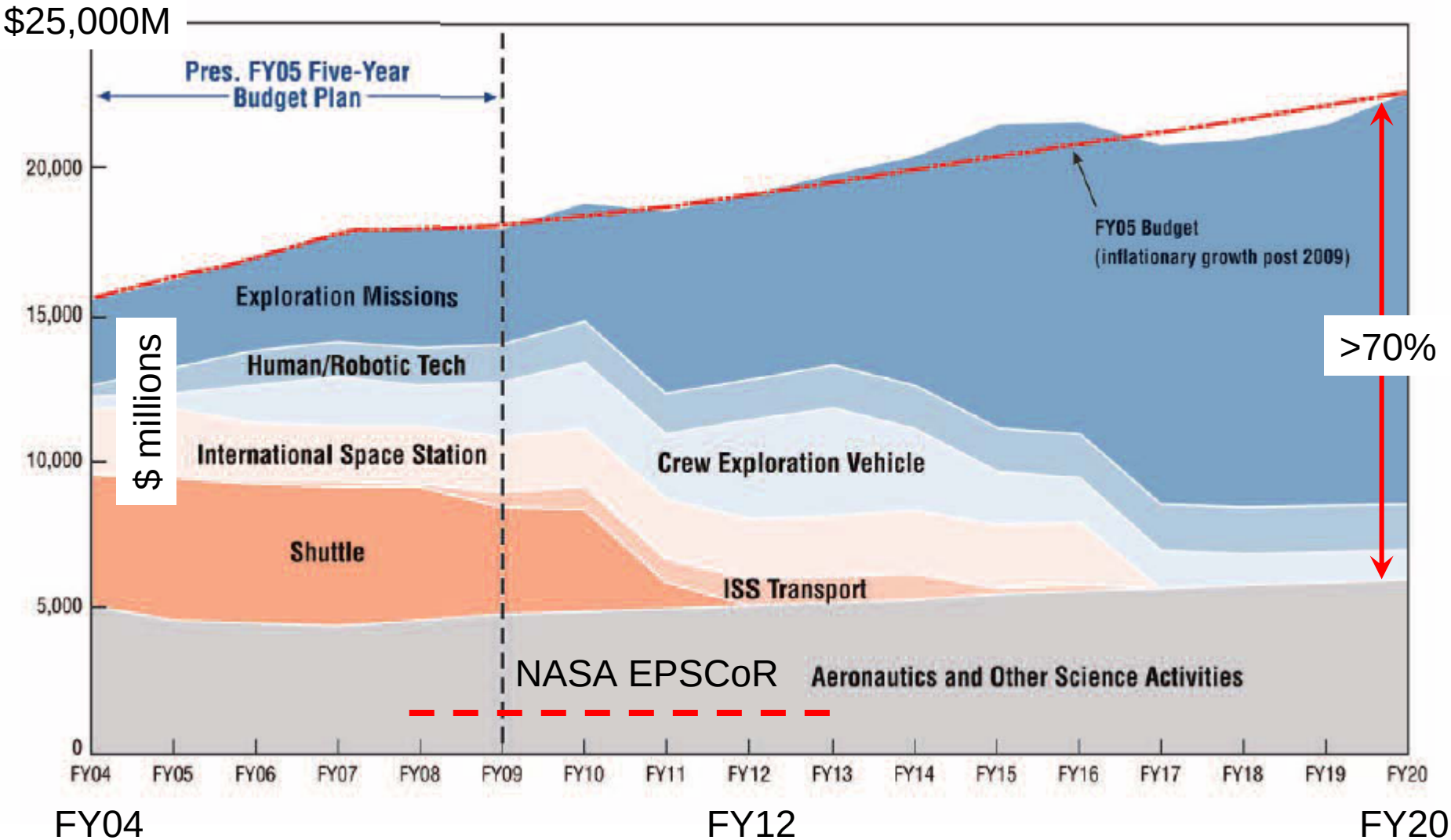
Looking Forward – NASA Priorities

- *Human and robotic exploration of space*





South Dakota NASA EPSCoR Program Overview



South Dakota NASA EPSCoR Program Overview

NASA Strategic Goals 2006-2016 (*2006 NASA Strategic Plan*)			
1	Fly Shuttle until retirement		?
2	Complete International Space Station		
3	Balanced overall program of science, exploration, and aeronautics		
	A	Study Earth from space	?
	B	Understand Sun-Earth system	?
	C	Solar system history, life, and resources	?
	D	Origin and evolution of the universe	?
	E	Fundamental aeronautics research and development	?
	F	Effects of space environment on humans	?
4	Bring Crew Exploration Vehicle into service		
5	Partner with commercial space sector		
6	Return to Moon and establish lunar base		?

South Dakota NASA EPSCoR Program Overview

Looking Forward – NASA "EPSCoR 2007"

- First program round "EPSCoR 2000" scheduled for 2001-2006
  - Most jurisdictions (including SD) are in no-cost extension
- In 2007, number of jurisdictions increased from 20 to 25
- Maximum annual funding $375K per jurisdiction (down from $700K)
- New program components:
  - $125K "core" research infrastructure development grant
  - Up to $250K for one major research project
  - Both categories funded for three years (2007-2010) with potential extension to five years (2012)
