SCHOOL OF GEOSCIENCES
MONASH UNIVERSITY
A member of the Victorian Institute of Earth and Planetary Sciences (VIEPS)

HONOURS AND MASTERS PROGRAMS AND PROJECTS FOR 2006

INTRODUCTION

The School of Geosciences at Monash University, a member of the Victorian Institute of Earth and Planetary Sciences (VIEPS), offers two fourth year programs for well-qualified students who have completed a three-year undergraduate degree:

- a one year full-time or two year part-time Honours program, and
- a one year full-time or two year part-time Masters Preliminary program, which, subject to satisfactory completion at a level of Honours 2nd Class Division A or better, leads into a second year full-time or two years part-time of the Masters Research year.

Graduates who already have an Honours qualification can undertake a one to two year research Masters program, focussing almost entirely on a research project and thesis, but including however much optional coursework from the VIEPS course program as is desired.

Following is information about our Honours and Masters programs for 2005. Further information is available from the Honours and Masters Co-ordinator, Professor Ray Cas as follows:

Telephone: 03 9905 4897 email: Ray.Cas@sci.monash.edu.au

(Four your information, the Victorian Institute of Earth and Planetary Sciences (VIEPS), is a collaborative consortium between the geoscience/earth science Schools at Monash and Melbourne universities. VIEPS allows students to take relevant fourth year subjects at any of the VIEPS schools and facilitates access to all research facilities at the VIEPS schools. These arrangements give VIEPS students and staff an unprecedented advantage in Australia in accessing educational and research opportunities and facilities.)

GUIDELINES FOR APPLYING HONOURS AND MASTERS PROGRAMS:

Procedures for Honours Applications

1. Student obtains honours application from the Faculty, School/Department (Mrs Monika Walker, Room 128 , Building 28) or WEB:
   http://www.sci.monash.edu.au/undergrad/adminforms.html
   http://www.sci.monash.edu.au/forms/studentforms.html or
   http://www.sci.monash.edu.au/students/undergrad/honours.html

According to the Faculty of Science, application forms will be available in October.

2. Completed honours applications are to be lodged with the Faculty of Science by 11th November. Applications from students from other institutions must be submitted, if possible, with a

certified copy of the academic record and a statement confirming that the student has qualified for a Science pass degree, by 30th November. Students must consult with their prospective supervisors and notify the honours coordinator prior to completing and submitting their application;

3. The Faculty Office will circulate an excel spreadsheet with applicant details and application status etc. to the relevant School/Department after the internal applications closing date.

4. After the availability of academic results for the present semester, the Faculty, in consultation with the School/Department, will finalise assessment of the honours applications.

5. The Faculty Office will send students an official honours offer letter during December.

6. Successful applicants commencing Honours in semester 1 2005 will enrol late January.

7. **The VIEPS and Monash Geosciences Honours year starts at the *beginning of February*.**

8. Students who are eligible and want to begin midyear should also submit an application form this round.

Procedures for Masters Applications:

- Masters Preliminary application forms are also available from Mrs. Monika Walker, School of Geosciences, or from the Faculty of Science Office, or from
  http://www.sci.monash.edu.au/students/prosp/postgrad.html
  (select Masters Preliminary)

- Masters Preliminary students can submit an application at any time of the year but it is strongly recommended that their timetable conforms with the Honours year (calendar year or midyear) to take advantage of the VIEPS course program and the moral support of having others at the same stage of their study program.

PREREQUISITES FOR ENTRY

- **Honours:** Average 70% or better (Distinction or better) in 4 related third year subjects/units (24 credit points) relevant to geosciences in the Monash system, or half a Third course load in other institution systems). However, the Faculty of Science will consider applications for Honours from students with a 24 point 3000 level average of 65 to 70% if the prospective supervisor, supported by the Head of School, provides a strong written supporting case, and if the remaining marks average is also in the 65%+ ball park. A case should be attached to the student's application when originally submitted. Obviously, the closer the average is to 70%, the better the chances.

