

# Academic Data Contributions for Biodiversity, Land & Seascapes, Socio-Economics and the Atmosphere: 1,000 or so public Polar Data Sets after IPY

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E W H A L E

LABORATORY FOR  
Ecological  
Wildlife  
Habitat  
Data  
Analysis  
for the  
Land- and Seascape

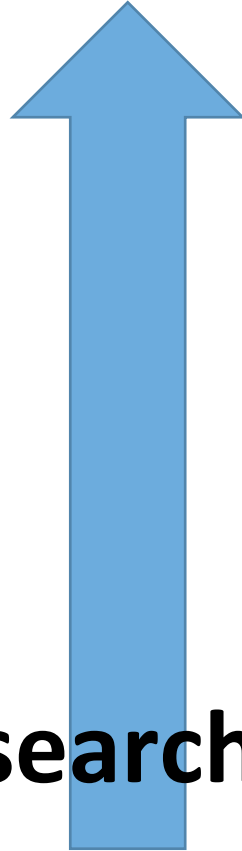


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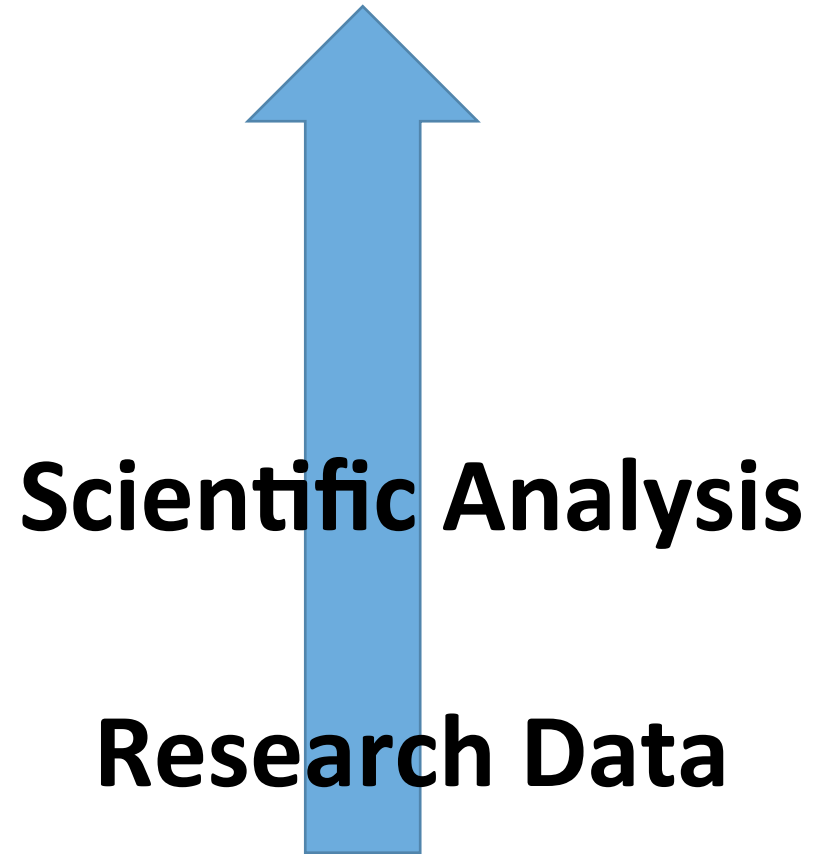


# Academic Data Contributions: A schema !



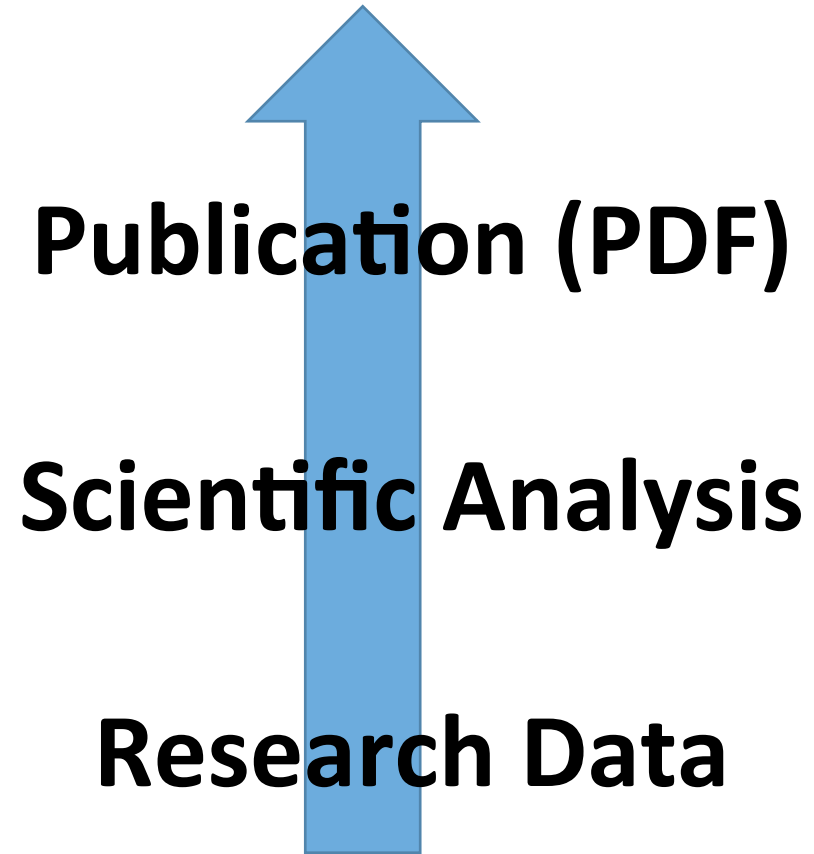
**Research Data**

# Academic Data Contributions: A schema !

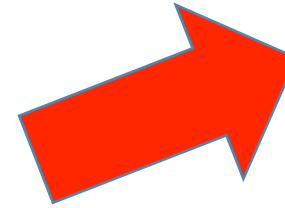
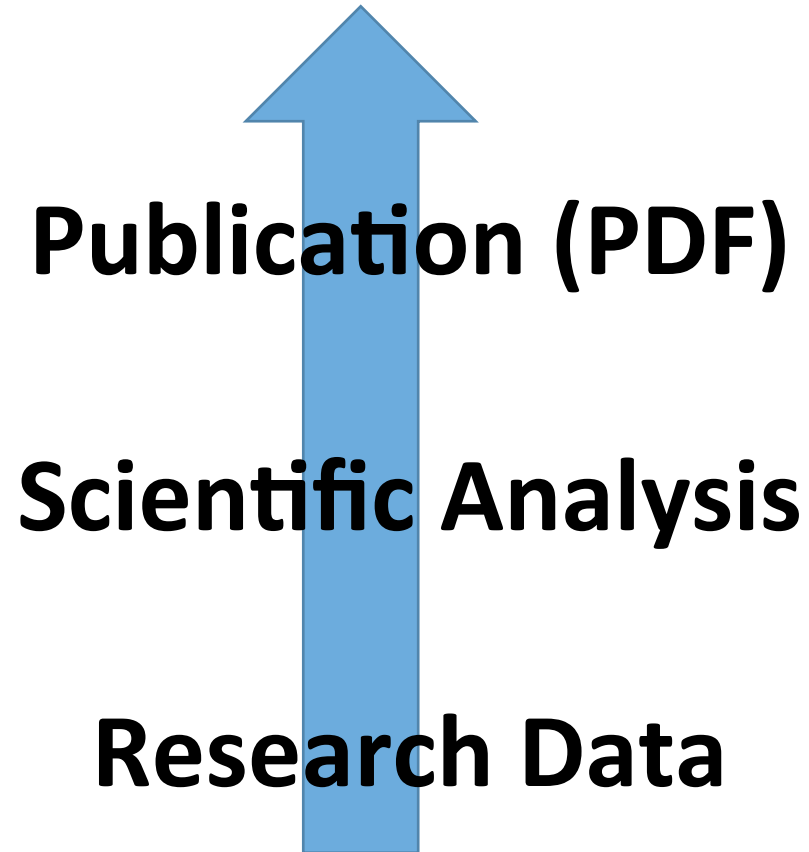




