

Advances and Challenges in Development of a Permafrost Observing System



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Global Terrestrial Network-Permafrost (GTN-P): Thermal State of Permafrost (TSP)

~ 850 stations

TSP Countries

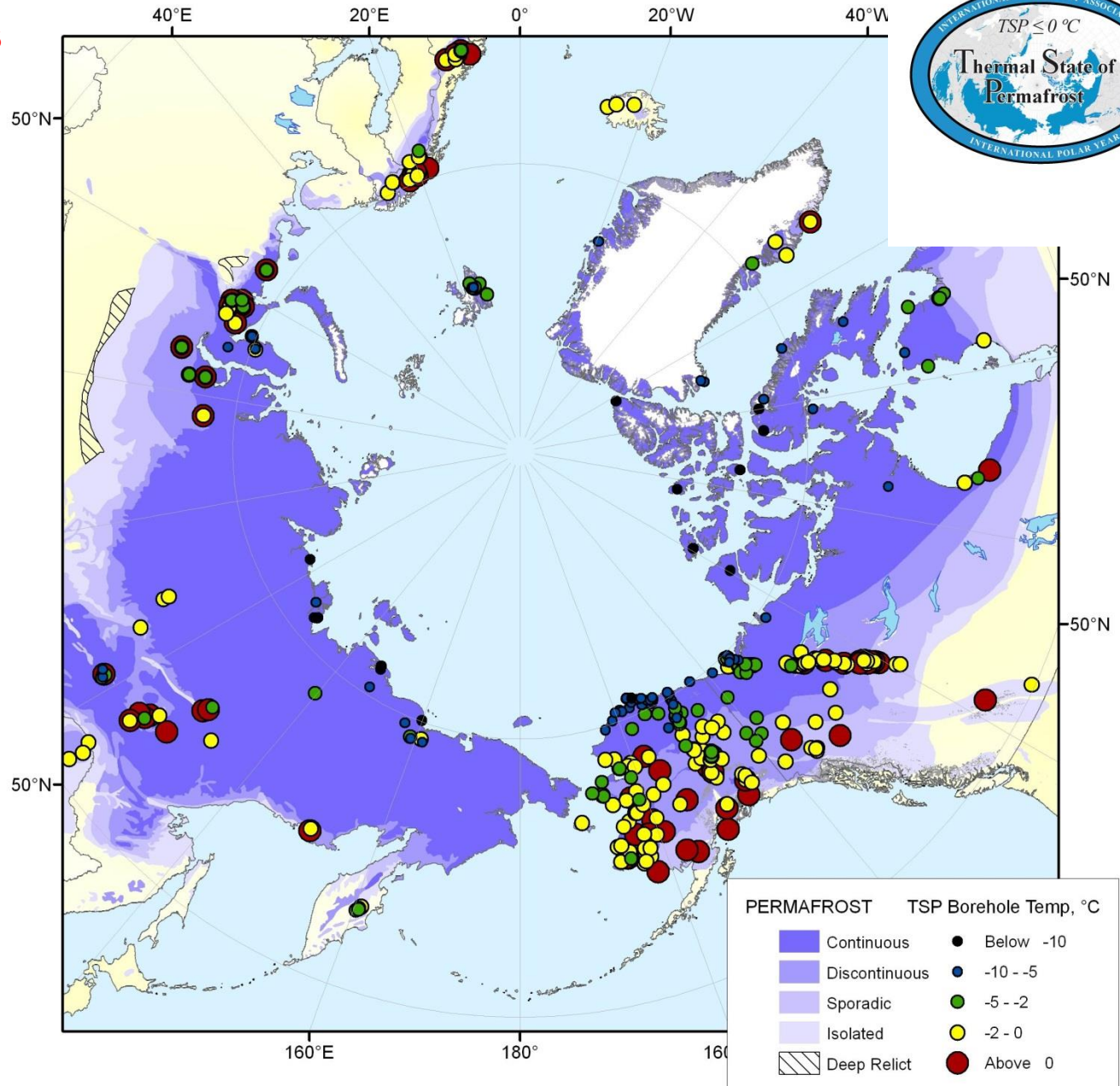
- Canada
- China
- Denmark (Greenland)
- Germany (Russia)
- Iceland
- Italy
- Kazakhstan
- Mongolia
- Norway (NORPERM)
- Poland
- Russia
- Sweden
- Switzerland (PERMOS)
- USA

~ 760 stations

Southern Hemisphere

- Italy
- New Zealand
- Portugal-Spain
- Russia

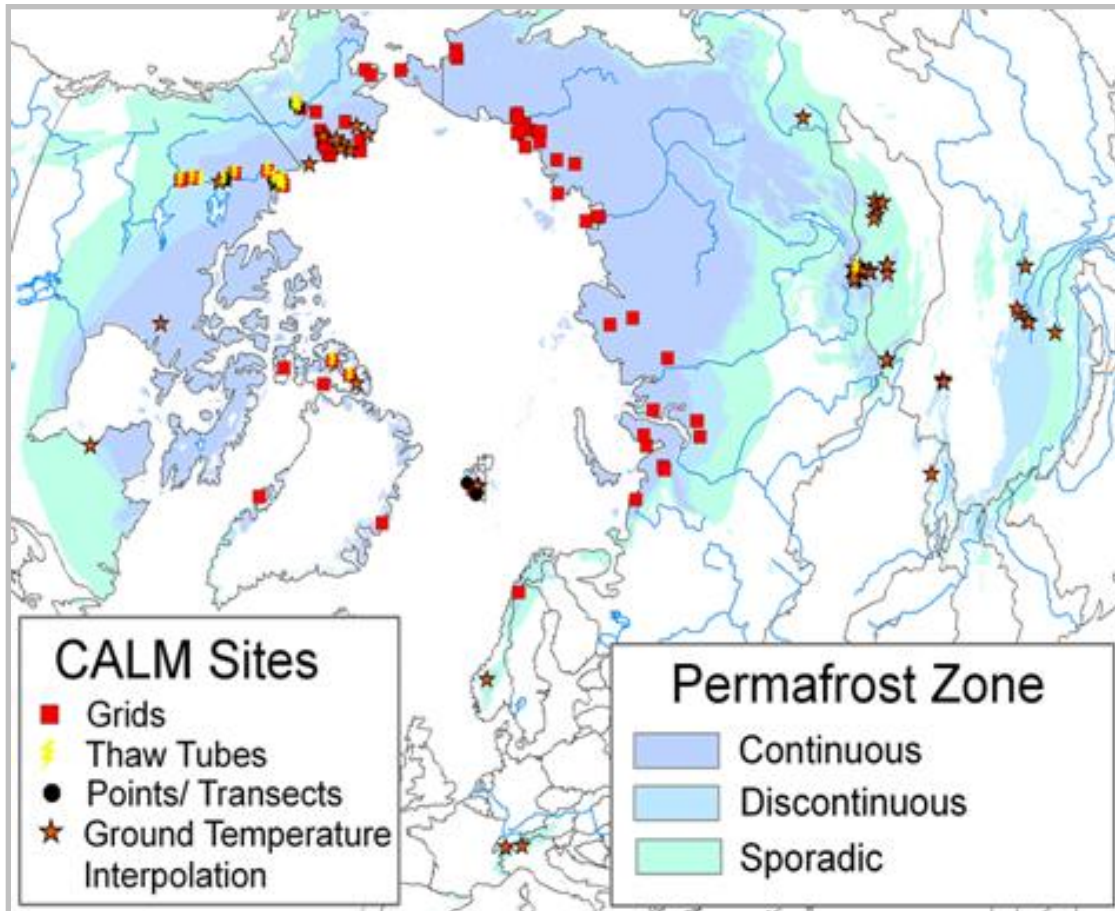
USA ~ 90 stations



CALM Network

The CALM network incorporates 220 sites in Arctic, sub-Arctic, Antarctic, and mountainous regions.