- **Masters Preliminary:** As for Honours, although students with an average a few percentage points less may be accepted with the approval of a supervisor and the Head of School.

- **Masters Research:** Honours or Masters Preliminary at a standard of 70% (Honours 2A) or better.

COURSE STRUCTURE

Honours:

- schedule: can be taken fulltime, part-time; calendar year, midyear
- duration: beginning of February to beginning of November (full-time, calendar), or equivalent schedule for part-time, or mid-year start
- 4 one-week VIEPS fourth year shortcourses chosen consultatively by student and supervisor, and from course available at any of the VIEPS Schools at Monash, Melbourne or LaTrobe universities or even elsewhere. Each course is worth 6.25%.
- literature review research essay on a topic relevant to the main Honours or Masters research project
- seminar on research project, worth 10%
- thesis on research project, worth 65%

Masters: Preliminary (Year 1)

- can start anytime of year, but beginning of year or midyear is recommended
- structure as for Honours year

Masters Research (Year 2)

- focus on research project (usually same one as undertaken in Year 1) and write final thesis
- a further 4 one week short courses required, with an overall 70% grade required.

GRADING SCHEME

Honours and Masters Preliminary grades have different names than undergraduate grade names. They are as follows:

- 1st Class Honours: 80% - 100%
- 2nd Class Division A 70% - 79%
- 2nd Class Division B 60% - 69%
- 3rd Class 50% - 59%
- Fail < 50%

Marks from all assessable components are collated at the end of the year in the following proportions, leading to the assignation of the appropriate Honours or for Masters Preliminary, Honours equivalent grade:

- Coursework 25%
- Research seminar 10%
- Thesis/MSc Prelim. Report 65%

PROJECT LIST

3D Geophysical Modelling of key fault geometries in the Mount Isa inlier.

Supervisor/s: Laurent Ailleres & Barry Murphy (Uni. Melb)
Field of study: Geophysics, Structural Geophysiscs, 3D modelling
Support Offered: Field and analytical costs.
Collaborating organisation/s: pmd*CRC, Uni Melbourne
Preferred Program: Honours

This project will focus on refining geometries for parts of key mineralised faults networks in the Mount Isa Inlier. Research will involve geophysical interpretation (2D) and forward modelling (2.75D forward modelling in GMSYS) followed by 3D geometrical modelling. The aim is to refine the said geometries and integrate these results in the larger scale fluid flow modelling undertaken by pmd*CRC researchers.

Geothermal Energy and Crustal Heat Flow

Supervisor: Graeme Beardsmore
Field of Study: Heat Flow; Regional Geophysics
Support Offered: Field and laboratory support
Collaborating Organisation/s: Scopenergy Limited
Preferred Program: Honours

Geothermal energy has the potential to contribute to the reduction in Australia's greenhouse gas emissions, through both electricity generation and direct usage. However, exploration for geothermal energy resources in Australia is in its infancy. Much work is required to identify potential targets for high crustal temperatures at shallow depth, close to potential energy markets. This project will involve working closely with a geothermal energy exploration company to develop conceptual models of crustal temperature in southeast Australia, and to test those models against field measurements of surface heat flow. It will involve interpretation of regional geophysical data sets, field and laboratory work, and some computer modelling.

For further information, contact Graeme Beardsmore

Alteration styles in felsic volcanics around intrusive komatiitic dunites

Supervisor/s: Ray Cas, Steve Beresford
Field of study: Multi-disciplinary including volcanology, geochemistry, ore geology
Support Offered: Travel, field and analytical Costs.
Possible vacation employment at BHPBilliton Ltd
Collaborating organisation/s: BHPBilliton Ltd
Preferred Program: Honours only

The alteration styles in felsic volcanics intruded by komatiitic dunites are poorly understood and could act as a vector to areas of highest heat flow. This project willl involve comparing and contrasting alteration near dunites from away...so a combined felsic volcanology and alteration systematics...distinguishing contact metamorphism from regional metamorphism vs diagenesis (not

so easy in felsic volcanics). Can we recognise contact affects?

