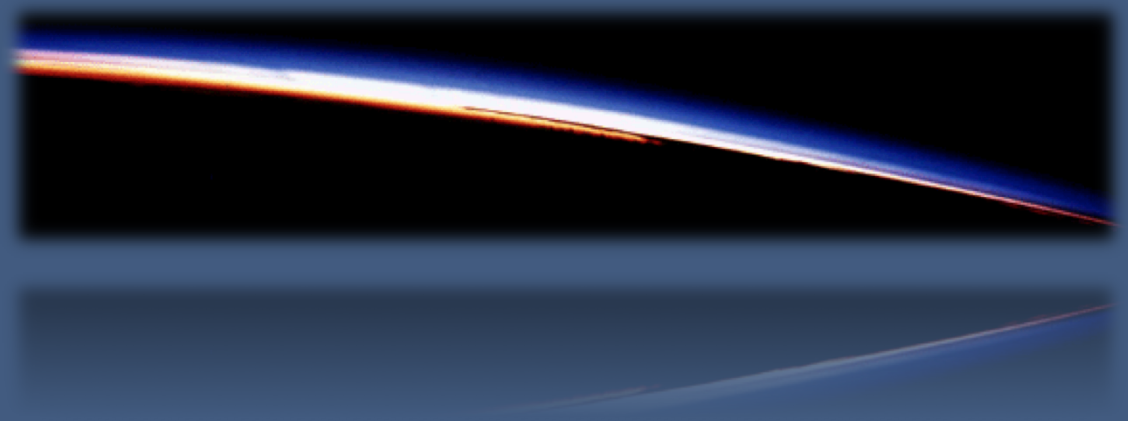
Frontiers of Global Change Science

17 – 22 August 2014 • Aspen, Colorado

John Katzenberger



AGCI Mission

To further the understanding of Earth systems and global environmental change

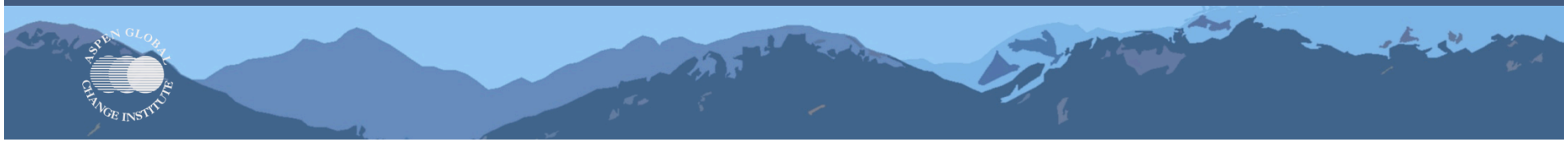
ASPEN GLOBAL CHANGE INSTITUTE

Support for this workshop

& Other Private
Foundations

Outline

- About AGCI
- Tasks this week
- Outcomes and products



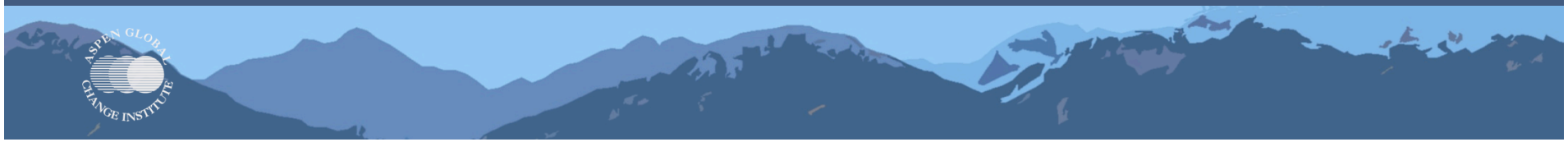
Program Areas

Interdisciplinary Science Workshops

Research & Consulting

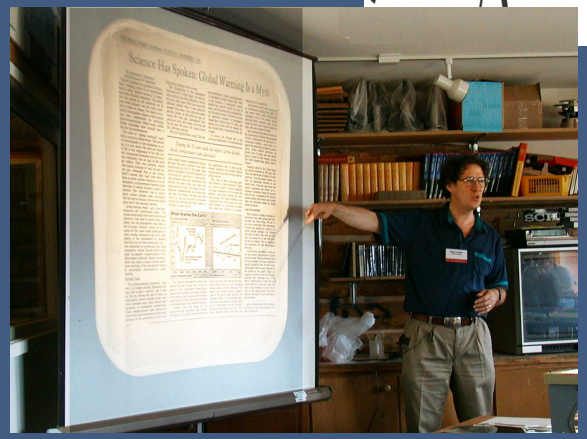
Education & Public Outreach

Sponsored Projects



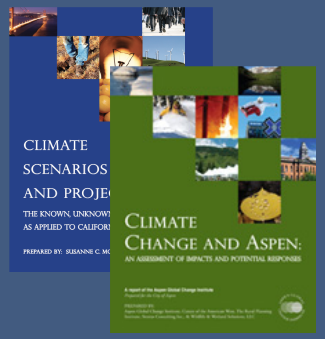
Education & Public Outreach

- NASA & NSF grants for global change science curriculum development
- *From the Horse's Mouth*
  - Turning AGCI's 24 years of video into a virtual classroom resource
- Walter Orr Roberts Public Lectures online



Research & Consulting

- Local to regional decision support
- Monitoring and analysis
- Collaborations with research community & stakeholders
- Collaborations with independent researchers



