remobilized. The deposit is open at depth and recent drilling has delineated another ore-body (T6/T7).

The present geometry and distribution of stratigraphy and ore-bodies at the Flying Fox deposit reflects a complex interplay of primary and secondary processes. Recognition and understanding of these processes and their affects on nickel sulfides will further aid in exploration success.

Quaternary Evolution of Scott Reef, Australia's North West Shelf

Lindsay B. Collins[1], Andrew V Shuckstes[2],

[1] Department of Applied Geology, Curtin University of Technology, GPO Box U1987, Perth 6845, L.Collins@curtin.edu.au
[2] WorleyParsons, Level 7, 250 St Georges Terrace, Perth. 6000. andrew.shuckstes@worleyparsons.com
[3] WorleyParsons, Level 7, 250 St Georges Terrace, Perth, 6000. michael.page@worleyparsons.com

The North West Shelf is a modern tropical ramp which is underlain by Cretaceous-Tertiary limestones. Coral reef systems, discontinuously developed, vary from fringing reefs to isolated reefs which rise from deep-ramp settings. Evolution of the reef systems is being documented using seismic imaging, coring, bathymetric imaging and U-series dating.

Scott Reef (at 14oS) is a macrotidal, isolated reef which overlies a carbonate platform and a major gas discovery. It has recently been the site of coral bleaching and studies of such disturbances are ongoing. Seismic profiles reveal a buried Last Interglacial (MIS5, ca.125,000 year) reef system, in contrast to the widely exposed reef of similar age along the Ningaloo coast, such that reefs which apparently grew to sea level are now 30m below present sea level, indicating significant subsidence in the Late Quaternary. Contemporary reefs grew during the Holocene (last 10,000 years) in the accommodation space provided by subsidence and are up to 35 m thick. These reefs have growth rates similar to those recorded for tropical reefs elsewhere.

New, preliminary data have provided a greater understanding of the growth history of Scott Reef and the timing of sea-level events. The interaction of subsidence and glacial-interglacial sea-level change has resulted in multiple events of reef growth, each separated by periods of emergence and karstification, so that the reefs resemble a series of "stacked saucers" atop a 400m high carbonate platform.

Magmatic V-Ti-Fe mineralization at Barrambie, Western Australia

Peter L.F. Collins [1,2], Bryan Smith [2,3]

1. Department of Applied Geology, Curtin University of Technology, Perth WA, Australia
2. Reed Resources Ltd, 97 Outram Street, West Perth, WA Australia
3. Bryan Smith Geosciences, 47 Tain Street, Applecross, WA Australia

significant long-term source of vanadium and titanium. The high-grade deposit is part of a near-vertical layered, anorthosite-gabbro intrusive complex (Barrambie Complex) that has been emplaced into the Archaean Barrambie Greenstone Belt. The Barrambie Complex is 500-1700m thick and has a strike length of at least 22 km. It is blanketed by colluvium and residual lateritic capping above a weathered profile that extends for up to 80m below surface and has distinct geochemical profiles. V-Ti-Fe mineralisation occurs as cumulative segregations of vanadiferous magnetite and ilmenite within a 150-200m thick anorthositic zone. Most of the mineralization, in the 'Central Bands', consists of massive bands and lenses (>80% magnetite-ilmenite) that are separated by layers of anorthosite-gabbro with disseminated magnetite and ilmenite. The eastern margin of mineralization is defined by a continuous, 20-30m thick, massive Ti-enriched 'Eastern Band'. The magnetite-rich layers are continuous over at least 11 km strike length (with small fault offsets).

Coarse granular magnetite and ilmenite are the dominant primary ore minerals with much of the ilmenite present as lamellae within magnetite grains. Within the weathered profile magnetite is almost completely altered to hematite (martite) and ilmenite is partially altered to leucoxene. Vanadium is mostly in solid solution in magnetite (martite), which contains up to 3.6% V_2O_5. There is a distinct bimodal distribution of V and Ti composition of the ore, which is similar to several other magmatic V-Ti-magnetite deposits in layered intrusive complexes elsewhere in the world.