The geology of the Audentes komatiite system, Western Australia

Supervisor/s:	Ray Cas, Steve Beresford
Field of study:	Multi-disciplinary including volcanology, geochemistry, ore geology
Support Offered:	Travel, field and analytical Costs. Possible vacation employment at BHPBilliton Ltd
Collaborating organisation/s:	BHPBilliton Ltd
Preferred Program:	Honours only

The Audentes.komatiite system of Western Australia is a poorly known komatiite with traces of NiS minerlaisation. The project would involve surface mapping, logging of drill core, establishing structure and stratigraphy, and understanding the volcanology and origins of the mineralization.

For further information, contact ray.cas@sci.monash.edu.au

The geological setting and evolution of the White Flag Lake area, Western Australia

Supervisor/s:	Ray Cas, Peter Betts, Rick Squire, Gerard Tripp
Field of study:	Multi-disciplinary including structure, stratigraphy, volcanology, sedimentology, and geochemistry
Support Offered:	Travel, field and analytical costs (to be confirmed). Possible vacation employment Placer Dome
Collaborating organisation/s:	Placer Dome, Kalgoorlie
Preferred Program:	Honours only

The area around White Flag Lake, northwest of Kalgoorlie, Western Australia, is a classical Archaean greenstone terrain, consisting of felsic and mafic volcanic and intrusive rocks and sedimentary rocks. The succession has been variably deformed, and relatively little is known about its geological setting, and history. Placer Dome intends to begin an exploration program, and is willing to support a geological study of a part of the area.The project would encompass geological mapping, structural analysis with sedimentological/volcanological interpretation and reconstruction of the area
For further information, contact ray.cas@sci.monash.edu.au

Basaltic volcanism in the Newer Volcanics Province of Victoria and South Australia

Supervisor(s): `	Ray Cas, Laurent Ailleres, Ian Nicholls, Bruce Schaefer
Field of Study:	Physical volcanology
Support Offered:	Field support, analytical costs
Preferred Program:	Honours or MSc: 1-2 project(s)
Collaborating Organisation:	None

The Newer Volcanics Province of western Victoria and southeastern South Australia includes some spectacular phreatomagmatic and magmatic explosive, and lava forming volcanic centres, however much work still needs to be done on this poorly understood volcanic province. One or more of these centres are to be the focus of a research program aimed at documenting in detail the eruptive sequence of events, eruption, transportation and depositional processes, deposit characteristics, and quantifying the eruption dynamics. Although magmatic volatiles may have played some part in the explosive activity, it also clear that aquifers of the Tertiary of the subjacent Otway Basin succession

have sourced explosive energy. The project will involve initial study of regional geophysical data sets to use aeromagnetics, radiometrics and gravity to assess the regional framework of the field area and as first order mapping tool for lavas and eruption centres (you don't have to be a geophysical wiz kid for this!) followed by field mapping, section logging, sampling, sieving, geochemistry, including perhaps some isotopic studies and simple hydrogeology.
For further information, contact ray.cas@sci.monash.edu.au

Groundwater-surface water interaction in SE Australia

Supervisor/s: Ian Cartwright
Field of study: Hydrogeology and Environmental Geoscience
Support Offered: Field and analytical costs.
Collaborating organisation/s:
Preferred Program: Honours (up to 2 projects)

These projects focus on understanding groundwater-surface water interaction in SE Australia using a combination of river and groundwater data. Major ion and stable isotope geochemistry will be used to identify and quantify groundwater fluxes to rivers and to examine the origin and fate of solutes. The impacts environmental changes, such as land use changes, regulation of flow via dams, and dryland salinity, will also be addressed on the natural pattern of groundwater-surface water interaction. The results of this work will have significant implications for understanding and managing land and water resources in southern Victoria.

