The combination of capabilities offered by Australia’s Centre for Accelerator Science (CAS), affords ANSTO and its many external users access to a suite of tools in one location to undertake research in a vast array of fields — from archaeology to zoology.

CAS offers a suite of four accelerators and preparation facilities, providing access to cutting edge research techniques based on accelerator mass spectroscopy and ion beam analysis.

**Revealing the sources of air pollution**

Nuclear techniques have been applied to ‘fingerprint’ air pollution, so it can be traced back to its source across cities and across nations. In short, researchers identify the origin of the particles in the pollution and its impact on our environment.

By using a combination of techniques, including analysing the particles’ chemical composition and taking account of meteorological data, ANSTO researchers are able to quantify the effects of air pollution. This invaluable information provides data for policymakers making decisions affecting air quality.

**Finding sustainable water resources**

ANSTO researchers are studying groundwater on Rottnest Island, Western Australia to assess the sustainability of using this underlying water as a resource long-term.

Groundwater is used during the summer months to supplement the island’s other water supplies. This study uses the isotopic composition of the groundwater to determine how much groundwater there is and how quickly it is being replenished. Regular sampling and analysis is assisting in planning to meet the island’s future water needs.

**Offsetting greenhouse gas emissions**

Cutting edge research conducted at ANSTO is helping explain the major role marine and coastal ecosystems play in storing carbon to offset greenhouse gas emissions.

Coastal vegetation stores carbon far more effectively and permanently than terrestrial forests and freshwater wetlands, because organic carbon is often re-mineralised and thus lost to the atmosphere.

Mangrove and saltmarsh are considered the most efficient wetlands for sequestering carbon because the saline conditions inhibit the capacity of the bacteria responsible for methane (greenhouse gas) emissions.

**Stability of the Antarctic Ice Sheets**

ANSTO scientists are using an innovative age dating technique to determine the timing and magnitude of ice volume reduction at various locations of the East and West Antarctic ice sheets since the last Ice Age 20,000 years ago. The results are being used to measure the contribution of melting Antarctic ice to the global sea level rise of 120 meters over that time. Using this information, glacial modelling can then better assess the likely response of the Antarctic Ice Sheet to future global warming.