



POLAR 2018 - Where the Poles come together



Essential Cold Region Variables to reach societal benefits

Yubao Qiu, Massimo Menenti and ECRV Task Team (ongoing)

2018.6 @ Davos - Switzerland /GEO Cold Regions Initiative



GEO Supporting Global Policies



UN World Conference on
Disaster Risk Reduction
2015 Sendai Japan

Sustainable Development UN SDGs



**Measuring Status
& Progress**

Climate Action Paris Agreement



**Monitoring &
Understanding**

Disaster Risk Reduction Sendai Framework



**Supporting
Resilient
Infrastructure**

Societal Benefit Areas

-  Biodiversity and Ecosystem Sustainability
-  Disaster Resilience
-  Energy and Mineral Resource Management
-  Food Security and Sustainable Agriculture
-  Infrastructure and Transportation Management
-  Public Health Surveillance
-  Sustainable Urban Development
-  Water Resources Management

 **Climate**

The GEOSS Platform



UNIVERSITÉ
DE GENÈVE

GEOSS Portal



FGDC.GOV
FEDERAL GEOGRAPHIC DATA COMMITTEE



170+ brokered catalogs

5000+ data providers

400 Million+ resources



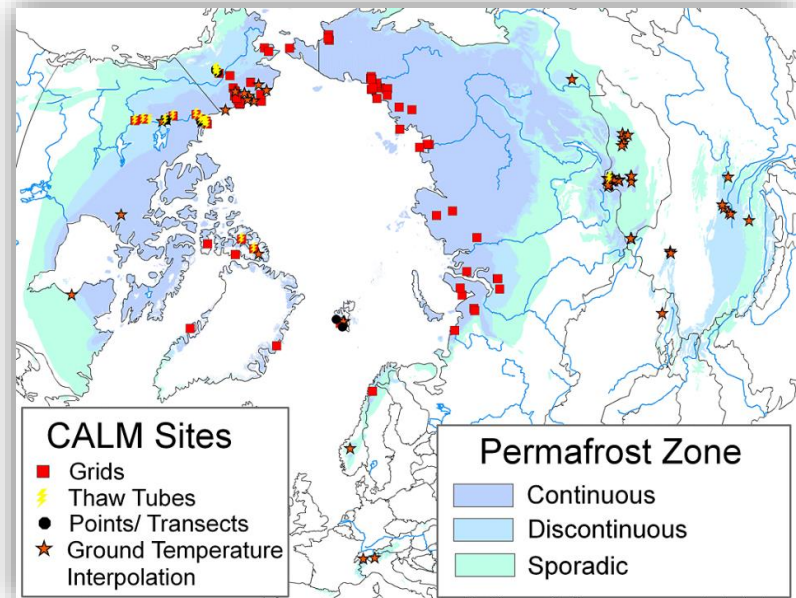
2000 km

Where the Poles come together - POLAR 2018



Look at the Earth from a different way :
the Earth Poles connected closely.

- ◆ Cold Regions: are the most important environment that driven the Earth system and the Earth planet.
- ◆ Frozen Water and Phase changing Domination Role :
 - High Latitude ;High Altitude



GEO-X Plenary & Geneva Ministerial Summit

Integrating Observations to Sustain our Planet

15-17 January 2014, Geneva, Switzerland

GEOSS: An Information Service for Cold Regions

Conclusion and Recommendations from GEO Cold Regions Side Event
Geneva, Switzerland, January, 2014

An **Information Service for Cold Regions** (or GEO Cold Regions), exploiting the GEOSS information system, is needed to develop a **user-driven approach** for Cold Regions **information services to complement** the current mainly science-driven efforts.

