



u^b

b
UNIVERSITÄT
BERN

Global Mountain Biodiversity Assessment

Supporting Long-Term Research in Mountain ecosystems

Davnah Payne

Institute of Plant Sciences

University of Bern

Switzerland

<http://www.gmba.unibe.ch>

BACKGROUND



Facts & Figures



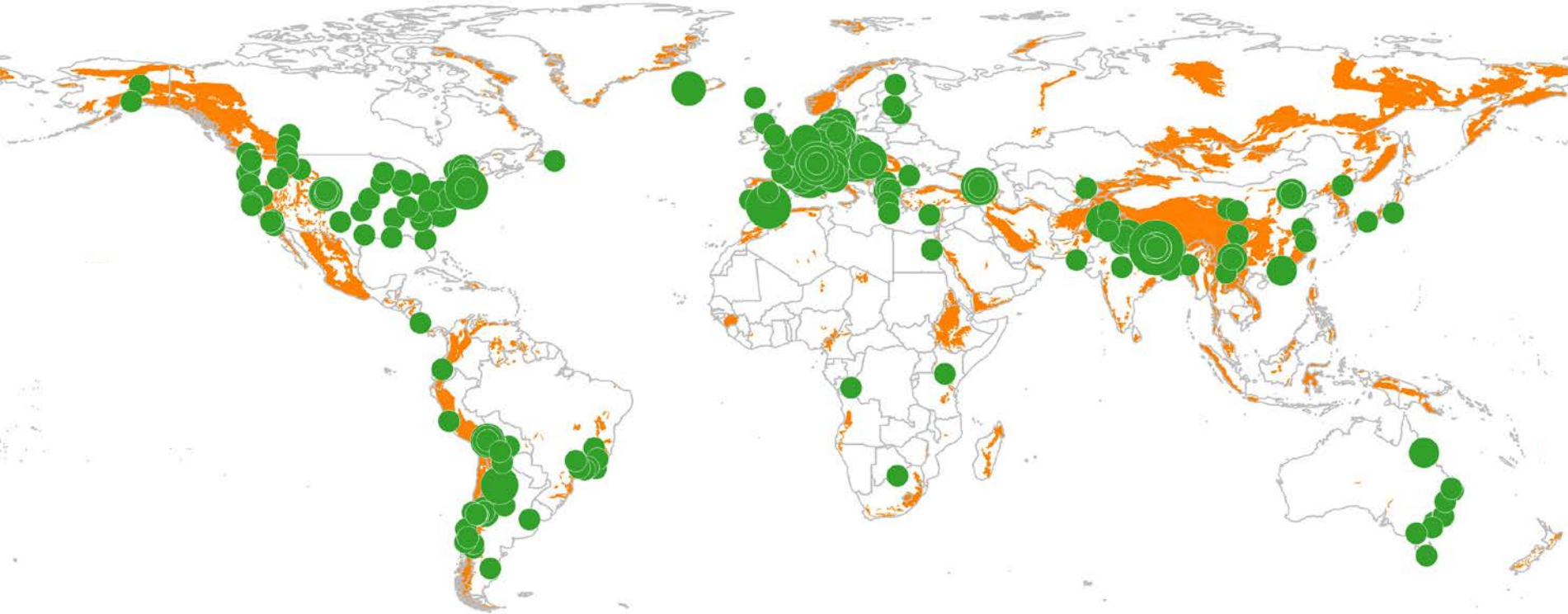
- > What: “infrastructure” project of the Swiss Academies of Sciences & Global Research Project of Future Earth
- > When: 2000 –
- > Where: University of Bern, Switzerland
- > International Project Office: Markus Fischer (PI), Eva Spehn, Davnah Payne, Mark Snethlage
- > Scientific Steering Committee: incl. Susanna Venn, Christian Körner, Laszlo Nagy, Harald Pauli, Nigel Yoccoz

Mission and goals



- > Support mountain biodiversity community
 - Research & collaboration
 - Access to resources (experts, data, etc)
 - Interaction with stakeholders & policy makers
 - Contribution to sustainable development

Network



Countries: ~80

Organisations: ~850

Experts: ~1000

-
- > Mountain Portal
 - Mountain definition
 - Treeline algorithm
 - Bioclimatic belts
 - Mountain inventory