FOREST HEALTH INDEX
TAKING STOCK OF OUR FOREST IN THE ROARING FORK VALLEY

CITY OF ASPEN
CANARY INITIATIVE

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Sponsored Projects

ENERGY INNOVATION
POLICY & TECHNOLOGY, LLC

- Hal Harvey, Director
- Identifying outsized policy levers
- Research
  - E.g. German renewables, Chinese cities, natural gas
- Informing key decision-makers and persons of influence

energyinnovation.org/

CLIMATE COMMUNICATION
SCIENCE & OUTREACH

- Susan Hassol, Director
- Communication workshops for scientists
- Connecting skilled science communicators to the media

climatecommunication.org

Program Areas

- Interdisciplinary Science Workshops
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- Education & Public Outreach
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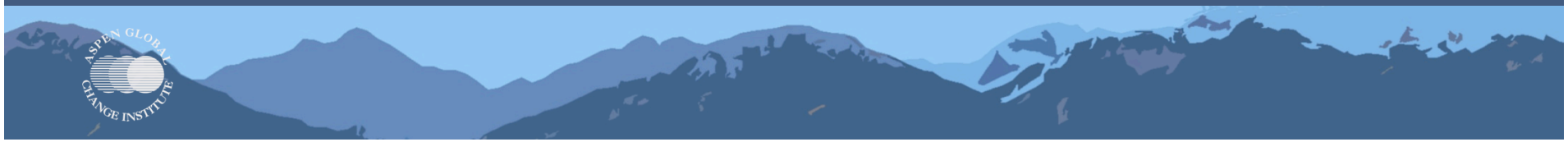
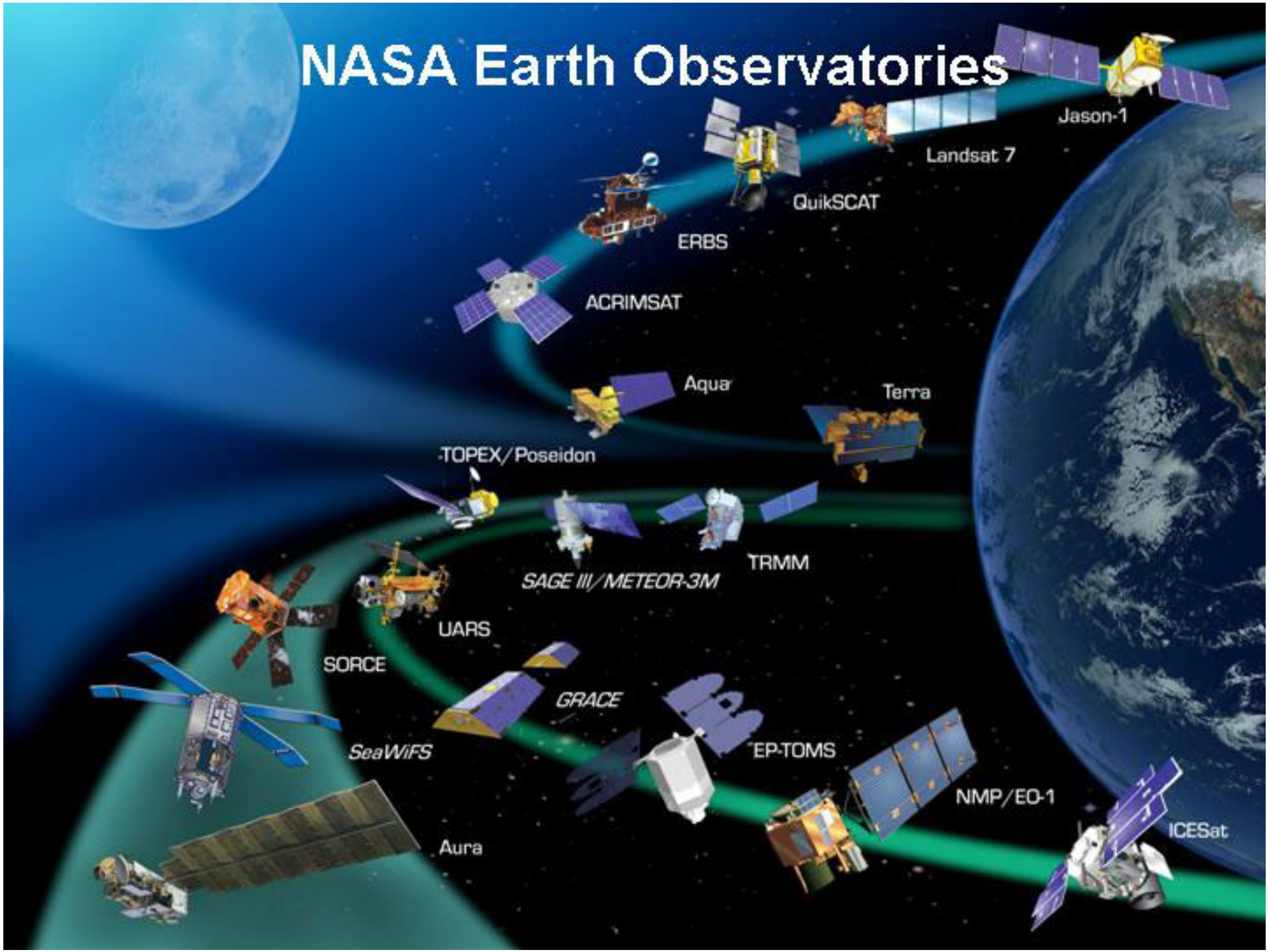


Some underpinnings

- 1972 UN Conference
- 1979 WCRP
- 1987 IGBP
- 1988 IPCC
- 1980's Mission to Planet Earth, EOS development
- 1989-90 USGCRP

AGCI Founding

- 1988 Rick Chappell brought the idea to the Windstar Foundation (John Denver)
- 1989 NASA supported planning workshop
  - Jack Eddy, John Katzenberger, Rick Chappell
    - Berrien Moore, Tom Malone, George Stranahan, Noel Brown, Cheryl Charles, Greg Wilson, John Christy, Richard Somerville, Payson Stevens, William Rawson, Paul Risser, and Ron Zee
    - Established mission
- 1990 First summer workshop


