EARTH OBSERVATIONS AND GLOBAL CHANGE

Why? Where Are We? What Next?

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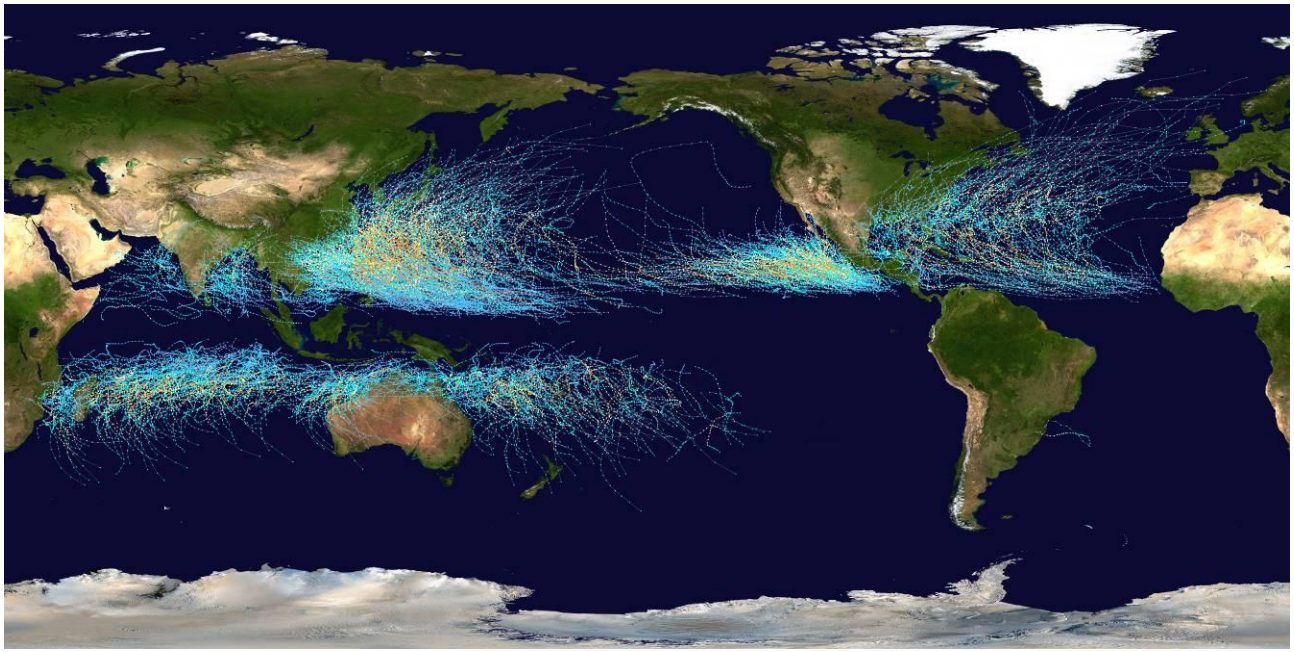
BACKGROUND

- Stresses on Earth's systems growing more severe at ever-increasing pace
  - Major implications for natural resource management; availability of water, food, and energy; the economy; and national security



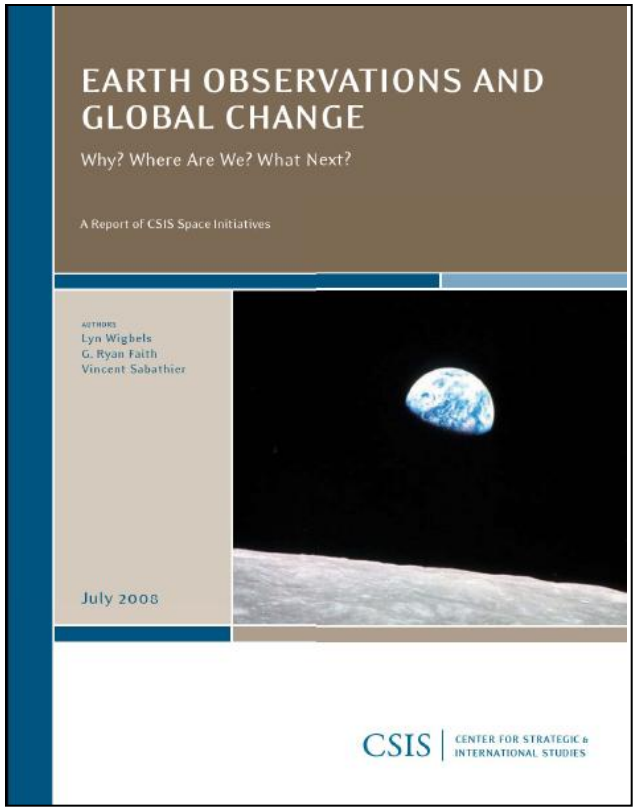
BACKGROUND (continued)