# Academic Data Contributions: A schema !

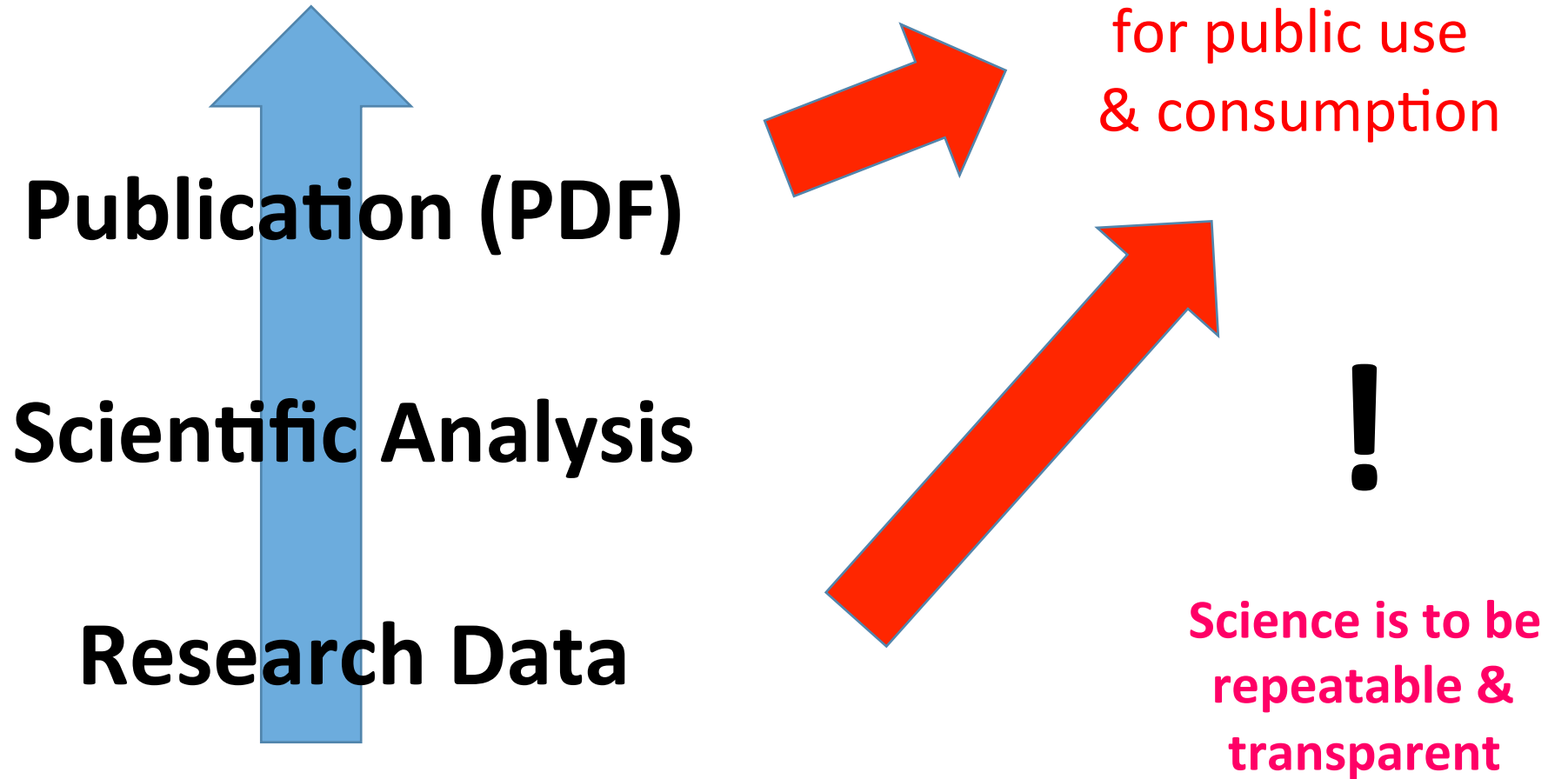


# Academic Data Contributions: A schema !



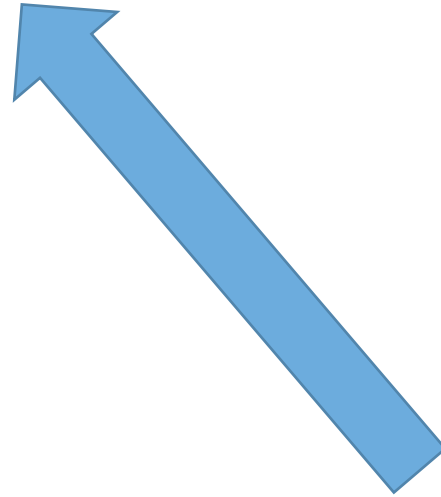
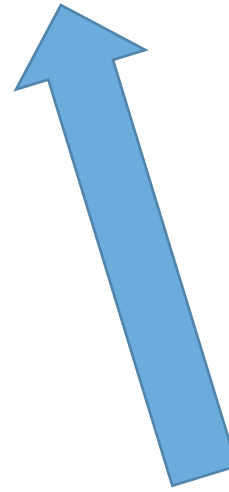
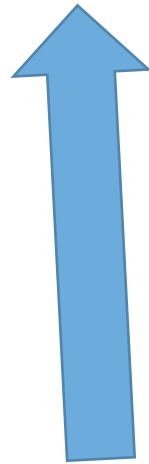
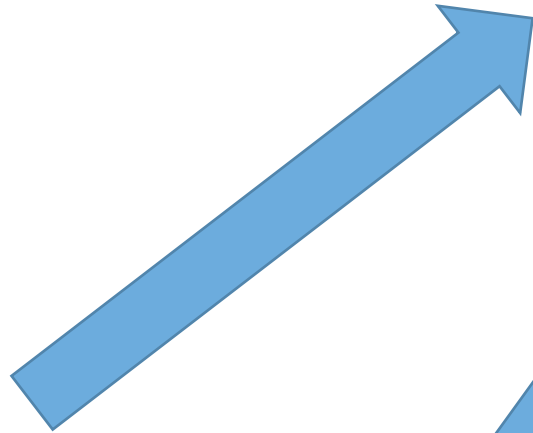
Open Access  
for public use  
& consumption

# Academic Data Contributions: A schema !



**The wider public good ?! (as per mandate)**

**DATA**



Industry

Government

Academia

NGO

Others, e.g. Citizens

**Public Funds**

# Legalities and Best Professional Practices ?!

FOIA

NSF Cyberinfrastructure

NIH

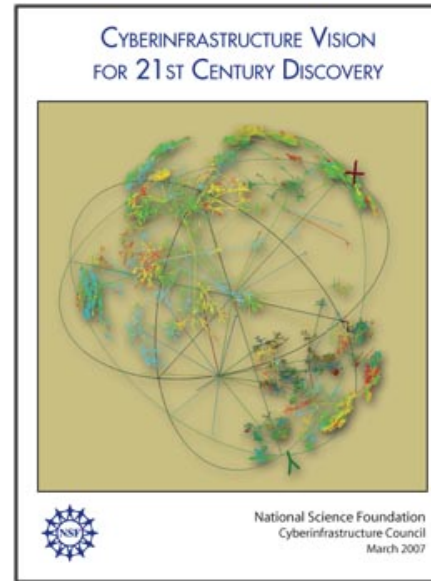
IPY

ICSU Open Access

CODATA Policy

Budapest Declaration

Berlin Declaration ...



# Legalities and Best Professional Practices ?!

FOIA

NSF Cyberinfrastructure

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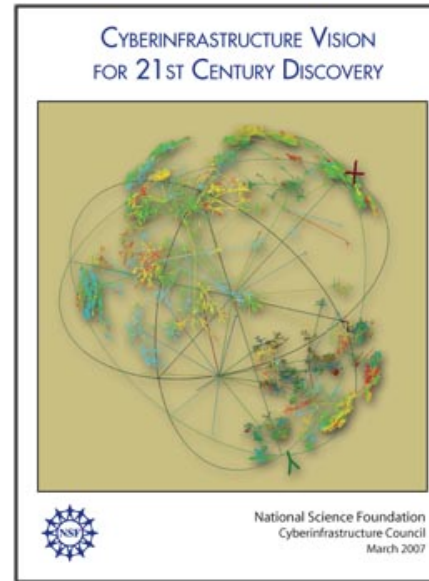
IPY

ICSU Open Access

CODATA Policy

Budapest Declaration

Berlin Declaration ...



**But see  
Carlson (2010, 2013)**



# Some polar data examples from Academia: Antarctica and ~Antarctic Treaty System (ATS)

## THE BIOGEOGRAPHIC ATLAS OF THE SOUTHERN OCEAN

**Scope**  
Biogeographic information is of fundamental importance for discovering marine biodiversity hotspots, detecting and understanding impacts of environmental changes, predicting future distributions, monitoring biodiversity, or supporting conservation and sustainable management strategies. The recent extensive exploration and assessment of biodiversity by the Census of Antarctic Marine Life (CAML), and the intense compilation and validation efforts of Southern Ocean biogeographic data by the SCAR Marine Biodiversity Information Network (SCAR-MarBIN / OBIS) provided a unique opportunity to assess and synthesise the current knowledge on Southern Ocean biogeography. The scope of the Biogeographic Atlas of the Southern Ocean is to present a concise synopsis of the present state of knowledge of the distributional patterns of the major benthic and pelagic taxa and of the key communities, in the light of both and abiotic factors operating within an evolutionary framework. Each chapter has been written by the most pertinent experts in their fields, relying on vastly improved occurrence datasets from recent decades, as well as on new insights provided by molecular and phylogeographic approaches, and new methods of analysis, visualisation, modelling and prediction of biogeographic distributions. A dynamic online version of the Biogeographic Atlas will be hosted on [www.biodiversity.aq](http://www.biodiversity.aq).

**The Census of Antarctic Marine Life (CAML)**  
CAML ([www.camli.aq](http://www.camli.aq)) was a 5-year project that aimed at assessing the nature, distribution and abundance of all living organisms of the Southern Ocean. In the time of environmental change, CAML provided a comprehensive baseline information on the Antarctic marine biodiversity as a sound benchmark against which future change can reliably be assessed. CAML was initiated in 2005 as the regional Antarctic project of the worldwide programme Census of Marine Life (2000-2010) and was the most important biology project of the International Polar Year 2007-2009.

**The SCAR Marine Biodiversity Information Network (SCAR-MarBIN)**  
In close connection with CAML, SCAR-MarBIN ([www.seamrbin.be](http://www.seamrbin.be), integrated into [www.biodiversity.aq](http://www.biodiversity.aq)) compiled and managed the historic, current and new information (i.e. generated by CAML) on Antarctic marine biodiversity by establishing and supporting a distributed system of interoperable databases, forming the Antarctic regional node of the Ocean Biogeographic Information System (OBIS, [www.obis.org](http://www.obis.org)), under the aegis of SCAR (Scientific Committee on Antarctic Research, [www.scar.org](http://www.scar.org)). SCAR-MarBIN established a comprehensive register of Antarctic marine species and, with [biodiversity.aq](http://biodiversity.aq) provided free access to more than 2.8 million Antarctic georeferenced biodiversity data, which allowed more than 60 million downloads.

**The Editorial Team**

<p><b>Claude DE BROYER</b> is a marine biologist at the Royal Belgian Institute of Natural Sciences in Brussels. His research interests cover structural and functional biodiversity and biogeography and cover the poles and deep sea benthic ecology. Active promoter of CAML and ANDEEP, he is the initiator of the SCAR Marine Biodiversity Information Network (SCAR-MarBIN). He took part to 13 polar expeditions.</p> <p><b>Huw GRIFFITHS</b> is a marine Biogeographer at the British Antarctic Survey. He created and manages SCOMBASE, the Southern Ocean Species Database. His interests include large-scale biogeographic and ecological patterns in space and time. His focus has been on molluscs, bryozoans, sponges and protozoans as model groups to investigate trends at high southern latitudes.</p> <p><b>Cédric d'UDEKEM d'ACOZ</b> is a research scientist at the Royal Belgian Institute of Natural Sciences, Brussels. His main research interests are systematics of arthropod crustaceans, especially of polar species and taxonomy of Decapod crustaceans. He took part to 2 scientific expeditions to Antarctica on board of the Polarstern and to several sampling campaigns in Norway and Bratnet.</p> <p><b>Bruno DANIS</b> is an Associate Professor at the Université Libre de Bruxelles, where his research focuses on polar biodiversity. Former coordinator of the expedition to the Antarctic continent, he is a leading member of several international commissions, such as the SCAR Expert Group on Antarctic Biodiversity Information. He has published papers in various fields, including oceanology, physiology, biodiversity informatics, polar biodiversity of chironomid science.</p> <p><b>Susie GRANT</b> is a marine biogeographer at the British Antarctic Survey. Her work is focused on the design and implementation of marine protected areas, especially through the use of biogeographic information in systematic conservation planning.</p> <p><b>Christoph HELD</b> is a Senior Research Scientist at the Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, Bremerhaven. He is a specialist in molecular systematics and phylogeography of Antarctic crustaceans, especially isopods.</p> <p><b>Falk HUETTMANN</b> is a 'digital naturalist': he works on three poles (Arctic, Antarctic and French-Guyana Himalaya) and freshwater (marine, terrestrial and atmospheric). He is based with the university of Assiut (Assiut, UAF) and focuses primarily on effective conservation questions engaging predictions and open access data.</p>	<p><b>Philippe KOUUBI</b> is professor at the University Pierre et Marie Curie (Paris, France) and a specialist in Antarctic fish ecology and biogeography. He is the Principal Investigator of projects supported by IREP, the French Polar Institute. As a French representative to the CCAMLR Scientific Committee, his main input is on the proposal of Marine Protected Areas. His other field of research is on the oceanisation of the high seas.</p> <p><b>Ben RAYMOND</b> is a computational ecologist and exploratory data analyst, working across a variety of Southern Ocean, Antarctic, and wider research projects. His areas of interest include ecosystem modelling, registration and marine protected area selection, risk assessment, animal tracking, seabird ecology, complex systems, and remote sensed data analysis.</p> <p><b>Anton VAN DE PUTTE</b> works at the Royal Belgian Institute for Natural Sciences (Brussels, Belgium). He is an expert in the ecology and evolution of Antarctic fish and is currently the Science Officer for the Antarctic Biodiversity Programme, <a href="http://biodiversity.aq">biodiversity.aq</a>. This portal provides free and open access to Antarctic Marine and Terrestrial biodiversity of the Antarctic and the Southern Ocean.</p> <p><b>Bruno DAVID</b> is CNRS director of research at the laboratory BIOGEOSCIENCES, University of Burgundy. He works focus is evolution of benthic forms, with and more specifically on sea urchins. He published a book and edited an extensive database on Antarctic echinoids. He is currently President of the scientific council of the Museum National d'Histoire Naturelle (Paris) and Deputy Director at the CNRS Institute for Ecology and Environment.</p> <p><b>Julian GUTT</b> is a marine ecologist at the Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, Bremerhaven, and professor at the Oldenburg University, Germany. He participated in 13 scientific expeditions to the Antarctic and was twice chief scientist on board Polarstern. He is member of the SCAR committees ACE and ANT-ERA (as chief officer). Main foci of his work are biodiversity, ecosystem functioning and services, responses of marine systems to climate change, non-invasive technologies, and outreach.</p> <p><b>Graham HOSIE</b> is Principal Research Scientist in zooplankton ecology at the Australian Antarctic Division. He founded the SCAR Southern Ocean Continuous Plankton Recorder Survey and is the Chief Officer of the SCAR Life Sciences Standing Scientific Group. His research interests include the ecology and biogeography of plankton species and communities, notably their response to environmental changes. He has participated in 17 marine science voyages to Antarctica.</p> <p><b>Alexandra POST</b> is a marine geoscientist, with expertise in benthic habitat mapping, geomorphology and geomorphic characterization of the seafloor. She has worked at Geoscience Australia since 2002, with a primary focus on understanding seafloor processes and habitats on the East Antarctic margin. Most recently she has led work to understand the biological environment beneath the Amery Ice Shelf, and to characterise the habitats on the George V Shelf and slope following the successful CAML voyages to that region.</p> <p><b>Yan ROPERT-COUDERT</b> spent 10 years as the Japanese National Institute of Polar Research, where he graduated as a Doctor in Polar Science in 2001. Since 2007, he is a permanent researcher at the CNRS in France and the director of a polar research programme (since 2011) that examines the ecological response of Adélie penguins to environmental changes. He is also the secretary of the Expert Group on Birds and Marine Mammals and of the Life Science Group of the Scientific Committee on Antarctic Research.</p>
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Census of Antarctic Marine Life  
SCAR-Marine Biodiversity Information Network

