BioBasis Zackenberg

- BioBasis is the biological monitoring within Greenland Ecosystem Monitoring (GEM)

- GEM consists of 5 subprogrammes

Climate Basis Geo Basis Marine Basis Bio Basis Glacio Basis

- Monitoring of Arctic biodiversity

Zackenberg

Disko

Nuuk

Back in 1991.....

'For the next fifty years we will measure the effects of climate variability on arctic ecosystems. These measurements will be used as a reference, or a ZERO-line, when climate starts to change.'

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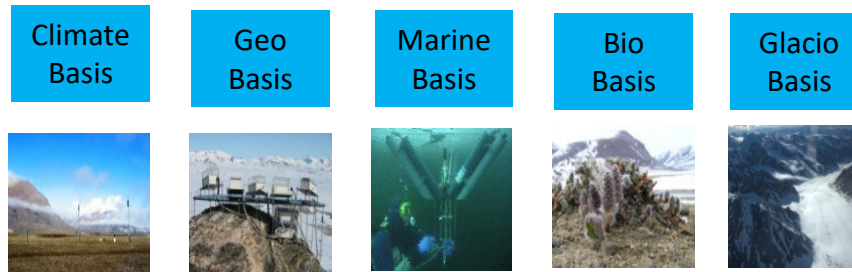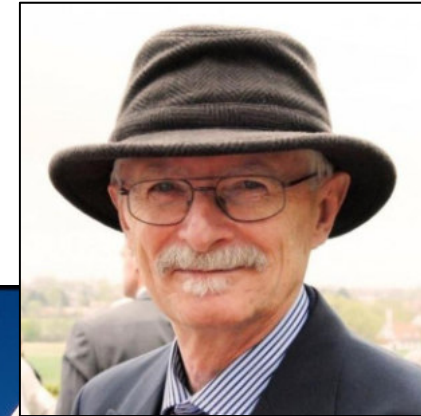ZACKENBERG BIOBASIS PROGRAM AND LINKAGES TO CBMP - MONITORING BIODIVERSITY IN GREENLAND

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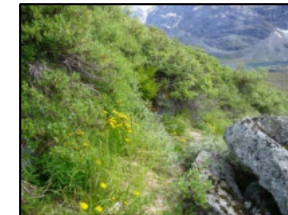SENIOR RESEARCHER

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The original questions

- How and why does climate variability influence the dynamics of arctic ecosystems?

- How do arctic ecosystems affect climate?

BioBasis aims

- Monitor <u>key species</u> (animal and plant) and <u>key processes</u> within the terrestrial and limnic ecosystems

- Documenting the <u>intra- and inter-annual variation</u>, resilience and long-term trends

- BioBasis aims at maintaining the integrity of the long core time series available within GEM, whilst developing the monitoring to embrace new methodologies and questions.