About 70% of the sites are located in Arctic and Subarctic lowlands underlain by continuous permafrost.



Discontinuous and mountainous permafrost areas contain respectively 20% and 10% of sites.

The distribution of sites is not uniform, a circumstance attributable to historical circumstances and logistical constraints.

GTN-P Workshop Nov 2011 (Potsdam)



Focus: Definition of user requirements and development of standardized permafrost measurement methods

- New GTN-P management structure
- Strategy and Implementation plan
- **The PAGE21 DMS is the opportunity to create a standardized GTN-P database**

International
Permafrost
Association



**Global Terrestrial Network
on Permafrost (GTN-P)**

STRATEGY AND IMPLEMENTATION PLAN
2011-2016



Policy Implications of Warming Permafrost

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5. Policy Recommendations

5.1. Commission a Special Report on Permafrost Emissions

Commission a Special Report on Permafrost Emissions: The Intergovernmental Panel on Climate Change (IPCC) may consider preparing a special assessment report on how CO₂ and methane emissions from thawing permafrost would influence global climate to support climate change policy discussions and treaty negotiations. All climate projections in the IPCC Fifth Assessment Report, due for release in 2013-14, are likely to be biased on the low side relative to global temperature because the models did not include the permafrost carbon feedback. Consequently, targets for anthropogenic greenhouse gas emissions based on these climate projections would be biased high. The treaty in negotiation sets a global target warming of 2°C above pre-industrial temperatures by 2100. If anthropogenic greenhouse gas emissions targets do not account for CO₂ and methane emissions from thawing permafrost, the world may overshoot this target.

5.2. Create National Permafrost Monitoring Networks

Create National Permafrost Monitoring Networks: To adequately monitor permafrost globally, individual countries may consider taking over operation of TSP and CALM sites within their borders, increasing funding, standardizing the measurements and expanding coverage. This applies to all countries with permafrost, but particularly to countries with the most permafrost: Russia, Canada, China and the United States. The IPA should continue to coordinate development and the national networks should remain part of the GTNP.

5.3. Plan for Adaptation

Plan for Adaptation: Nations with substantial presence of permafrost may consider developing plans evaluating the potential risks, damage and costs of permafrost degradation to critical infrastructure. This applies to all countries with permafrost, but particularly to Russia, Canada, China and the United States. Most nations with permafrost currently do not have such plans, which will help policy-makers, national planners and scientists quantify costs and risks associated with permafrost degradation.

5. Policy Recommendations

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Global Terrestrial Network on Permafrost (GTN-P)

STRATEGY AND IMPLEMENTATION PLAN 2012-2016

Strategy and Implementation Plan for the Global Terrestrial Network on Permafrost (GTN-P) presented by the International Permafrost Association (IPA) to the Global Climate Observing System (GCOS) and the Global Terrestrial Observing System (GTOS).

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GTOS



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WMO



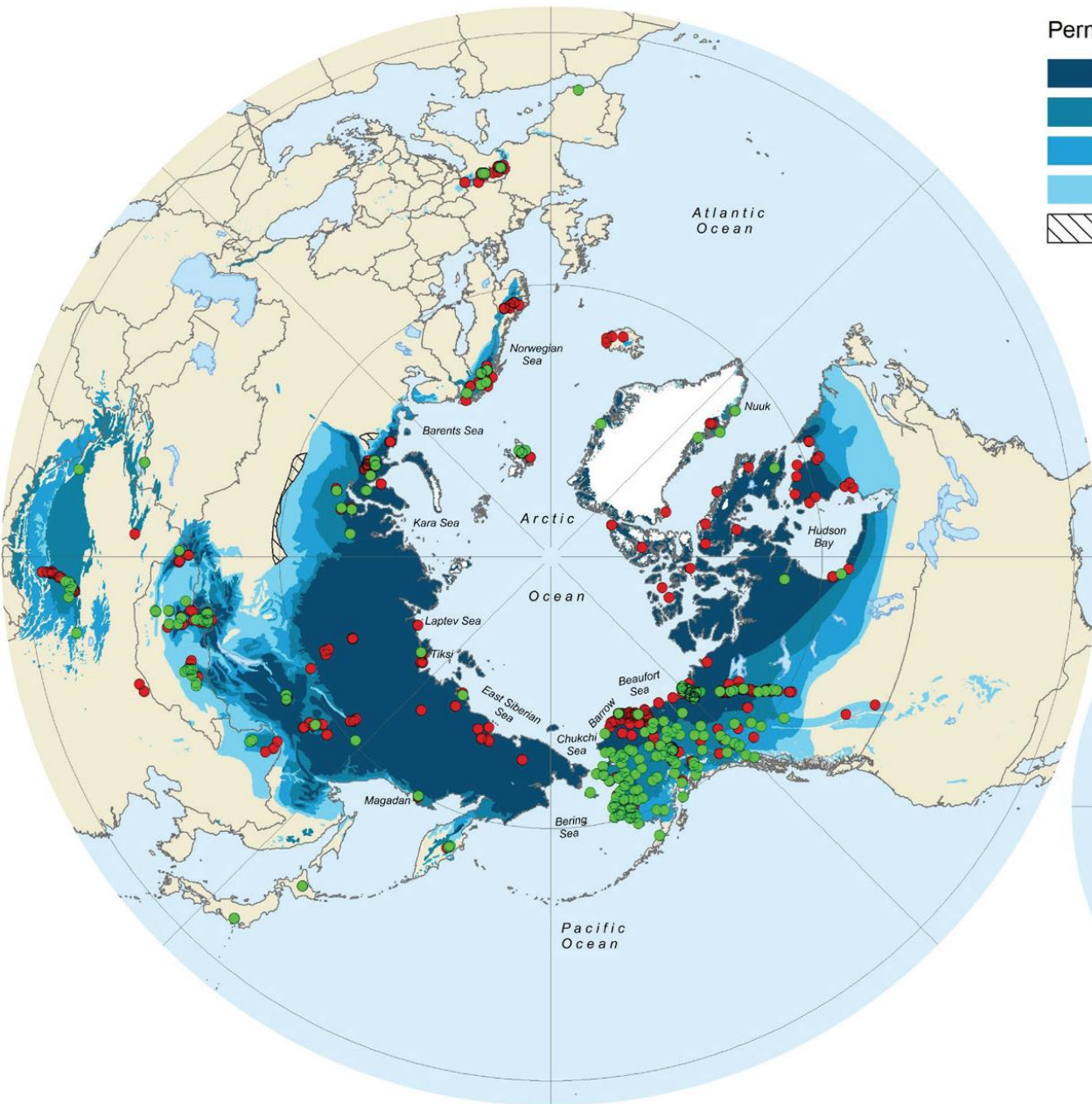
United Nations Educational, Scientific and
Cultural Organization
Intergovernmental Oceanographic
Commission
UNESCO/IOC