NASA Earth Observatories
Jason-1
Landsat 7
QuikSCAT
ERBS
ACRIMSAT
Aqua
Terra
TOPEX/Poseidon
TRMM
SAGE III/METEOR-3M
UARS
SORCE
GRACE
SeaWiFS
EP-TOMS
NMP/EO-1
ICESat
Aura

USGCRP Priority Framework 1990

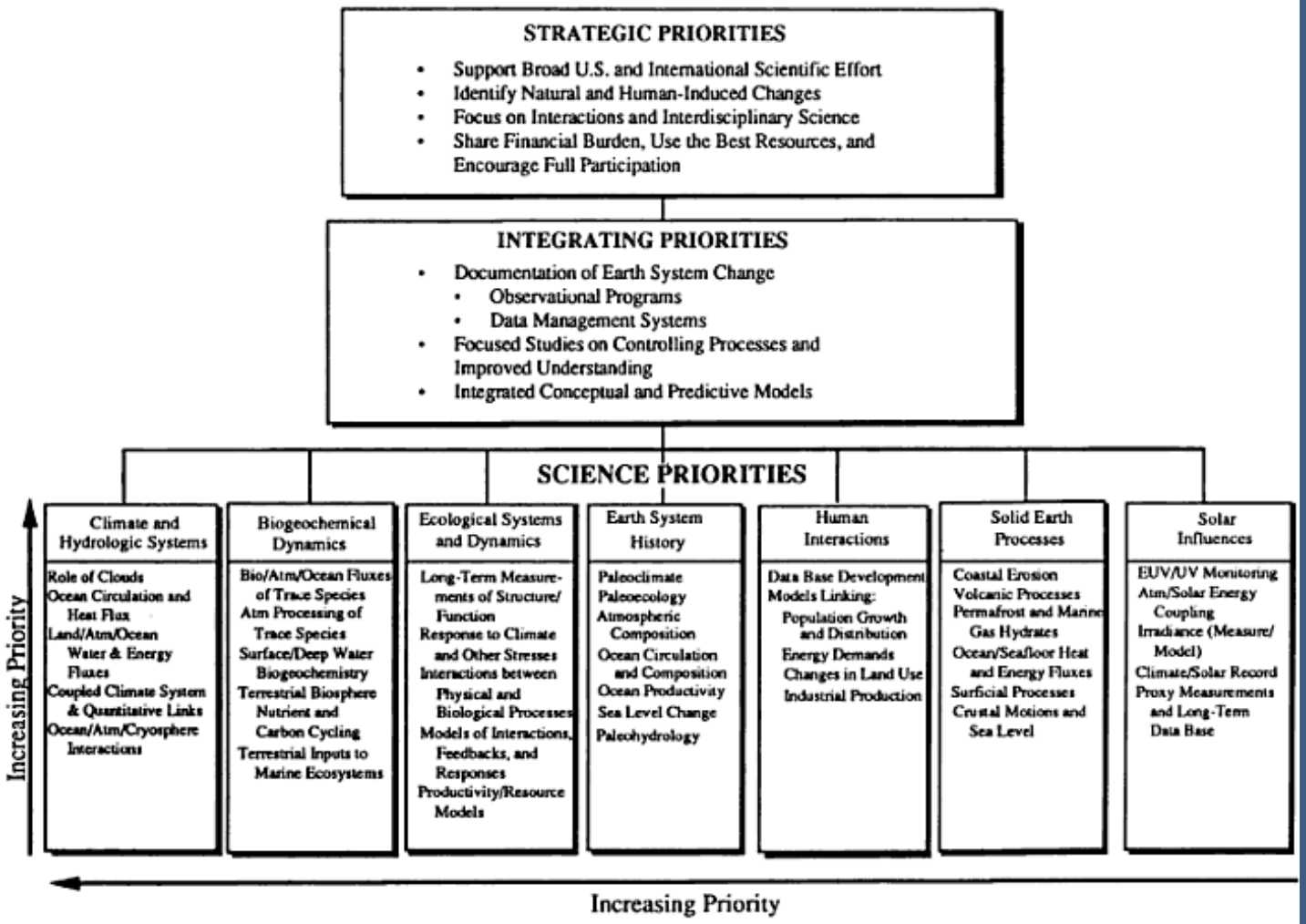
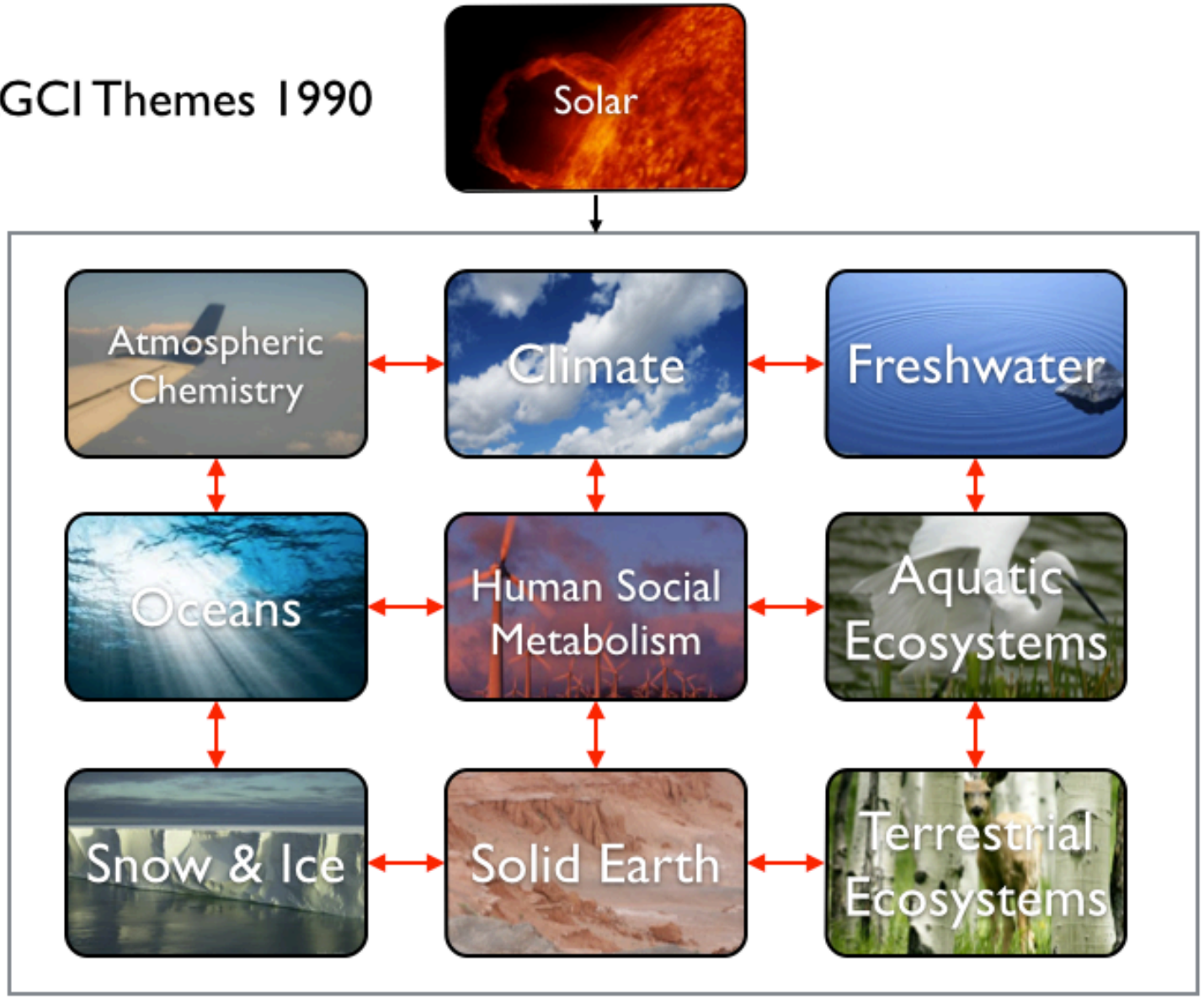