Carbon cycling in SE Australian Rivers

Supervisor/s: Ian Cartwright
Field of study: Environmental Geoscience
Support Offered: Field and analytical costs.
Collaborating organisation/s:
Preferred Program: Honours (up to 2 projects)

These projects focus on understanding carbon transport in SE Australian rivers using primarily C isotopes together with major ion chemistry. Documenting carbon budgets is a major concern for understanding processes within the biosphere that also has implications for understanding climate. The projects will aim at discerning organic vs inorganic carbon sources and quantifying carbon fluxes from a number of rivers that vary from pristine to impacted.

Groundwater discharge processes in the Glenelg-Hopkins region

Supervisor/s: Ian Cartwright & Marc Leblanc
Field of study: Hydrogeology and Environmental Geoscience
Support Offered: Field and analytical costs.
Collaborating organisation/s:
Preferred Program: Honours (up to 2 projects)

This project focuses on groundwater and surface water processes in discharge areas in the Glenelg-Hopkins region using a combination of fieldwork, groundwater and surface water chemistry, soil / sediment chemistry, and remote sensing. The aims will be to delineate discharge areas (e.g. lakes or rivers) and to understand the processes in those areas, including evapotranspiration, water-rock interaction, and mineral precipitation. The results of this work will have significant implications for

understanding and managing land and water resources in southern Victoria and mitigating the impacts of land clearing and environmental change.

Remote Sensing and GIS applications for Water Resources Management

Supervisor/s:	Marc Leblanc
Field of study:	Hydro(geo)logy, remote sensing and GIS
Support Offered:	Field, data and analytical costs.
Collaborating organisation/s:	-
Preferred Program:	Honours (1-2 projects)

This project will focus on applications of remote sensing and GIS to improve understanding and management of water resources in drought prone regions. The project will use a combination of satellite data (e.g., Modis, Aster, radar) in a GIS framework to look at past and present variability of water resources in these vulnerable regions. Specific objectives will include the mapping of ancient hydrological features and the monitoring of large inland lakes using State of the Art remote sensing and GIS packages. The results of this study will have very significant implications for proposing effective monitoring systems and assessing the impact of climate change on water resources.

Structure, stratigraphy and evolution of the Proprietary Peak – Mt. Jukes area, West Coast Range, Western Tasmania.

Supervisor:	Mike Hall
Field of Study:	Structure, stratigraphy, basin evolution
Support:	Field costs, including travel to and from Tasmania
Preferred program:	Honours, could be enlarged for MSc

The Proprietary Peak – Mt. Jukes area contains some of the best exposures in the entire West Coast Range of sediments and structures involved in the Palaeozoic history of western Tasmania. Extensional faults controlled both Late Cambrian deposition and Early Devonian inversion structures, before the area was again strongly deformed in the Middle Devonian. The objective of this project is to produce a detailed structural and stratigraphic map, followed by an accurate cross section that can be back-stripped to help understand details of both the extensional and compressional history of the area.

Structure and evolution of the Sorell Peninsula, Macquarie Harbour, Western Tasmania

Supervisor:	Mike Hall
Field of study:	Structure, stratigraphy, geophysics
Support:	Field costs, including travel to and from Tasmania
Preferred program:	Honours or MSc

Rocks exposed along the Macquarie Harbour coastline of the Sorell Peninsula include sediments, volcanics, ultramafics and low-grade metamorphics and range in age from Proterozoic to Ordovician. Some of these rocks were deformed in the Delamerian Orogeny and all were deformed in the Tabberabberan Orogeny. The objective of this project is to construct a detailed cross section, model it geophysically and restore it in order to help resolve the geological history of the area.

Structural and stratigraphic evolution of the coastal area between Cape Otway and Moonlight Head, Western Victoria.

