Integrating Science, Conservation and Policy in Antarctica in the 21\textsuperscript{st} Century

\textit{Interfaces and...}

\textit{...Challenges}
**Steven Chown**

- **SCAR Science Horizon Scan (SHS)**

  **Audiences**
  - Science Community (SCAR)
  - Science funders
    - ACS

  **Affiliated Activities**
  - Martha T. Muse Prize
  - Muse Fellows Colloquium

**Antarctic Conservation Strategy (ACS)**

  **Audiences**
  - Policy Makers
  - Committee on Environmental Protection/Antarctic Treaty Consultative Meetings
    - AEP

**Antarctic Environments Portal (AEP)**

  **Audiences**
  - Policy Makers
  - Committee on Environmental Protection/Antarctic Treaty Consultative Meetings
    - Antarctic Treaty Parties

**Societal Benefit**

- Encourage international partnerships and cooperation
- Expand the global knowledge database
  - Inform policy discussions
  - Improve decision-making
- Attain conservation and stewardship goals
- Educate and engage the public

**Neil Gilbert**
1st SCAR
Antarctic and Southern Ocean Science Horizon Scan

Word Cloud
The 1st SCAR Antarctic and Southern Ocean Science Horizon Scan

The international Antarctic community came together to “scan the horizon” to identify the highest priority scientific questions that researchers should aspire to answer in the next two decades and beyond.
An inclusive process

- Community-wide question solicitations
  - Round 1 – 751 questions
  - Round 2 – 115 questions

- Retreat invitation nominations
  - 789 nominations of 510 individuals

- Scientists, Program Directors/Managers, policy makers, decision makers and early career scientists.

- 75 Retreat attendees from 22 countries

- 6-8 Observers (Nature, MFAT, Tinker Foundation, Media)
Six priorities for Antarctic science

Mahlon C. Kennicutt II, Steven L. Chown and colleagues outline the most pressing questions in southern polar research, and call for greater collaboration and environmental protection in the region.

Antarctica. The word conjures up images of mountains draped with glaciers, feroxioos seas dotted with icebergs and iconic species found nowhere else. The continent includes about one-tenth of the planet’s land surface, nearly 90% of Earth’s ice and about 70% of its fresh water. Its encircling ocean supports Patagonian toothfish and krill fisheries, and is crucial for regulating climate and the uptake of carbon dioxide by sea water.

Antarctic scientists are unlocking the secrets of Earth’s climate, revealing lakes and mountains beneath the ice, exploring the deep sea and contemplating the origins of life and the Universe. Once seen as a distant place frozen in time, Antarctica is now known to be experiencing relentless change. Local transformations such as the loss of ice, changes in ocean circulation and recovery of atmospheric ozone have global consequences— for climate, sea level, biodiversity and society.

In April 2014, the Scientific Committee on Antarctic Research (SCAR) convened 75 scientists and policy-makers from 22 countries to express the priorities for Antarctic research for the next two decades and beyond. This is the first time that the international Antarctic community has formulated a collective vision through discussion, debate and voting. The SCAR Antarctic and Southern Ocean Science Horizon Scan narrowed a list of hundreds of scientific questions to the 80 most pressing ones (see Supplementary Information: go.nature.com/llhboa). A full report will be published in August.
**SCIENCE PRIORITIES FOR…**

**DEFINE**
the global reach of the Antarctic atmosphere and Southern Ocean

**UNDERSTAND**
how, where and why ice sheets lose mass

**REVEAL**
Antarctica’s history

**OBSERVE**
space and the Universe

**LEARN**
how Antarctic life evolved and survived

**RECOGNIZE AND MITIGATE**
human influences

Stieg et al 2009

NASA/LIMA

NASA/LIMA

Antarctic and Southern Ocean Science
Integrated Science
The History and Future of Life

Informing policy, changing the course of events

Six priorities for Antarctic science
Theory, empiricism, technology, policy


Jane Francis

The Sweet Spot

Climate overcome

Enemies overcome

Barriers overcome
Theory, empiricism, technology, policy
Compact genome of the Antarctic midge is likely an adaptation to an extreme environment