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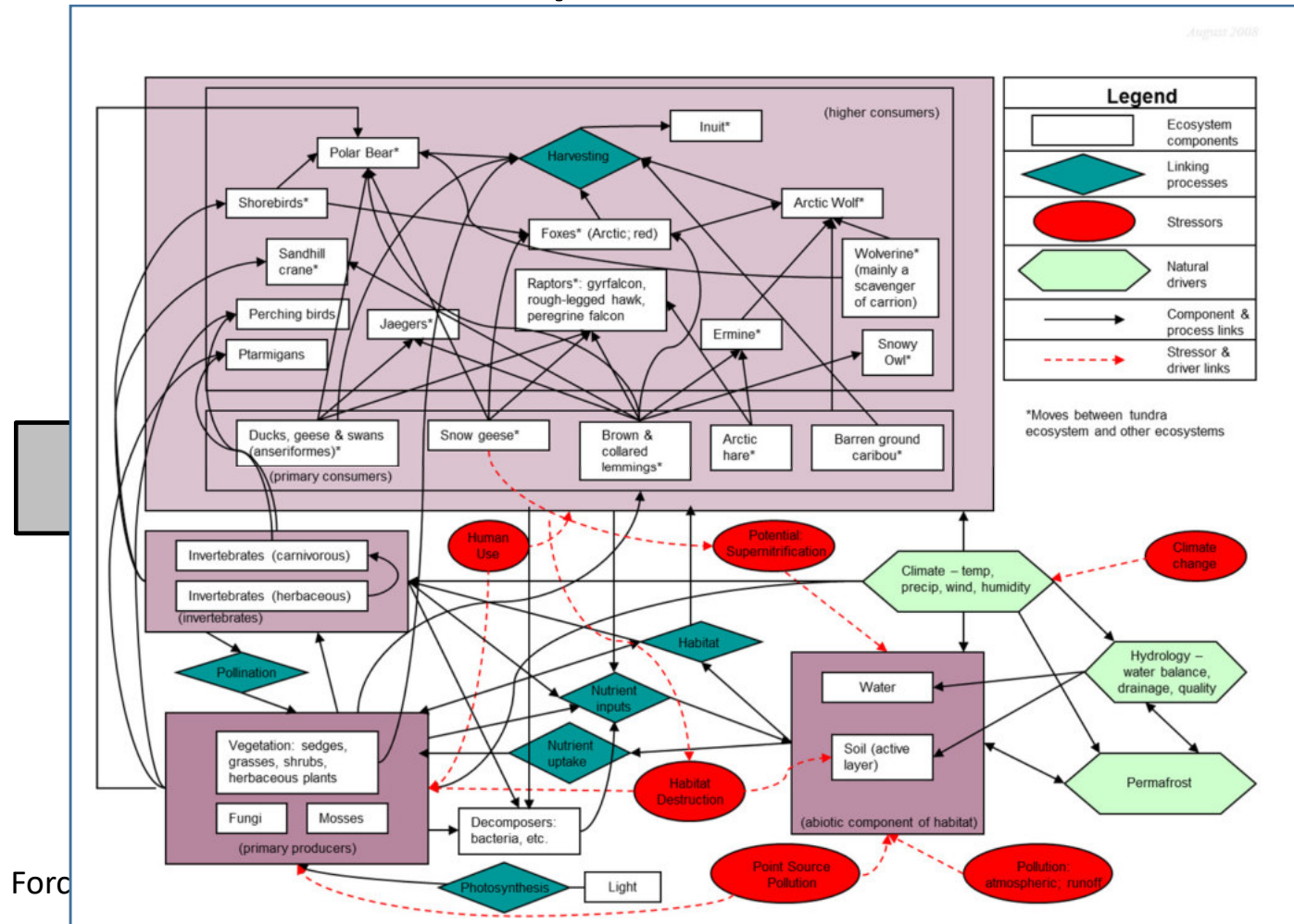NMS@BIOS.AU.DK

BioBasis focus

- **Focus is on biodiversity**
  - Abundance
  - Community composition
  - Phenology
  - Reproduction and predation

  - Flora (phytoplankton, lichens, mosses and vascular plants)
  - Invertebrate (zooplankton, arthropods)
  - Vertebrates (fish, birds and mammals)