United Nations Environment Programme
UNEP



International Council for Science
ICSU

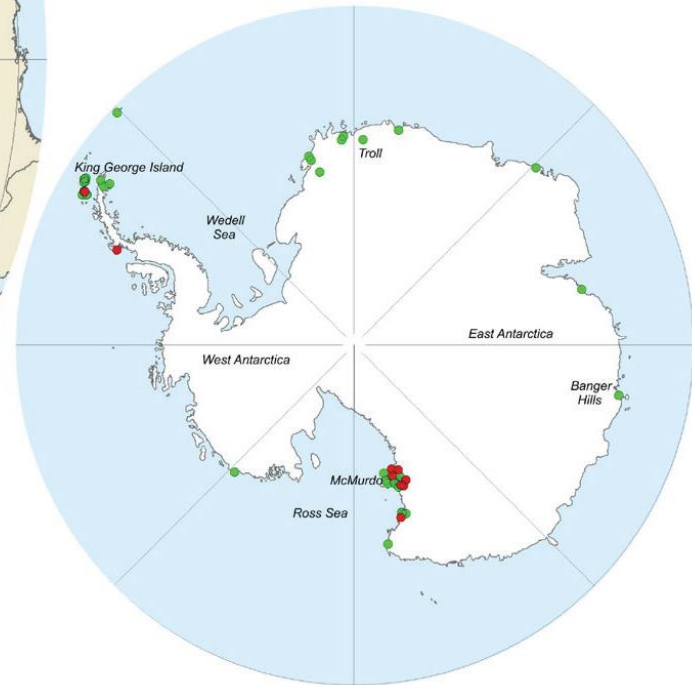


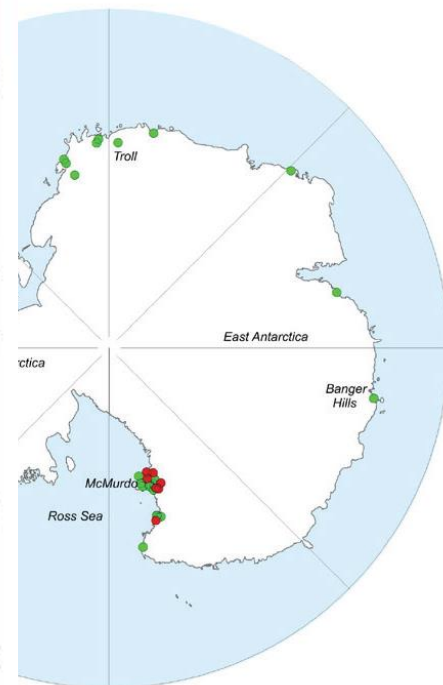
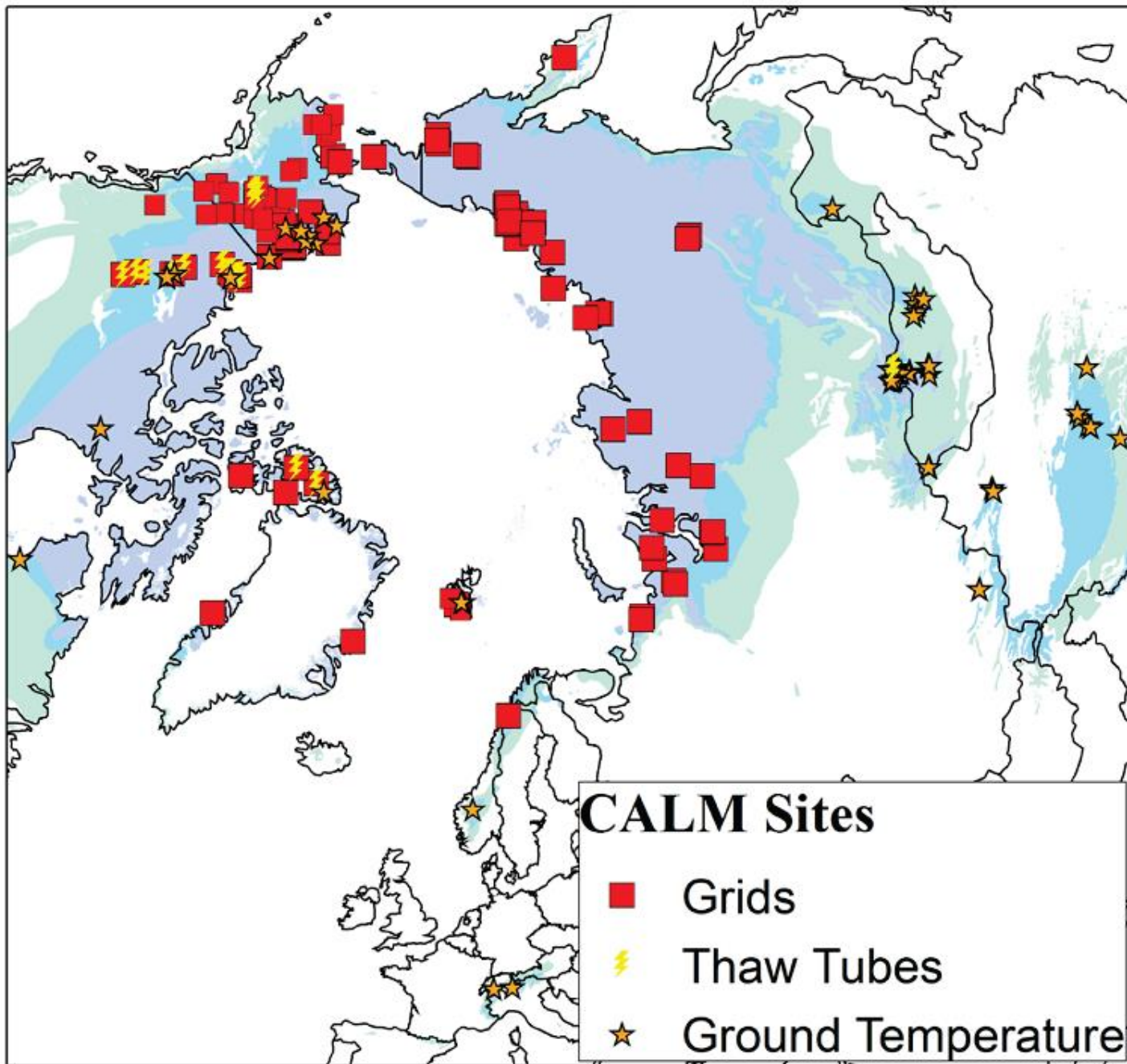
Permafrost Distribution

- Continuous
- Discontinuous
- Sporadic
- Isolated
- Deep Relict

TSP Borehole

- Deep (>10 m)
- Shallow (<10 m)