  - 1:1 match on "core grant; no match requirement on "research" grants
- FY2008 budget at $10M (requesting $15M)

South Dakota NASA EPSCoR Program Overview

Looking Forward – "Core" Infrastructure Development

- South Dakota proposal approved 4/29/07
- $125K per year for three years ($375K, 3/07 – 3/10)

Seed grants*	$44,000	Strengthen ties to NASA
Travel grants*	$12,000	
Tribal College coordination	$5,000	
State planning meetings	$5,000	
Management and evaluation	$38,000	
Indirect costs	$21,000	
Waived F&A for cost share	($18,000)	

* Grantee must provide 1:1 match

"The reviewers and panel noted that the plan describes clear linkages and identification of synergies between programs and facilities across the state, and demonstrates a good awareness of NASA's priorities."

South Dakota NASA EPSCoR Program Overview

Looking Forward – Major Research Grant Component

- Announced 5/30/07; due 7/10/07
- NASA has funding for maximum of 20 grants (FY2006+FY2007 funds) (for 25 jurisdictions)
- Jurisdictions may submit up to two proposals; NASA will fund maximum of 1
- 3 years @ $250K/yr, all awarded in first year ($750K)
- Multi-institution proposals good, but not required
- 8-10 new grants each year in successive years

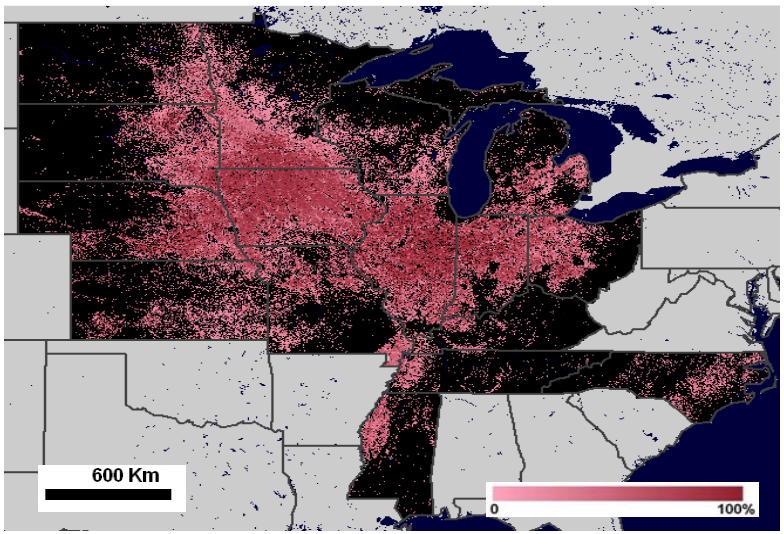
South Dakota NASA EPSCoR Program Overview