- Earth observation has become a global public good
  - International scientific fora
    - IPCC Fourth Assessment Report documents global changes; emphasizes role of EO in providing higher confidence in scientific findings
  - EO contributions to nine societal values
    - Disaster management; human health and well-being; energy resources; climate variability and change; water resources; weather; terrestrial, coastal, and marine ecosystems; agriculture and desertification; and biodiversity
  - Rising concerns about national security impacts caused by global change
    - Greater recognition of role of EO in providing security-relevant knowledge
  - Increasing private sector reliance on EO
    - Business decisions and risk management

CSIS EARTH OBSERVATIONS AND GLOBAL CHANGE PROJECT

- Recognizing that EO is an important policy priority, CSIS initiated dialogue among government, private sector, and science communities
  - Role and value of Earth observations
  - Current state of EO systems
  - Gap between requirements and capabilities
- Four working group meetings October 2007 – May 2008
  - Issues associated with current and next generation EO systems
  - National and international strategies to address these issues
- *Earth Observations and Global Change – Why? Where Are We? What Next?* report released July 2008

EARTH OBSERVATIONS AND GLOBAL CHANGE – WHY? WHERE ARE WE? WHAT NEXT?

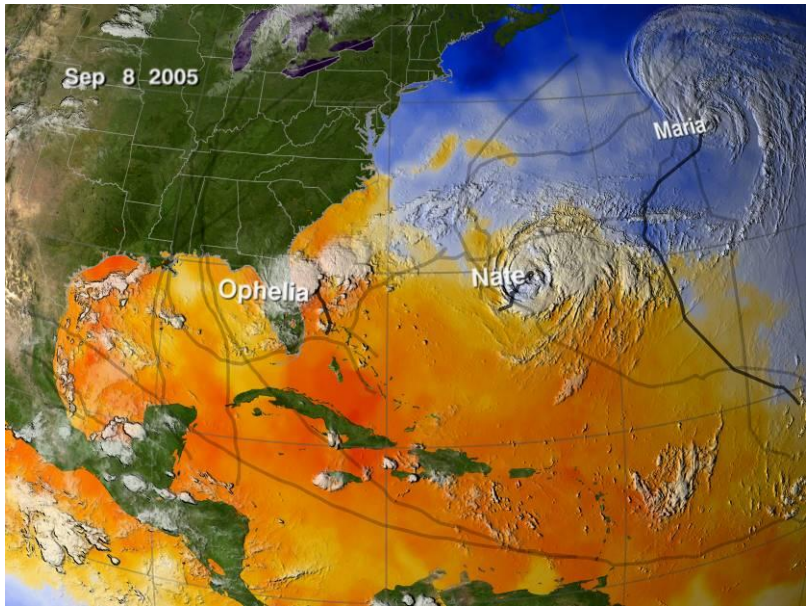


- Report organizes findings and recommendations in three areas:
  - o U.S. Government
  - o International Community
  - o Private Sector

U.S. CHALLENGES AND OPPORTUNITIES – FINDINGS

- Today, U.S. public (civil and national security) and private sector users are increasingly reliant on civil EO systems to:
  - Understand global change
  - Identify ways to predict, prevent, mitigate and adapt to its impacts
- In future, EO capabilities will be more critical for governments and industry to:
  - Monitor, understand, and adapt more quickly to global change
  - Verify international agreements
  - Track and respond to consequences of past, present, and future policy choices
- Without EO capabilities, there is risk of making the wrong decisions and misdirecting resources towards solving the wrong problems or causing unintended consequences

