

MINUTES

LGP Terrestrial Publication Meeting

Video conference between University of Canterbury and Waikato University
6 May 2010

Participants:

Present at UC: Fiona Shanhun, Jenny Webster-Brown, Bryan Storey (Gateway Antarctica, Clive Howard-Williams, Shulamit Gordon,

Present at WU: Craig Cary, Megan Balks, Charlie Lee, Ian Hogg

Apologies: Roberta Farrell, Jackie Aislabie, Allan Green and Mark Stevens (who was unfortunately unable to join in as we couldn't get the conference phone working).

Background:

The purpose of this initial meeting was to establish whether there was common ground and connected developments within the terrestrial research undertaken under the LGP. If so the likely form of a publication synthesising these results, as a major outcome of this first phase of the LGP, was to be discussed. In addition, the potential for combining with a similar LGP marine publication was to be considered.

Within the context of a potential LGP terrestrial synthesis publication, each of the participants outlined what they considered to be their most significant research findings.

Research Results:

Megan Balks:

Soil conditions are responding to gradients other than latitude. The most important appear to be proximity to coast and altitude. Not sure how the Darwin will fit in to this, as it appears to be an anomaly ... as was Cape Hallett (due to penguin colony).

Craig Cary:

Most of their work has been in the McMurdo Dry Valleys, with LGP connections through an indirect role at Cape Hallett, and in the Darwin (via Mark Stevens). Seeing huge microbial diversity in the McMurdo Dry Valleys, and little cross over between valleys. Suspect that the history of the area is much more important than the effects of climate/latitude, as the systems are more responsive than had been thought. For example, shifting a mummified seal onto new ground showed that the microbial community structure changed within 2 years due changes in C, other nutrients, moisture etc. Therefore loss or change of microbial diversity could happen quickly in response to such changes, regardless of how they are brought about (e.g., by climate change or by other local or regional physical changes).

Bryan Storey:

Involvement in the LGP has mainly been through dating landscape age in the Darwin, where exposed ice-free surfaces range from millennia to just a few years in age. Connections with biodiversity suggest that this is higher in younger parts of the landscape (age gradient).

Clive Howard-Williams:

On the McMurdo Ice Shelf the ponds and patches of soil on the “dirty” ice, have acted as biological stepping stones allowing same microbial communities to develop across a large area. Wonders why the same thing hasn’t happened in the Dry Valleys (*Craig - notes that perhaps the environment is selective even though the seeding is the same*). Suggests that there is a mosaic of scales, e.g., with biodiversity, time and conditions. A paper could use this concept (of scales) as an important linkage between different types of study. Notes that in the first LGP Special Edition, it was observed that on a local scale, local differences were more important than regional change. The concept of scales was discussed in some detail, with Craig observing that the scale can be as fine as different minerals of a rock favouring different microbial communities. Ian Hogg notes that the scale issue has been analysed by Carusa (sp?).

Ian Hogg:

The invertebrate biology is linked into Bryan’s work with landscape age. Older ice-free landscapes are critical refuges for biota during the ice ages. The breaks noted in biological distribution may be related to this. Breaks are noted between the Darwin and Beardmore, for example, but also north of the Darwin where the Drygalski Ice Tongue is likely to have been an obstacle to distribution along the shoreline of Victoria Land. As with the microbiology, distinct genetics appear linked to the history of an area. It can take 100K to 1million years to get genetic change in invertebrate communities as they are less mobile than bacteria, and there is no selective pressure from predation.

Jenny Webster-Brown:

The latitudinal gradient does not appear to be the principal gradient controlling meltwater chemistry or microbiology in ponds between Cape Hallett and the Darwin. Significant differences occur in both chemistry and biology of meltwater ponds within each region, and even between ponds within a few meters of each other. The Darwin appears to be an anomaly in terms of pond productivity. Glacial cryoconites do not appear seeded by terrestrial ponds in the Darwin, unlike those of the Taylor Glacier to the north. Cape Hallett a problem for comparison, as there were not many ponds and the area was influenced by the penguin colony also. Coastal proximity appears to be a major driver of pond chemistry, and availability of P a major consideration for pond productivity. Clive notes that days above freezing will affect N₂ fixation and productivity, so should have an influence in the Darwin (less DAF).

Fiona Shanhan:

Looking at soil respiration rates (CO₂ release) in the Taylor Valley and in the Darwin. Still obtaining and interpreting results. Hard to measure CO₂ flux directly so using ATP (as an accumulated proxy) measurements instead, also using Lucene (sp?) method.

Charlie Lee:

Looking at the effect of landscape ages, particularly division into stages of <10yr, >1000yrs and >1million years. Considering how this affects soil accumulation, and the role of bedrock geology, particular on trace element release. Copper, for example, may be a major factor controlling cyanobacteria activity in the Beacon limestone.

Shulamit Gordon:

Notes that ICEMATE may be delayed a year, but will still provide a good opportunity for northern Victoria Land site access. We should keep this in mind. A US/NZ Science & Technology Commission conference is held every 2 years (this time in Wellington) and some of the LGP issues can be discussed in this forum, alongside the LTER and the linkage of Science to Antarctic Management.

The future of the LGP will be a topic of the LGP workshop at the NZ Antarctic Conference (in July, 2010), with issues such as the Beardmore season, whether the LGP should become a wider gradients programme (“Antarctic Gradient Program” ?), moving from descriptive to more functional/process studies but with consistent data collection for every site . Also thinking about scales for climate variation. Dr Peyman Zawar-Reza at UC to work on this with a PhD student looking at climate data analysis.

Summary

Support for a synthesis publication on the relative response of the terrestrial environment to gradients in (all or some):

- Latitude (may be minimal)
- Landscape age
- Coastal proximity
- Altitude
- Days above freezing
- Scale

Publication to include aspects of microbial ecology, invertebrate ecology, landscape age/dating, soil characteristics and geochemistry, but not to combine with Marine LGP synthesis paper, at least initially. Suggestions for a part I &II approach perhaps.

Timing – best to wait until results of Beardmore season are available, so plan for preparation in 2012. A Northern site would still be desirable for completion of the LGP, but is unlikely to fit within this time frame. Jenny W-B to collate information for publication when appropriate.

Circulation

Minutes to also be circulated to participants, to the wider LGP mailing list (as held by Shul), and to any other interested parties.