FIGURE 3.1 USGCRP priority framework. (Reprinted from CES (1990), Figure 1, p. 13.)

AGCI Themes 1990



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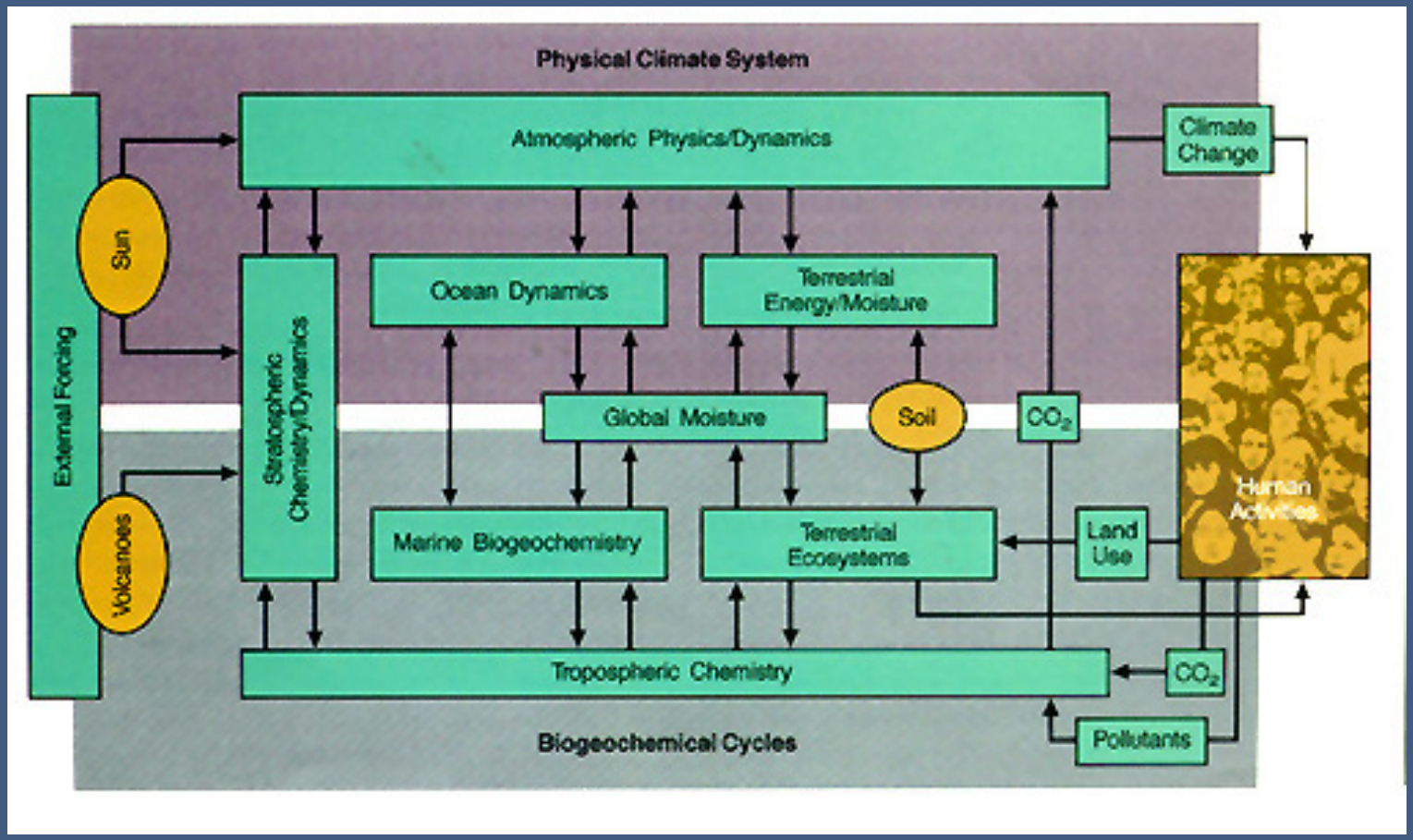
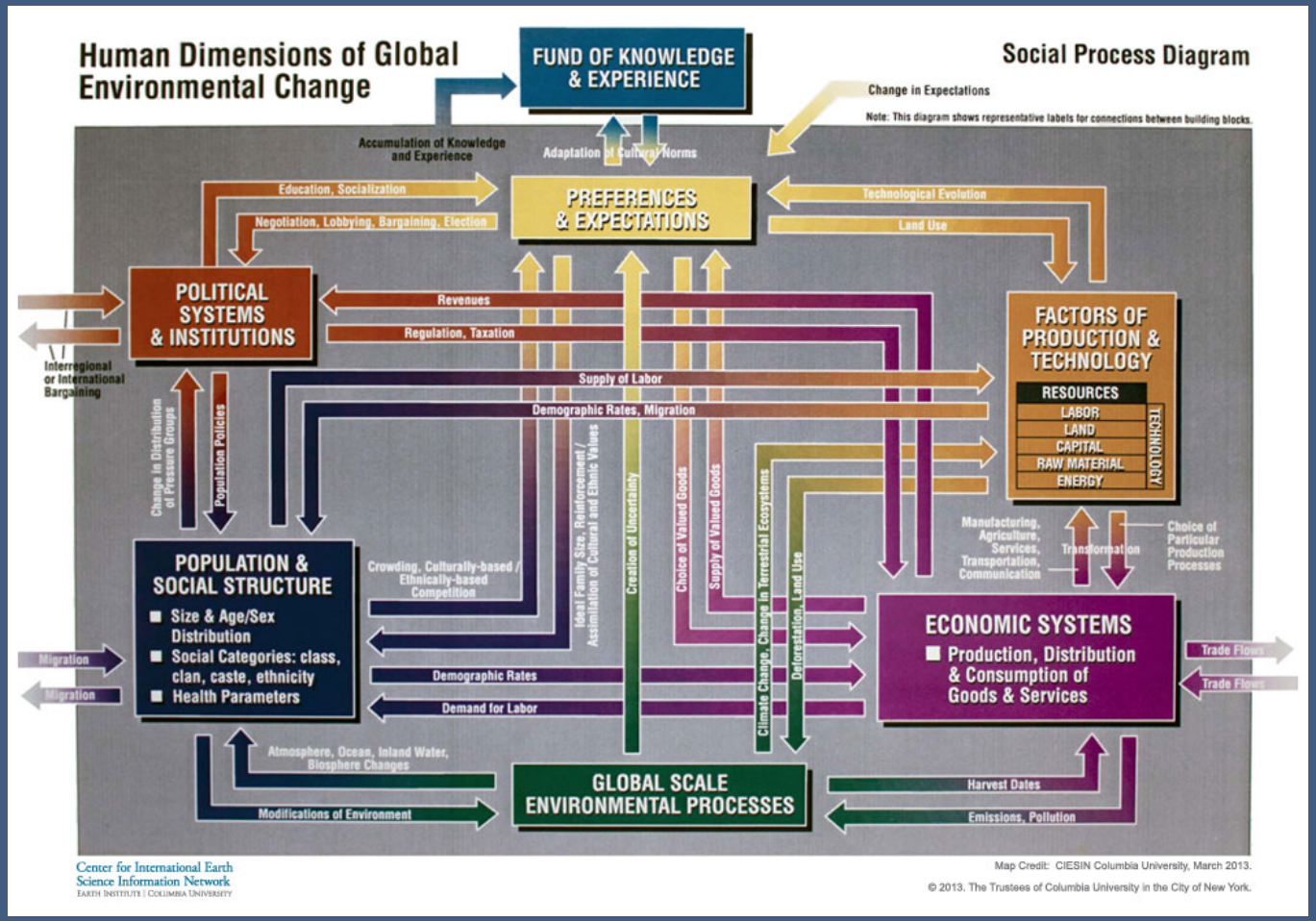
Bretherton Diagram