# BIOGEOGRAPHIC ATLAS OF THE SOUTHERN OCEAN

**EDITED BY:**  
Claude DE BROYER & Philippe KOUUBI (chief editors)

with Huw GRIFFITHS, Ben RAYMOND, Cédric d'UDEKEM d'ACOZ, Anton VAN DE PUTTE, Bruno DANIS, Bruno DAVID, Susie GRANT, Julian GUTT, Christoph HELD, Graham HOSIE, Falk HUETTMANN, Alexandra POST & Yan ROPERT-COUDERT

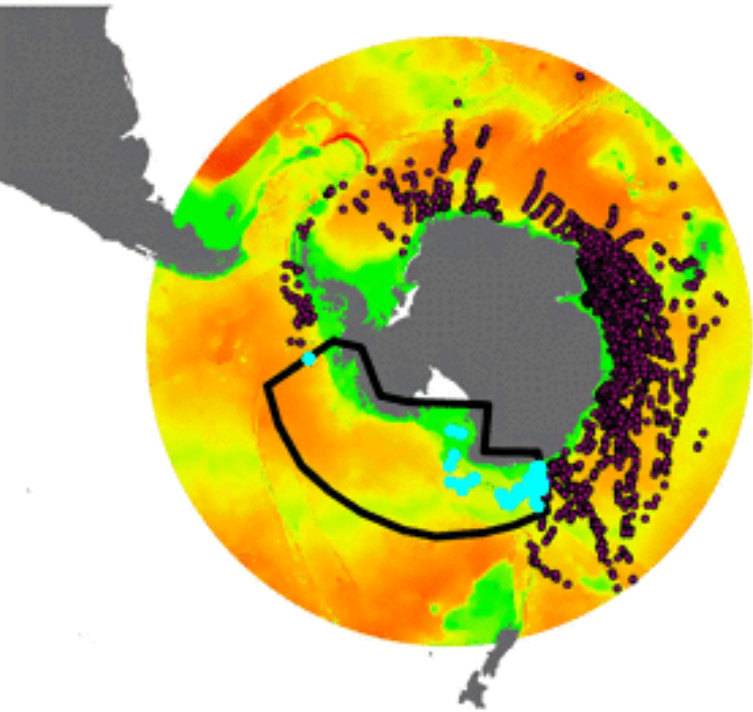
**SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH**

CAML / SCAR-MarBIN

BIOGEOGRAPHIC ATLAS OF THE SOUTHERN OCEAN

# Some polar data examples from Academia

## Antarctica: Ross Sea remote wilderness



Hydrobiologia  
DOI 10.1007/s10750-015-2520-x



BIOLOGY OF THE ROSS SEA

Review Paper

### A first overview of open access digital data for the Ross Sea: complexities, ethics, and management opportunities

Falk Huettmann · Moritz Sebastian Schmid ·  
Grant Richard Woodrow Humphries

Received: 8 January 2015 / Revised: 27 September 2015 / Accepted: 28 September 2015  
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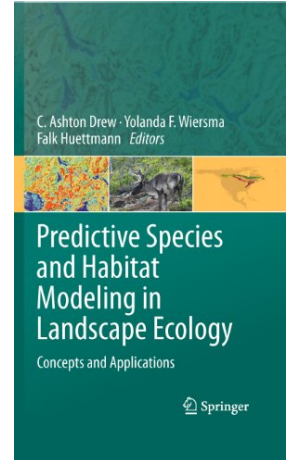
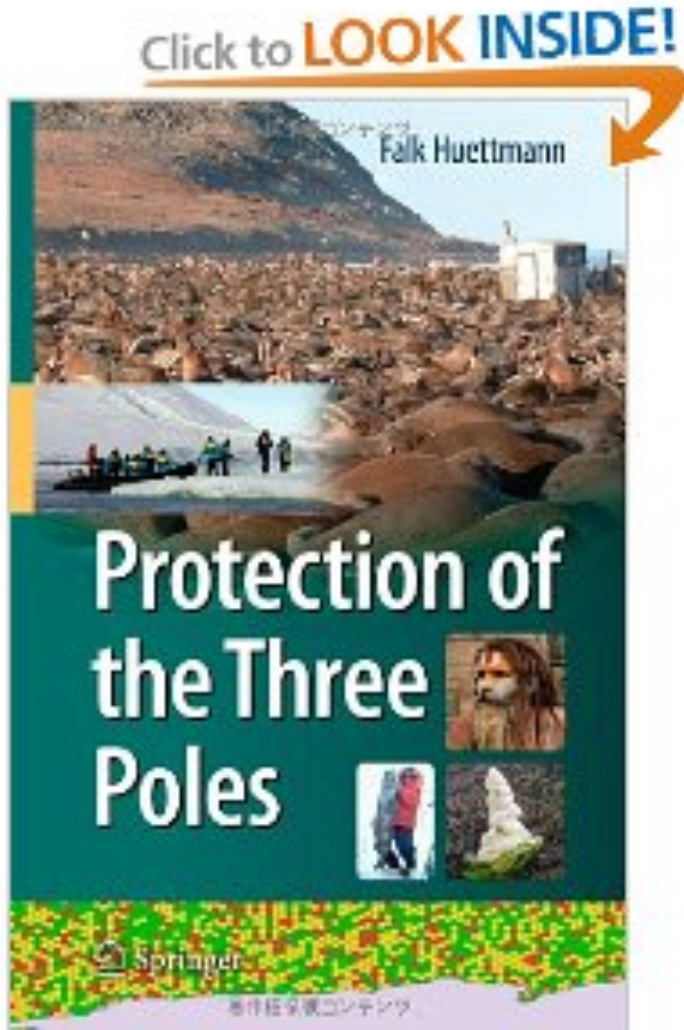
**Abstract** It is now understood that the Ross Sea stands as one of the last relatively pristine (ocean) areas. Many decades of international research have been carried out under the Antarctic Treaty System stipulating that data acquired under this scheme must be shared with the global community. In line with Carlson (Nature 469:293, 2011, Polar Research 10.3402/polar.v32i0.20789, 2013), we find little evidence of enforcement towards making digital geographic information systems (GIS) project data available

possible to find easily >40 digital datasets for most areas and pixels worldwide, despite many decades of research in the Ross Sea, only app. 100 digital datasets can be found for the study area. It simply shows that data from many studies in the region are not available. High-quality population and trend data explicit in space and time are mostly missing in the public realm, e.g., from the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR.org). This presents an ethical dilemma because it still

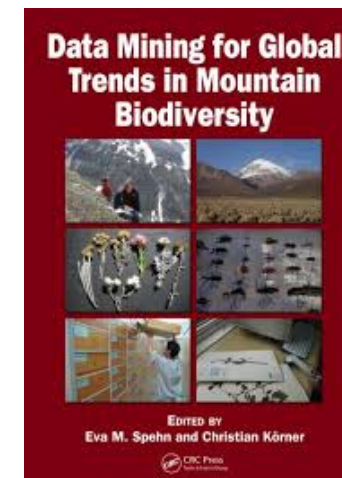
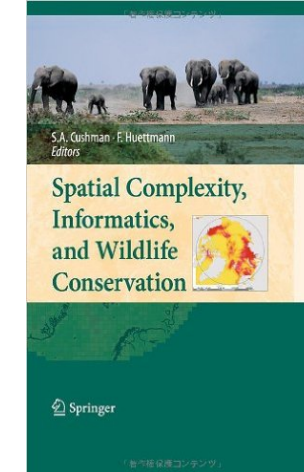


# Some polar data examples from Academia

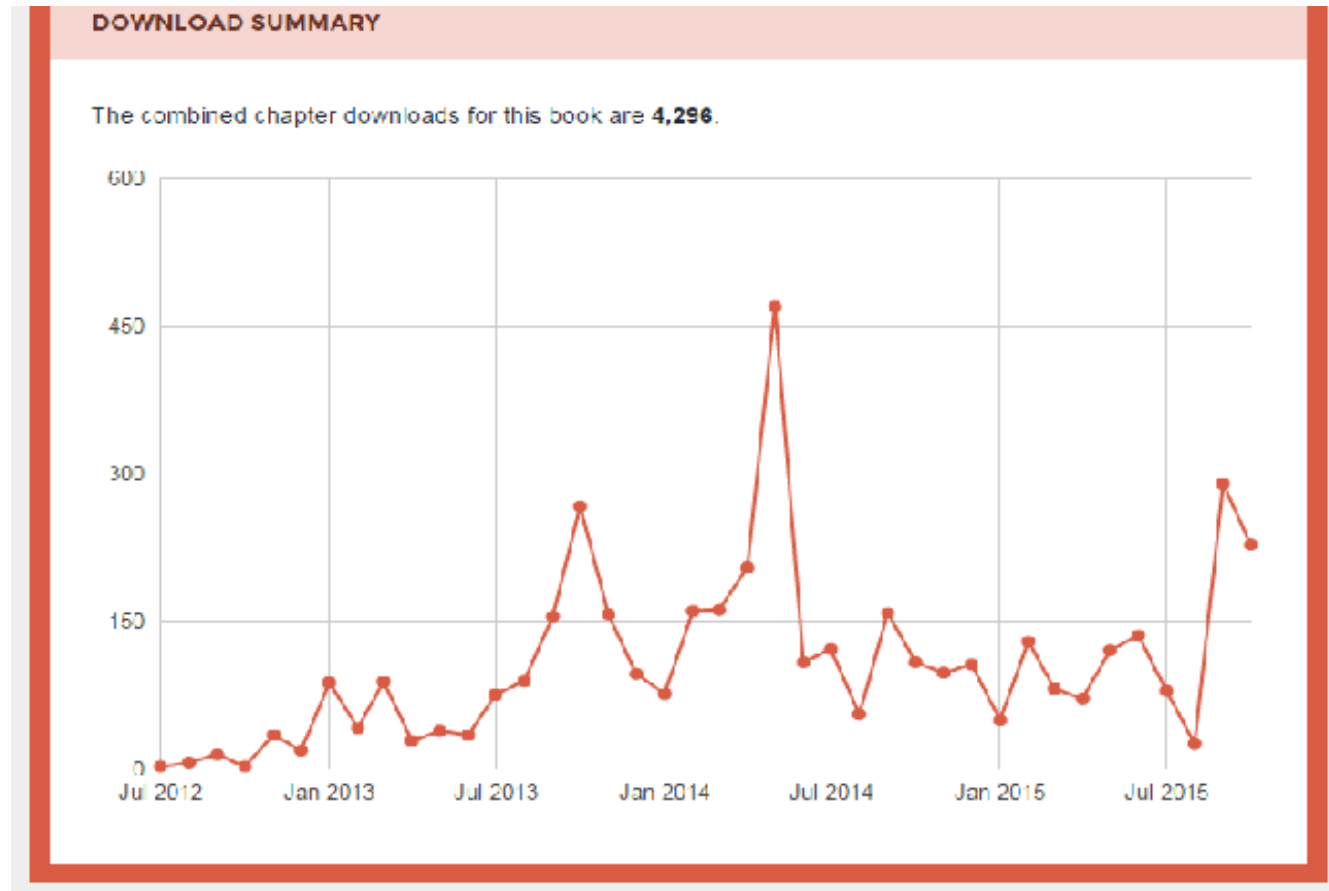
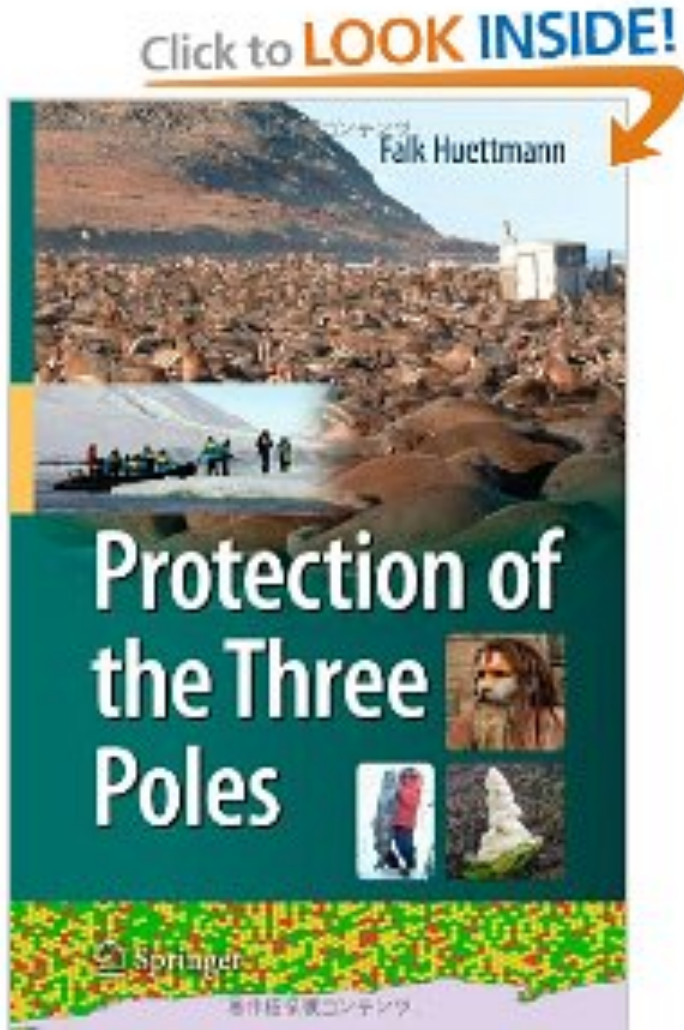
## 3<sup>rd</sup> Pole