Looking Forward – Major Research Grant Component

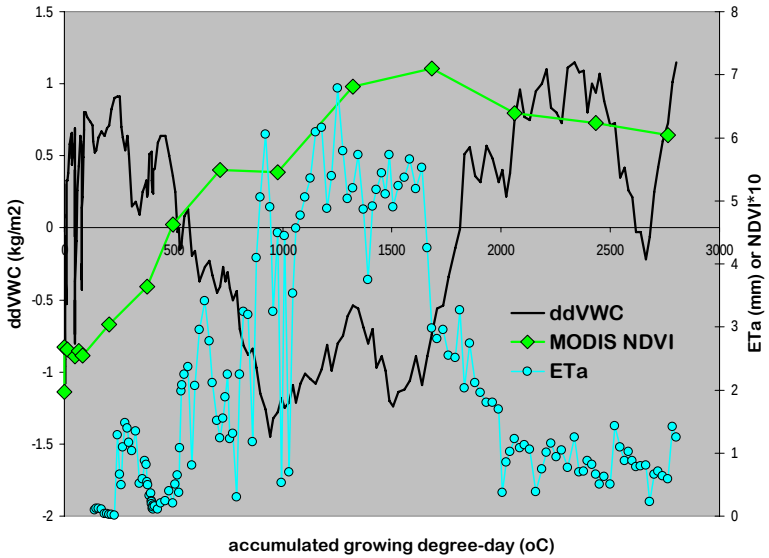
- Eight Letters of interest
- Four complete proposals submitted
- Steering Committee selected two proposals to forward to NASA (7/10/07)
- Decisions pending

Looking Forward – Research Proposal #1

- "Land Cover Dynamics, Regional Hydrometeorology, and the Vulnerability of Rain-Fed Agriculture to Climate Change under Scenarios of Extensive Cultivation of Biofuel Feedstocks"



Corn and soybean from MODIS 500-m data



Looking Forward – Research Proposal #2

- "Continuous Nano-Scaled Carbon Fibers with Superior Mechanical Strength and their Innovative Composites for Aeronautics and Space Applications"

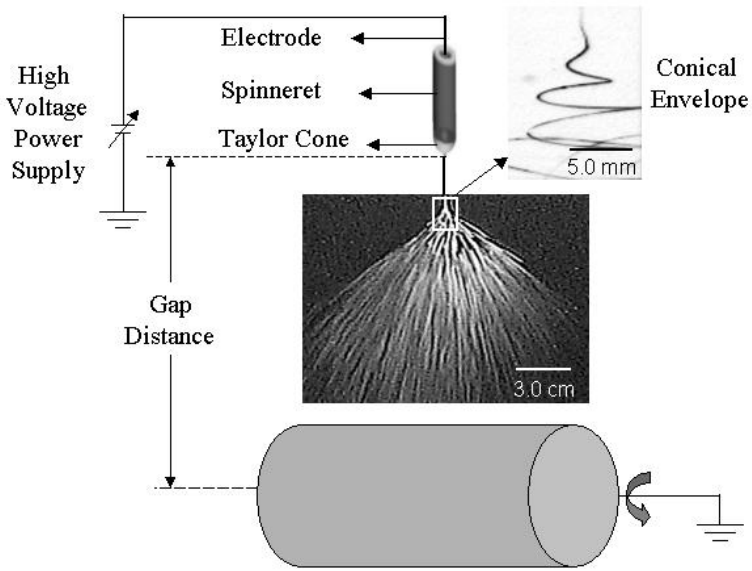
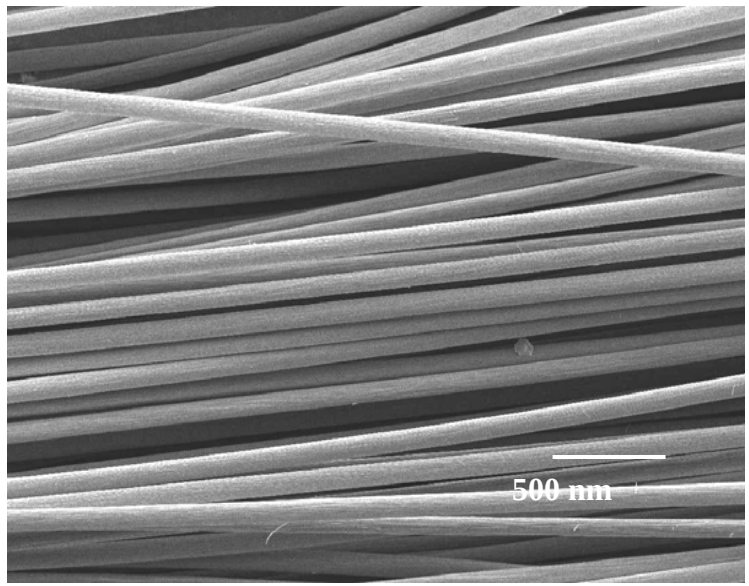