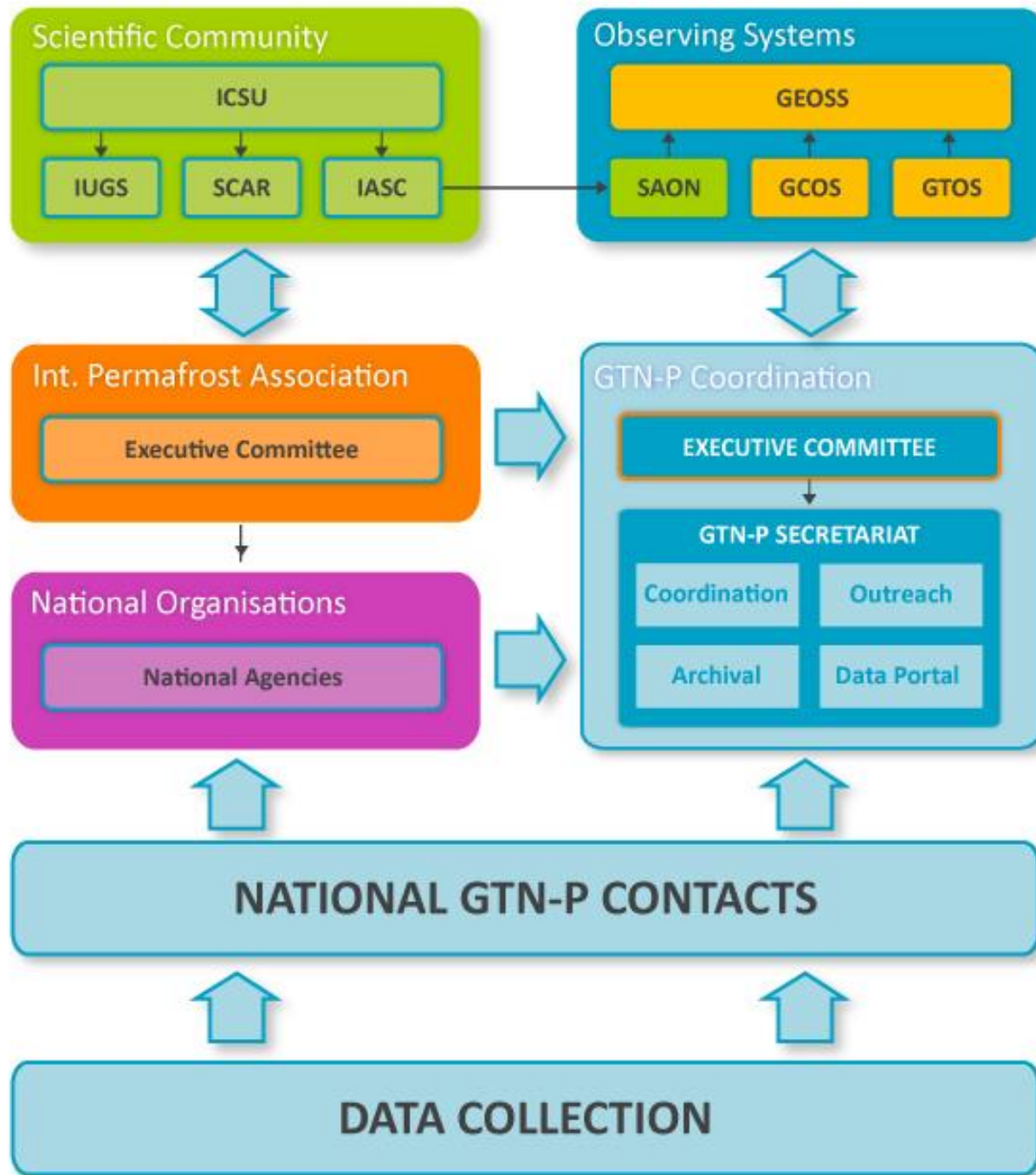


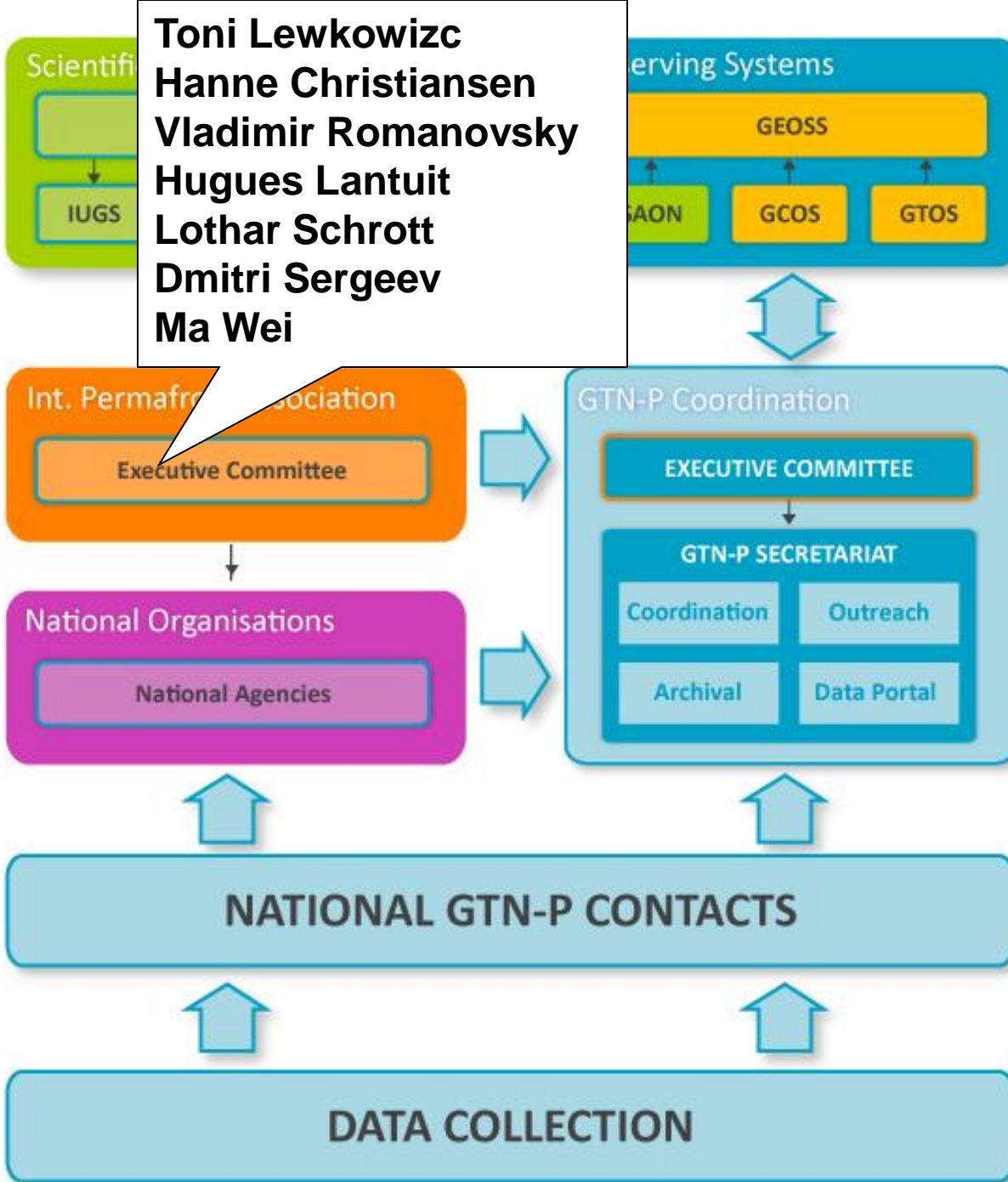


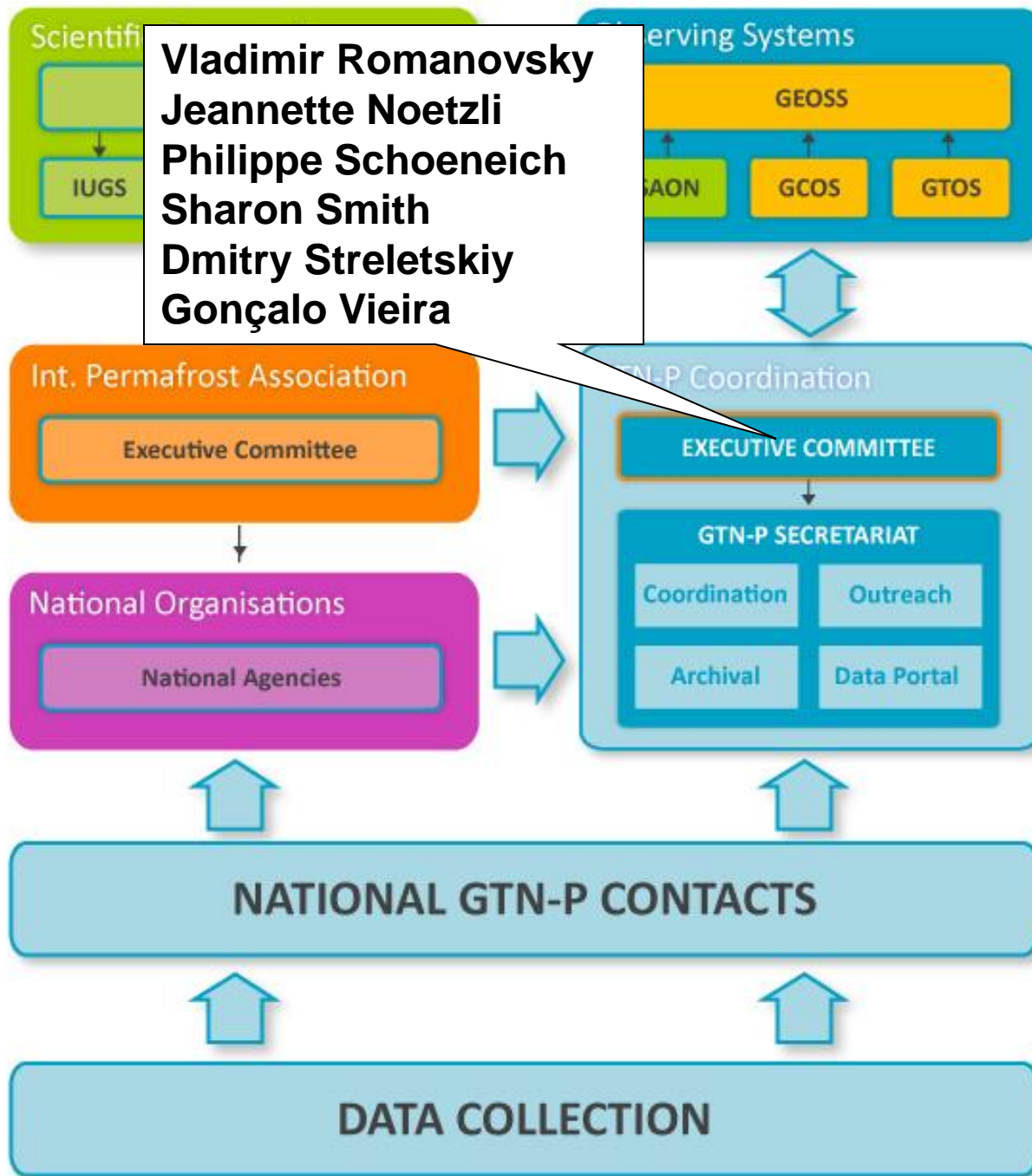
The Purpose

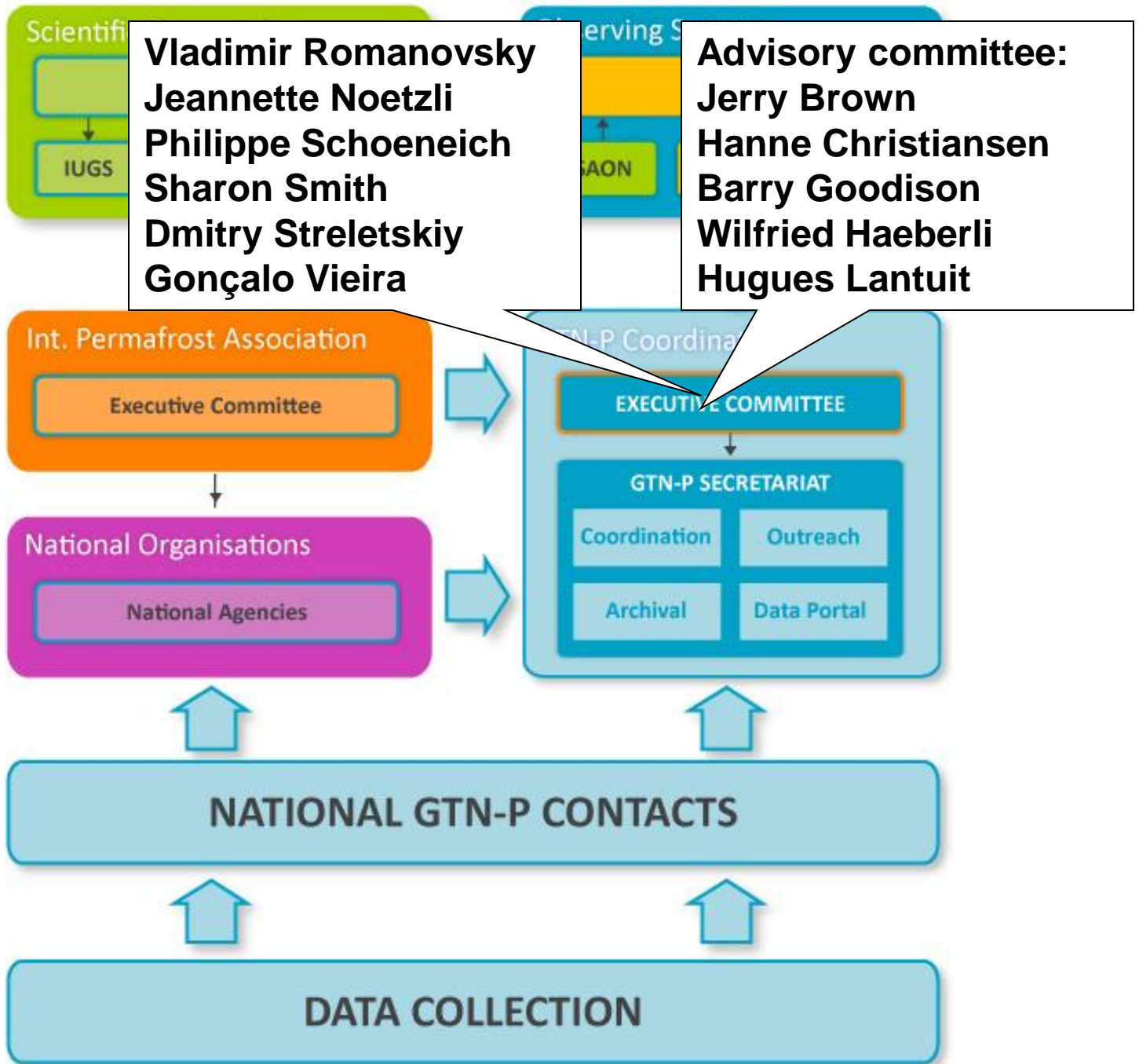
The main purpose of the GTN-P is to operate a strong monitoring network, in order to **provide consistent long-term data series** of selected permafrost parameters and to assess their state and changes based on actual field measurements over time. The data generated from the GTN-P can then be utilized to **develop and validate models**, to produce **regional maps** of current permafrost conditions, and also to predict **future permafrost extent**

