Australian Government
Geoscience Australia

Geoscience Australia and Greenhouse Gas Monitoring

Monitoring is an important aspect in verifying the integrity of the geological storage of greenhouse gases. Geoscience Australia is working with CSIRO, the CO2CRC, the Australian National University, the University of Adelaide and the University of Wollongong to develop and evaluate new techniques to detect and quantify greenhouse gas emissions.

Other projects are focusing on providing baseline groundwater chemistry maps and data for high priority greenhouse gas geological storage areas.

Research is also being undertaken to establish the best methods to measure background carbon dioxide (CO_2) levels in the atmosphere, so that we have a baseline upon which to measure possible emissions at potential geological storage sites.

Testing techniques and technologies

Geoscience Australia is undertaking multiple field experiments and surveys in collaboration with research partners to evaluate the effectiveness and sensitivity of CO_2 monitoring techniques. Measurement techniques being tested include several atmospheric monitoring methods, soil flux measurements, soil gas analysis, electro-magnetic field surveys and hyperspectral surveys.

Figure 1: Wireless network of solar powered CO_2 sensors and eddy covariance tower at the GA-CO2CRC Ginninderra greenhouse gas controlled release facility, Canberra.

Providing baseline assessments

Over the past four years, multiple groundwater surveys have been conducted in collaboration with the Geological Survey of Queensland in the Bowen and Surat basins. The data have been compiled with other historical datasets to develop baseline hydrogeochemical maps for several important aquifers in the Great Artesian Basin.

Groundwater chemistry could be sensitive to changes from activities such as geological storage or the production of coal seam gas and requires monitoring to ensure that changes can be detected early and appropriately managed. The maps will be made available as a regional baseline record of the groundwater chemistry in the Great Artesian Basin and assist with future groundwater monitoring programmes.

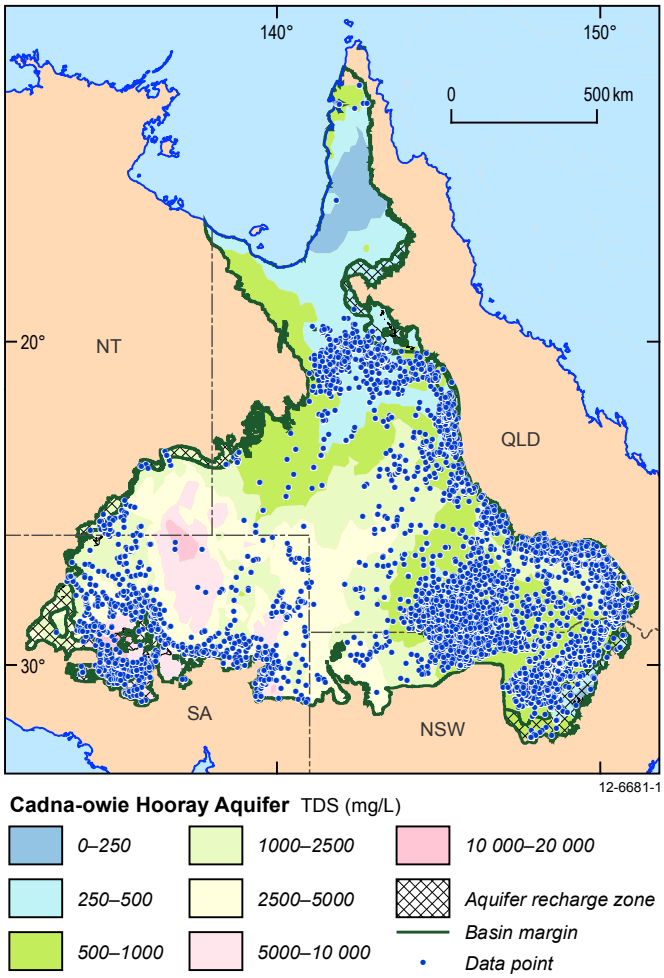

Figure 2: Updated groundwater salinity Total Dissolved Solids map for the Cadna-owie Hooray Aquifer in the Great Artesian Basin.

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Figure 3: Installation of equipment at the joint GA-CSIRO atmospheric greenhouse gas baseline station *Arcturus*, in central Queensland.

Demonstration of emissions quantification

In collaboration with CSIRO, an atmospheric monitoring station 'Arcturus' was established in 2010 near Emerald, Queensland. The aim of the project was to develop a baseline understanding of atmospheric greenhouse gas concentrations and fluxes near a site of interest for geological storage of CO_2 and evaluate atmospheric modelling techniques.

The data collected so far have enabled us to test atmospheric transport models for methane and CO_2 emissions from various known sources in the area. Geoscience Australia has also worked with CSIRO, the CO2CRC and the University of Wollongong to develop a new technique for emissions quantification, called atmospheric tomography. This technique can provide very accurate measurements of greenhouse gas emissions at a smaller scale.

Geoscience Australia is working with its collaborators to develop and field-test atmospheric quantification techniques that will underpin future greenhouse gas reporting requirements.

For Further Information:

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