

Finding Gold and Geologists in the Tasman

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Finding Gold.....

....learning from Siberia

Location of Sukhoi Log



Geological plan and Cross Section

Wood and Popov
(2005)

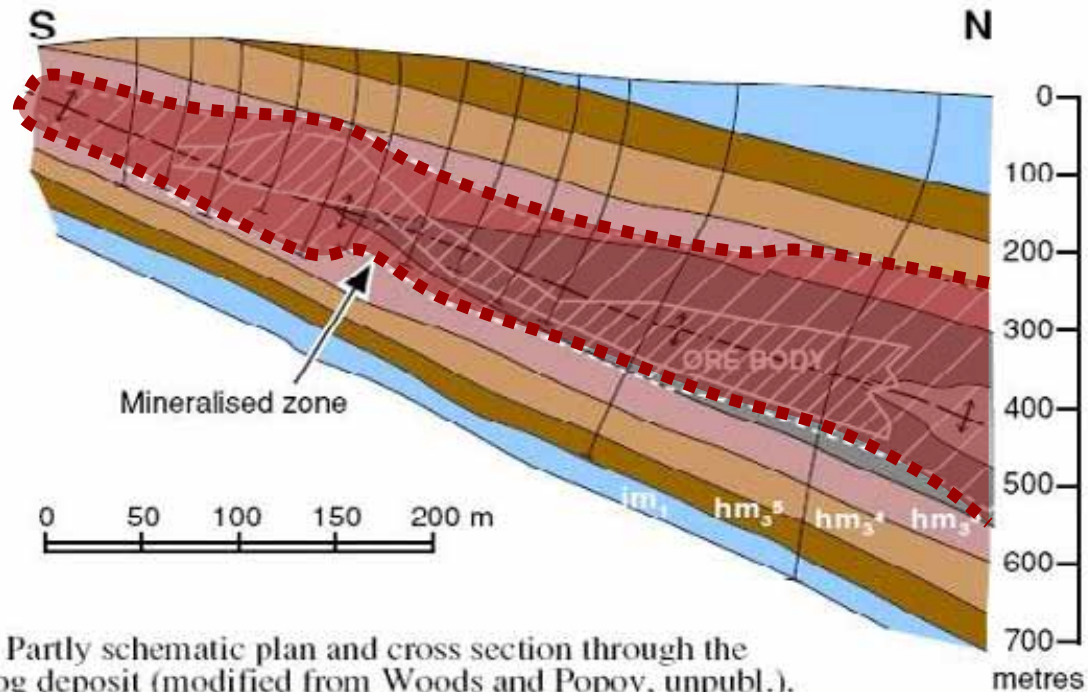
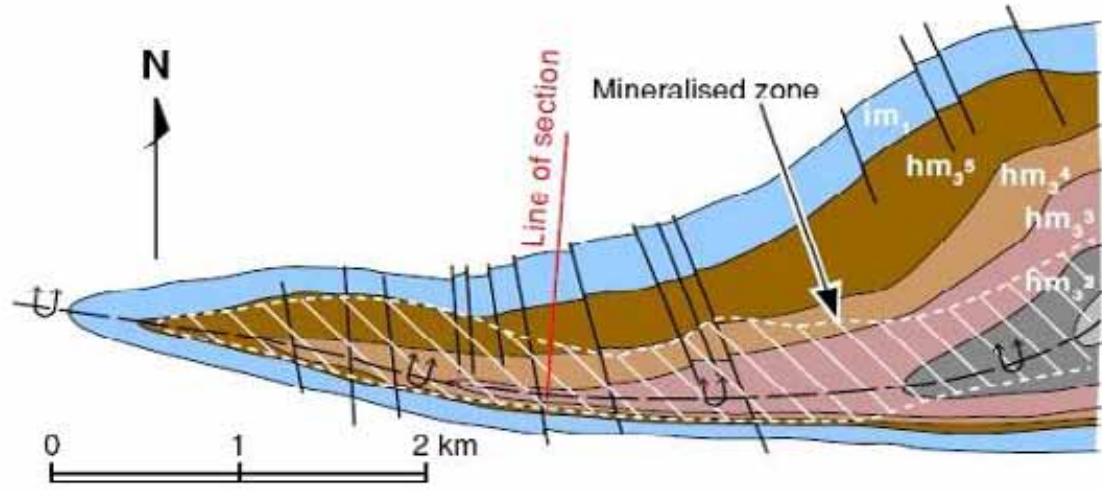
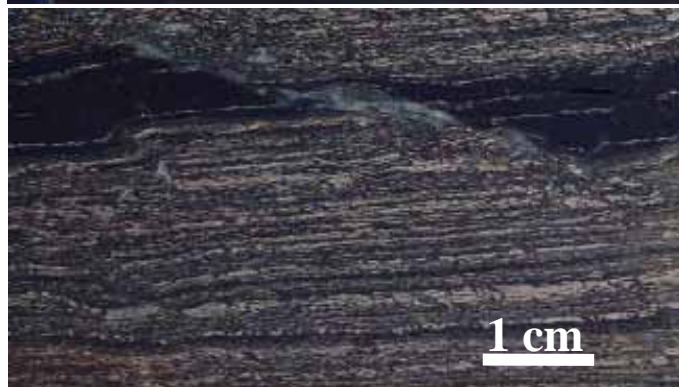
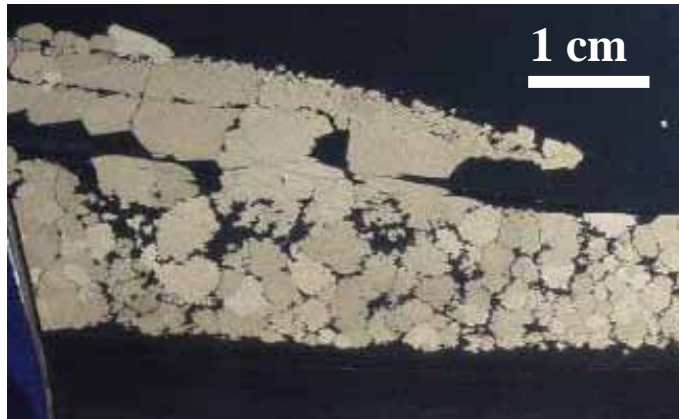
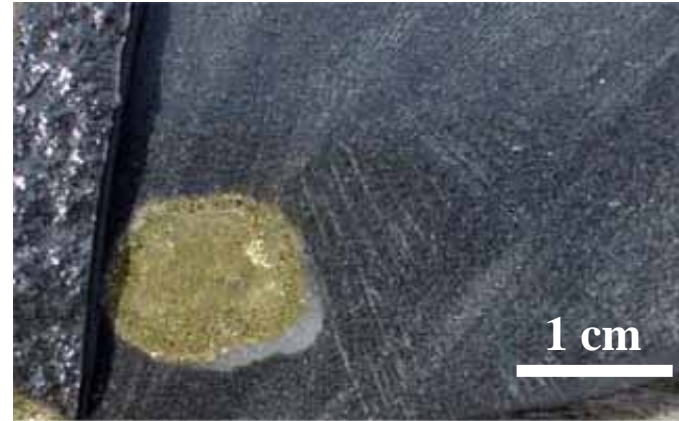
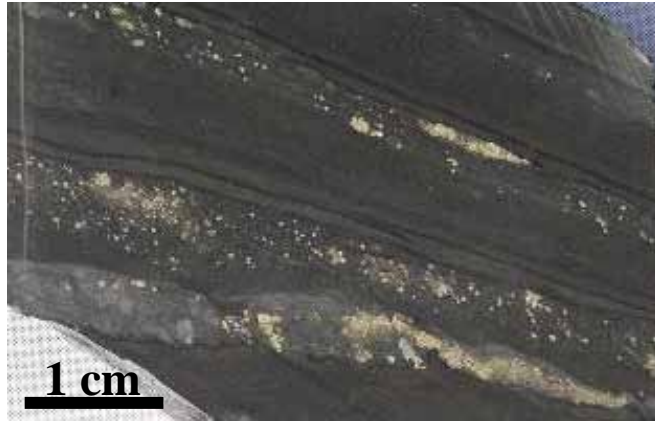