Simplified version of Bretherton 1986

Social Process Diagram



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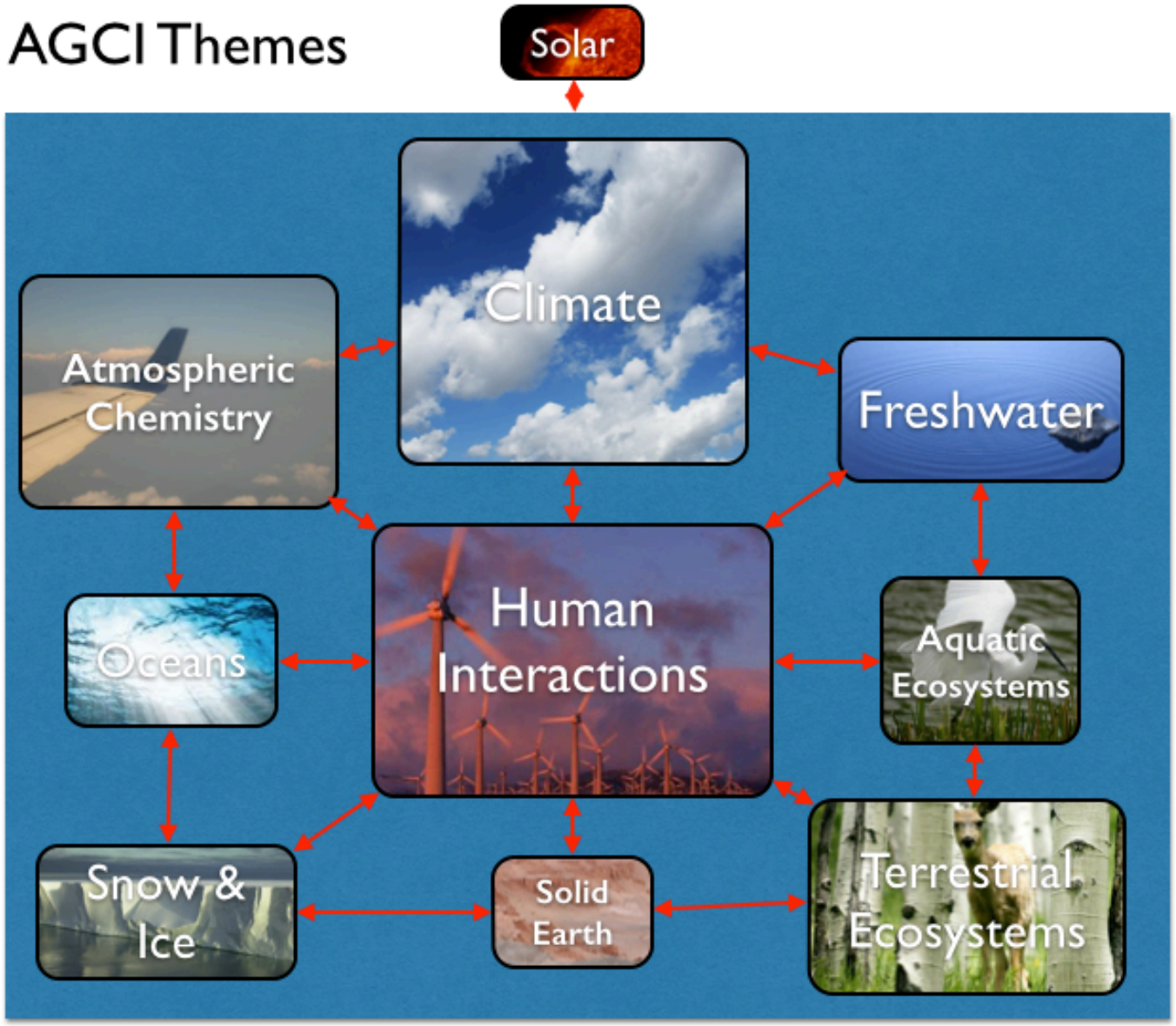
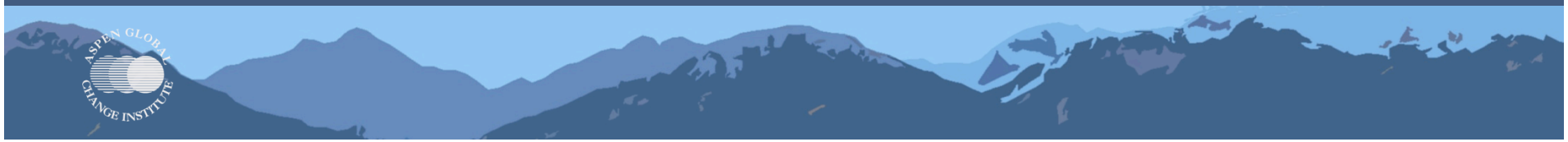
AGCI Themes


Solar
Climate
Atmospheric Chemistry
Freshwater
Human Interactions
Oceans
Aquatic Ecosystems
Snow & Ice
Solid Earth
Terrestrial Ecosystems

Physical, Biological, and Human Dimensions of Global Change • Remote Sensing, Environmental Change, & Human Health • Biogeochemical Cycles and Population Dynamics • Human Dimensions of Global Change • Biodiversity and Development Fresh Water, Land and Biologic Interactions: Changes and Impacts • The Coupled Climate System and Climate Change • Food, Conservation and Environmental Change: Is Compromise Possible? • Human Social Metabolism • The Early Detection of Global Change • Radiation Feedbacks and the Credibility of Atmospheric Models • Anticipating Global Change Surprises • Biological Invasion as a Global Change • Changes in Global Vegetative Patterns & Their Relationships to Human Activity • Improving the Effectiveness of the Climate Convention • The Metro-Agro-Plex as a Geographical Unit of Analysis for Regional and Global Environmental Change" • Global Change and Natural Hazards • Ranking & Communicating Levels of Confidence to Policy & Media Audiences • Scaling from Site-Specific Observations to Global Model Grids • Planning for a US National Assessment • Innovative Energy Systems & CO2 Stabilization •Climate Extremes: Changes, Impacts, and Projections • Integrating Human and Natural Systems to Understand Climate Change Impacts on Cities • Ecological and Agricultural Consequences of Climatic Extremes and Variability • Industrial Carbon Management: Crosscutting Scientific, Technical & Policy Implications • Atmospheric Composition, Biogeochemical Cycles, and Climate Change • Forest Management and Global Change: Near-Term Decisions and Long-Term