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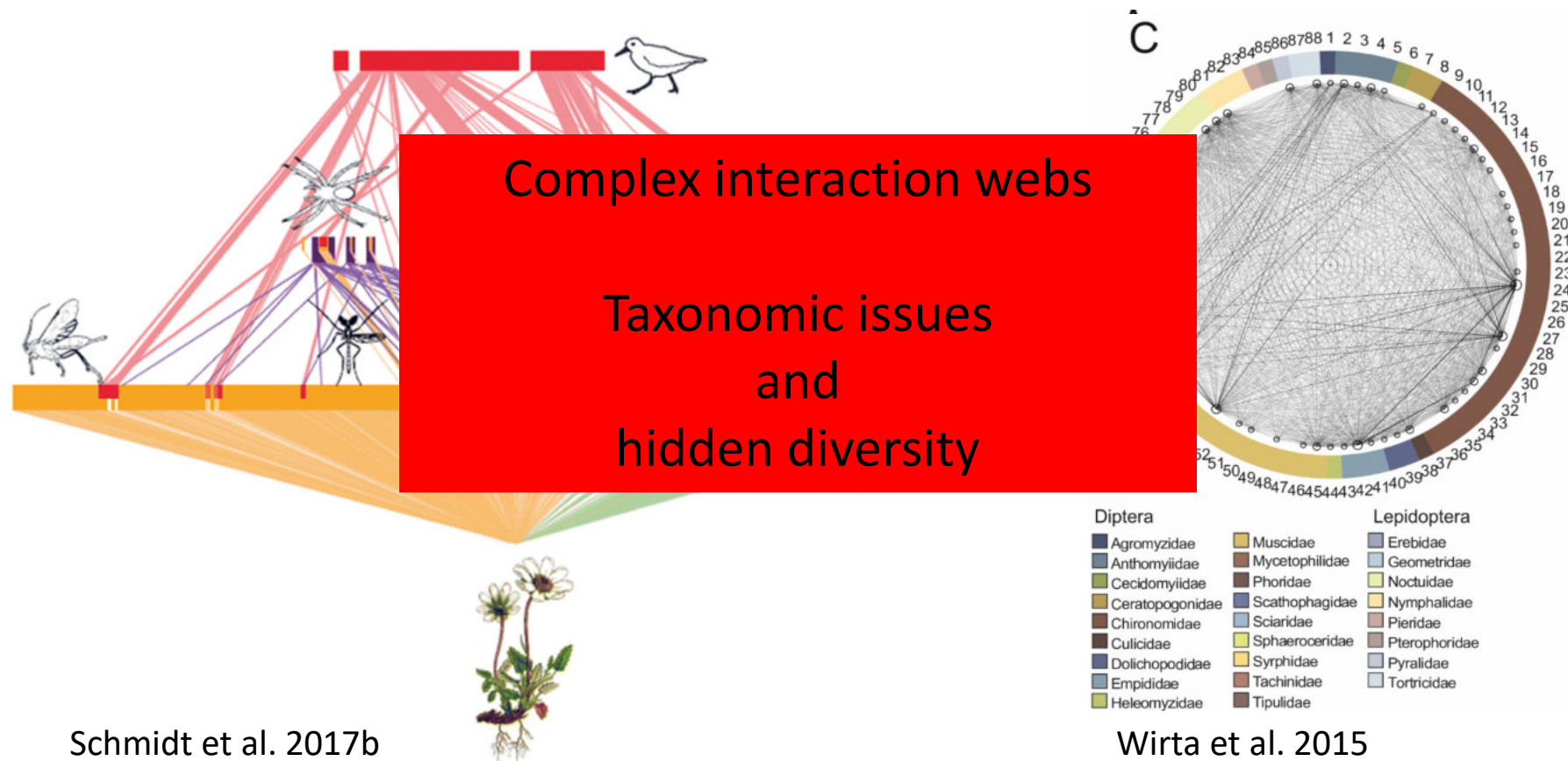
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BioBasis within GEM

- GEM is ecosystem-based monitoring

- Monitoring that incorporates major focal elements *and* their likely drivers (biotic and abiotic)

- Based on conceptual models

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Conceptual models

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Deciphering the Arctic food webs

Complex interaction webs

Taxonomic issues
and
hidden diversity

Schmidt et al. 2017b

Wirta et al. 2015

Diptera
- Agromyzidae
- Anthomyiidae
- Cecidomyiidae
- Ceratopogonidae
- Chironomidae
- Culicidae
- Dolichopodidae
- Empididae
- Heleomyzidae
- Muscidae
- Mycetophilidae
- Phoridae
- Scathophagidae
- Sciaridae
- Sphaeroceridae
- Syrphidae
- Tachinidae
- Tipulidae