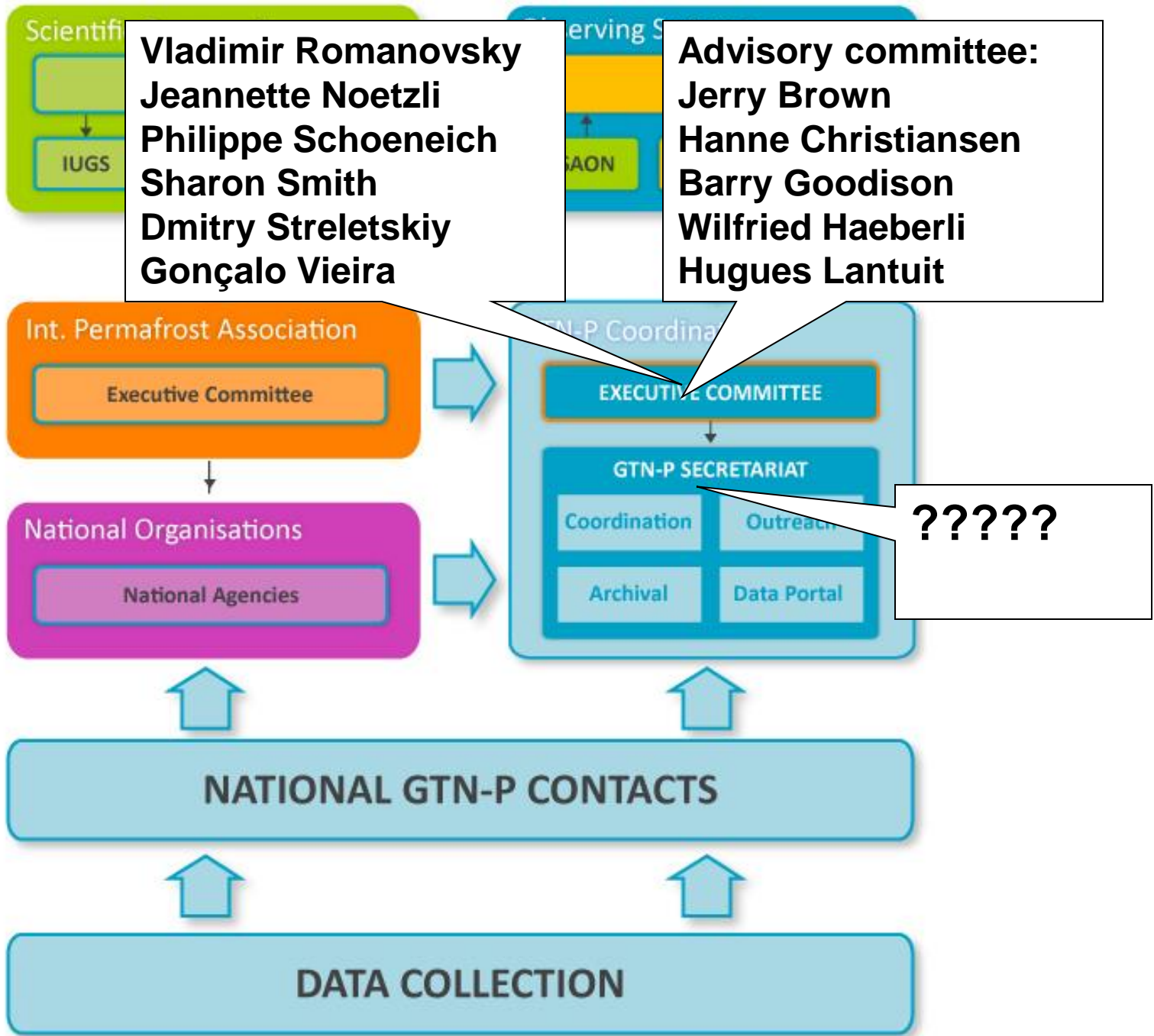
GTN-P products are also meant to provide **answers to socio-economical issues** directly relevant to the **populations living in permafrost areas and beyond**, through the provision of key information for **land management decisions** including those related to resource development and development of strategies to **adapt to climate change** in permafrost areas

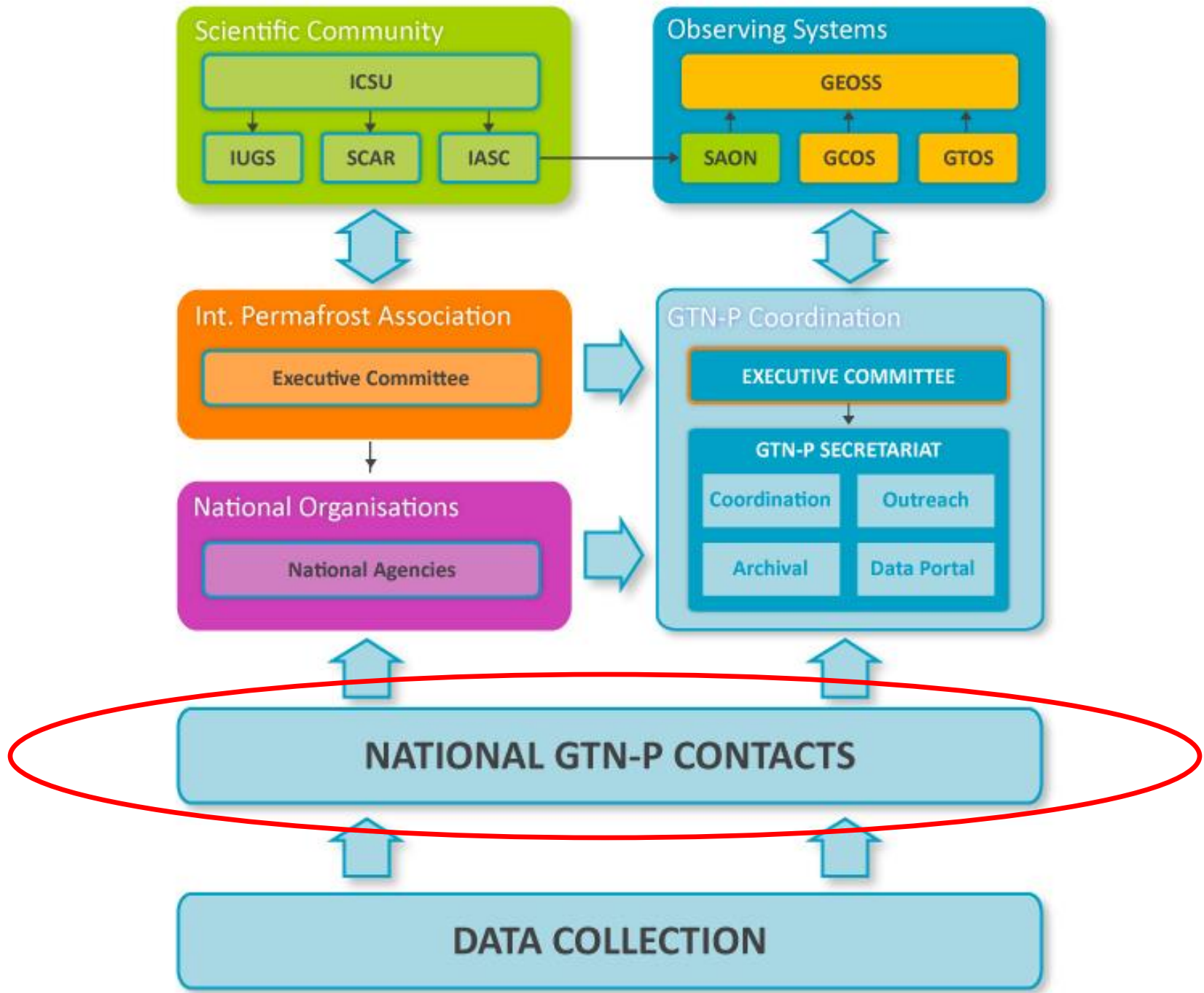












The new organization of GTN-P shall clearly articulate and define **the bottom-up approach** associated with data reporting, through the involvement of **National Correspondents**. When possible, these National Correspondents should be tightly associated with the ones of major observing systems and UN agencies (e.g. WMO). The national correspondents should form the backbone of the reporting process, and **be closely associated with the decision-making** at the GTN-P coordination level

National Correspondents

- **National Correspondents shall foster the implementation of the GTN-P strategy in their country.** This may include the building and improving structure of a national network, as well as the coordination of monitoring activity and data submission in the country
- **National Correspondents shall be responsible for stimulating and coordinating the collection of data and reporting by the individual investigators** to the Data Management or the GTN-P Secretariat office to be fed into the GTN-P information system. National Correspondents can take added responsibility and directly report the data in their country. Their major responsibility, however, will be mainly directed to providing data updates at least once a year
- **National Correspondents shall maintain close contacts with relevant institutions and funding agencies in their country and the IPA national Adhering Bodies.** These contacts will enable the emergence of an operational framework for the collection and reporting of permafrost data in the country and help in reaching out to the whole community of permafrost researchers in the country