Specific Earth observation needs and requirements

Climate & Weather

Biodiversity & Ecosystems

International Relations & Cooperation

Sustainable Development, Indigenous Communities & Traditional Practices

Health

Agriculture, Fisheries, Hunting & Food

Water

Pollution & Environmental Protection

Hazards

Built Environment, Infrastructure & Transport

Energy

Mining & Fossil Fuels

Forestry

Shipping

Tourism



Examples: The melting Arctic creates a new world of shipping and resource opportunities

Make Way for More Ships



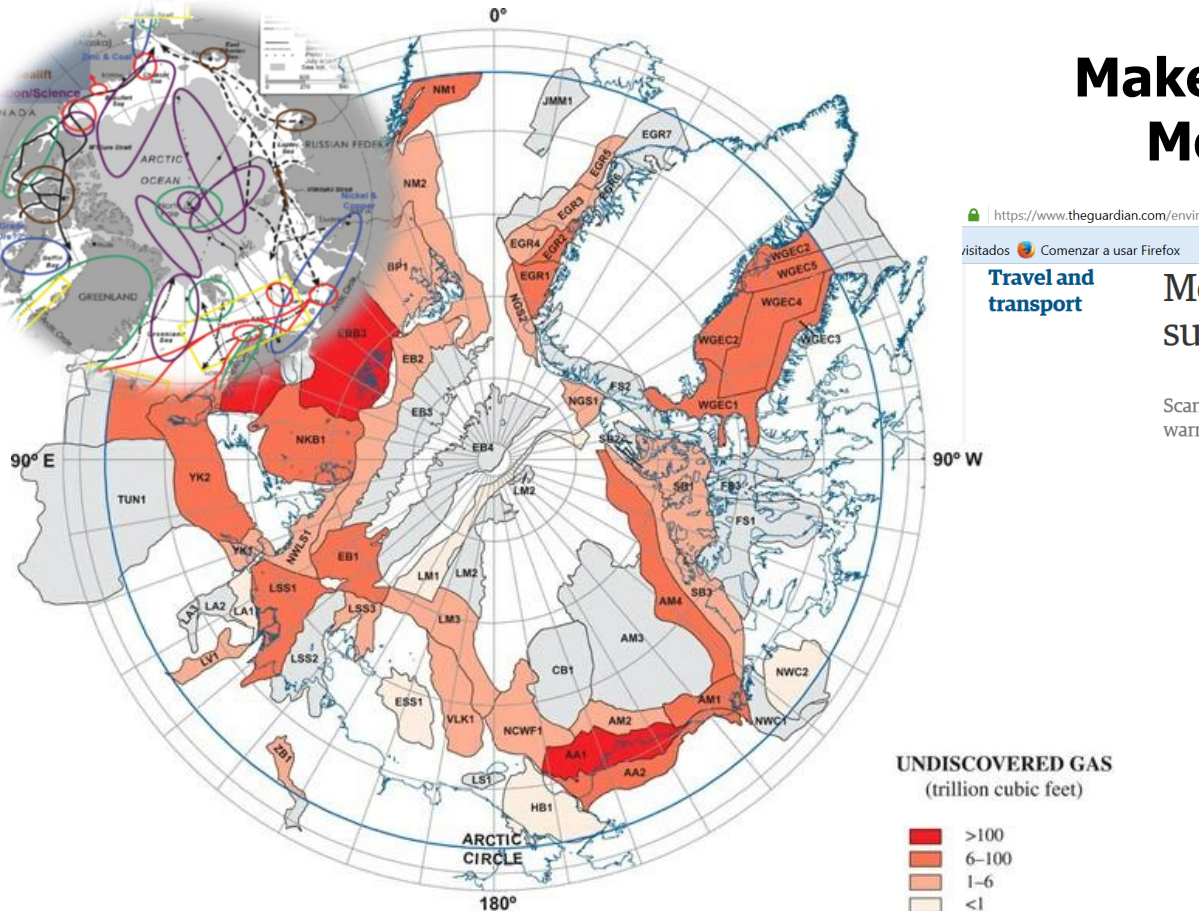
<https://www.theguardian.com/environment/2011/oct/05/melting-arctic-ice-supertankers>

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Travel and transport

Melting Arctic ice clears the way for supertanker voyages

Scandinavian shipowners say cargo routes through the Arctic, made possible by warmer temperatures, would save money and emissions