Outcomes • Learning from Regions: A Comparative Appraisal of Climate, Water, and Human Interactions in the Columbia and Colorado River Systems • Energy Options and Paths to Climate Stabilization • Climate Scenarios and Projections: the Known, the Unknown, and the Unknowable as applied to California • Aerosols and the Hydrological Cycle • Abrupt Climate Change: Mechanisms, Early Warning Signs, Impacts, and Economic Analyses • North American Weather and Climate Extremes: Progress in Monitoring and Research • Biodiversity in a Changing Climate: Assessing Uncertainties • Earth Systems Models: The Next Generation • Exploring the Boundaries of Nature: A Reflective Dialogue on the Environment • Weather and Climate Extremes in a Changing Climate • Northern Eurasia Land surface Properties and Change and its Role in the Global Earth System • Climate Prediction to 2030: Is it possible, what are the scientific issues, and how would those predictions be used? • Managing the Cycles of Nitrogen and Phosphorus: Mitigation and Adaptation • Advanced Climate Modeling and Decision-Making Support of Climate Services • State of the Global Phosphorus Cycle • Global Change and the Solar-Terrestrial Environment • Making Sense of the multi-model decadal prediction experiments from CMIP5 • Informing a Forest Health Index and Bioclimatic Monitoring Network for the Roaring Fork Valley • Climate Sensitivity on Decadal to Century Timescales: Implications for Civilization • Science for Climate Change Adaptation: Enhancing Decision-Support Capability • Next generation climate change experiments needed to advance knowledge and for assessment of CMIP6 • Adaptation to climate change in mountain & coastal areas: a transatlantic dialogue • Pathways for Climate Solutions: Assessing Energy Technology and Policy Innovation • Experimental design for CMIP6: Aerosol, land use, and future scenarios • Frontiers of Global Change Science