**National Correspondents Workshop on GTN-P
Implementation and Data Policy**

May, 6-8, 2013

**World Meteorological Organization
Headquarters
Geneva, Switzerland**

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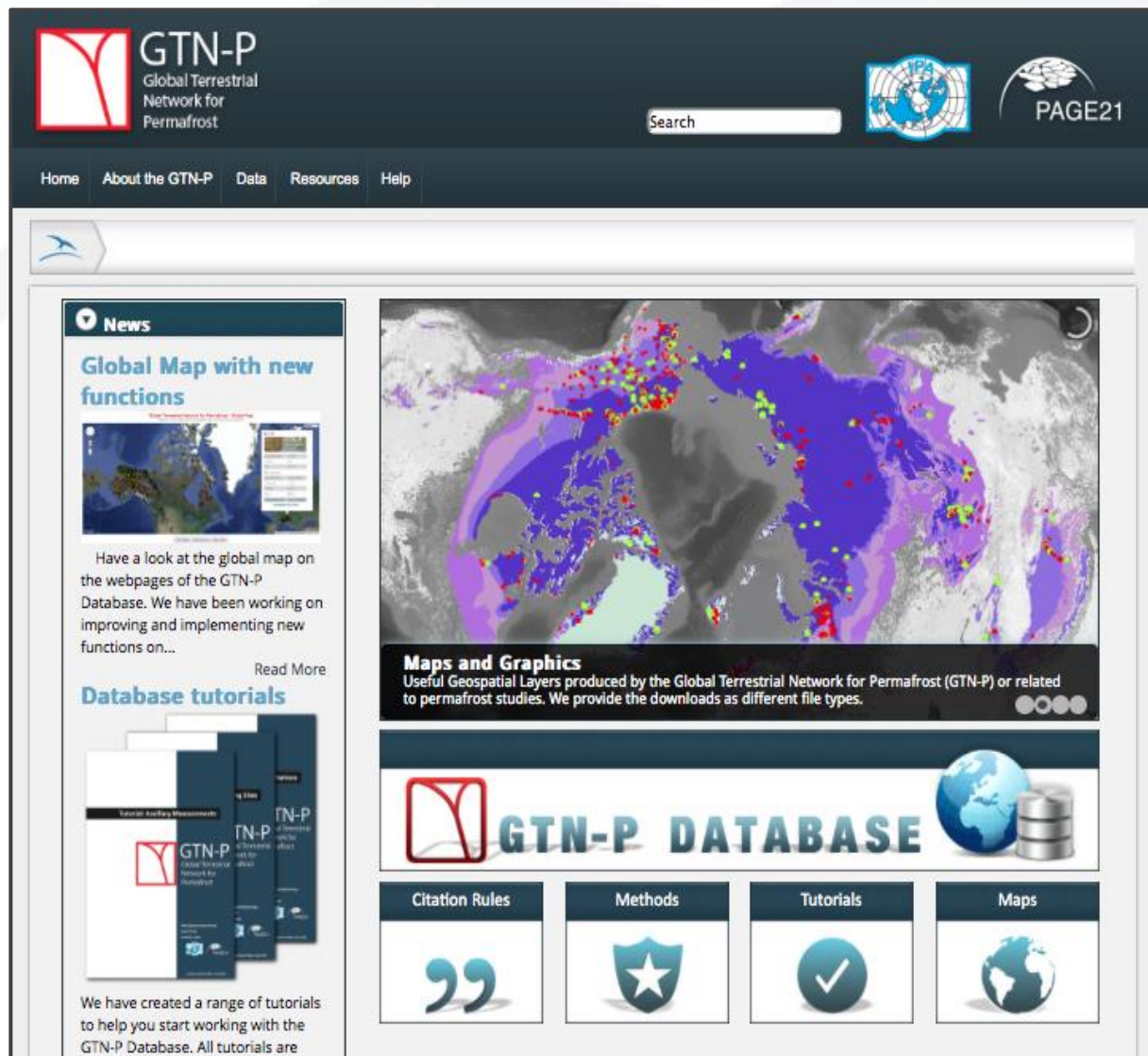
The first meeting of the National Correspondents of GTN-P:

Twenty two countries nominated 32 National Correspondents

18 countries sent their National Correspondents to this meeting

Data Management

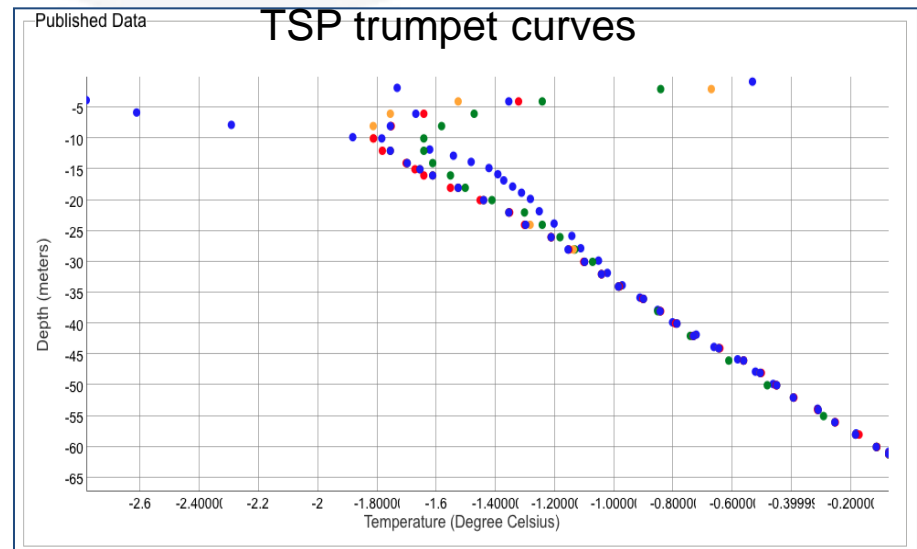
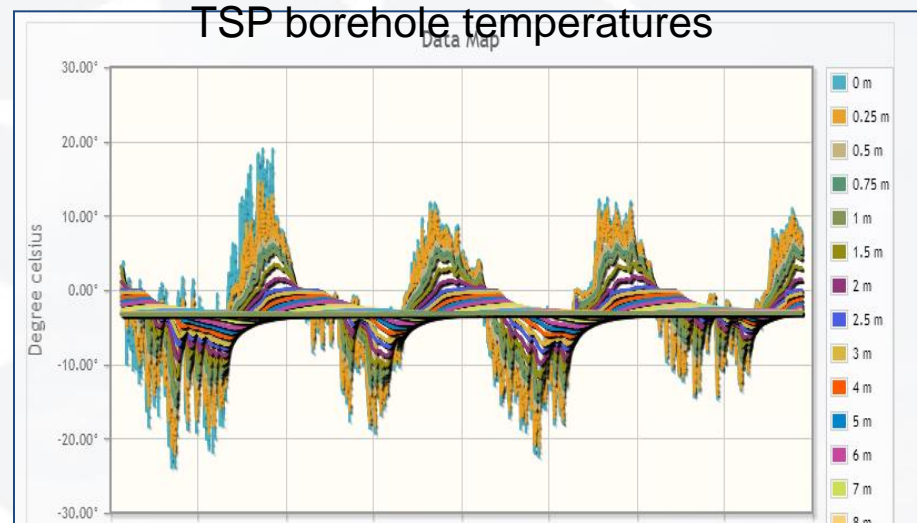
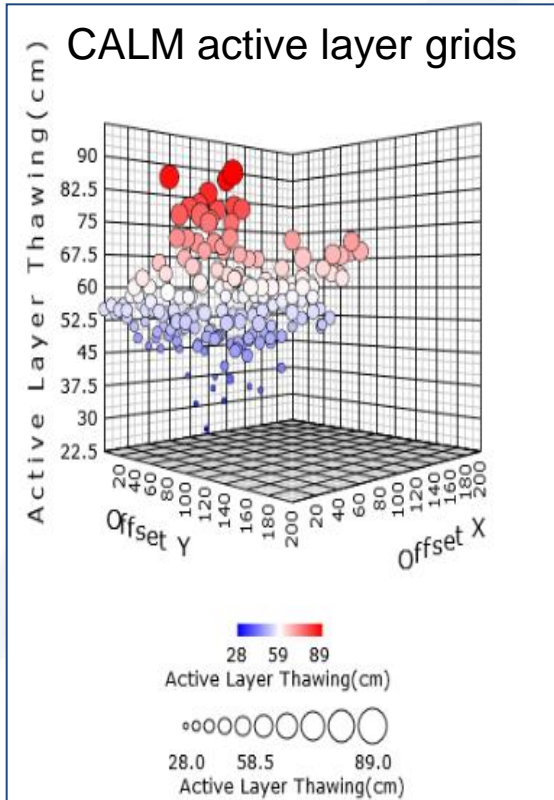
- **The data management framework of GTN-P shall be established as a permanent GTN-P Data and Information System and shall be coordinated by the GTN-P Secretariat**
- **Datasets included in GTN-P will be archived centrally in a master database to be constructed in 2012**
- The first step in the implementation of the **data submission** process will be the creation of an online form to submit annual data updates. This form should be as intuitive and easy to use as possible