Lepidoptera
- Erebidae
- Geometridae
- Noctuidae
- Nymphalidae
- Pieridae
- Pterophoridae
- Pyralidae
- Tortricidae

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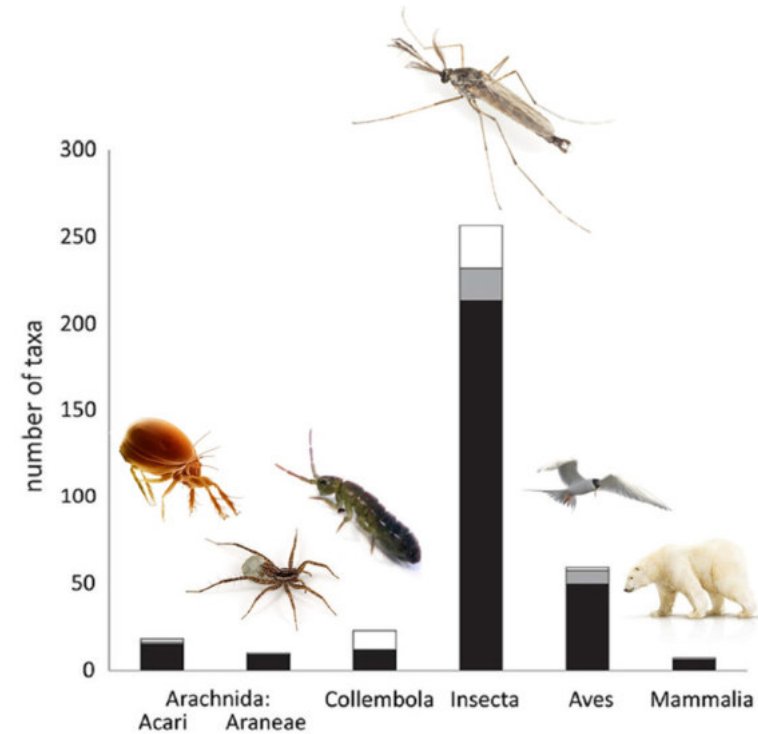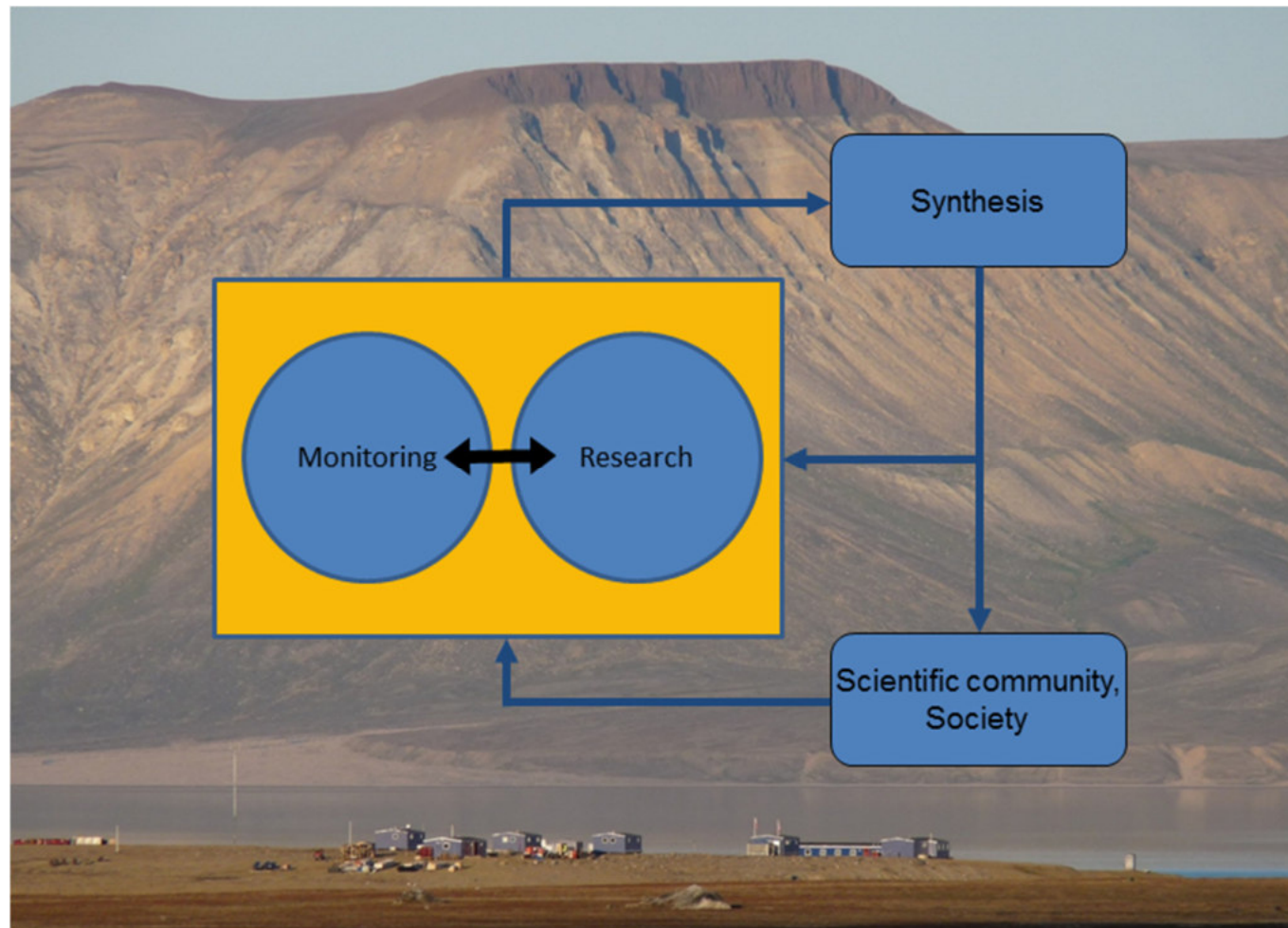
Hidden diversity