### Data Management Citations for Polar & Model Projects



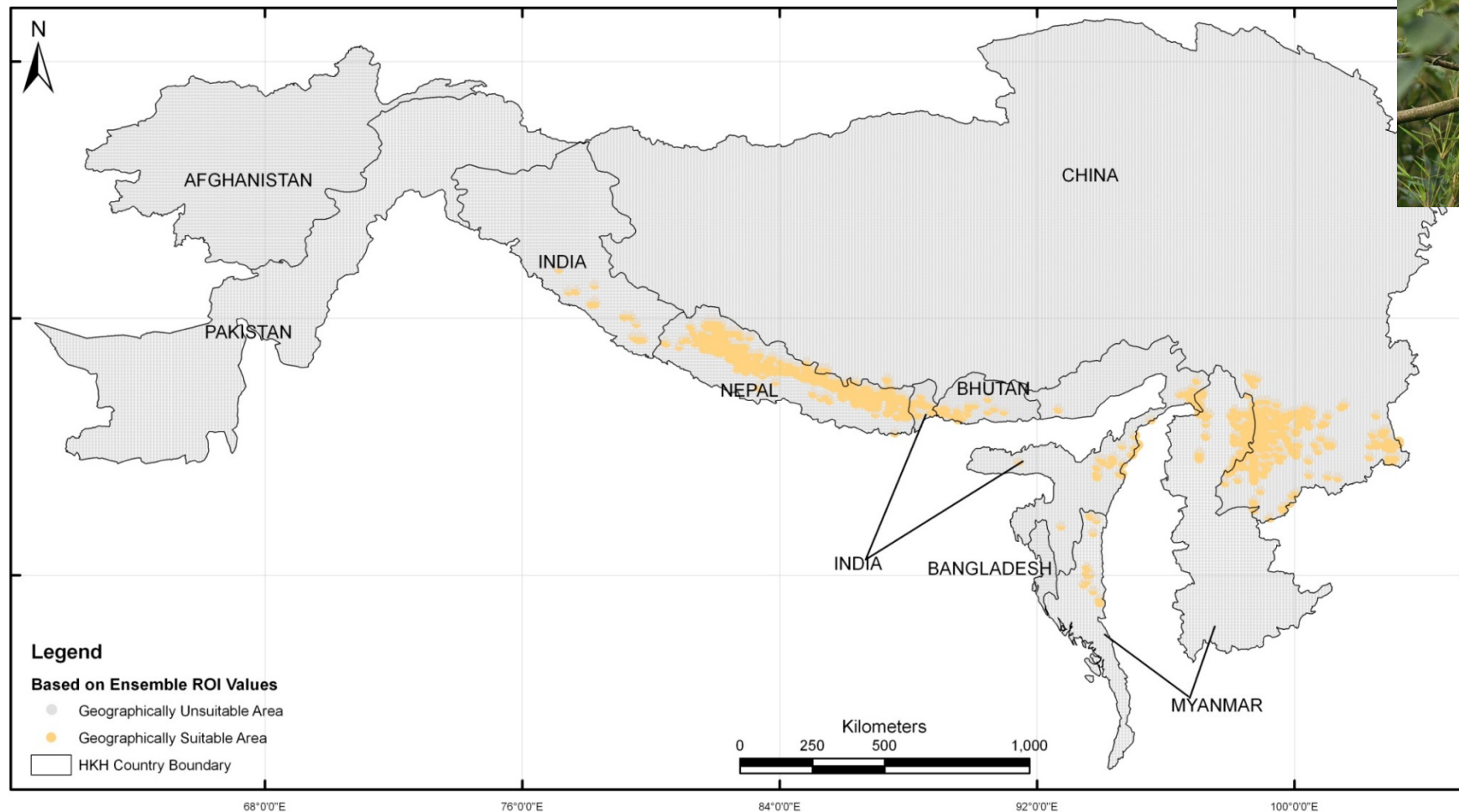
# Some polar data examples from Academia 3<sup>rd</sup> Pole



# Some polar data examples from Academia

## Hindu Kush-Himalaya (HKH)

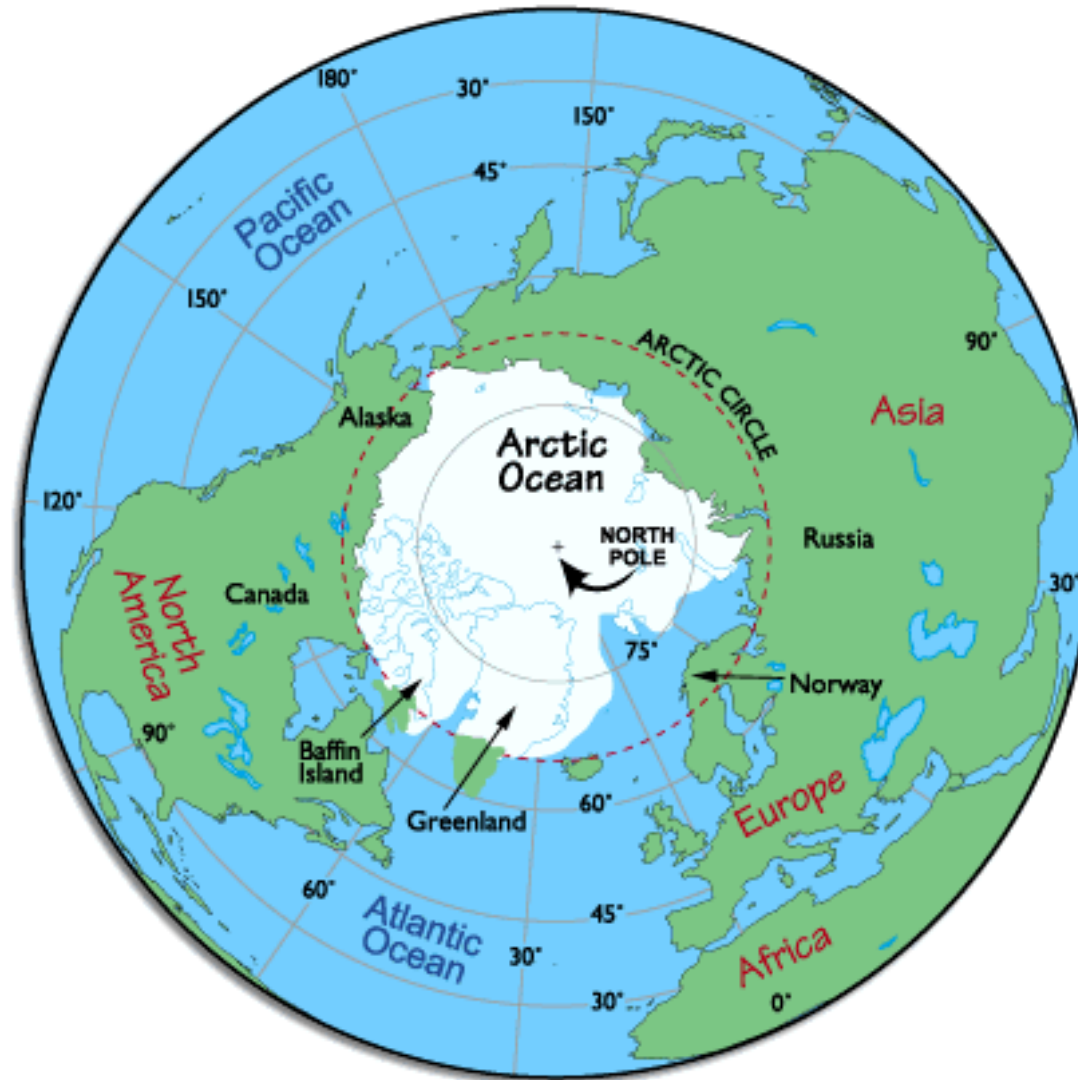
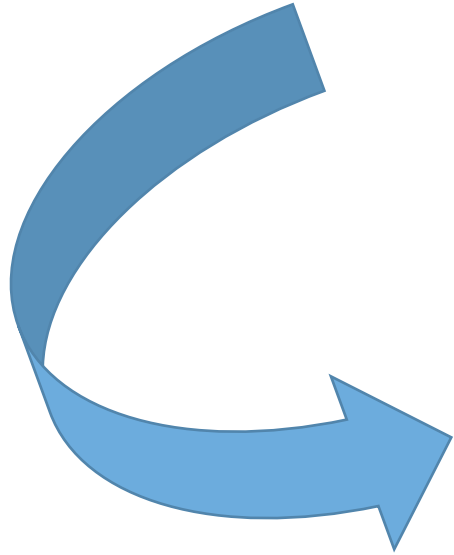
### Red Panda