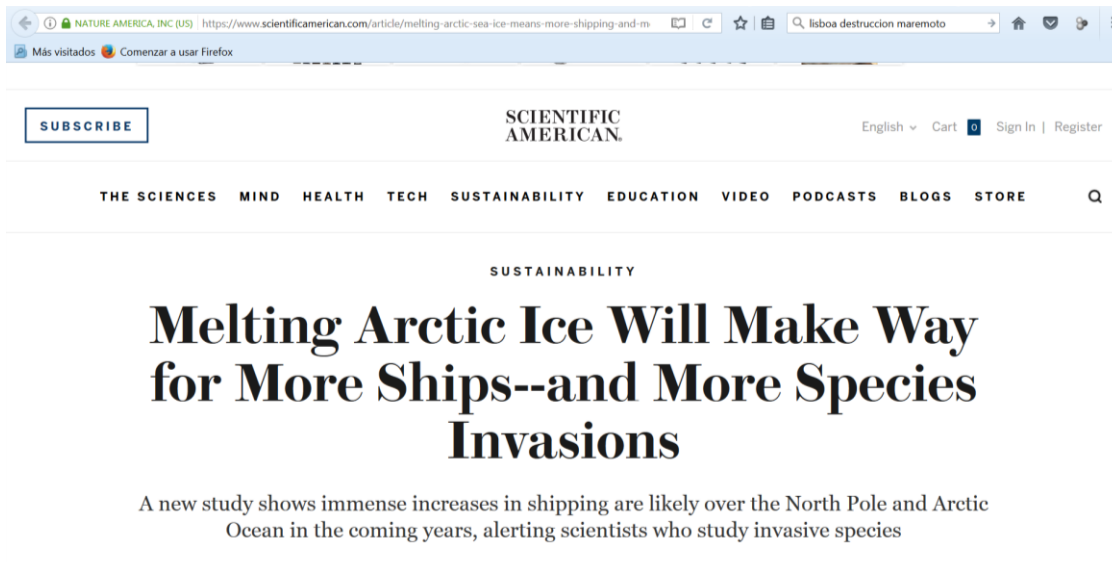


Source: Science Magazine: Donald L. Gautier, Kenneth J. Bird, Ronald R. Charpentier, Arthur Grantz, David W. Houseknecht, Timothy R. Klett, Thomas E. Moore, Janet K. Pitman, Christopher J. Schenk, John H. Schuenemeyer, Kai Sørensen, Marilyn E. Tennyson, Zenon C. Valin and Craig J. Wandrey (2009). Assessment of Undiscovered Oil and Gas in the Arctic. Science Vol. 324 no. 5931 pp. 1175-1179. DOI: 10.1126/science.1169467



Energy Resources in the Arctic Ocean

Examples: The melting Arctic creates a new world of shipping and resource opportunities