Supervisor:	Mike Hall
Field of study	Structure, stratigraphy, geophysics
Support:	Field costs and accommodation at Apollo Bay
Preferred program:	Honours

Early Cretaceous and Tertiary sediments exposed along this stretch of coastline are folded and cut by large faults. The objective of this project is to construct a detailed cross section that can be backstripped in order to detail the geological history of the area. There will also be the opportunity to undertake a more detailed study of either the stratigraphy and sedimentology or geophysical aspects of the area, including seismic interpretation and/or gravity and magnetic modelling.

Structure and paragenesis of Au-Bi-Sn-W-Mo mineralisation at Glala Range, northern Queensland

Supervisor/s:	Geordie Mark
Field of study:	Geochemistry, ore geology
Support Offered:	Field and analytical costs.
Collaborating organisation/s:	Auzex Resources
Preferred Program:	Honours

This project will investigate the structural and hydrothermal evolution of the Au-Bi-Sn-W-Mo-rich hydrothermal system at Glala Range, northern Queensland. The aim of the work is to determine the structural controls on the distribution of base and precious metal mineralization, and assess its relations coeveal magmatic intrusions. Fieldwork will involve detailed field mapping and potentially diamond drill core logging. Furthermore, the research will integrate advanced analytical analysis, including XRF and INAA of whole rock samples, and stable isotope analysis of ore-related silicates and sulphides. The results of this work with be integrated with concurrent exploration activities in northern Queensland, and will aid in the development of exploration models in the New England Batholith region.

Modeling the dynamics of subduction zones

Supervisors:	Louis Moresi, Dave Stegman, Pete Betts
Field of study:	Geodynamics / global tectonics
Support offered:	Supercomputer training course
Collaborating organisations:	Victorian Partnership for Advanced Computing
Preferred Programme:	Honours

This project brings together computer modeling and large scale geophysical datasets such as seismic tomography, oceanic bathymetry and geoid, regional seismicity to model how slabs evolve during the subduction process. No programming is required but there is the opportunity to learn about how computational geodynamics codes work. The project can be taken in a number of different directions according to the interest and experience of the student. For example: comparing geological observations in convergent settings with model results; compiling remote sensed observations and tectonic reconstructions for a specific region to build your own model; studying the stress conditions in the slab for a range of parameter space.
Contact:louis.moresi@sci.monash.edu, dave.stegman@sci.monash.edu, peter.betts@sci.monash.edu

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Analogue and numerical models of crustal deformation models

Supervisors:	Louis Moresi, Catherine Mériaux
Field of study:	Geodynamics, structural geology
Support offered:	Laboratory materials
Collaborating organisations:	Victorian Partnership for Advanced Computing
Preferred Programme:	Honours

This project is aimed at better understand the dynamics of extension and/or compression of the continental lithosphere. It will involve Earth-like experiments in the Epsilon laboratory combined with numerical models using the Underworld code. No programming is required but there is the opportunity to learn about how computational geodynamics codes work. The project can be tailored to the student's individual interest (e.g. if you have a preferred field area which you would like to model). In general, however, the approach is similar: first we expect to show that the parametrization used in the numerical experiments is relevant when compared with the laboratory experiments. Second we wish to find the different regimes of behaviour for the extension and/or compression of the continental lithosphere in terms of the typical scales that will characterize our models. Comparison with regions responding to compression and/or stretching can also be investigated.
Contact: louis.moresi@sci.monash.edu, catherine.meriaux@sci.monash.edu

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Unusual "Newer Volcanics"(?) trachyandesite cones in the Gisborne-Sunbury area

Supervisor/s:	Ian Nicholls, (Ray Cas, Bruce Schaefer)
Field of Study:	Field relations/volcanology of mafic-intermediate lavas/pyroclastics, petrology, geochemistry
Support Offered:	Field and analytical costs
Collaborating Organisation/s:	N/A
Preferred Program:	Honours/Masters