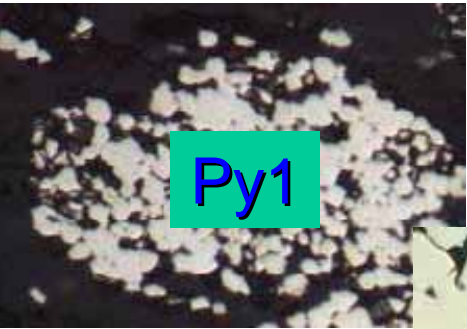
Figure 3. Partly schematic plan and cross section through the Sukhoi Log deposit (modified from Woods and Popov, unpubl.).

Sulfide Mineralisation



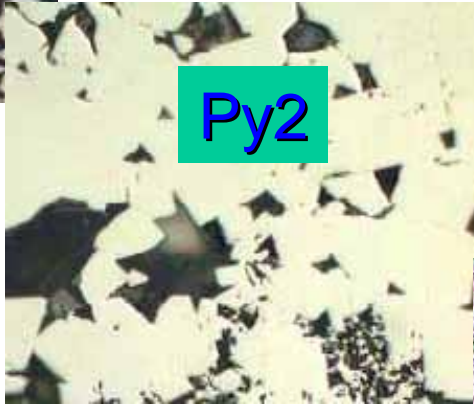
Pyrite History

Sedimentary-diagenetic



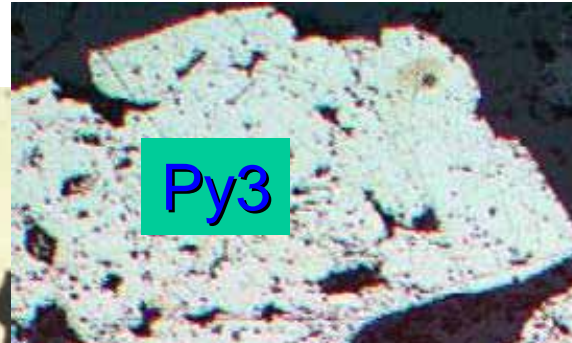
Py1

Early-diagenetic

