‘Omics and the Antarctic

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What are the science questions?

• How have organisms adapted to life in the cold?

• What is the level of biodiversity?

• How do they react when faced with changing conditions?

• How is the ecosystem impacted in a changing environment?

• Can we make accurate predictions of ecosystem level changes?
The imperative
Miniturisation

• *In situ* long term monitoring
  • Real time
  • Avoid tissue preservation
  • Micro-habitats

• Seasonality
Seasonality
Natural variability: Annual

Fig. 3. Seasonal variability in mean temperature in Antarctic marine, freshwater and terrestrial sites. Data presented for sea temperatures are from Signy Island (northern maritime Antarctic) and McMurdo Sound (continental Antarctic) after Clarke (1968), original McMurdo Sound data from Littlepage (1965) for 30 m depth. Data for freshwater are from Adelaide Island (southern maritime Antarctic), following Peck (2004). Data for terrestrial temperatures are also from Adelaide Island (P. Convey, unpublished data).

Natural variability: Daily

Fig. 5. Maritime Antarctic variability in temperature in summer (December) and winter (July). Data show comparisons of short-term (sub-hourly) temperature variation variability in summer (thick upper line) and winter (thin lower line) over several days in air, soil, freshwater and marine environments (all data for Signy Island, A. Clarke previously unpublished).
Summer solstice 2012
Autonomous sampling and analysis
Genome size and sequencing:
A cautionary tale

*Euphasia superba*
47Gb

*Homo sapiens*
3.2Gb
~23,000 genes