In the Gisborne-Macedon-Woodend area northwest of Melbourne there are a number of lava/spatter cones of unusual hypersthene-bearing trachybasalts and trachyandesites, some with abundant igneous enclaves indicating mingling/mixing of tholeiitic magmas. In a number of cases there is evidence for a range of mid-crustal granulite xenoliths, as well as granitic and sedimentary material of shallower origin. It is uncertain whether these occurrences belong to the ~6 Ma group of lava domes which includes the Camel's Hump trachyte or form part of the 4.5 Ma-5,000 year BP "Newer Volcanics" field. Third Year and Honours project work during the past year has outlined the petrography and geochemistry of some of these enigmatic rocks. But there remain major problems to be addressed concerning their age and genetic links, including the origin of clearly xenocrystic hypersthene and sodic augite phenocrysts. Because of the relatively silica-rich and viscous nature of parent magmas for these cones, there are some spectacular examples of formation of agglutinated spatter aprons followed by intrusion of dyke like bodies which probably fed small summit "lava lakes". There are excellent road and quarry exposures in several cones which would allow detailed physical volcanology studies.

Magma mingling/mixing in the Tynong Granite complex, western Gippsland

Supervisor/s:	Ian Nicholls, (Roland Maas, University of Melbourne)
Field of Study:	Field mapping**;** granite emplacement mechanisms; petrology/geochemistry
Support Offered:	Field and analytical costs

Collaborating Organisation/s: N/A
Preferred Program: Honours/Masters

The Tynong Granite complex is a large area of Late Devonian granitic rocks, consisting of 5 closely spaced plutons, in the Tynong-Neerim area north of Warragul. One of the best exposures is in a working quarry near Tynong North, just off the Princes Hwy. Here, a zone of mingling/mixing between more mafic and more felsic phases is spectacularly exposed, with the mafic phase forming large pillow-like enclaves. This occurrence is suitable for detailed mapping and petrological/geochemical study. In addition, other plutons have a range of more felsic rock types whose distribution and petrology are well worth a study.

Dioritic intrusive activity and gold-platinum mineralization of the Devonian "Woods Point Dyke Swarm" – possible relationships with the Mt. Stirling-Mt. Buller diorite-granite complex?

Supervisor/s: Ian Nicholls
Field of study: Field mapping; petrology/geochemistry (of mineralized rocks and unmineralised equivalents)
Support Offered: Field and analytical costs
Collaborating Organisation/s: GeoScience Victoria
Preferred Program: Honours/Masters

A component of the project will be to place the Wood's Point Dyke Swarm within the wider context of ~370 Ma and younger granitic and more mafic magmatism within and just outside the Melbourne Zone. Several granitic complexes within the Zone, and especially the Mirimbah-Mt.Buller-Howqua complex just east of the Zone contain isotopically primitive I-type granodioritic to gabbroic rocks, often with mafic enclaves, which show strong direct or indirect mantle influences. The Mt. Stirling Granodiorite at Mt. Buller is associated with at least two types of mafic-intermediate rocks - low-K diorites-gabbros with strong similarities to equivalents within the Wood's Point swarm and more potassic syenodiorites. There is a strong possibility that (probably directly mantle-derived) magmas of the types represented by these two suites contributed to dyke swarm intrusive activity (and to the origin of magmatic ore deposits). This possibility should be assessed on the basis of comparisons between field relationships, major and trace element geochemistry, and preferably isotope geochemistry of rocks of the Mt. Buller complex and the Wood's Point swarm. This work would be combined with more detailed studies of temporal/genetic relationships between gold and platinum mineralization of the Woods Point swarm and magmatic activity.