Figure 1: Schematic representation of the electrospinning process.



South Dakota NASA EPSCoR Program Overview

	Landcover Dynamics	Carbon Fibers
Institutions and Programs	SDSU, SDSM&T, USGS-EROS	SDSM&T (NDSU, Boeing), Chem., Mech. Eng.
Participants	8 fac., 1 post-doc, 1 grad., 4 undergrad.	3 fac., 2 post-doc, 3 grad., 2 undergrad.
NASA Goals	3A—Study earth from space	3E—Fundamental aeronautics R&D
NASA Collaboration	Goddard Space Flight Center (Biospheric Sciences Branch)	Ames Research Center (Center for Advanced Materials and Devices, Space Technology Division)
State Goals	Supports new Research Centers, Ph.D. programs, and USGS-EROS; 2010 Goal 3 and Goal 2C (agriculture)	Supports new Research centers and Ph.D. programs; 2010 Goal 3
2010 Centers	(Geographic Information Science)	Center for Accelerated Applications at Nanoscale, (Composites and Polymer Engineering)
New Ph.D. Programs	Geospatial Science and Engineering, Atmospheric and Environmental Science	Nanoscience and Nanoengineering, Materials Engineering and Science, Chemical and Biological Engineering

South Dakota NASA EPSCoR Program Overview

Summary—Positive Impact

- How can NASA EPSCoR and Space Grant help the overall EPSCoR effort in South Dakota?
  - Over $900K annual NASA funding
  - Statewide network of 26 organizations committed to STEM education
    - Higher education, K-12, informal education, industry, government
  - National network of 52 Space Grants that offer collaborative opportunities
  - Access to hundreds of internships at NASA Centers
  - Commitment to STEM opportunities at Tribal Colleges
  - Strong Congressional support (esp. Space Grant)

Problems—National Level

- What are the outstanding problems hindering the NASA EPSCoR and Space Grant programs at the national level?
  - Communication with NASA Headquarters
    - Office grossly underfunded and understaffed
    - Incremental funding common (especially with Space Grant)
  - Inadequate budget (especially for 25 jurisdictions)
    - FY 2008 NASA EPSCoR budgeted at $10M; request $15M

Problems—State Level

- What are the outstanding problems hindering the NASA EPSCoR and Space Grant programs at the state level?
  - Matching funds: $375K (EPSCoR), over $300K (Space Grant)
    - Currently faculty release, waived F&A, …
    - Preferred mechanisms: staff salary, match for research programs or grad students, industry contributions
  - Coordination of EPSCoR-like programs
    - Website (state EPSCoR “portal”)
    - Scholarship and fellowship announcements, applications, review (>$100K annually)
    - Internship opportunities (STEP, N2TEC, industry, matching funds)

Problems—State Level (cont.)

- What are the outstanding problems hindering the NASA EPSCoR and Space Grant programs at the state level?
  - Management issues
    - Timely processing of subawards
    - Efficient tracking of subawards and participants
    - Efficient documentation of cost-sharing
  - Minimal industry involvement