The screenshot shows the GTN-P website interface. At the top, there is a dark navigation bar with the GTN-P logo, the text "Global Terrestrial Network for Permafrost", a search bar, and icons for a globe and "PAGE21". Below the navigation bar are menu items: Home, About the GTN-P, Data, Resources, and Help. The main content area features a "News" section with a headline "Global Map with new functions" and a sub-headline "Have a look at the global map on the webpages of the GTN-P Database. We have been working on improving and implementing new functions on...". Below this is a "Database tutorials" section with a "Read More" link and an image of tutorial booklets. To the right is a large map of the Arctic region with various colored overlays and data points. Below the map is a "Maps and Graphics" section with a description: "Useful Geospatial Layers produced by the Global Terrestrial Network for Permafrost (GTN-P) or related to permafrost studies. We provide the downloads as different file types." At the bottom of the page is a "GTN-P DATABASE" banner with icons for "Citation Rules", "Methods", "Tutorials", and "Maps".

<http://gtnpdatabase.org> or GTN-P website at <http://gtnp.org>

Automated visualisation

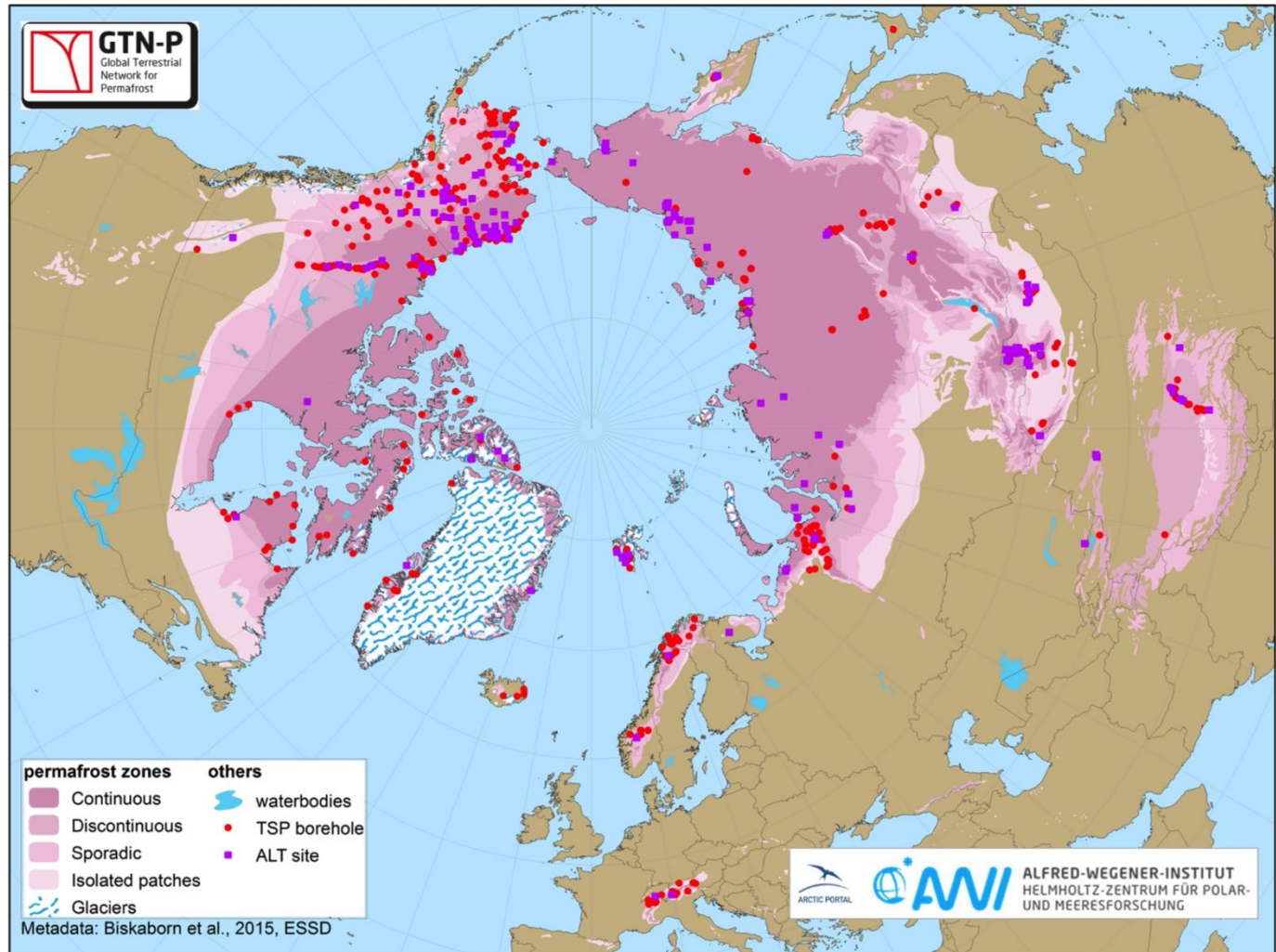


Metadata following international standards

Global Terrestrial Network for Permafrost

1118 boreholes
243 active layer sites

Supporters



www.gtntp.org

Data Management System for transferring **permafrost temperature** and **active layer thickness** to **global models**

GTN-P Governance



Database launch publication

Earth Syst. Sci. Data, 7, 245–259, 2015
www.earth-syst-sci-data.net/7/245/2015/
doi:10.5194/essd-7-245-2015
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Earth System
Science
Data

The new database of the Global Terrestrial Network for Permafrost (GTN-P)

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GTN-P

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GTN-P National Correspondents

36 Representatives of 25 countries with permafrost,
responsible for coordinating and sustaining national data upload

... good news!

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NATURE | SEVEN DAYS

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The week in science: 11–17 September 2015

Permafrost tracked Drug smugglers

Permafrost tracked The first international database of standardized permafrost data was launched this week by the Global Terrestrial Network for Permafrost (GTN-P), an international consortium that aims to establish an early-warning system for permafrost thawing, for use by scientists and policymakers. The European Union-funded database gathers frozen-soil temperatures and annual thaw depths. Permafrost has a key role in climate-change modelling, because when it thaws it can release the greenhouse gases carbon dioxide and methane.

www.gtnp.org