Origin and tectonic significance of the Ifould Suite, western Gawler Craton SA

Supervisor/s: Bruce Schaefer, Peter Betts
Field of study: Geochemistry, Structural Geology
Support Offered: Field and analytical costs.
Collaborating organisation/s: PIRSA (Primary Industry and Resources South Australia), Adelaide University
Preferred Program: Masters

This project will focus on understanding the timing and source of the Lake Ifould intrusive rocks in South Australia. They occupy a critical niche in the tectonic reconstruction of the Palaeoproterozoic in Australia, as the somewhat sparse previous work has considered them to represent a convergent plate margin arc complex. Application of refined geochemical and isotopic (particularly Sm-Nd and Re-Os) isotopic techniques will test not only the tectonic setting for these rocks, but also offer insights into their actual age. This will enable more precise lithospheric scale

reconstructions of the assembly of Precambrian Australia. Opportunities exist to collaborate with co-workers at Adelaide University.

Kimberlites and xenoliths as indicators of Lithospheric structure beneath the Gawler Craton SA

Supervisor/s: Bruce Schaefer, Peter Betts
Field of study: Geochemistry, Geophysics
Support Offered: Field and analytical costs.
Collaborating organisation/s: PIRSA (Primary Industry and Resources South Australia), Adelaide University
Preferred Program: Masters

This project will focus on analysing the isotopic composition of kimberlites, lamproites and associated mafic rocks and xenoliths of various ages across the Gawler Craton to establish the age and timing of stabilisation of the lithospheric mantle. Samples will be collected from both outcrop and drill core and placed in a regional context using world class geophysical data sets. Opportunities exist to collaborate with co-workers at Adelaide University.

* A range of other geochemical, structural and geophysical projects can be designed to incorporate individual interests, centred around the isotopic geochemistry of the Gawler Craton and Musgrave Block in South Australia. See either Peter Betts or Bruce Schaefer

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Geochemistry and Geochronology of Neoproterozoic sediments from the Adelaide Fold Belt, South Australia

Supervisor: Bruce Schaefer
Field of study: Isotope Geochemistry
Support Offered: Field and analytical costs
Collaborating organisation/s: PIRSA
Preferred Program: MSc

Targeted geochronology and geochemistry of selected Neoproterozoic sequences (Australian, Namibian and Oman) leading into and coming out of the Snowball Earth episodes, and the Acraman impact ejecta horizon (the worlds first “mass” extinction) will be undertaken. Sample collection trips to South Australia and laboratory based on state of the art isotopic analysis will form the basis for investigating what was driving major changes in the Earths climate and subsequent evolution of metazoans.

Structural Analysis of the Migmatite-Hosted Challenger Gold Deposit

Supervisor/s: Andy Tomkins
Field of study: Structural geology, ore geology, metamorphic petrology.
Support Offered: Field and analytical costs.
Collaborating organisation/s: Dominion Mining (to be confirmed)
Preferred Program: Masters

The aim of this project will be to evaluate how deformation during granulite facies metamorphism and partial melting influenced the morphology of a series of gold-bearing ore shoots at the Challenger gold mine. Challenger is probably the world’s most highly metamorphosed gold deposit and as such it represents a rare opportunity to understand the effects of high temperature

metamorphism and deformation on the mobility of metals in the lower crust. Research will involve a period of field work based at the Challenger gold mine in central South Australia, followed by petrological analysis. The results of this work will be integrated with current exploration and mining activities in and around the deposit, and will ultimately form part of the exploration models for similar gold deposits in the region and in other high grade terrains around the world.

For further information, contact Andy Tomkins (Andy.Tomkins@sci.monash.edu.au)

Age of the Lawn Hill Impact Structure: Influence on the Century Zn-Pb Deposit?

Supervisor/s:	Andy Tomkins, Bruce Schaefer
Field of study:	Field mapping, geochronology, impact petrology, ore geology.
Support Offered:	Field and analytical costs.
Collaborating organisation/s:	Pasminco Mines (to be confirmed)
Preferred Program:	Honours

The Century Zn-Pb deposit (one of Australia's largest) is situated at the intersection between a large fault and an interpreted impact structure, in the Mt Isa Inlier, Queensland. Currently, there is a disconnect between geologists who study impact events (who believe that the circular Lawn Hill structure formed as a result of a meteor impact) and economic geologists concerned with the evolution of the Century deposit (who have essentially ignored the possibility of an impact). The aim of this project is to further evaluate the Lawn Hill structure through detailed mapping and geochronology; to determine the age of the impact and examine the significance of the impact to the evolution of the Century Deposit.

