



Australian Government
Geoscience Australia

The Pine Creek AEM Survey, Northern Territory

(Data acquisition, processing, delivery and interpretation)

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GEOSCIENCE AUSTRALIA

Pine Creek Survey - Who's who:



Dr Mike Craig
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Regolith Geologist



Dr Songfa Liu
Senior Geologist



Ms Marina Costelloe
Geophysicist



Dr Ned Stolz
Geophysics Program Leader
Geophysicist



Dr Subhash Jaireth
Senior Geologist

Onshore Energy Security Program:

- Acquire pre-competitive regional AEM data;
- Attract investment in exploration for mainly uranium energy sources;
- Identify regions of enhanced uranium prospectivity using AEM;
- Regional surveys with wide line spacing to provide a better regional framework for exploration; and
- Target Paterson, Pine Creek and Frome Embayment regions.

This Survey

- Flown over the Pine Creek Orogen in the Northern Territory during 2008 and 2009:
 - Provides pre-competitive data for enhancing uranium and other mineral exploration;
 - **Covers an area of 74,000 km² (roughly the size of Tasmania);**
 - Area already hosts several uranium deposits, including the Ranger Uranium Mine, Rum Jungle and Nabarlek; and
 - The region is also prospective for metals including copper, lead, zinc, gold, tin, rare earths, tantalum, tungsten, molybdenum and nickel.

Its Purpose:

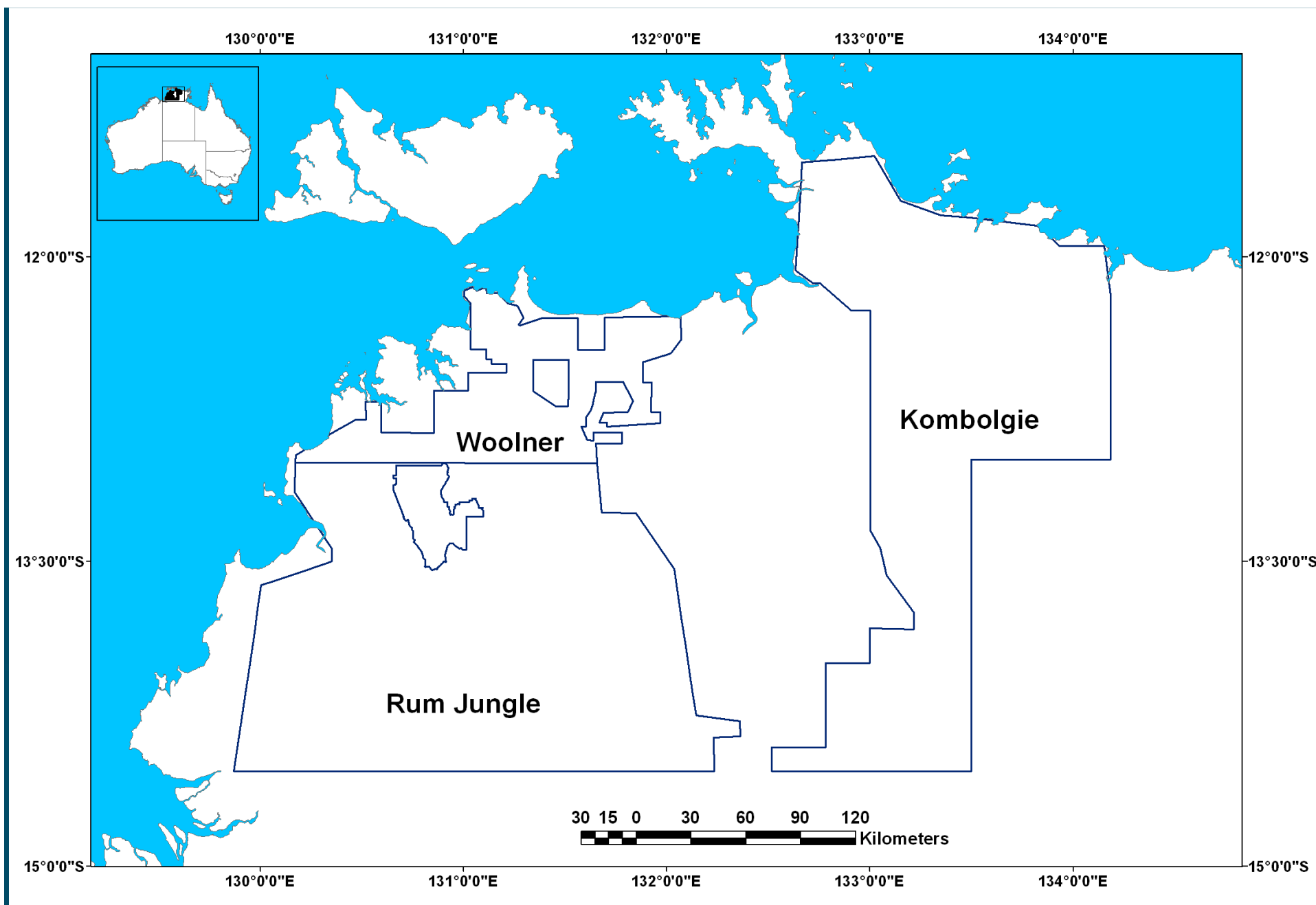
Provide pre-competitive AEM data to encourage energy and mineral exploration in Australia