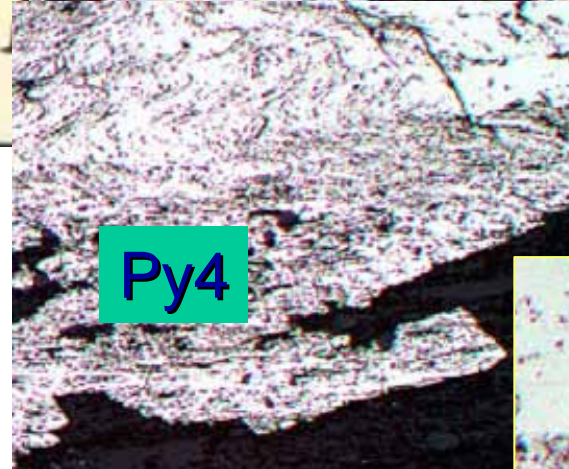


Py2

Late-diagenetic



Py3



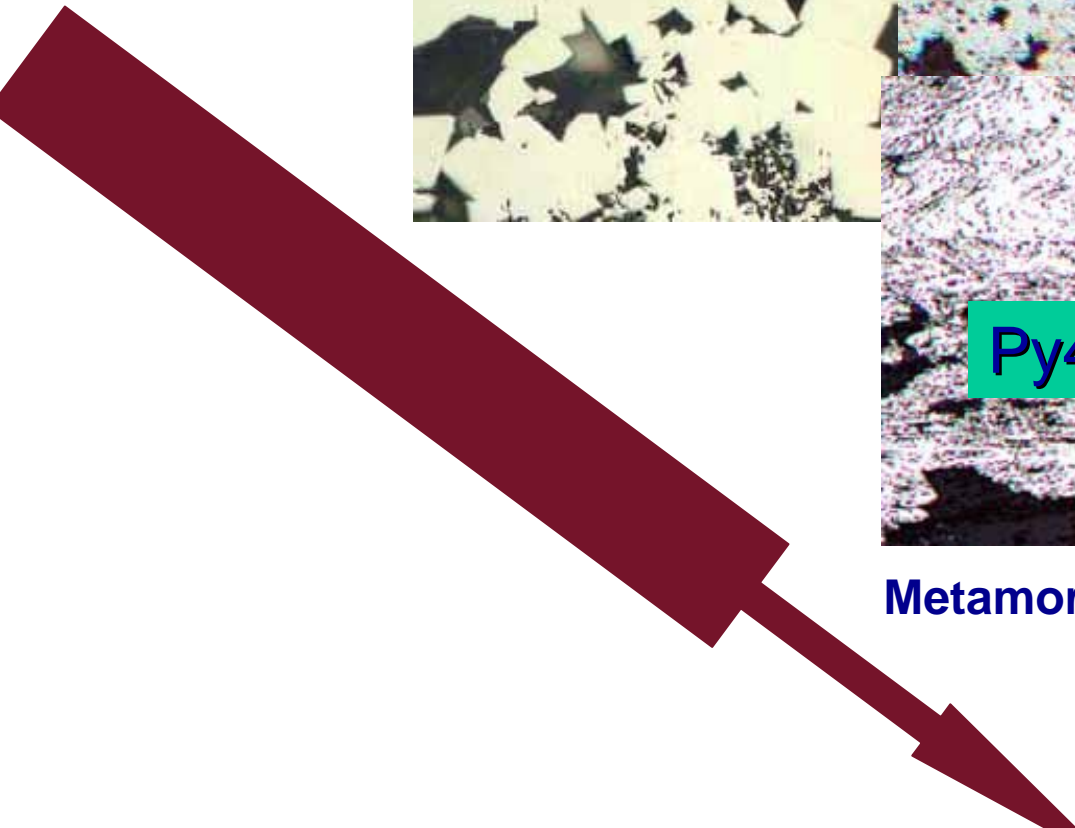
Py4

Late-metamorphic

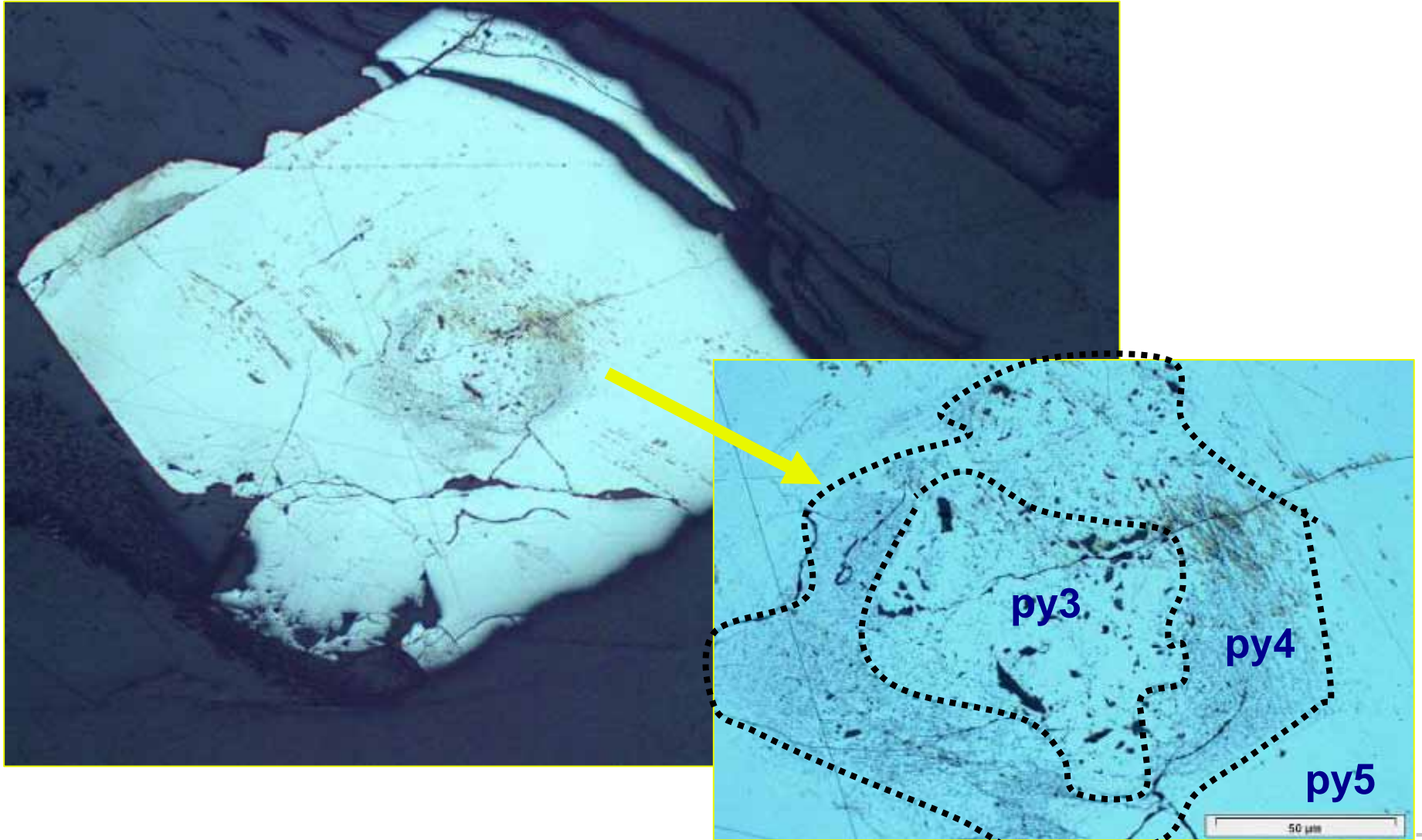


Py5