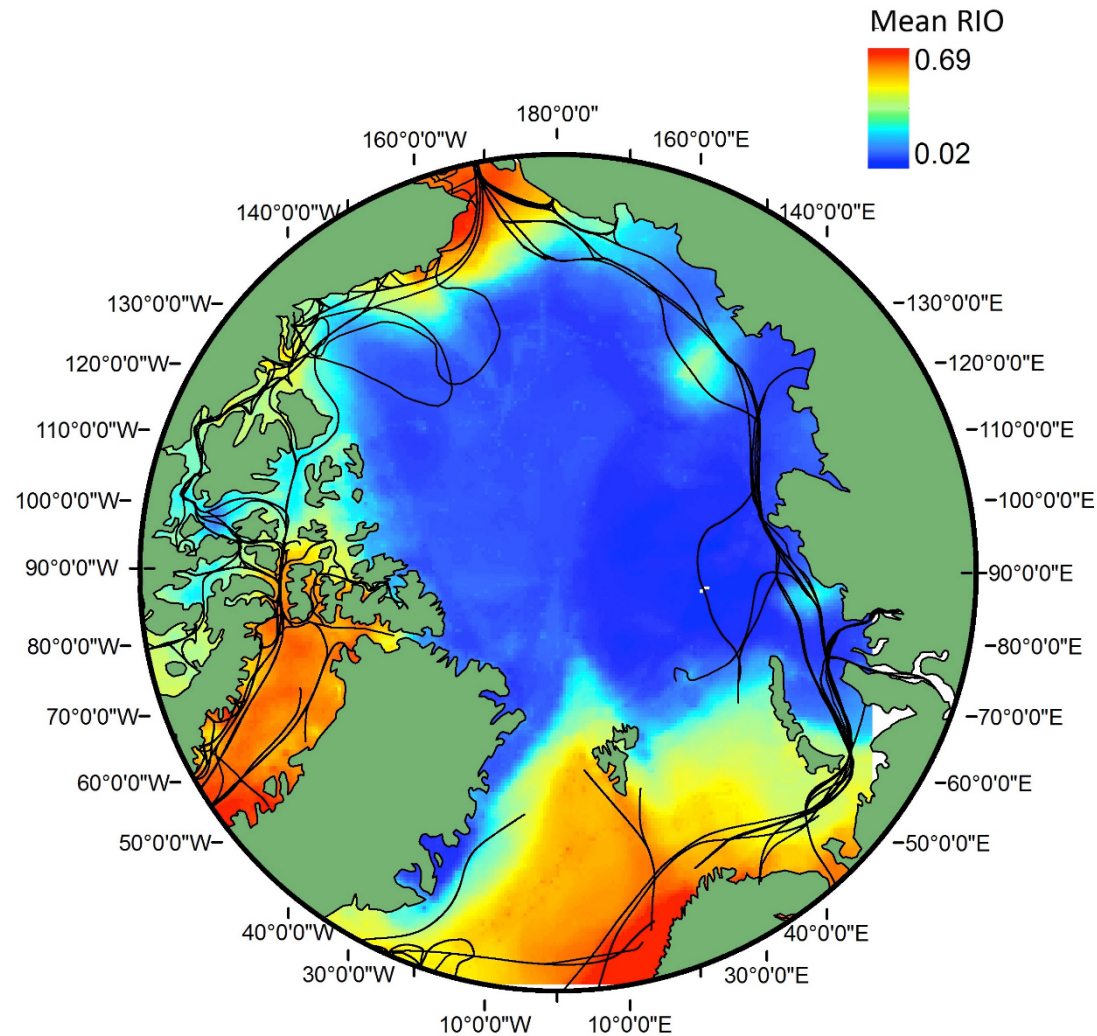
# Some polar data examples from Academia

## Arctic



# Some polar data examples from Academia

## Arctic Seabirds



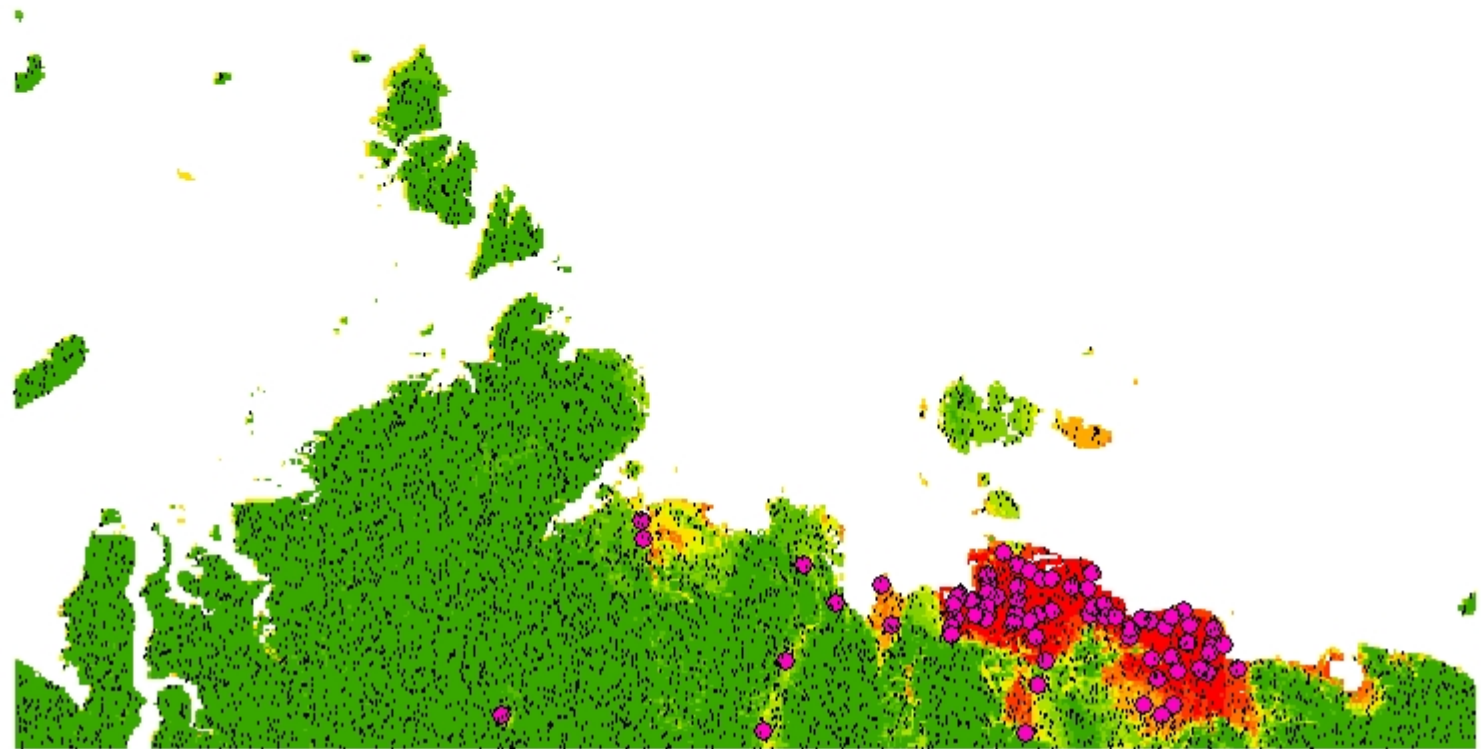
Use of Open Access data via GBIF.org  
Allowed for  
Predicted 27 Seabird Diversity  
vs real Shipping Lanes  
(black lines)



Humphries  
and Huettmann (2014)

# Some polar data examples from Academia Arctic

## Siberian Crane in Russian High Arctic (breeding)

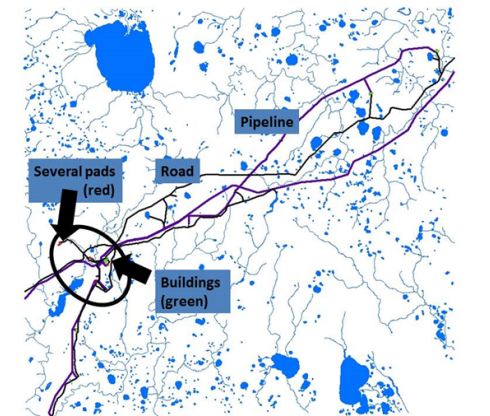
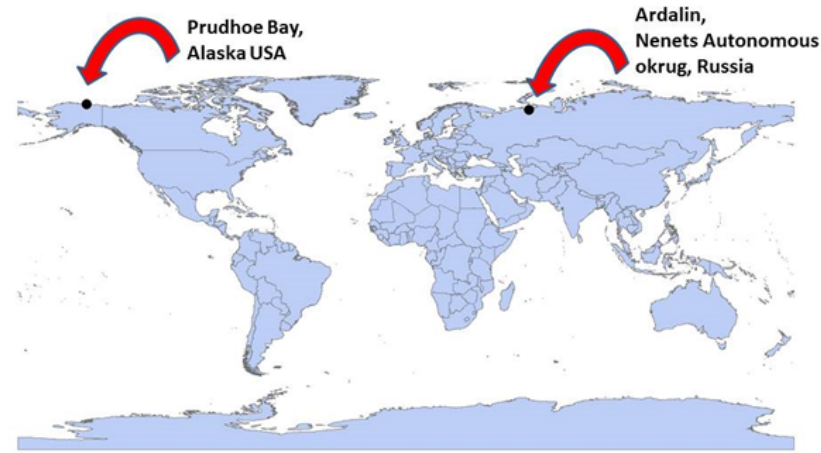


Chunrong, Huettmann et al.  
(in prep.)