More Species Invasions



Impact on Security and Health

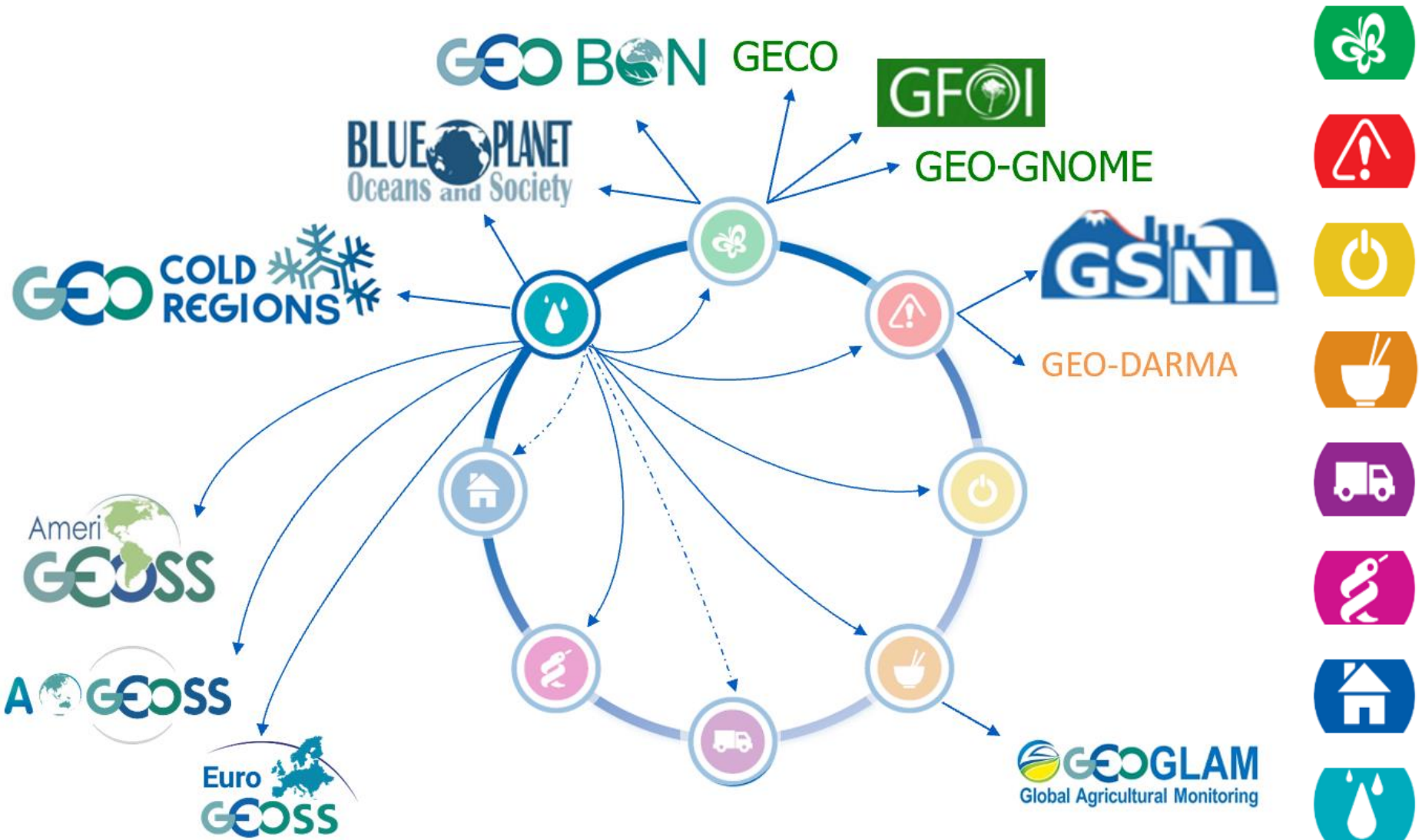


Ice melt forces polar bears into paths of Alaska schoolchildren

Trevor Hughes, USA TODAY Published 4:07 a.m. ET April 22, 2016 | Updated 7:05 a.m. ET April 23, 2016