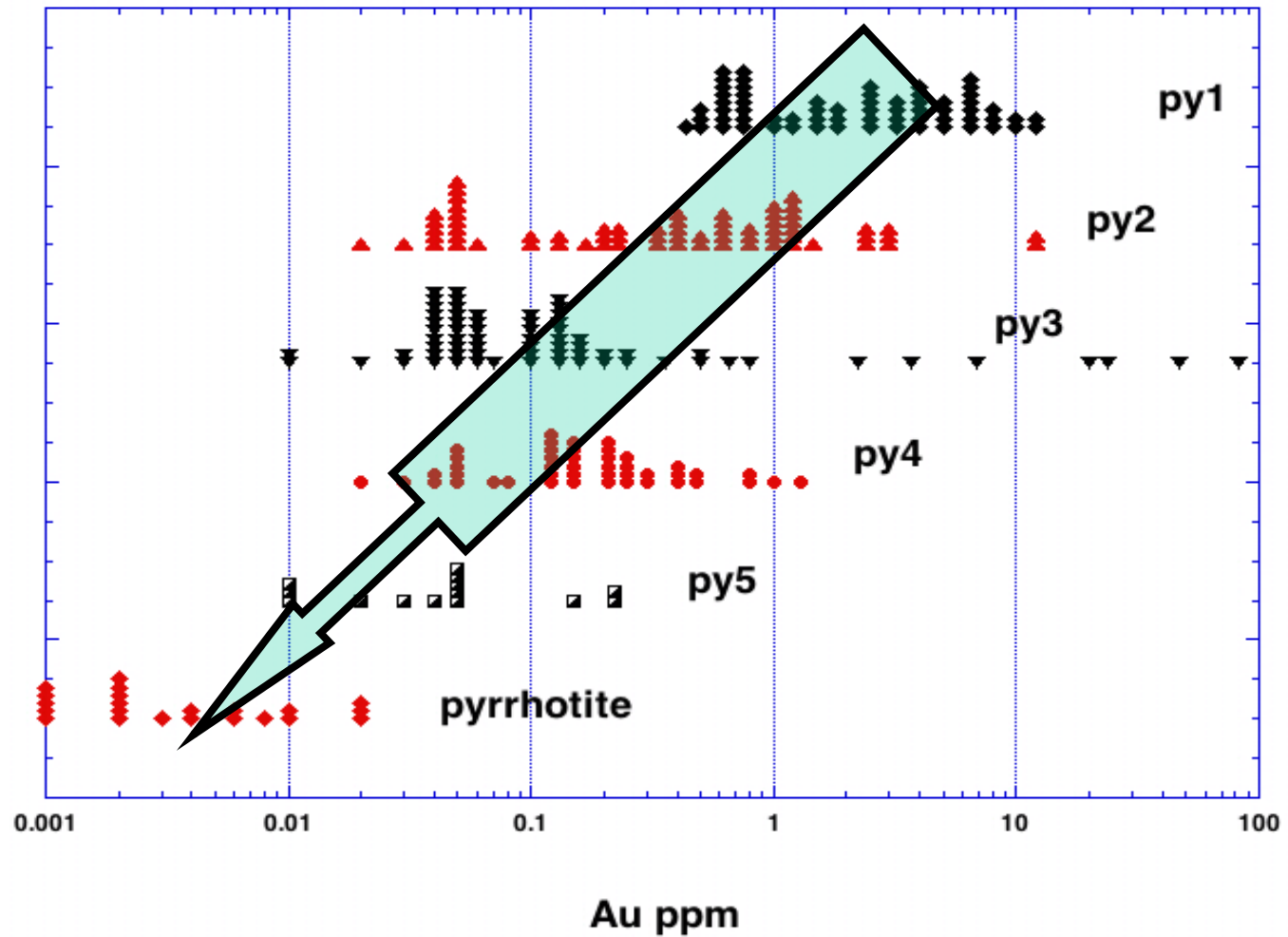
Metamorphic



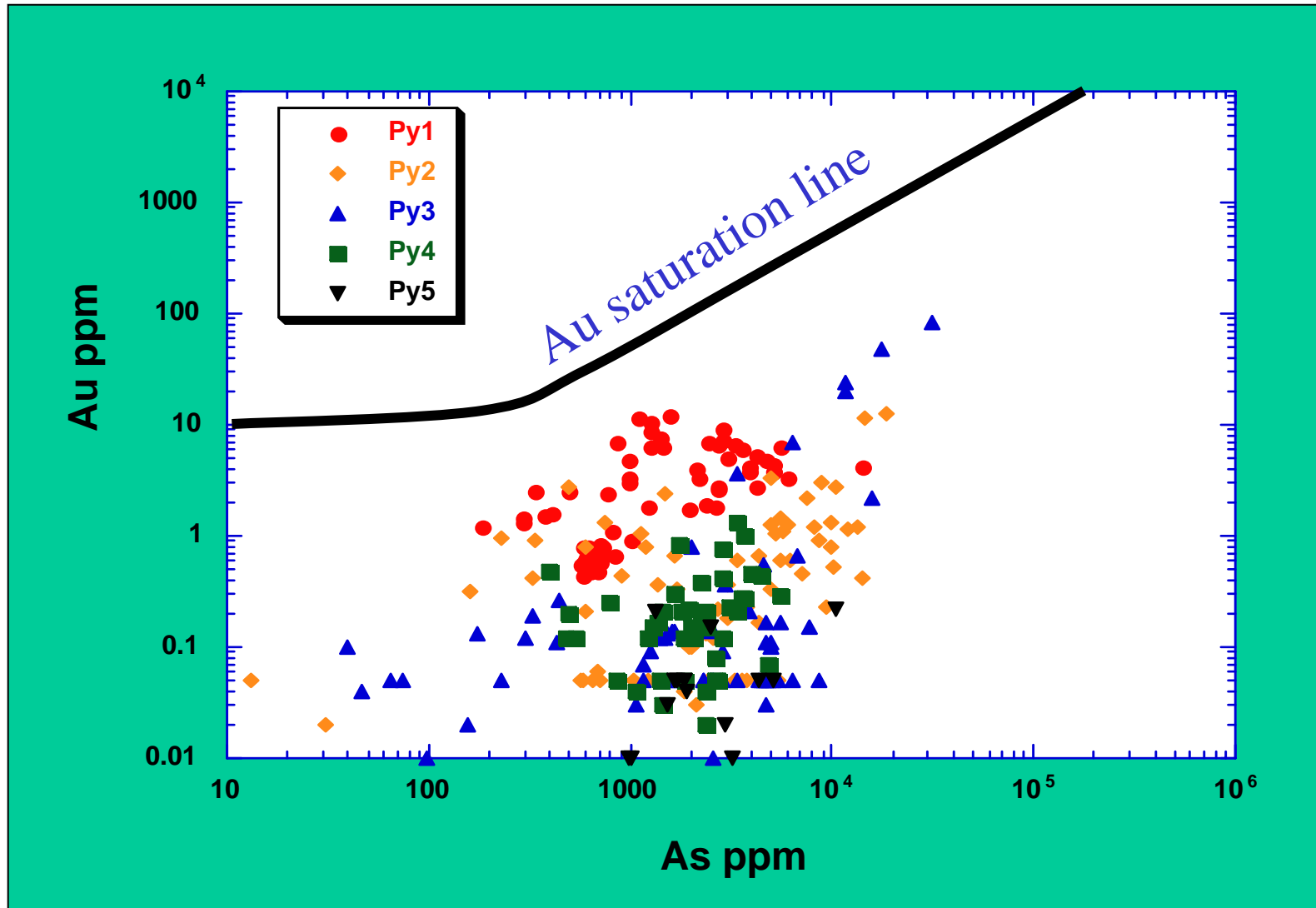
Pyrite in py-qtz veins is zoned



Pyrite is Progressively Depleted in Gold from Py1 to Py5