# Some polar data examples from Academia

## Arctic

### Arctic Fox, e.g. 'King of the Arctic' in oil fields

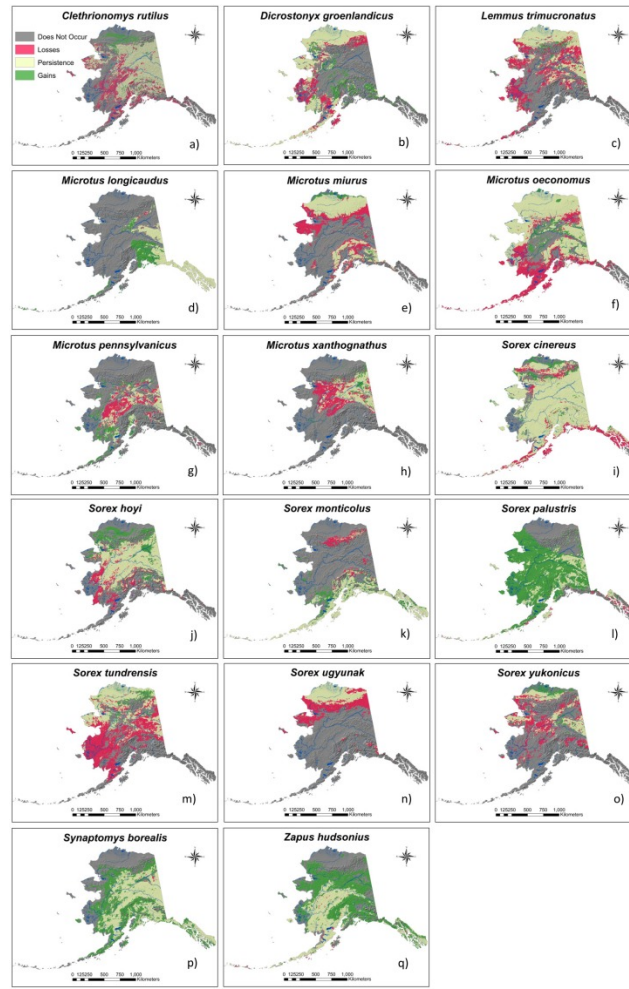


Korobitsyn, Larson and Huettmann  
(in review) Polar Biology



# Some polar data examples from Academia Arctic Alaska

## 27 species of Small Mammals (points, range, 2100)



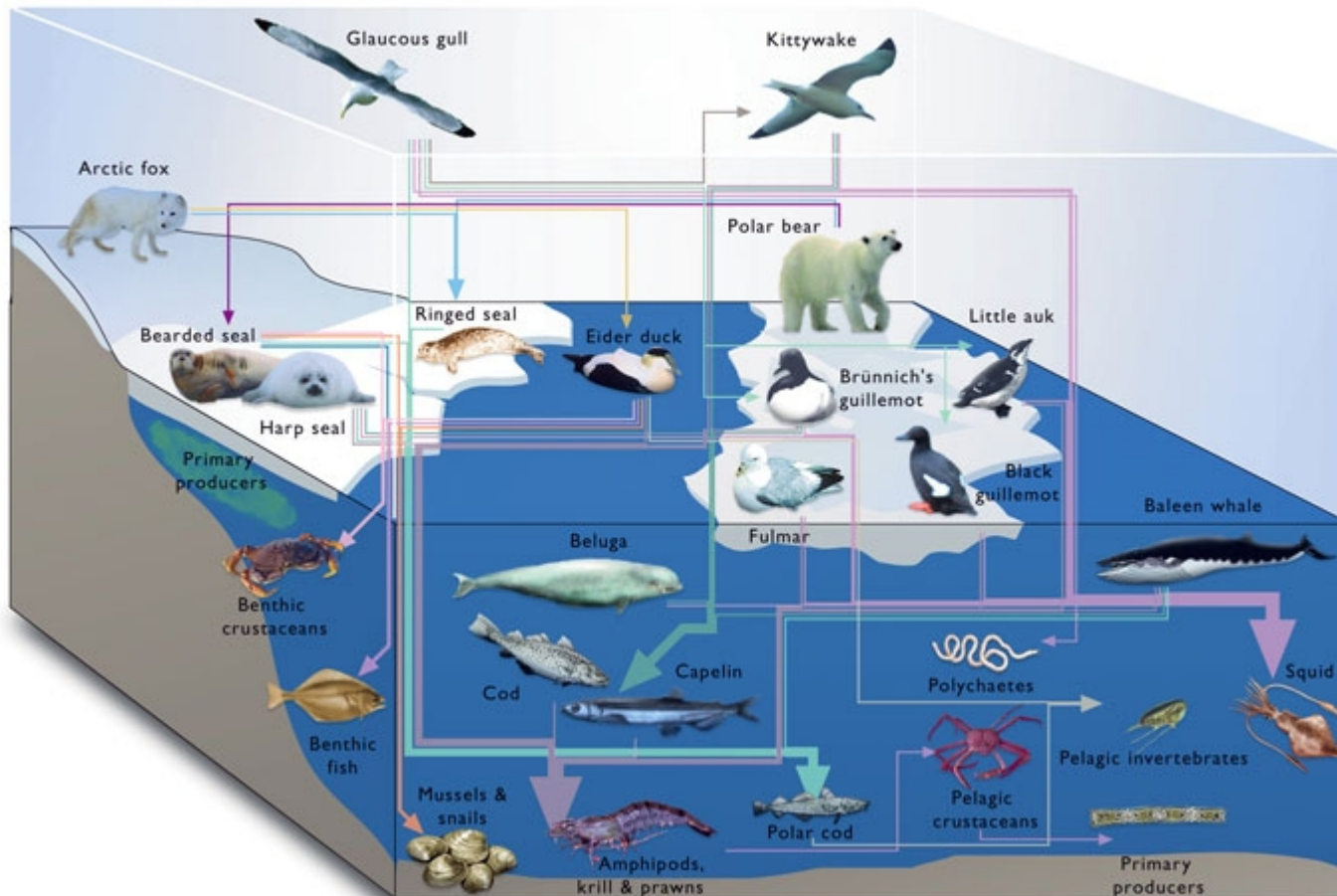
Baltensperger et al. (2015a.b)



# Some polar data examples from Academia

## Arctic Alaska

>300 (Terrestrial) species (Alaska GAP project)



Alaska Center for  
Conservation Science  
UNIVERSITY of ALASKA ANCHORAGE

# Some polar data examples from Academia

## Arctic Alaska

### White Spruce Distribution and Point Data

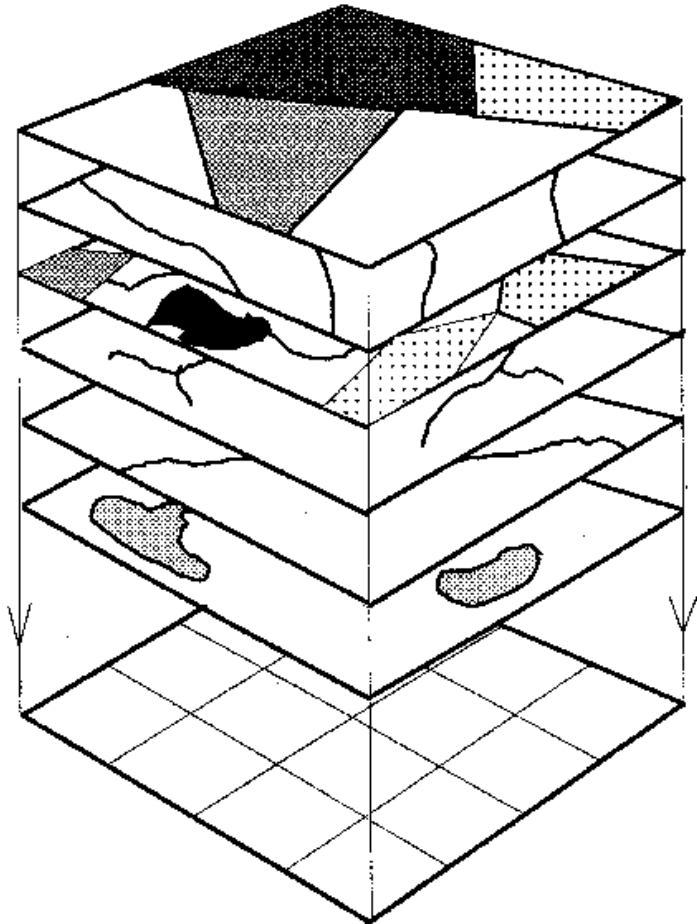


Ohse et al. (2010)  
Polar Biology

# Some polar data examples from Academia

## Arctic Alaska

40 Environmental GIS Data layers ~60m pixels  
(Alaska GAP project)



vegetation

contours

land use

drainage

shoreline

wetlands

reference map



Alaska Center for  
Conservation Science

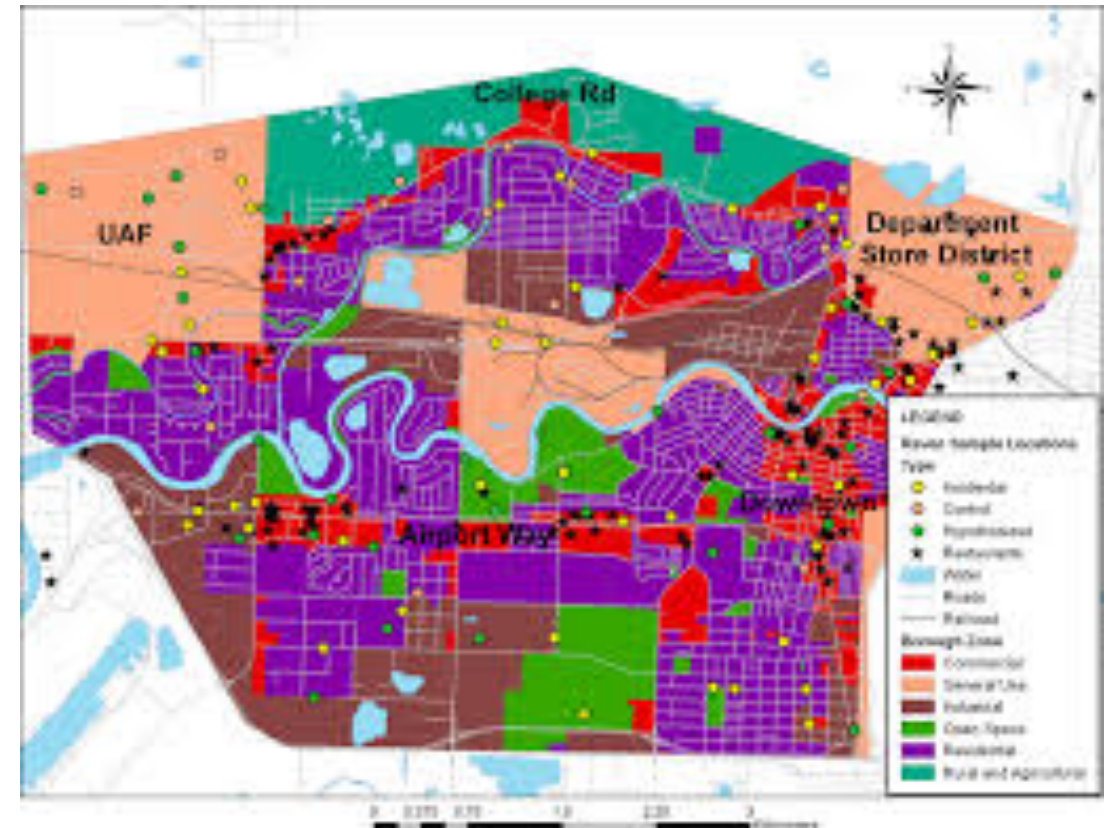
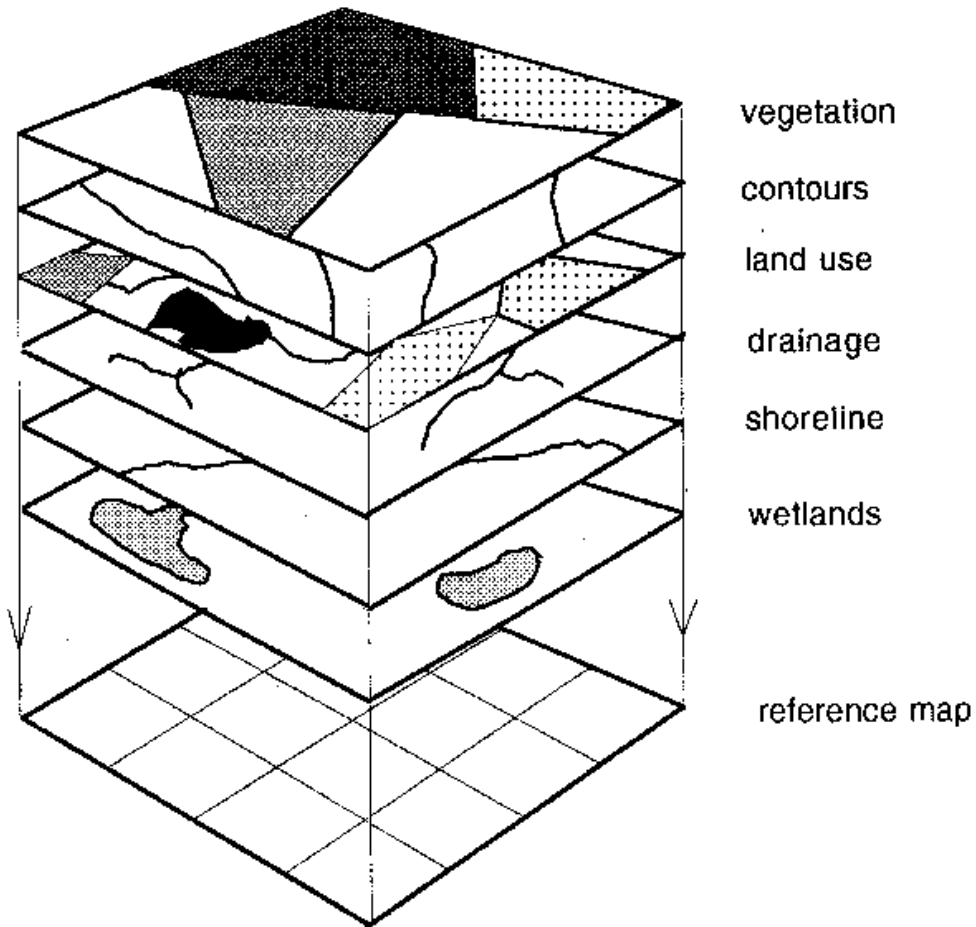
UNIVERSITY of ALASKA ANCHORAGE