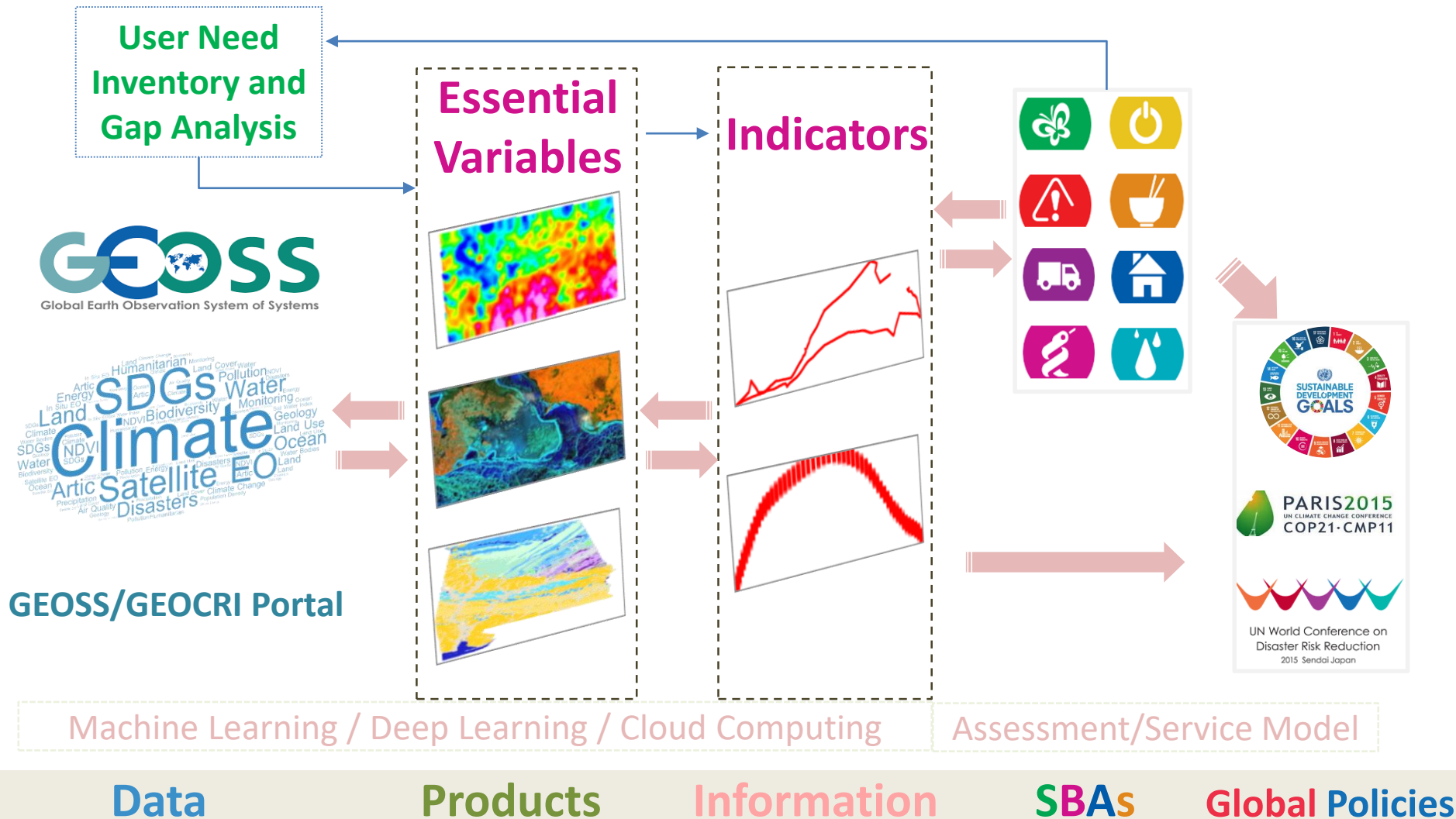


GEOCRI links to other SBAs



Data ↔ Information ↔ Decision

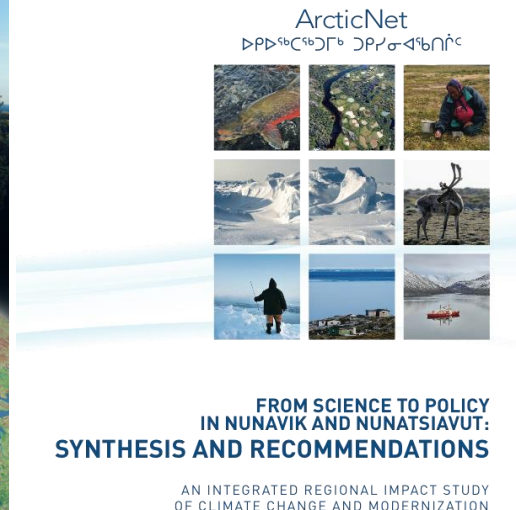
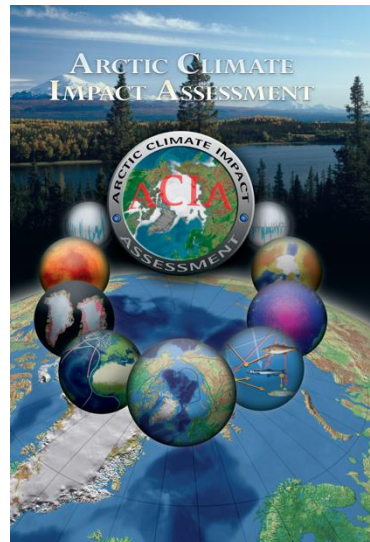
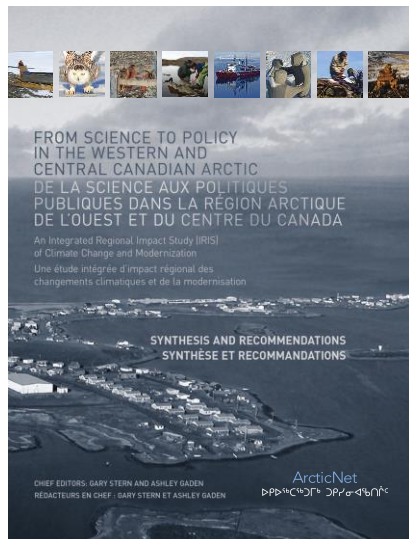
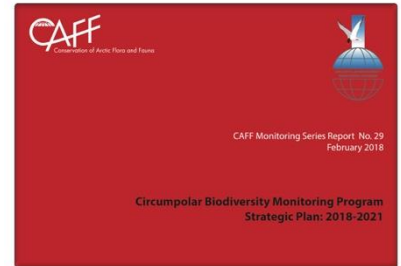
Big Earth Data based : Information Service for Cold Regions



