

State of the Antarctic Ecosystem (AntECO)

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STATE OF THE
ANTARCTIC
ECOSYSTEM

Objectives

‘Biodiversity dictates how ecosystems function and underpins the life-support system of our planet’

AntECO aims to:

- promote, stimulate and co-ordinate international, **interdisciplinary** research relevant to Antarctic ecosystems
- promote **bioinformatic** and **ecoinformatic** approaches to understand **spatial patterns** from genes to ecosystems & determine how these patterns have evolved through **time**.
- identify implications for **conservation management** in a time of rapid environmental change.



Key scientific questions

- How has Antarctic biology responded to past change and what does this tell us about the capacity to respond to future change? (very strong connection with climatologists (AntClim21), geologists, modellers, data managers - SC-ADM)
- How do we explain the origin, current distribution and abundance of biodiversity? (interdisciplinary within biology [Ant-ERA] using various classical and new tools)
- What do we need to know to provide the CEP with the tools it requires to properly manage the Antarctic environment? (direct links to CEP, ATCM, CCAMLR)



Methods and implementation

Utilise existing and emerging technologies in:

- molecular research
- spatial analyses
- meta-analyses;

} 'informatics'

to allow us to better understand biodiversity patterns in Antarctica.

Threats to biodiversity now and in the future will be a major product of these analyses. Linking these data with [AnT-ERA](#) and [AntClim21](#) a comprehensive model of biodiversity protection can be created.



Methods and implementation

- Modelling and prediction of biodiversity-environment interactions, pattern analyses and bioregionalisation (climate modelling, permafrost, glacial changes, bipolar comparisons – joint theme with AntClim21 and AnT-ERA “Impact of physical changes on the Antarctic Environment and Biosphere”)
- Employ modelling and simulation techniques to utilise census, molecular and environmental data to investigate potential biodiversity impacts under a range of environmental scenarios (SC-ADM, links to AntClim21, AnT-ERA – joint theme)
- Elucidate evolutionary history of Antarctic and Southern Ocean biota – radiations and extinctions (broadscale patterns across taxa, integrate palaeontological and molecular data - infer physical environmental drivers of change)
- Biodiversity census and sustained observing platforms (link with SOOS, AG-Ocean Acidification, EG-BAMM, EG-CPR)



Methods and implementation

- Application of cutting edge remote sensing and other technological innovations, along with simple, repeatable baseline surveys to detect biotic change (build up a model of environmental proxies for biodiversity)
- Establish and develop cross disciplinary links to facilitate integrated approaches to reconstructing evolutionary history of the biota (e.g. seascape/landscape genetics) (between molecular evolution, glaciological, oceanographic, climatological and climate modelling communities – AntClim21)
- Use state of the art software (e.g. GIS, multivariate stats approaches) to analyse and synthesis large and complex datasets – taking advantage of SCARs georeferenced community datasets (e.g. ANTABIF)
- Analyze change in biodiversity in groups that leave morphological and biochemical remains in sediments to determine palaeoenvironments



Methods and implementation

- Implement 3rd generation sequencing for exploring microevolutionary processes - providing a baseline for monitoring future change (provide guidance in establishing protocols for future protection – SC-ATS)
- Establish protocols for a genetic monitoring program to detect range shifts, population expansions and contractions (provide guidance in establishing protocols for future protection – SC-ATS)
- Populate spatial frameworks with comprehensive biodiversity data to enable identification of hotspots and unique biodiversity (SCADM SCATS CEP)
- Determine Holocene changes in biodiversity (marine, lacustrine & terrestrial) and identify corresponding environmental factors (Integration with geological record and palaeoecology)



Stakeholders

The programme will inform:

- the **ATS parties and CEP**
- International stakeholders e.g. **Intergovernmental Panel on Climate Change (IPCC)**, **Inter-governmental Platform for Biodiversity and Ecosystem Services (IPBES)** and the **Convention on Biological Diversity (CBD)**

And links to

- **SCAR Programmes /groups - AnT-ERA, AntClim21..., ANTABIF, SCAR Predictions group, SC-ADM**
- other Antarctic structures as **CCAMLR, SOOS**



Deliverables

- ‘State of the Antarctic Ecosystem’ report (cf. [ACCE](#))
- Population of relevant databases with spatially significant population datasets [Biodiversity.aq \(ANTABIF*\)](#)
- Cross linkages between SRPs ([AntClim21](#), [AntERA](#)) – papers and reports authored by scientists across SRPs/disciplines/nationalities

*Antarctic Biodiversity Information Facility - feeds into global data capture linkages



Deliverables (cont'd)

- Recommendations to the **CEP's 5-year plan** e.g. prediction of distribution and biodiversity changes (vulnerable species and systems), **MPAs, ASPAs (SC-ATS)**
- **New data for glaciological and geological and other SCAR SRPs**
- **Outreach and capacity building**



Programme Planning Group

Theme	Biodiversity, contemporary biogeography, colonisation	Palaeo reconstruction and evolution	Conservation and management, including invasions, interaction with CEP, SCATS, etc.	Data management
Leader	Don Cowan	Jan Strugnell	Mark Hindell	Bruno Danis
Key members	Angelika Brandt	Louise Newman	Kevin Hughes	
	David Barnes	Elie Poulin	Steven Chown	
	Pete Convey	Byron Adams	Antonio Quesada	
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	Piero Luporini	Dominic Hodgson	Martin Riddle	
	Stefano Schiaparelli	Nerida Wilson	Aleks Terauds	
	Nicoletta Cannone	Marc Eleaume		
	Huw Griffiths			
	Louise Allcock			

Overseers: Pete Convey, Guido di Prisco, Andy Clarke, Clive Howard-Williams, Kathy Conlan



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