Feature	Pine Creek
Depth to Basement	✓
Basement Structures	✓
Regolith Mapping	✓
Graphitic Units in the Basement	✓
Unconformities	✓
Hydrogeological Elements	✓

Mapping regional targets reduces exploration risk and encourages exploration in the region.

What areas?

- Survey comprises three major areas:
 - Kombolgie to the east of Kakadu National Park;
 - Woolner Granite near Darwin;
 - Rum Jungle to the west of Kakadu National Park.



The Pine Creek AEM survey

- Involved collaboration with:
 - NTGS;
 - NRETAS;
 - **Eight private infill companies;** and
 - National Water Commission.
- * additional investment of approximately \$2 million; and
- * Follow-up exploration now equals or exceeds this amount.

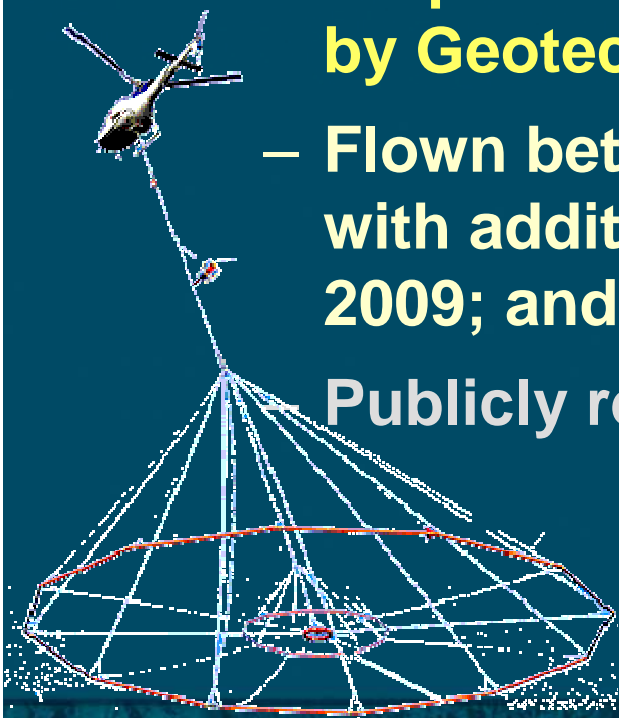
The Pine Creek AEM survey

- **Woolner Granite and Rum Jungle survey areas :**
 - Acquired using the TEMPEST fixed wing AEM system ;
 - **Acquisition and processing were carried out by Fugro Airborne Surveys Pty. Ltd ;**
 - Flown between August 2008 and May 2009 ; and
 - publicly released by GA in July and September 2009, respectively.



The Pine Creek AEM survey

- **Kombolgie survey area:**
 - Acquired using VTEM helicopter AEM system;
 - Acquisition and processing were carried out by Geotech Airborne Pty. Ltd;
 - Flown between August and November of 2008 with additional calibration flights flown in April 2009; and
 - Publicly released by GA in December 2009.



Survey Aims?

- The main aims were to:
 - Assess the potential for uranium mineralisation;
 - Map key geological features including;
 - » thickness and character of regolith
 - » Palaeozoic-Mesozoic-Cenozoic cover
 - » Thickness of the Kombolgie subgroup cover
 - » Discrete EM conductors within the Pine Creek Orogen basement
 - » Faults and other fluid pathways in both the cover and Pine Creek Orogen sequences and
 - » Sea water incursion into coastal aquifers; and
 - Improve understanding of the regional- and tenement-scale geology and prospectivity.