# Some polar data examples from Academia

## Arctic Fairbanks municipality

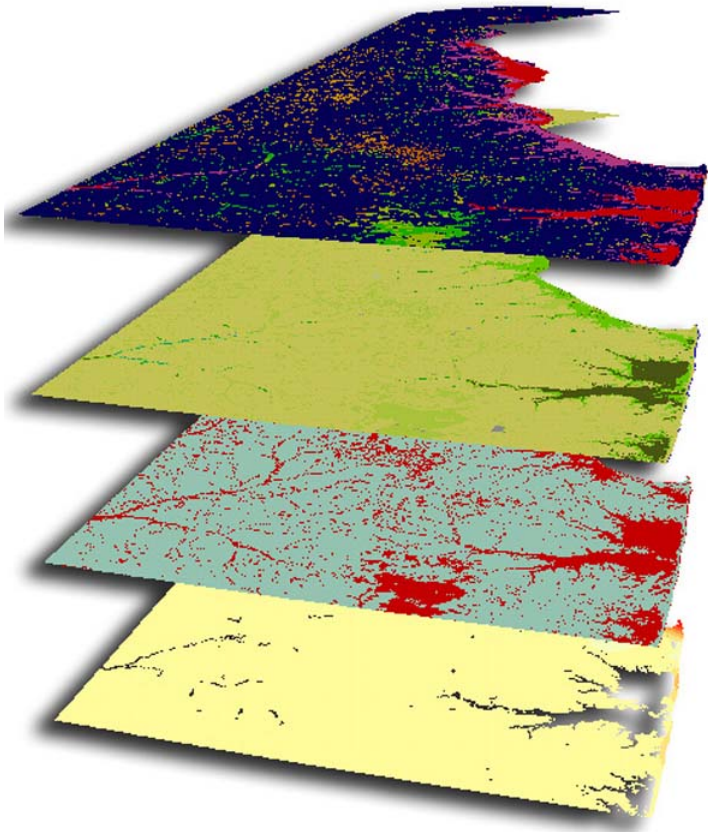
>12 Environmental GIS Data layers (Fairbanks municipality)



# Some polar data examples from Academia

## Arctic Ocean M.Sc. Thesis

**>100 Environmental GIS Data layers for 2010 and 2100**



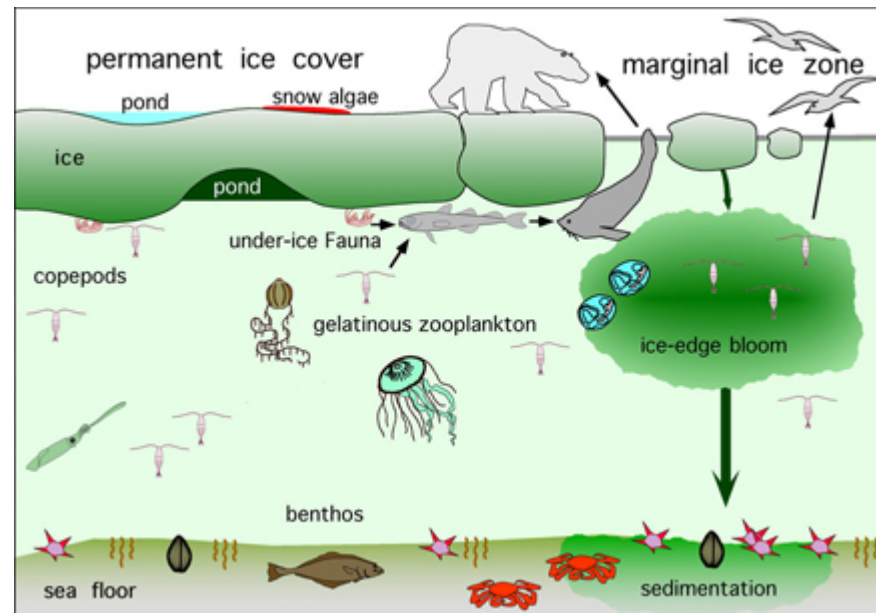
**M. Schmid (2012) Model-predicting the effect of freshwater inflow on saltwater layers, migration and life history of zooplankton in the Arctic ocean: Towards scenarios and future trends. MINC program, University of Goettingen and Lincoln, Germany/New Zealand**

[https://www.dropbox.com/s/jo03r6p6boeuf73/  
Schmid\\_Moritz\\_M.Sc\\_thesis\\_FINAL.pdf](https://www.dropbox.com/s/jo03r6p6boeuf73/Schmid_Moritz_M.Sc_thesis_FINAL.pdf)

# Some polar data examples from Academia Arctic Ocean Biodiversity (>1,200 species) ArcOD data points in OBIS & WORMS via COML



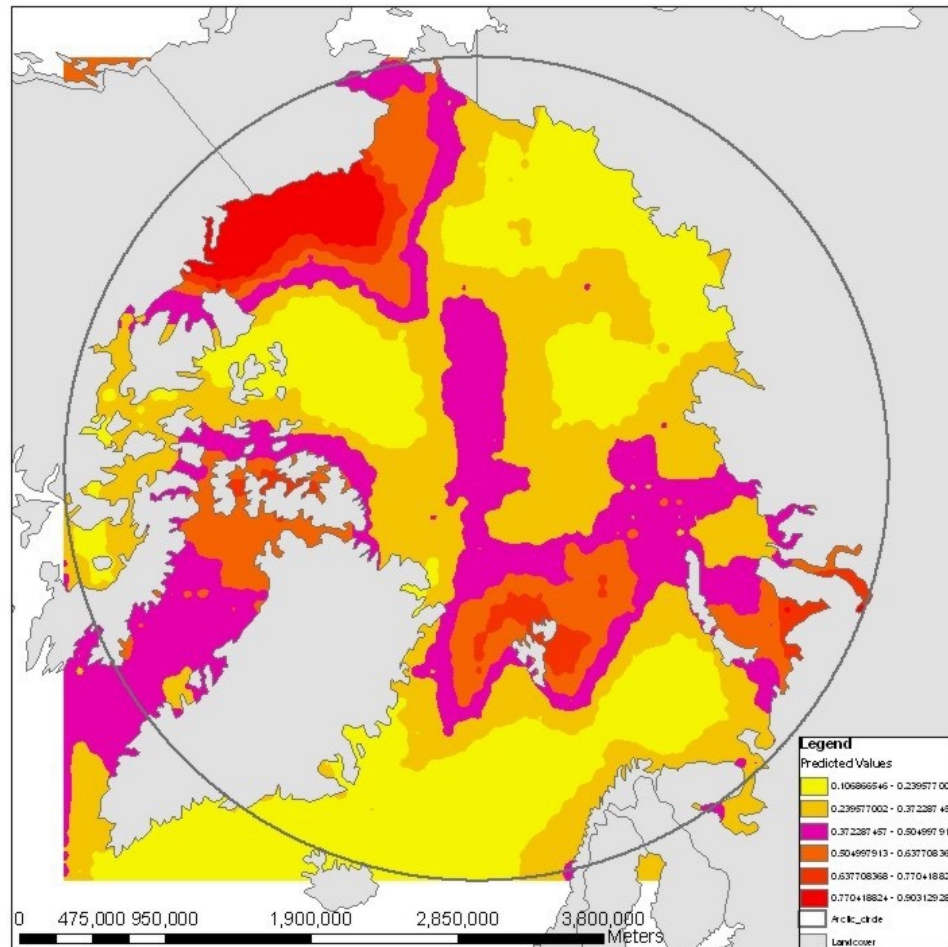
Arctic Ocean Diversity





# Some polar data examples from Academia Arctic Ocean Zooplankton

(best available compiled data and models 'to date'; 7 species)



I. Rutzen, SFOS

# Some hot button (data) topics

## Polar Bears ?





## Some hot button (data) topics

**Wolf, e.g. predator control ?**



# Some hot button (data) topics

## Whales, seals & walrus?



# Some hot button (data) topics

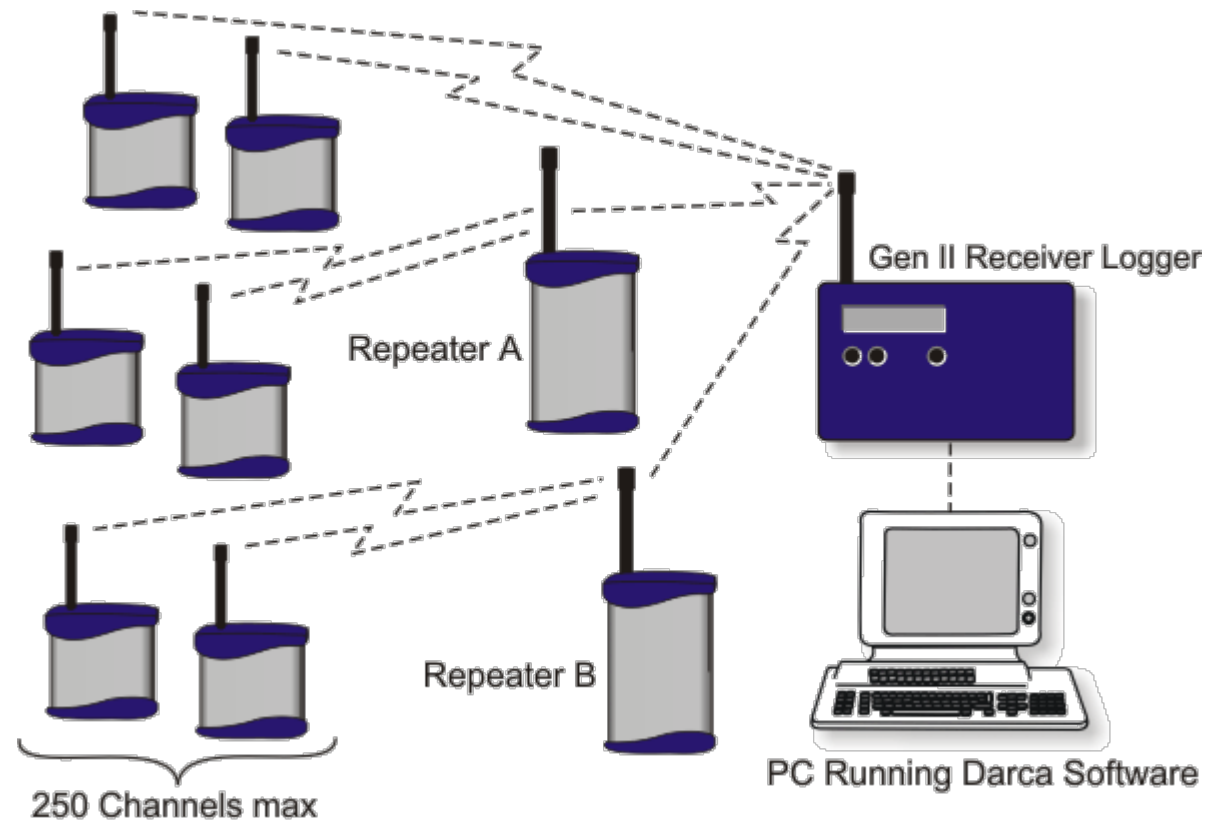
## Fisheries

(Magnusson Stevens Act does NOT really support FOAI)