User Need and Gap Identification

Example: Knowledge Gaps

- State of Canada Arctic Report
- Arctic Biodiversity Assessment
- State of Arctic Marine Biodiversity Report
- Circumpolar Biodiversity Monitoring Program
- IASC Working Groups



Big Earth Data for the Planet

Courtesy : GA, Datacube

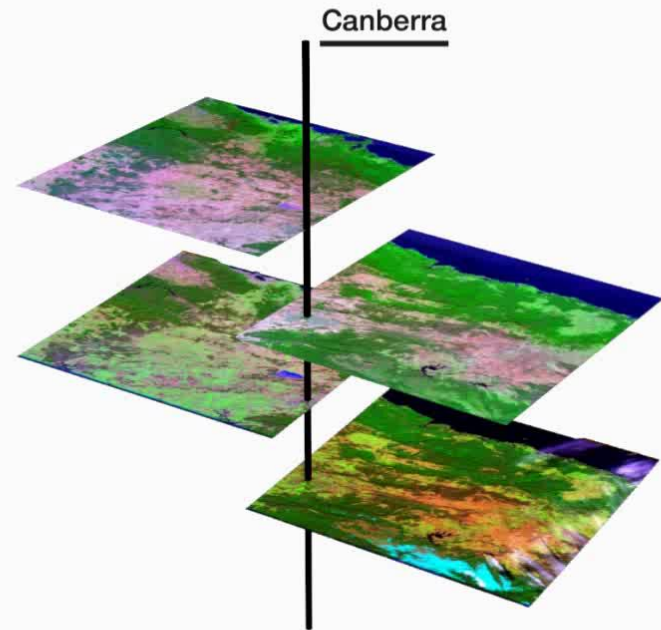
Orthorectification



Calibration



Time series



Example: Australian Geoscience Data Cube



Water quality monitoring: Lake Burley Griffin

Courtesy : GA, Datacube

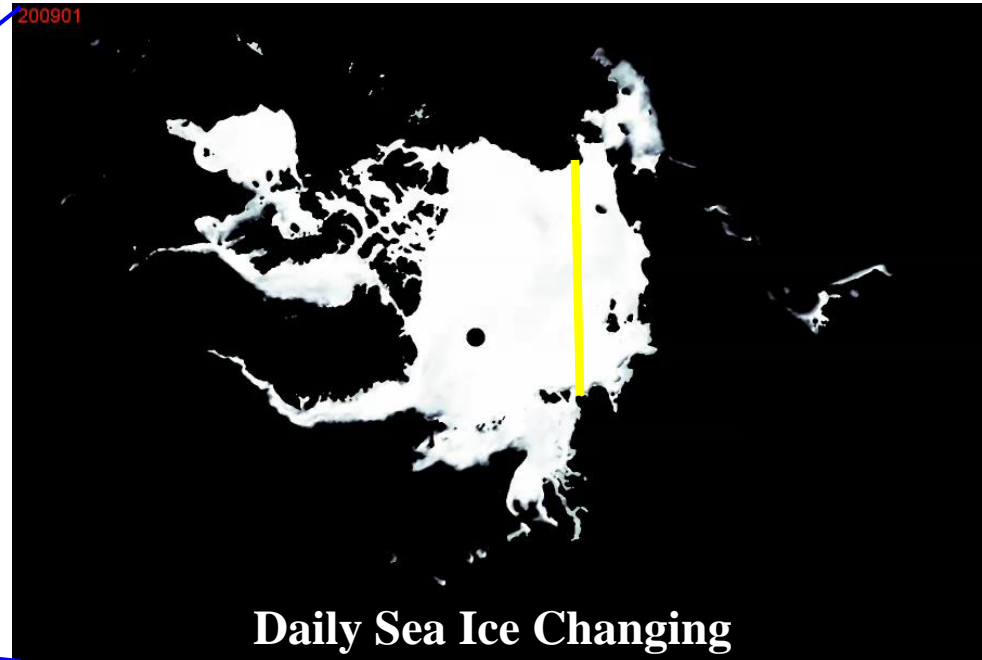
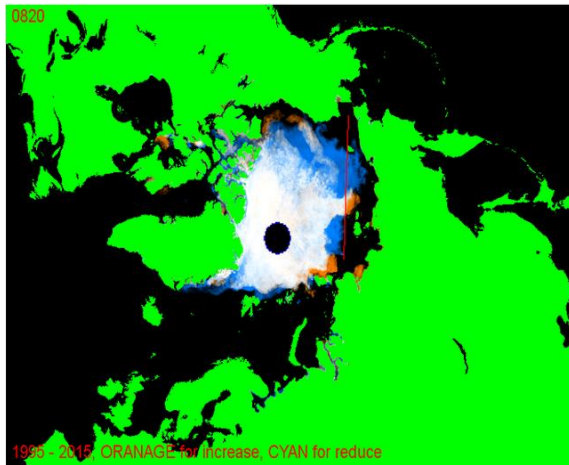