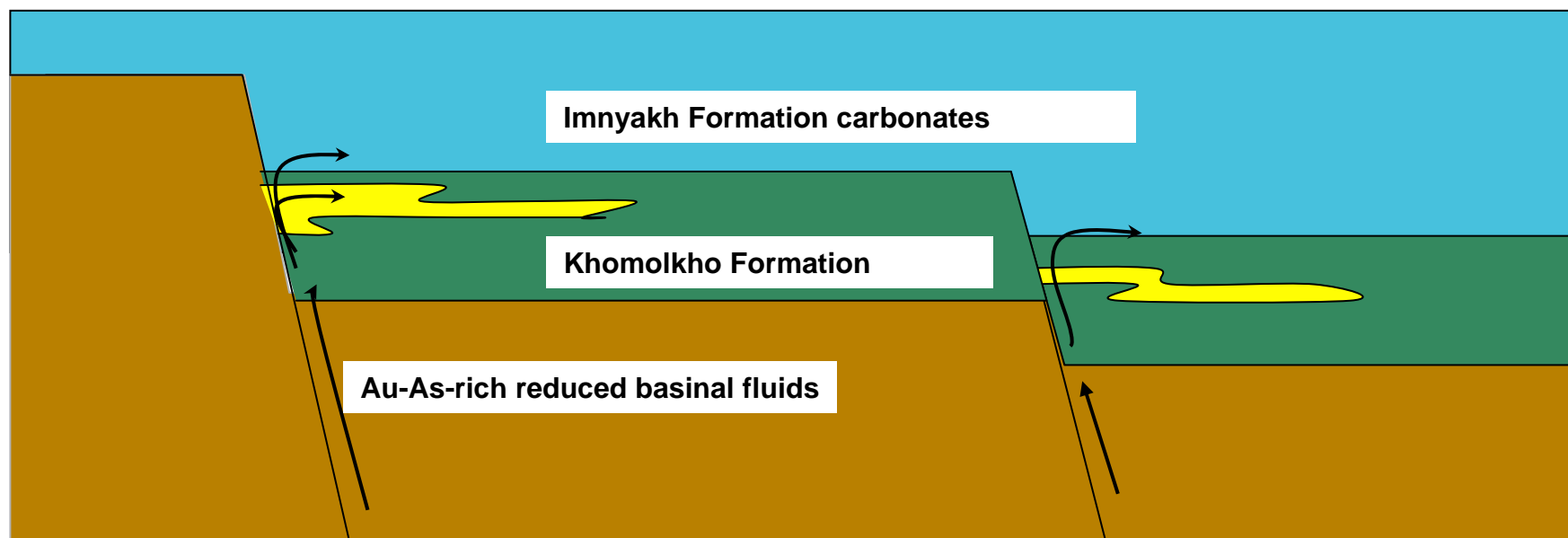


Au-As Relations in SL Pyrite



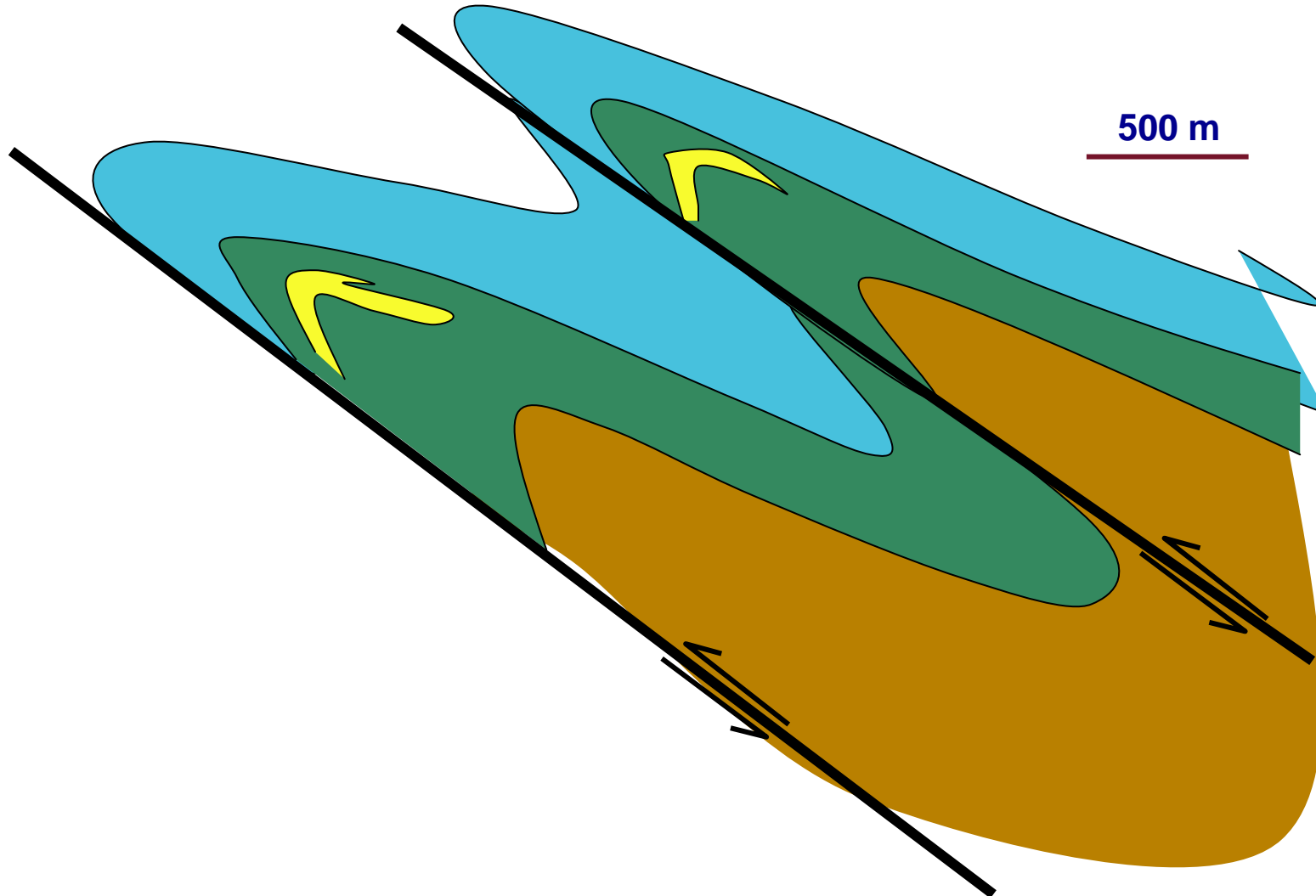
Stage 1: Exhalation of Au-As-Rich Basinal Fluids