# Some hot button (data) topics

## Telemetry Data





## Some hot button (data) topics

**(Many) Pelagic Survey, Vessel and Monitoring Data**



## **Some hot button (data) topics**

**High Resolution Remote Sensing Data  
(other than Landsat from 1980s)**

**e.g.**

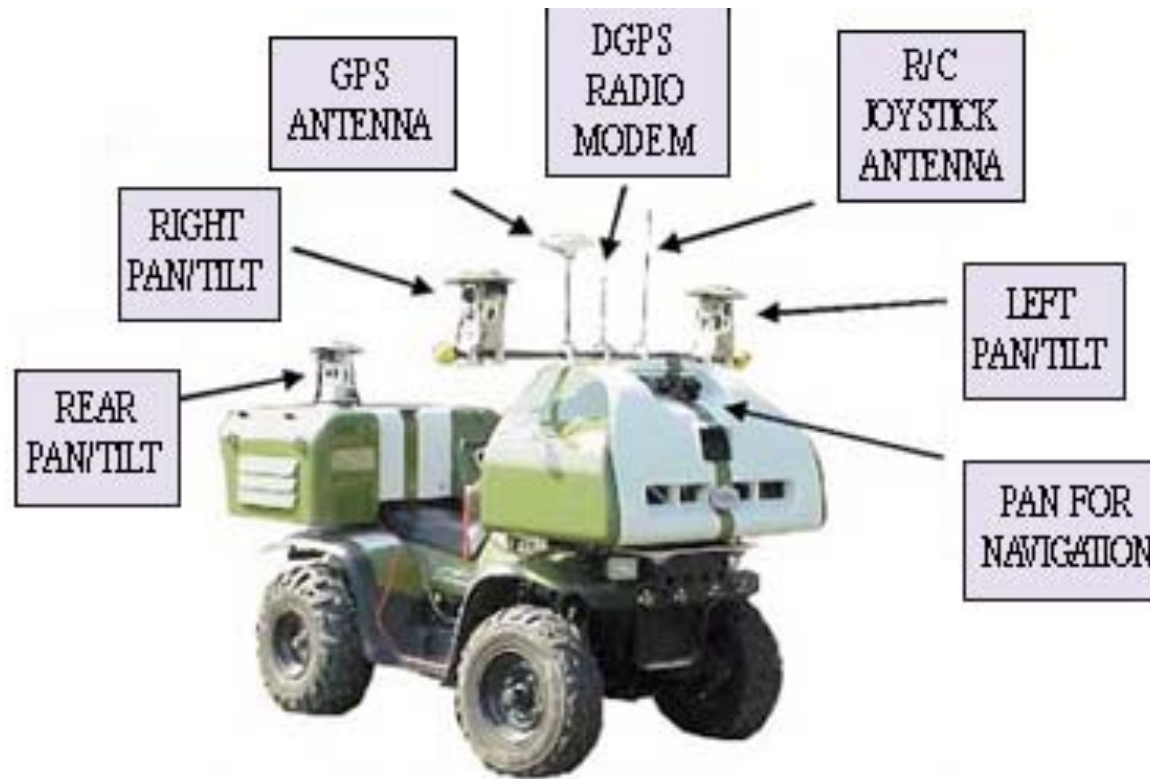
**IKONOS**

**RADARSAT**

**Marine Remote Sensing!**

# Some hot button (data) topics

## Many Sensor Data



# Some hot button (data) topics

## Drone Data





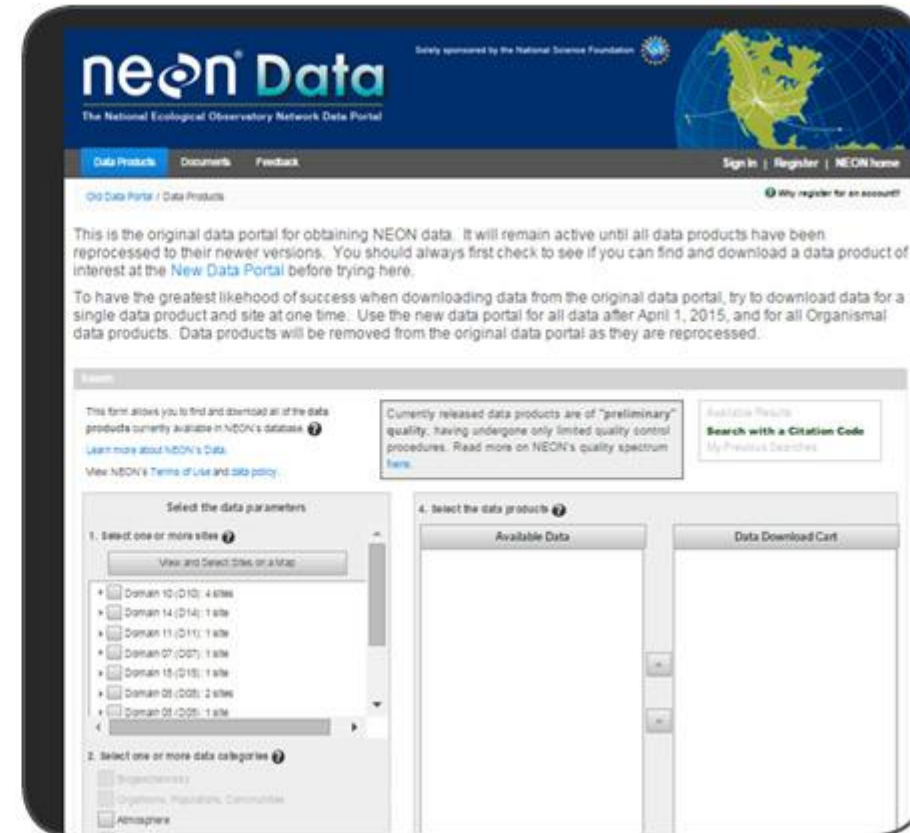
# Some hot button (data) topics

## LTER & NEON Data ?!

They are available (!), but do academia, resource managers and the public really use them ?



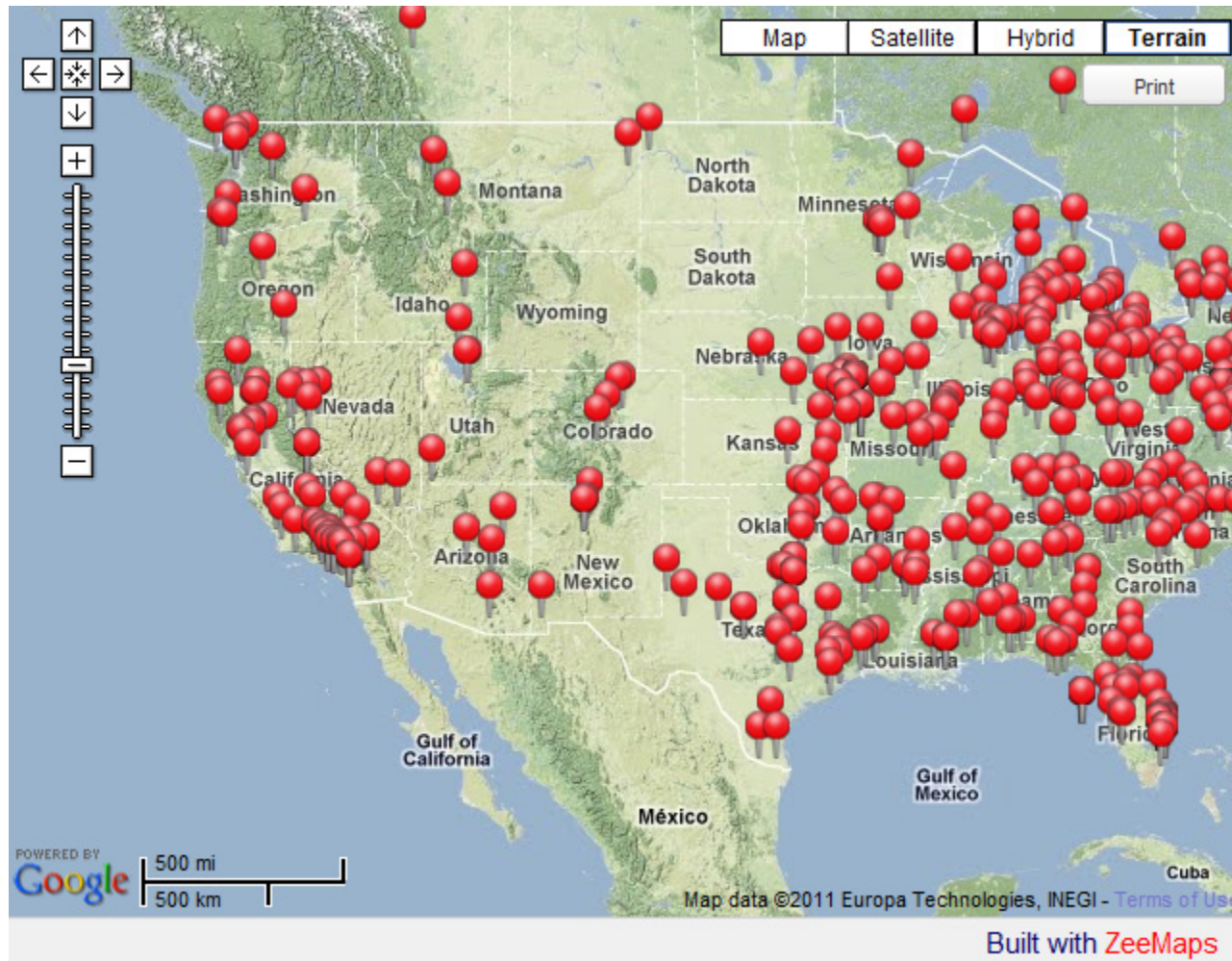
The screenshot shows the NEON Data Beta Portal. The header includes the NEON logo, "NEON Data", and "Safely funded by the National Science Foundation". Navigation links include "DATA PORTAL", "BROWSE DATA", "DOCUMENTS", and "FAQ". The main heading is "Search for NEON Data". Below this, there is a welcome message and a note about data quality: "Currently released data products are of 'preliminary' quality, having undergone only limited quality control procedures. Read more on NEON's quality spectrum here." The "Explore by Data Theme" section features five icons: "ATMOSPHERE" (Data available from 2012), "ORGANISMS, POPULATIONS & COMMUNITIES" (Data available from 2014), "ECOHYDROLOGY" (Data available from 2014), "BIOGEOCHEMISTRY" (Data available from 2014), and "LAND-USE, LAND COVER" (Data available from 2014).



The screenshot shows the NEON Data Original Portal. The header includes the NEON logo, "NEON Data", and "The National Ecological Observatory Network Data Portal". Navigation links include "Data Products", "Documents", and "Feedback". The main heading is "Old Data Portal / Data Products". Below this, there is a message about the original portal's status: "This is the original data portal for obtaining NEON data. It will remain active until all data products have been reprocessed to their newer versions. You should always first check to see if you can find and download a data product of interest at the New Data Portal before trying here." The "Select the data parameters" section includes a list of domains and data categories. The "4. select the data products" section includes a table for "Available Data" and a "Data Download Cart".

# Some hot button (data) topics

## 'Cancer Cluster' Data ?!



# Some hot button (data) topics

## Health & Disease (Hospital) Data ?!



# Some hot button (data) topics

## Field Schools

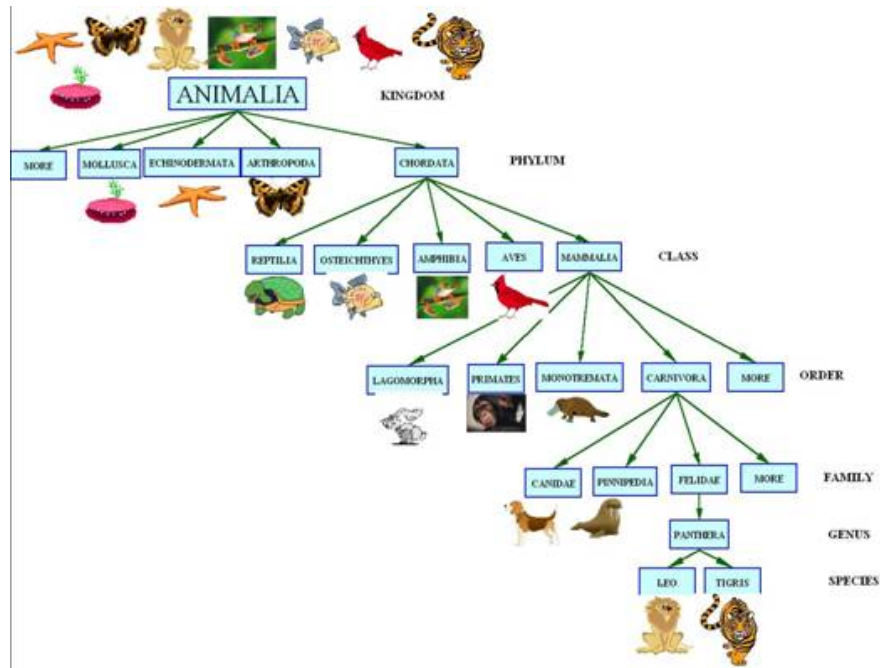




# Some hot button (data) topics

(Arctic) Taxonomy virtually unresolved, hardly available

ITIS.GOV ?!



**Good progress tough!**

**Citizen Science**

**dSPACE (UAF library)**

**ARCUS (UA Museum)**

**GBIF and affiliates**

**(some NSF and NIH)**



**So, where really are we in 2015  
re. Open Access of Raw Data (online) ?**

**Not much progress on 'meaningful' Arctic datasets...  
nor really awarded in real terms!**

**How many data sets get lost or remain unpublished,  
and widely underused ?**

**What is the management action for sustainability ?**