- > Working groups
 - Platform for research
 - Facilitates intellectual exchange among small teams of scientists, stakeholders, and other members of the mountain biodiversity and sustainability science community
 - Outputs: scientific publications, research tools, and project proposals

- > Workshops and Conferences

GMBA & LTER

Past



Sites & Workshops



> LTER working group

> Core sites

Tyrolean High Alps (Austria)	Valle d'Aosta (Italy)
Sierra Nevada (Spain)	Collelongo - Selva Piana (Italy)
Aigüestortes & Redon (Spain)	Furka Region (Switzerland)
Ordesa y Monte Perdido / Huesca ES (Sp...)	Pyramid Lakes (Nepal)
Niwot Ridge (USA)	

> Workshops 2011-2013

- Col du Lautaret (2011): use of common protocols to ensure comparability of data
- Aosta Valley (2013): procedure for testing common protocols to ensure comparability of data

GMBA & LTER

Past

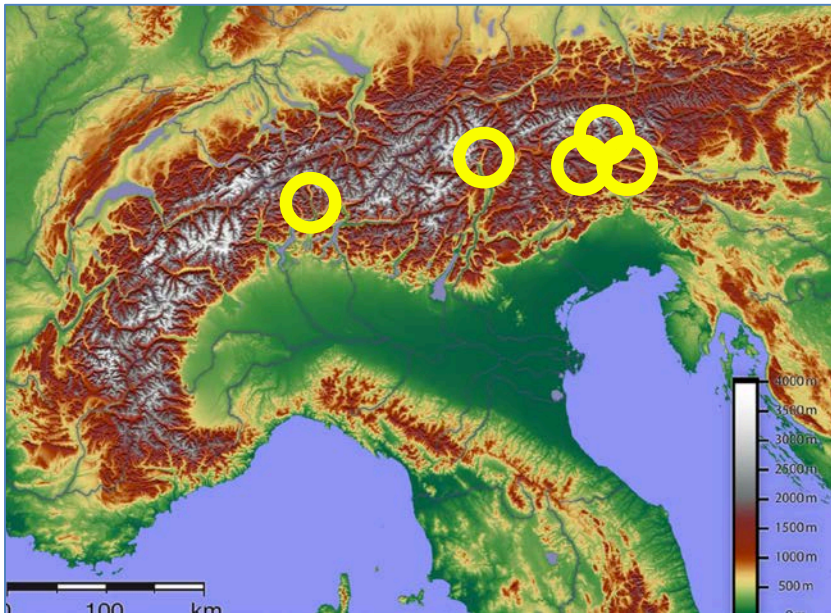
Present



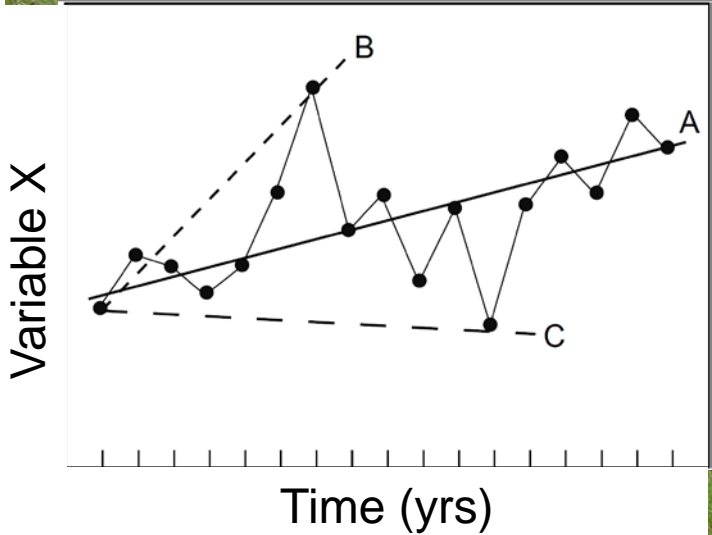
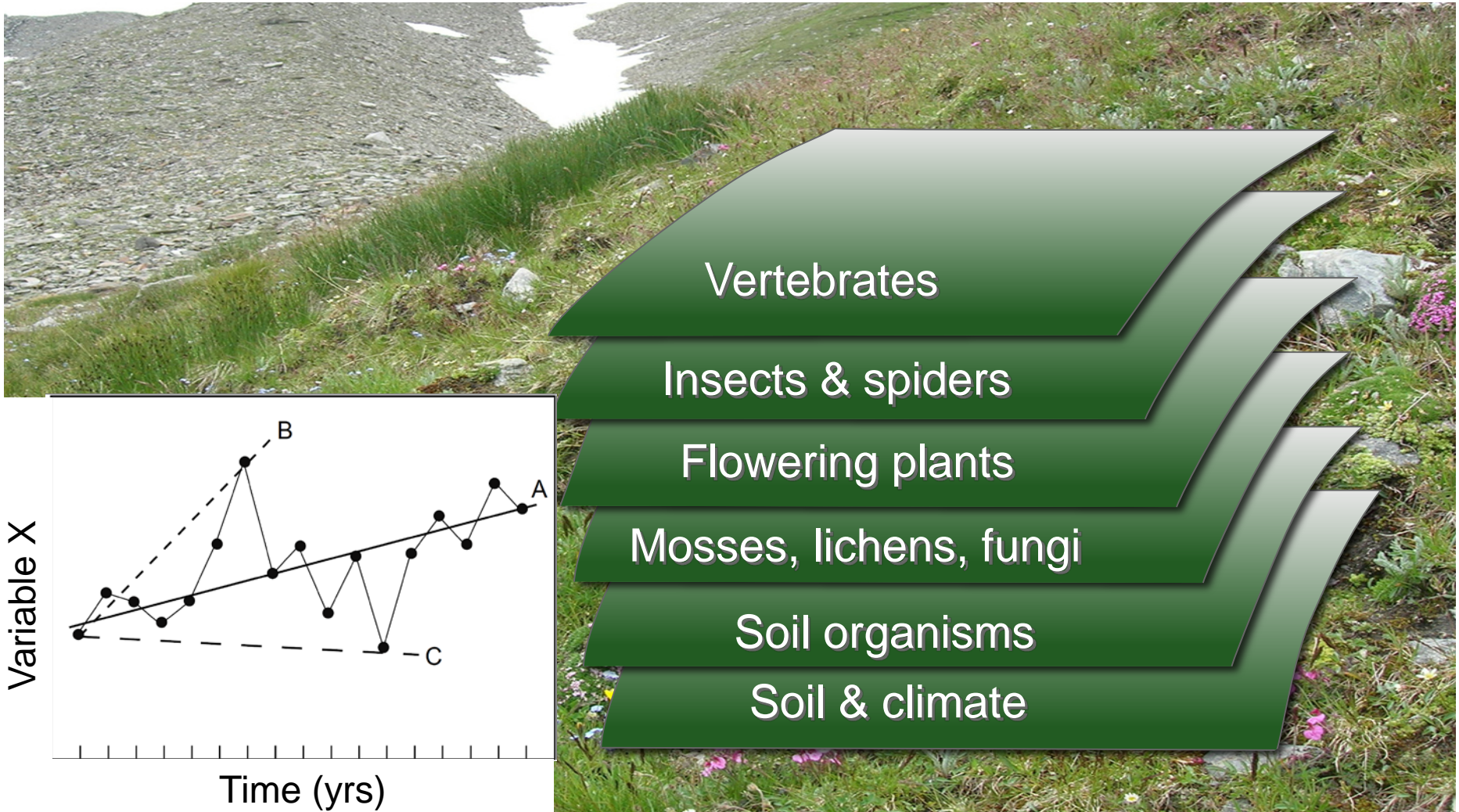
LTER across the Alps (1)



- > Comparative, long-term ecosystem monitoring across the Alps: Austrian Hohe Tauern National Park, South-Tyrol (Italy) and the Swiss central Alps (Körner, Tappeiner, Newesely)
 - Topography
 - Snow beds



LTER across the Alps (2)



LTER in the Andes



- > Long Term Ecological Research site in Campos de Jordao, Serra da Mantiqueira, Brazil (Laszlo Nagy)

Mantiqueira Mountains

Information | Species

Attributes

- Country: Brazil
- Total area of mountainous terrain: 11,143 km²
- Total human mountain population: 3,910
- Area of mountainous terrain above the treeline: 0 km²
- Area of mountainous terrain below the treeline: 11,143 km²