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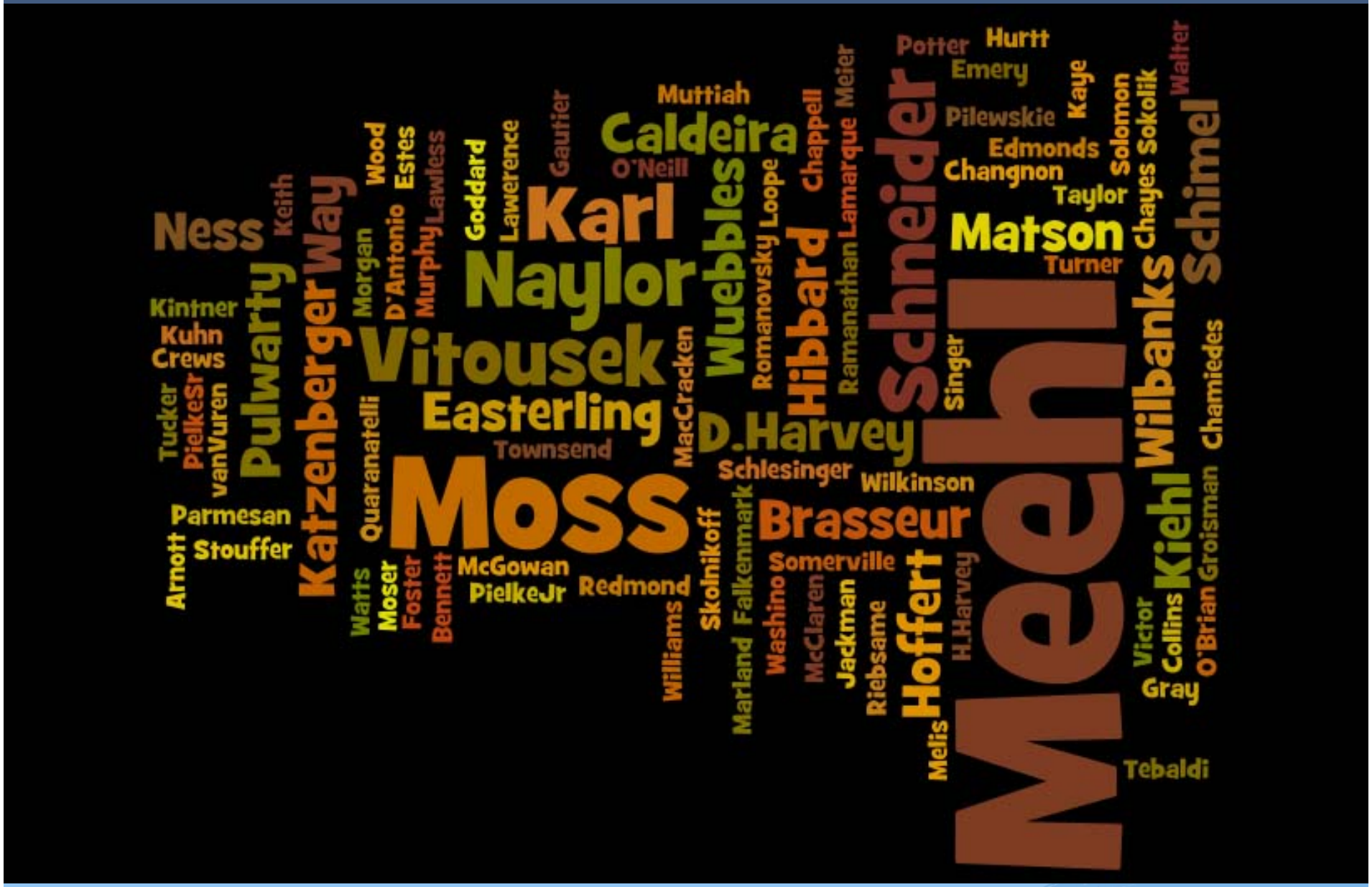
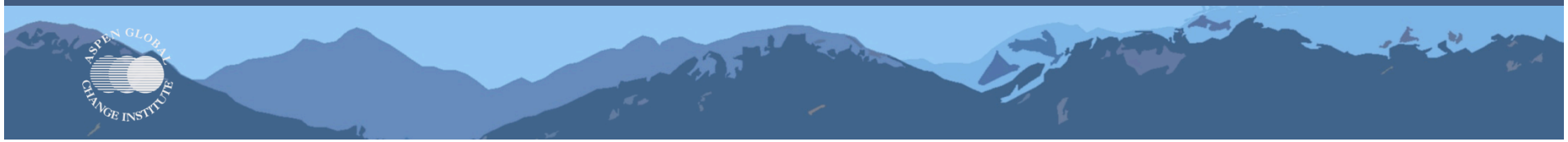