Example: Arctic Sea Ice Data

Courtesy : RADI-CAS



Transportation Assessment and Information



Year of 2015



Year of 2005



The Priorities Identifying Activities

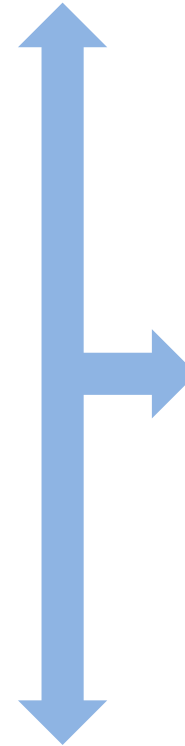


1) Infrastructure

*1) Community Portal
Development – GEO CRI*

*2) Essential Variables for Cold
Regions*

*Information
Service for
Cold Regions*



Earth
Observations

Data and
Infrastructure

Information
Technique

Societal
Impacts

Earth System Science and Policies

Activities Recently on Essential Variables



The 2017 International Workshop on Observations and Understanding of Changes in High Mountain and Cold Regions (HiMAC2017) was held in Beijing, China on 3-4th, March, 2017



Initial discussion ECRVs Work Meeting on 4th, March, 2017

Essential Cold Regions Variables Development



Task Team : Essential Cold Regions Variables Support for Information for Cold Regions

- ❄ Science Driven with **Societal impact and implications**
- ❄ User oriented applications to **support priorities of SBAs**
- ❄ **Compatible** to the existing EVs and Indicators
- ❄ Connections between the **data and indicators** for policy and evaluation purposes
- ❄ Relevance for **the Cold Regions and its human activities**
- ❄ Relevance for the **SBAs**: SDGs, Paris Agreement, Sendai Framework
- ❄ Deliverables: **White paper & potential journal articles recently**

GEOCRI Essential Cold Regions Variables Meeting *2018.9@Delft, Netherlands*



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Team Building : Data Scientist /
Earth Science / Poles Scientist /
Relevant GEOSS Projects / Policy
and Decision Makers / Private
Sectors...

Deliverables : Team / Road Map /
Implementation Framework with
the compatible to the existing
efforts / Networking with Policy
or user requirement Community;

A Cold Regions Information Service Approach for Societal Benefits

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10 National Oceanic and Atmospheric Administration (NOAA), USA

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12 Group on Earth Observations (GEO) Secretary, Switzerland

13 Universitat Politècnica de Catalunya-BarcelonaTech, Spain; and IEEE Ad-Hoc Committee on North & South Poles,
IEEE Geoscience and Remote Sensing Society

14 Department of Geography and Environmental Management, University of Waterloo, Canada

15 National Snow and Ice Data Center, University of Colorado, USA

16 Sustaining Arctic Observing Networks (SAON) Secretary, Norway

Data Value Chain
Approach

HiMAC2018

The 2nd international Workshop on Observations and
Understanding of Changes in High Mountain and Cold Regions



“What and how Earth Observations benefits
to the Societal Benefit Areas for HiMAC”

29-30, Oct @ Sodankylä, Finland



Thank You

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