Description

The Mantiqueira Mountains (Portuguese: Serra da Mantiqueira) are a mountain range in Southeastern Brazil, with parts in the states of São Paulo, Minas Gerais and Rio de Janeiro. It rises abruptly from the northwestern bank of the Paraíba do Sul River and extends northeastward for approximately 320 km (200 mi), reaching a height of 2,798 m (9,180 ft) at Pedra da Mina. The mountains, which eventually merge with the Serra do Espinhaço, were originally forest-covered, except for the peaks that rise above the tree line. They provide charcoal and pasture for cattle; on the lower slopes there are several health and tourist resorts, such as Campos do Jordão, Brazil's highest city. The name Mantiqueira derives from a Tupi word meaning "mountains that cry", denoting the large number of springs and streams found there.

The name shows the range's great importance as a source of drinking water, and the waters supply a great number of important cities in the southeast of Brazil. From its brooks are formed the Jaguari River, which supplies the northern region of Greater São Paulo; most left-bank tributaries of the Paraíba do Sul River, which crosses a densely populated and highly industrialized region; and the Grande River, which is the source of the Paraná River, one of the longest and most important in South America and the river with the world's largest hydroelectric output, through a series of power plants way down the river to Argentina and Paraguay.

GMBA & LTER

Past

Present

Future



Model-based LTER in Mountain Areas (1)




- > Working group on - and network of model-based monitoring programs for supporting management decisions
- > “What should we begin measuring now that can help society better understand and manage natural resources by 2050 (and beyond) and, in turn, guide human societies through a likely transition to a less bountiful world?”
- > “A new dialogue needs to emerge that emphasizes the importance of implementing appropriately stratified ecosystem specific, site-based monitoring that can detect change and explain the drivers of that change”

Monitoring: why, what, how (1)



- > Why to monitor?
 - (1) Focus on learning & developing an understanding of the behaviour and dynamics of the monitored system
 - (2) Focus on providing information that is useful in making informed management decisions

- > What to monitor?
 - Decisions about which variable to monitor determined by objectives of the program (i.e., answer to question why)

(1) 

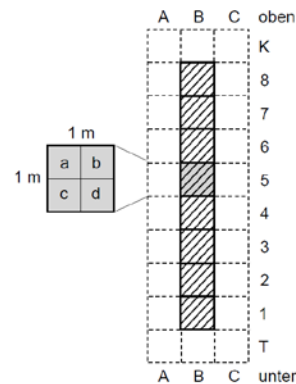
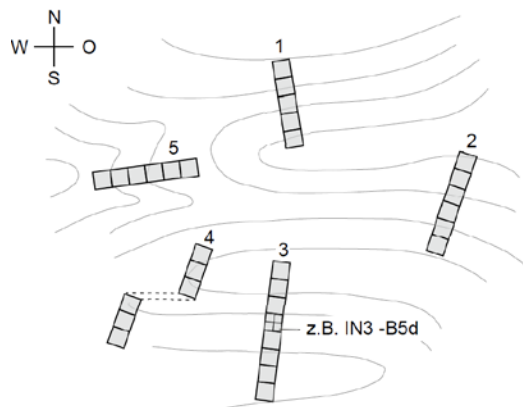
State variables + associated rate parameters important to a priori hypothesis of system behaviour

(2) 

State + other variables included in objective function + variables needed to model managed state variables

Monitoring: why, what, how (2)

- > How to monitor: based on hypotheses / models
 - Outline known or assumed functioning of ecological systems
 - Define adequate monitoring targets and their inter-relations
 - Predict the state of monitoring targets when subjected to drivers of change
 - Model-based sampling design
 - Sampling intensity
 - Temporal & Spatial resolutions and extents



Model-based LTER in Mountain Areas (2)



- > Working group on - and network of model-based monitoring programs for supporting management decisions
 - Context-specific hypotheses & predictions in mountain ecosystems + development of monitoring targets
 - Protocols & models
 - Shared understanding of drivers and responses

- > GMBA network of experts to advise on specific mountain systems & management requirements

Model-based LTER in Mountain Areas (3)



- > Facilitate integration of results and knowledge along spatial scale
- > Support syntheses of outcomes for policy-relevant recommendations
 - Support information management architecture to achieve, analyze, and reuse the data at appropriate scale
 - Outreach and communication