U.S. CHALLENGES AND OPPORTUNITIES – FINDINGS (continued)



- U.S. has demonstrated Earth monitoring research capability and operates a highly effective national weather prediction system
  - Proven sensors and ways of measuring essential variables
  - Precise data sets that have yielded new scientific understanding and short term forecasting improvements
  - Data sets relied upon for current state of understanding of global change

U.S. CHALLENGES AND OPPORTUNITIES – FINDINGS (continued)

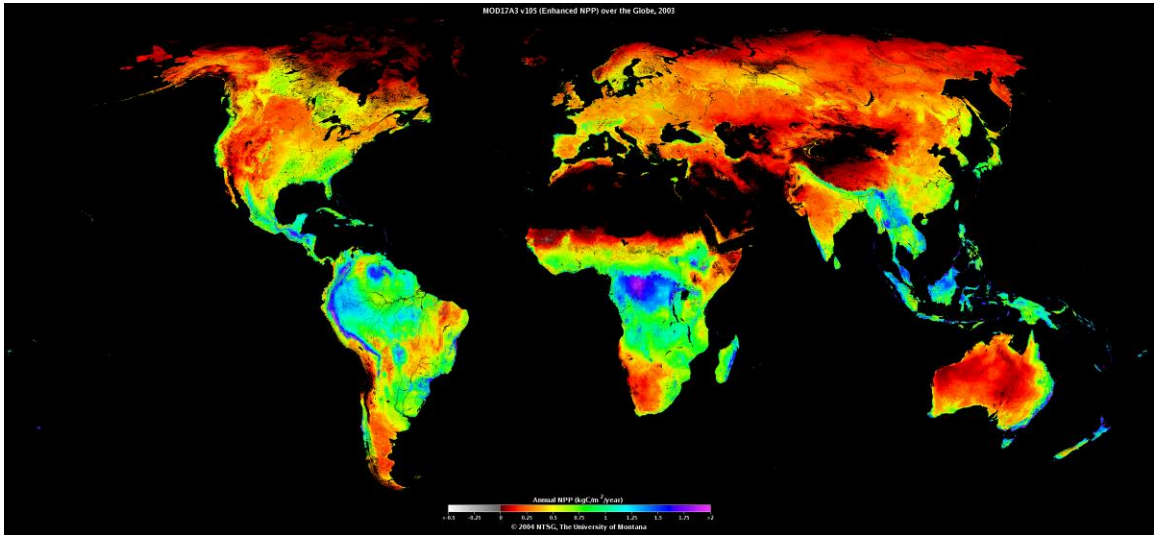
- U.S. does not currently have a commitment, institutionalized plans, or budget for continuous, complete, and comprehensive operational long-term data sets needed to sustain monitoring and understanding of global changes over the coming decades
- U.S. government responsibilities for EO are distributed through many agencies and not currently structured to effectively lead, plan, fund, and implement such an EO program

U.S. CHALLENGES AND OPPORTUNITIES – RECOMMENDATIONS

- Commit to long term, continuous acquisition of full complement of EO data products
- Develop overall plan for integrated, comprehensive, and sustained EO system with involvement of all public and private sector users
- Double funding of U.S. Earth observation efforts now to address current gaps and avoid looming long-term gaps in EO coverage
  - Reassess funding level following development of EO architecture
- Place responsibility with single individual at Cabinet level for
  - Planning and coordinating U.S. EO efforts, including private sector
  - Coordination and cooperation with other nations

INTERNATIONAL CHALLENGES AND OPPORTUNITIES – FINDINGS

- Global change is stewardship challenge requiring worldwide monitoring and solutions
- Many nations making commitments to and large investments in EO systems that can contribute to a global system of systems



INTERNATIONAL CHALLENGES AND OPPORTUNITIES – FINDINGS (continued)

- Multinational Group on Earth Observations (GEO) is a scientific, environmental, economic, and foreign policy achievement
  - Engaged governments at ministerial level
  - Agreement on value of EO in obtaining concrete societal benefits
  - GEO and Committee on Earth Observation Satellites (CEOS) have begun discussions on a Global Earth Observation System of Systems (GEOSS)
  - Positive steps on making EO data freely available at low cost
- However, additional collaborative efforts are needed to realize plans and funding for components to fill gaps enabling a robust GEOSS capacity for our future
- U.S. export control regulations impede international cooperation