Eric Sokol's MCSim metacommunity model

Whales from Space: Counting Southern Right Whales by Satellite

Peter T. Fretwell, Iain J. Staniland, Jaume Forcada

Local and regional influences over soil microbial metacommunities in the Transantarctic Mountains


Evidence of global-scale aeolian dispersal and endemic in isolated geothermal microbial communities of Antarctica

Craig W. Herbold1,2, Charles K. Lee1,2, Ian R. McDonald1-2 & S. Craig Cary1,2,3
Informing policy and changing the course of events

### The Antarctic Conservation Strategy

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<th>Policymaker summary - Pressure, State, Response</th>
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<td>12. Decision-support and implementation</td>
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The Antarctic Treaty System

Antarctic Treaty
- Promotes peace and science

Environmental Protocol
- Designates Antarctica as a natural reserve for peace and science
- Sets out tough environmental rules

Antarctic Treaty Meetings

Committee for Environmental Protection

Commission

Scientific Committee

Convention on Antarctic Marine Living Resources
- Conservation and rational use of marine resources
Committee for Environmental Protection

• Advises Treaty Parties on:
  – Environmental protection measures
  – Minimising / mitigating environmental impacts
  – Protecting special areas
  – Protecting species
  – The state of the Antarctic environment
  – The need for scientific research

*Informed governance and management of Antarctica*
Science to action

• State of environment reporting
• Management Action
  – Protected areas, specially protected species, EIA, guidance material, standards, catch limits, prohibitions
• Support / request research and monitoring
• Adopt / employ conservation tools
• Communicate nationally and internationally
GUIDELINES FOR THE OPERATION OF AIRCRAFT NEAR CONCENTRATIONS OF BIRDS IN ANTARCTICA

Fixed and rotary wing aircraft operations have the potential to cause disturbance leading to changes in the behaviour, physiology and the breeding success of wildlife. The level of impact will vary according to the intensity, duration and frequency of disturbance, the species involved and the phase in their breeding season. Most species are particularly sensitive to disturbance between late September and early May - the period when Antarctic helicopter and fixed-wing

Annex to Resolution 3 (2006)

Practical Guidelines for Ballast Water Exchange in the Antarctic Treaty Area

1. The application of these Guidelines should apply to those vessels covered by Article 3 of the IMO’s International Convention for the Control and Management of Ships’ Ballast Water and Sediments (the Ballast Water Management Convention), taking into account the exceptions in Regulation A-3 of the Convention. These Guidelines do not replace the requirements of the Ballast Water Management Convention, but provide an interim Ballast
The pace of change:
• climate
• human activity
• research

The pace of decision making:
• information
• awareness
• strategic planning
• Management tools

- Target analytes detected 25 km from the research bases
- Target analytes detected at concentrations similar to those reported in temperate environments with higher population densities.
• Urgent & increasing need for information
• The Portal:
  – Antarctic science at the fingertips of policy makers
  – Independent, reliable, up-to-date, policy ready summaries on priority issues
  – Raises awareness of emerging issues
• Outcomes
  – Future proofing
  – Sustainable Antarctica
  – Sustainable Antarctic Treaty Syste
Realizing the Promise of Antarctic Science

COMMUNICATE with all stakeholders

ENHANCE INTERNATIONAL COOPERATION

SUSTAIN STABLE FUNDING

PROVIDE ACCESS Region-wide Year-round

APPLY EMERGING TECHNOLOGIES

STRENGTHEN ENVIRONMENTAL PROTECTION

THE CHALLENGE...

NASA/LIMA Stieg et al 2009
"The best way to predict the future is to invent it."  A. Kay

"Tomorrow belongs to those who prepare for it today” paraphrase of an African proverb
Horizon Scan Supporters
An enthusiastic community effort!

Queenstown, NZ
20-23 April 2014

SCAR Antarctic & Southern Ocean Science Horizon Scan
To Reach for the Horizon:

“A coordinated, portfolio of interdisciplinary science, based on enhanced international collaboration as no one scientist, program or nation can realize these aspirations alone.”

"The best way to predict the future is to invent it." A. Kay

"Tomorrow belongs to those who prepare for it today” paraphrase of an African proverb