



Greenhouse gases and the need for integrated services to support climate mitigation

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In 2016, 175 parties agreed to ambitious greenhouse gas reductions under the UNFCCC Paris agreement, yet estimates of greenhouse gas emissions and uptake by sinks remain uncertain. The capability to verify emissions reductions at sub-national to national scale and guide carbon mitigation policy is urgently needed to support climate mitigation.

Atmospheric greenhouse gas measurements have a key role to play. The amount of greenhouse gases stored in the atmosphere is the by far the most well-known component of greenhouse gas budgets due to precise, accurate greenhouse gas records from a global network that comprises more than 400 stations, supported by over 80 nations. These measurements have been crucial to a range of scientific studies, but we have only begun to explore their potential to inform carbon mitigation policy.

We will present results from a case study in New Zealand, which suggests that NZ's land biosphere absorbs much more carbon than expected from the National Inventory Report (NIR) and previous synthesis reports. The NIR is the official national reporting of our greenhouse gas emissions and removals that follows international protocols and must be submitted annually to meet our UNFCCC obligations. The atmospheric data suggests that much of this missing carbon sink occurs in Fiordland, a high rainfall region dominated by indigenous forests. In addition to the results of our pilot study we will present plans to expand this effort through the newly funded CarbonWatch-NZ project. This five year programme will expand our national observing network to 11 permanent and 2 temporary stations, introduce urban and regional forest scale studies, leverage measurements of isotopes and carbonyl sulphide to understand source and sink processes, and integrate flux tower observations to understand the role of pastures.

In addition to addressing the scientific findings of this study, we will discuss the process used to engage New Zealand's NIR and environmental policy communities, starting from the development phase of the project. This will include the strategies used to resolve differences between components of the carbon budget counted in the NIR and those detected by the inversion, communicate uncertainties, and plan research activities that meet policy needs.