- Species pool poorly known

- Molecular tools under development

Wirta et al. Molecular Ecology Resources. 2016

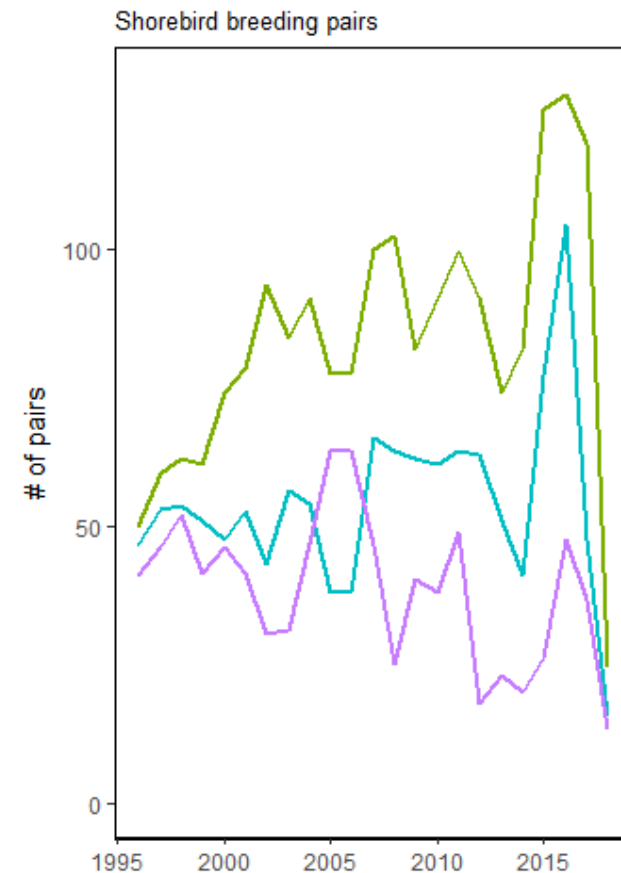# BioBasis program development

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BioBasis program development

- Development is important, but do not compromise core series

- Document rare or extreme events etc.