INTERNATIONAL CHALLENGES AND OPPORTUNITIES – RECOMMENDATIONS

- GEO and CEOS should continue to champion and lead the process of developing GEOSS and promote adoption of open data policy
- U.S. should continue senior-level leadership and support of GEO and CEOS
- Leverage EO investments to promote global stewardship and develop global solutions

INTERNATIONAL CHALLENGES AND OPPORTUNITIES – RECOMMENDATIONS (continued)

- Optimize international partnerships for development and operation of EO capabilities
  - Leverage global synergies to minimize gaps and unnecessary overlaps while providing strategic redundancies
  - Seek further opportunities for cooperation on research missions, interoperable systems, and transition to long-term data acquisition and continuity missions
- U.S. export control policies should be revised to promote dialogue among international governmental and industrial partners

PRIVATE SECTOR CHALLENGES AND OPPORTUNITIES – FINDINGS

- EO data has provided private sector opportunity to:
  - Understand impacts of global change on domestic and international markets
  - Plan for investments and operations in a global economy impacted by these changes
  - Reduce uncertainty and operational risks

PRIVATE SECTOR CHALLENGES AND OPPORTUNITIES – FINDINGS (continued)

- Industry considers EO as a public good
- Many effective public-private partnerships involving use and dissemination of EO data
  - Not all efforts to commercialize EO capabilities have succeeded in U.S.
  - More success in Europe due to significant government support
- Better understanding and integration of entire EO value chain needed
  - Reduce uncertainties that data and satellite industries face in making investments in EO capabilities and applications

PRIVATE SECTOR CHALLENGES AND OPPORTUNITIES – RECOMMENDATIONS

- U.S. must coordinate among users and producers of Earth observations in both public and private sectors
  - Take advantage of ingenuity and innovations that private sector can offer
- Private sector should be an active participant in the development of architecture for integrated, comprehensive, and sustained EO system
- U.S. should seek innovative public-private partnerships for developing and operating EO systems
  - Engage traditional and non-traditional EO players
  - Continue provision of no- or low-cost data
  - Engage finance community

WHAT NEXT?

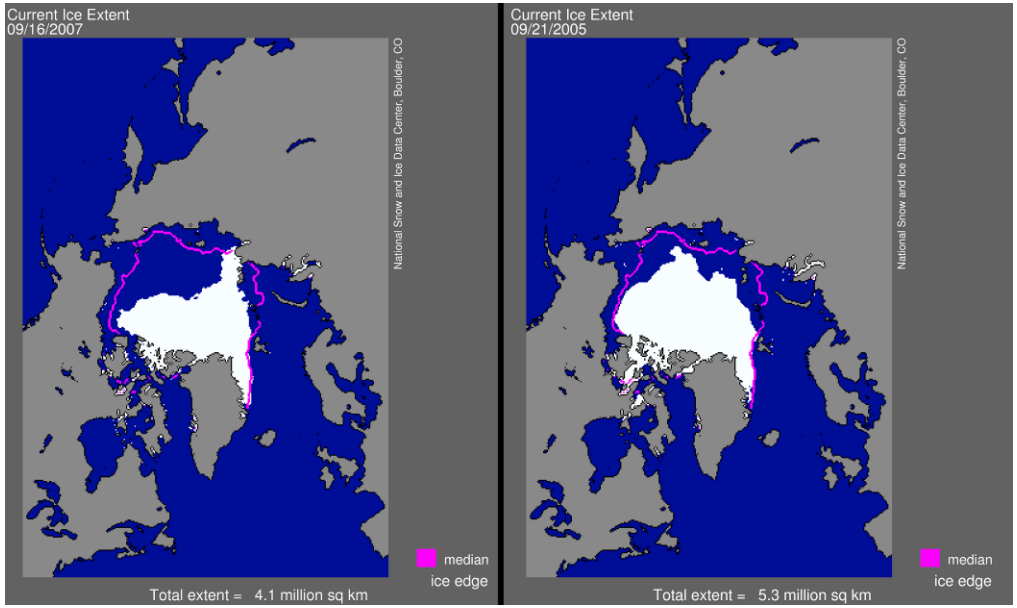
- Challenges
  - We need full complement of long-term climate data along with essential weather data
  - We must transition from short-term research and technology development missions to long-term operational capabilities
  - We can optimize the utility of all data and models to serve society
- Opportunities
  - The challenge is global—international collaboration is critical to meet it
  - Both public and private sector efforts are needed