For further information, contact Andy Tomkins (Andy.Tomkins@sci.monash.edu.au)

Sulfide Metamorphism at the Cannington Ag-Zn-Pb Deposit

Supervisor/s:	Andy Tomkins
Field of study:	Ore geology, metamorphic and experimental petrology.
Support Offered:	Field and analytical costs.
Collaborating organisation/s:	BHPBilliton, Australian National University (to be confirmed)
Preferred Program:	Honours

The aim of this project will be to evaluate the effect of amphibolite facies metamorphism on Ag-Zn-Pb sulfide mineralization the Cannington deposit in the Mt Isa Inlier, Queensland. The Cannington deposit has been metamorphosed at conditions near the lower limit of sulfide melting for the observed sulfide assemblage. The results of this project will therefore place constraints on the lower limit of sulfide melting. Another possible effect of metamorphism of sulfide minerals is to liberate sulfur, which is an important metal complexing agent in metamorphic fluids. This project will therefore also provide insights into generation of ore forming fluids in the source regions of ore deposits. Research will involve a period of field work based at the Challenger gold mine in central South Australia, followed by petrological analysis in conjunction with experiments on sulfide melting to be conducted at ANU.

For further information, contact Andy Tomkins (Andy.Tomkins@sci.monash.edu.au)

Mapping the geology of the Himalayas from space

Supervisor/s:	Roberto Weinberg and Marc Leblanc

Field of study: Geology, remote sensing and cartography
Support offered: Data and analytical costs supported as part of an ARC research project
Preferred Program: Honours

This project will focus on the geological mapping of an area in the Himalayas in Kasmir, India. ASTER and Landsat satellite data will be used to provide new geological information and complement the existing geological maps of the region. Remote sensing techniques, such as classification and edge detection, will be applied to map rock types and tectonic features. The results from this work will be integrated with the ARC research project and will help to understand the evolution of the area from island arc to a continental collision zone.

The formation of granitic cumulates in the Ladakh Batholith

Supervisor/s: Roberto Weinberg and Geordie Mark
Field of study: Geology of plutons
Support Offered: Travel, field and analytical costs.
Collaborating organisation/s: Supported by ARC research grant
Preferred Program: Honours

The formation of granitic cumulates in the Ladakh Batholith consisting of detailed mapping of a small area near Leh, Ladakh, sampling accompanied by a full geochemical study back in Monash.

Structural and lithological mapping of the Tangtse Pluton

Supervisor/s: Roberto Weinberg and Geordie Mark
Field of study: Geology of plutons
Support Offered: Travel, field and analytical costs.
Collaborating organisation/s: Supported by ARC research grant
Preferred Program: Honours

Structural and lithological mapping of the Tangtse Pluton, including geochemistry and full structural analysis of this small Himalayan-type leucogranite.

The Nature of Gold and Platinum-Group Element Ore at the Coronation Hill and Jabiluka deposits, Kakadu National Park, Northern Territory

Supervisor/s Andy Wilde
Field of Study Economic geology, petrography, geochemistry
Support Offered: Analytical costs, preparation of thin sections etc
Collaborating Organisation/s: AINSE
Preferred Program Honours

The Coronation Hill and Jabiluka deposits are unusual examples of economic gold associated with platinum-group metals (Pt and Pd) and uranium. Uranium is a key part of the resource inventory at Jabiluka and minor uranium was mined at Coronation Hill in the nineteen fifties. This project seeks to document the nature of the minerals of Au, Pt and Pd and how they relate to uranium and gangue minerals. For example, was uranium introduced at a different time in earth history to the Au, Pt and Pd? A suite of samples is already available. Techniques used will include the petrographic