The Phanerozoic: Reconciling modern plate tectonics with ancient orogenic systems and crustal growth

W.J. Collins[1], A.I.S. Kemp[1]

[1]School of Earth Sciences, James Cook University, Qld, 4811. (bill.collins@jcu.edu.au) (tony.kemp@jcu.edu.au)

Phanerozoic Earth history affords us the precious opportunity of understanding the links

continued next page...

between active tectonic processes and crustal growth, because we have the oceanic and continental record to combine into a coherent, whole-Earth geodynamic model. Such integrated models might then be applied to the Precambrian with some confidence. Phanerozoic orogenic systems can be grouped into two broad types: *accretionary* (circumPacific) and *collisional* (Alpine-Himalayan in Mesozoic-Cenozoic; Appalachian-Variscan in Paleozoic). These two systems reflect the effects of simple, long-term (500 Ma) mantle convection involving two global cells separated by the circumPacific subduction zone (Collins 2003, EPSL 205, p.225). Accretionary orogens form in the "Panthalassan" cell, where diverging Pacific Ocean crust prevents entry of continental fragments into that cell, thereby creating a stable, long-lived subduction zone, and equally long-lived, circumPacific orogenic system. In contrast, collisional orogens form in the "Pangean cell, which is traversed by a single subduction system (Alpine-Indonesian). This system is intrinsically unstable because continental fragments exist on the subducting plate. The instability causes MOR- and trench-jumps in the Indian Ocean, which have combined to progressively fragment and transfer Gondwana northward into Asia. Arrival of Gondwanan fragments at the subduction zone completes the Wilson cycle, which characterizes most Phanerozoic collisional orogenic systems.

Crustal growth is more likely to occur in accretionary systems, as collisional systems are largely continental transfer. However, exceptions occur in both. For example, the Andes seem to record little or no net crustal growth over almost 500 Ma. Rapid crustal growth seems to be confined to accretionary systems where large oceanic backarcs fill with turbidite, then are reworked into continental crust during alternating advance and retreat of the outboard subduction zone. The Paleozoic Tasmanide orogenic system of eastern Australia is an excellent example. The processes described above suggest that crustal growth mainly occurs by backarc opening and closing, not by crustal accretion at the arc front, which is borne out by the isotopic record of zircon growth on the Australian continent.

The AuScope Far North Queensland Survey.

W.J. Collins[1], Brian Kennett[2] and Bruce Goleby[3]

[1] *James Cook University, Townsville, Qld, 4811, Australia (bill.collins@jcu.edu.au).*
[2] *Research School of Earth Sciences, ANU, Canberra ACT, 0200,, Australia.*
[3] *Geoscience Australia, PO Box 378 Canberra ACT 2601, Australia.*

The Australian Government's National Collaborative Research Infrastructure Strategy (NCRIS) initiative awarded AuScope (http://www.auscope.org.au/) $42.8 million to support geoscience. AuScope will establish world-class infrastructure to characterise the structure and evolution of the Australian continent in a global context, from surface to core in space and time; and provide better understanding of the implications for natural resources, hazards and environment. The Earth Imaging and Structure (ANSIR) component of AuScope is focused on providing 3D databases of geologically important regions, which will be achieved through the collection of GeoTransects. AuScope will collaborate with, and use the services of ANSIR to achieve this.

In August 2007, the Far North Queensland (FNQ) Tasman Line project became the first AuScope Traverse to be acquired. This survey links with the GA/GSQ Isa-Georgetown-Charters Towers survey and together, provide an exceptional opportunity to image this important region of Australia crust in three-dimensions. FNQ best preserves the Tasman Line, which is the boundary between the Precambrian craton of Australia, and the Phanerozoic Tasmanides to the east.

The correlation between the lithospheric-scale structures evident in the seismic tomography images with mapped surface structures from observed geology suggests that this region is ideal for investigating the relationship between major upper crustal province boundaries and major features observed in geophysical images.

The FNQ AuScope Reflection Traverse will address important questions regarding the nature of continental growth in eastern Australia. The raw field stack indicates a significant change in Moho depth on either side of the Tasman Line, considerable coherent reflectivity within the middle crust and evidence of shallow mid-crustal structures. However, the seismic imaging does not indicate the presence of a single major structure that corresponds with the Tasman Line. The data now requires processing to enhance the seismic image within the upper crust.

Trace Elements In Sphalerite: Concentration Levels And Mode Of Incorporation.

Nigel J. Cook[1], William Skinner[2], Cristiana L. Ciobanu[3], Allan Pring[3], Masaaki Shimizu[4] And Leonid Danushevskiy[5]

[1]*Natural History Museum, University of Oslo, Norway: nigelc@nhm.uio.no*
[2]*Ian Wark Research Institute, University of South Australia, Adelaide, S.A., Australia,*
[3]*South Australian Museum, Adelaide, S.A., Australia*
[4]*University of Toyama, Japan*
[5]*CODES, University of Tasmania, Hobart, Tasmania, Australia*

Sphalerite from >20 ore deposits has been analysed by LA-ICP-MS for Ag, As, Bi, Cd, Co, Cu, Fe, Ga, Ge, In, Mn, Mo, Ni, Pb, Sb, Se, Sn and Tl. The suite included samples with wt.% levels of Mn, Cd and In. The aim was to better constrain solid solution ranges in the context of crystal chemistry and phase relationships, distinguish between solid solution and microscale inclusions, and to identify