Shorebird breeding pairs

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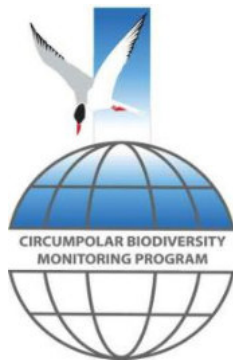SENIOR RESEARCHER

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Linkages to international programs

- Circumpolar Biodiversity Monitoring Program (CBMP)
  - Conservation of Arctic Flora and Fauna (CAFF)
  - Arctic Council

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BioBasis closely linked to CBMP

- BioBasis works closely with CBMP to <u>develop</u> monitoring protocols for the circumarctic region

- BioBasis works closely with INTERACT and CBMP to <u>implement</u> CBMP monitoring protocols accross the circumarctic region

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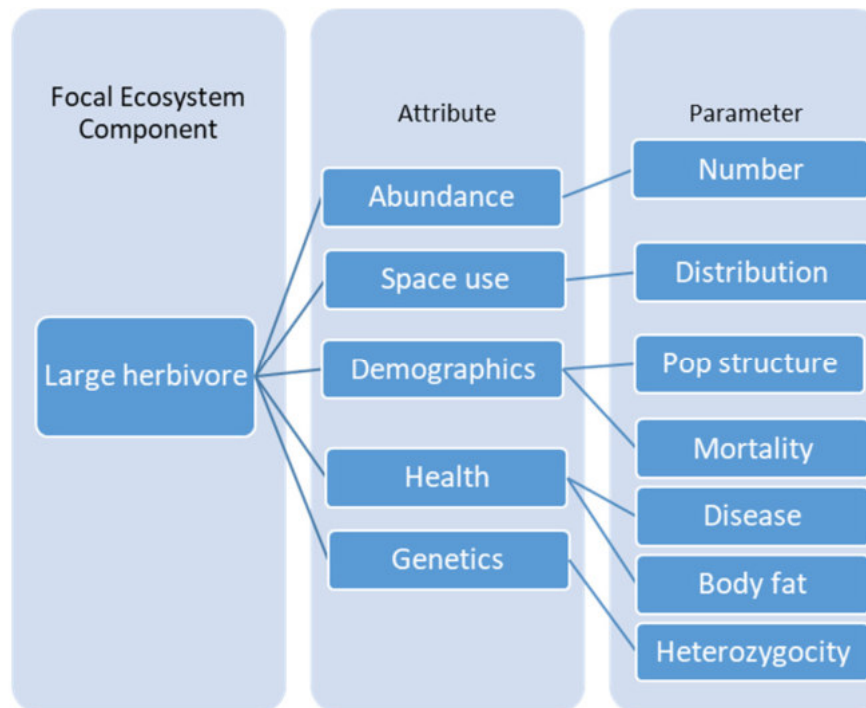SENIOR RESEARCHER

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CBMP monitoring

- Conceptual models

- Focal Ecosystem Components (FECs)
  - Key players
  - Ecosystem function
  - Human well-being
  - Red-listed

- Abiotic drivers (outside CBMP)

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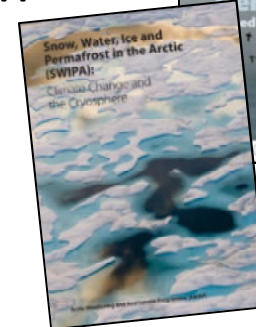DEPARTMENT OF BIOSCIENCE