The Pine Creek AEM survey

- **Potential uranium systems and their associated key geological units:**
 - Sandstone-hosted: roll-front or palaeochannel styles within Permian;
 - **Mesozoic or Cenozoic sediments in palaeovalleys or sediment sheets adjacent to U-rich granitoids for example the Waterhouse granites;**
 - Proterozoic Unconformity Sedimentary-related: volcanic rock units forming the northwest edge of the Mesoproterozoic McArthur Basin unconformably overlying the Pine Creek Orogen basement units;
 - Westmoreland-type: Oenpelli Dolerite dykes and sills intrude both the Pine Creek and McArthur Basin sequences; and
 - **Vein-type: Within the Palaeoproterozoic rocks of the Pine Creek Orogen.**

Survey

- **Products:**

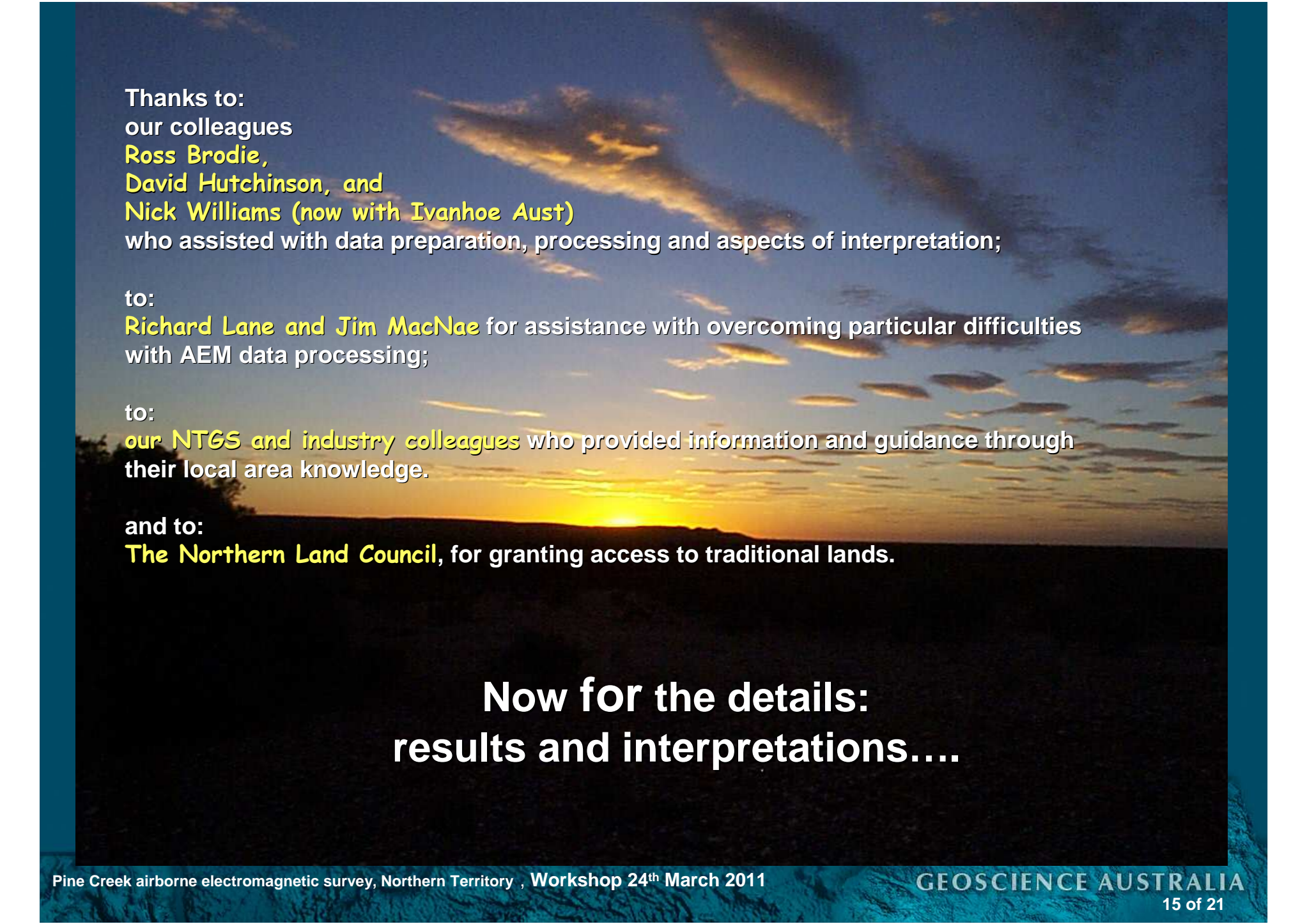
- **Sample-by-sample layered earth inversion products consisting of:**

- » Located data;
- » Geo-located conductivity depth sections;
- » Depth slice grids;
- » Elevation slice grids; and
- » An inversion report; and

- **An interpretation report highlighting:**

- » the impact of the new data for uranium prospectivity; and
- » the uses of regional AEM surveying to help decrease exploration risk in the Pine Creek area .





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their local area knowledge.

and to:

The Northern Land Council, for granting access to traditional lands.

**Now for the details:
results and interpretations....**