EARTH OBSERVATION, RISK ASSESSMENT, AND GLOBAL CHANGE: IMPLICATIONS FOR THE INSURANCE AND AEROSPACE SECTOR

- CSIS/Chatham House event, co-sponsored by IAF, in London July 16, 2008, to discuss value and future of Earth observations
  - Participation from financial and re/insurance, scientific and modeling, aerospace and space industry, and political and policy communities
- Insurance industry now reliant on EO data supply chain and considers it a global public good
  - Insurance industry's use of EO data has increased dramatically
  - Continuity and quality of EO data essential to producing models and decision support tools that enable insurance industry to successfully manage risk

IMPLICATIONS FOR THE INSURANCE SECTOR – FINDINGS

- EO measurements have proven that modeling is conservative, demonstrating critical need for continuous acquisition of EO data to improve scientific understanding of global change



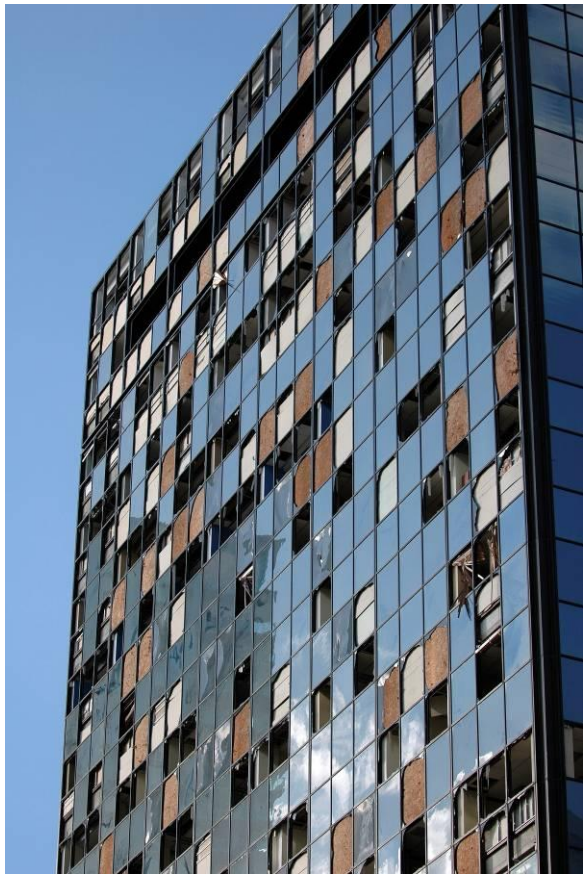
IMPLICATIONS FOR THE INSURANCE SECTOR – FINDINGS (continued)

- Limitations to current data availability requires modeling community to work with noisy, incomplete and, in some cases, sparsely populated data sets
- Insurance industry's ability to manage risk further impacted by lack of free access to some government-sponsored data

IMPLICATIONS FOR THE INSURANCE SECTOR – FINDINGS (continued)

- Relationship between insurance company use of capital and confidence levels of risk assessment is important
  - Determines amount of capital available for investments that could be used for adaptation and mitigation and new business opportunities

IMPLICATIONS FOR THE INSURANCE SECTOR – FINDINGS (continued)



- Insurance industry needs improvement in reliability, continuity, and quality of long-term EO products to ensure sustainability of their business
- Sustainability of insurance industry provides a fundamental means for private sector to adapt to global change

IMPLICATIONS FOR THE INSURANCE SECTOR – RECOMMENDATIONS

- It's in governments' interest that insurance industry can serve their communities – or managing risk will become a government responsibility, transferring losses associated with global change directly to taxpayers
- International community should create a comprehensive global change monitoring system to enable government and private sector to make the right decisions and take the most efficient and effective course of action