Meehl
Moss
Vitousek
Naylor
Karl
Caldeira
Schneider
Matson
Schimel
Wilbanks
Kiehl
Brasseur
Hoffert
D.Harvey
Easterling
Hibbard
Wuebbles
Katzenberger
Pulwarty
Ness
Way
Schlesinger
Wilkinson
Somerville
Tebaldi
Gray
Victor
Collins
O'Brian
Groisman
Chamiedes
Singer
Turner
Taylor
Changnon
Edmonds
Pilewskie
Emery
Hurtt
Potter
Walter
Solomon
Sokolik
Chayes
Kaye
Meier
Lamarque
Ramanathan
Romanovsky
Loope
Chappell
Muttiah
O'Neill
Gautier
Lawerence
Goddard
Lawless
Murphy
Estes
Wood
D'Antonio
Morgan
Keith
Kintner
Kuhn
Crews
Tucker
PielkeSr
vanVuren
Parmesan
Arnott
Stouffer
Quaranatelli
Watts
Moser
Foster
Bennett
McGowan
PielkeJr
Redmond
Williams
Skolnikoff
Falkenmark
Marland
Washino
McClaren
Jackman
Riebsame
H.Harvey
Melis
MacCracken
Townsend

Our Tasks in Q1-5

1. Your career
2. Global change research: advances, impediments
3. Evolving societal needs
4. Future challenges for research
5. AGCI's role



WCRP Grand Challenges

- Clouds, circulation and climate sensitivity
- Changes in cryosphere
- Climate extremes
- Regional climate information
- Regional sea-level rise
- Water availability

Future Earth Initiatives

- Exploring nitrogen in Future Earth
- Scientific support for IPBES knowledge generation
- What is urban? Global urbanization as viewed from multiple scientific domains
- Bright spots: seeds of a good Anthropocene
- Global biodiversity monitoring, prediction and reporting
- Extreme events and environments from climate to society
- Linking earth system and socio-economic models to predict and manage changes in land use and biodiversity
- Sustainability for water, food and energy through integrated water information and improved governance

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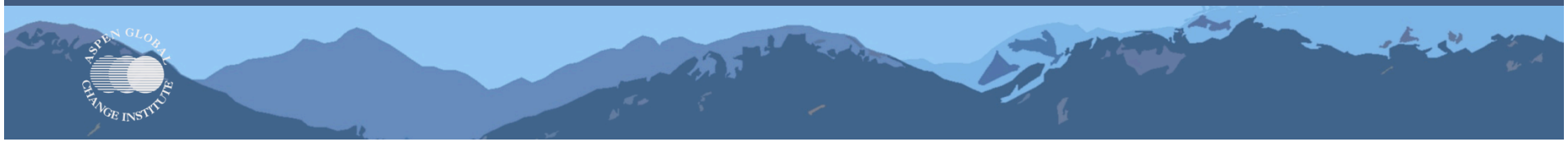
Workshop Outcomes & Products

- Learning and ambassadorship
- Working groups synthesis reporting
  - Questions 2, 3, 4
- Publications – open to what transpires this week

Some ideas for Q4

- How do humans individually and collectively make decisions at different spatial and temporal scales?
- What informs partitioning of investment for adaptation and mitigation?
- What are the key gaps in understanding thresholds in social and natural systems?



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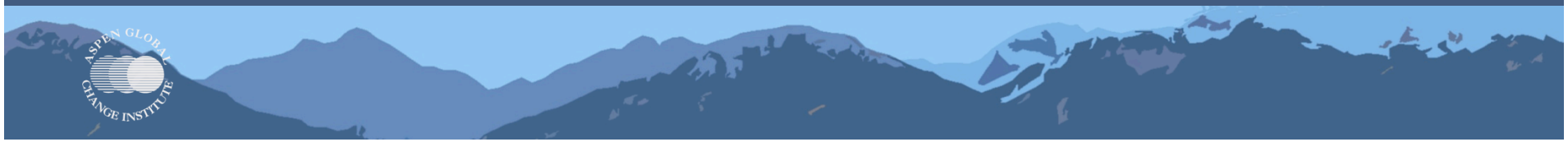
AGCI Human Dimensions Working Group 1991

- Chaired by Harold Jacobson and Bill Kuhn
  - Working group:
    - Urs Lutebacher

- 1991 Diversitas
- 1996 IHDP
- 2012 Future Earth



Funding

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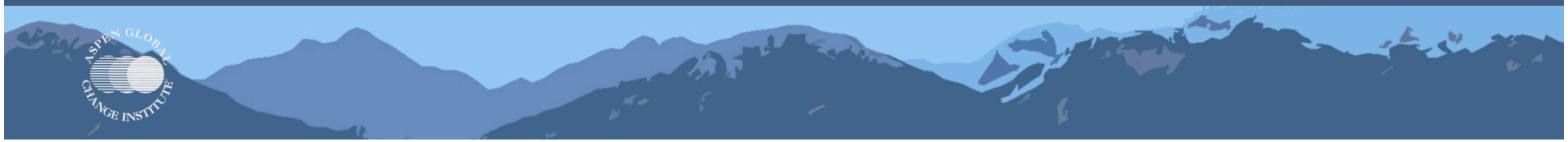
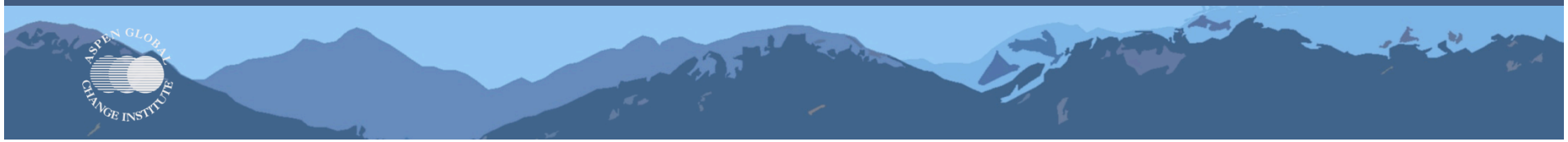
Additional support:

- Aspen Glow Foundation
- New-Land Foundation
- Sopris Foundation
- Individual contributions

& Other Private Foundations

Welcome to Aspen!
Thank you for coming.



Deeper understanding of:

- key processes in human and social systems
- thresholds in biological, social, physical systems
- interconnections affecting feedbacks and potential surprise
- decision support on what we already know matters
- decision support appropriate to spatial and temporal scales of impacts & user need