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Monitoring structure

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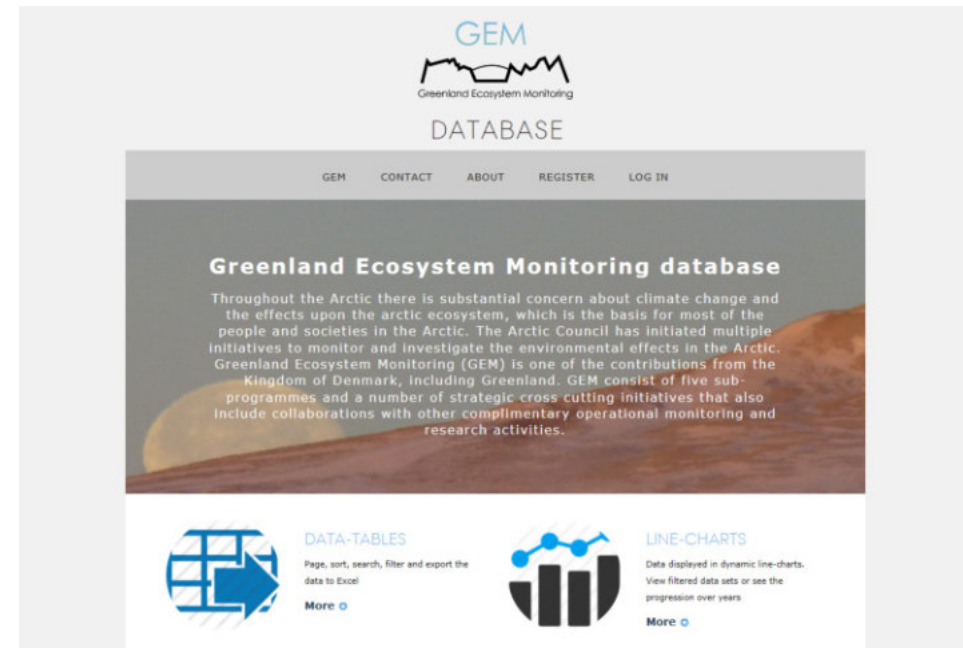NIELS MARTIN SCHMIDT
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BioBasis data and knowledge clients

- Stakeholders
  - Greenland and Danish authorities and institutions
  - Assessments (ABA, SWIPA, AACA,……)

- Other clients
  - CBMP, GBIF, international programs (e.g. NeAT, ITEX, Interactions Working Group, Herbivory network), international research community,….
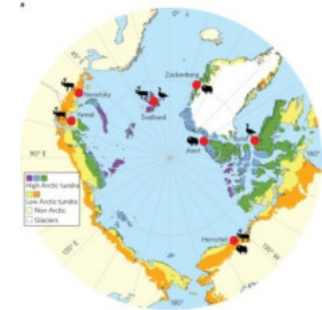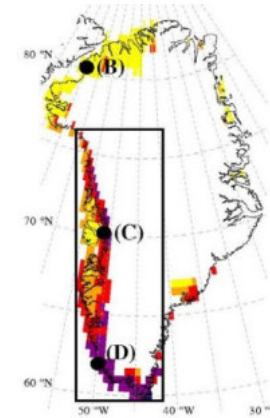
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BioBasis data and knowledge clients

- Data deliverables
  - Data are public domain (data.g-e-m.dk)

  - CBMP

  - ITEX, GLORIA, ABBCS, GBIF,…..

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From sites to large-scale patterns

- Upscaling is a major task (and challenge)

- Central ecosystem parameters and process understanding from core sites

- <u>CBMP as a large-scale gradient study</u>

- Large environmental gradients across sites

- Remote sensing and modelling

- Multiple data sources (harmonization / standardization)

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