- : deposition of gold-arsenic bearing py1
- : syn-diagenetic growth of py2 and py3

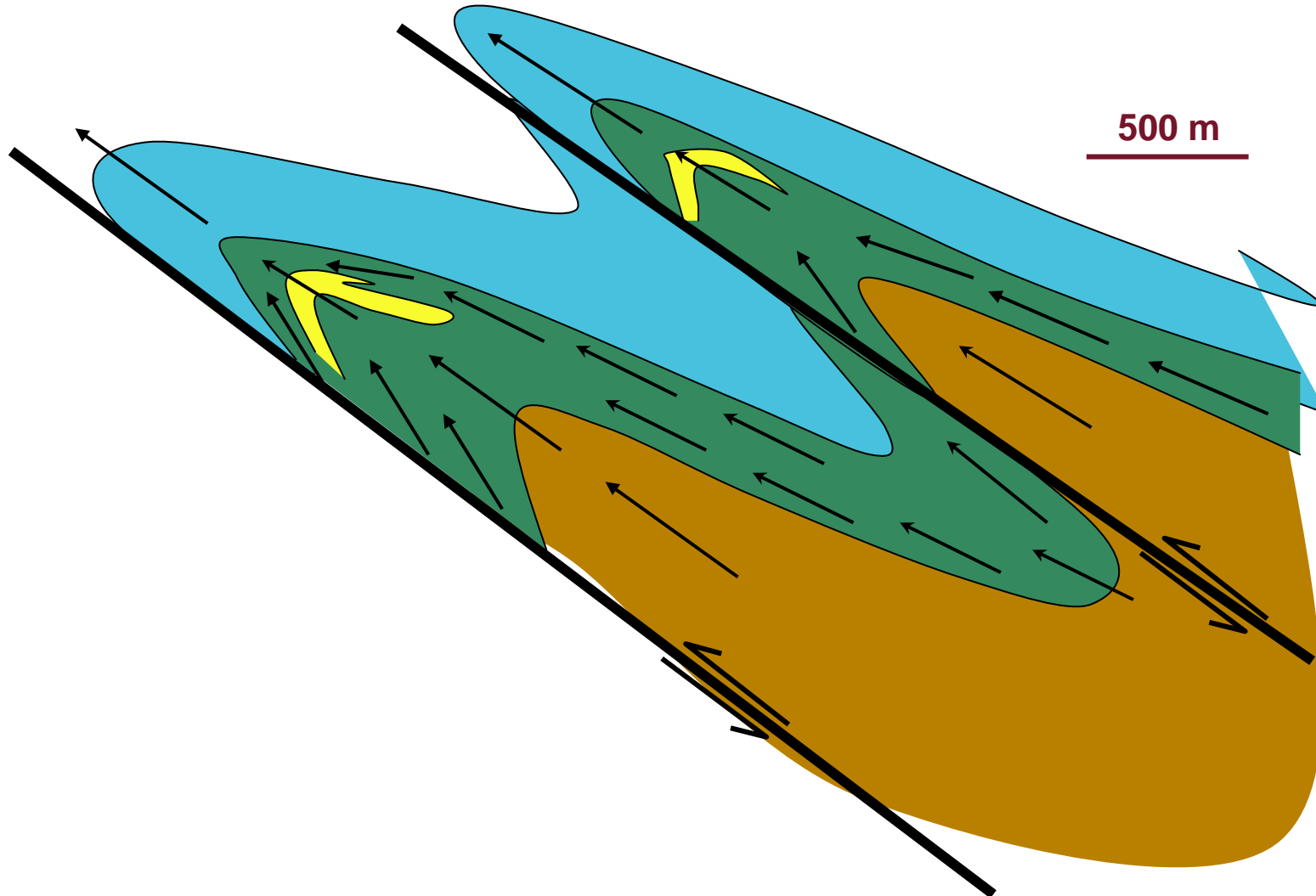


Regional enrichment of gold and arsenic in black shales of Khomolkho Formation

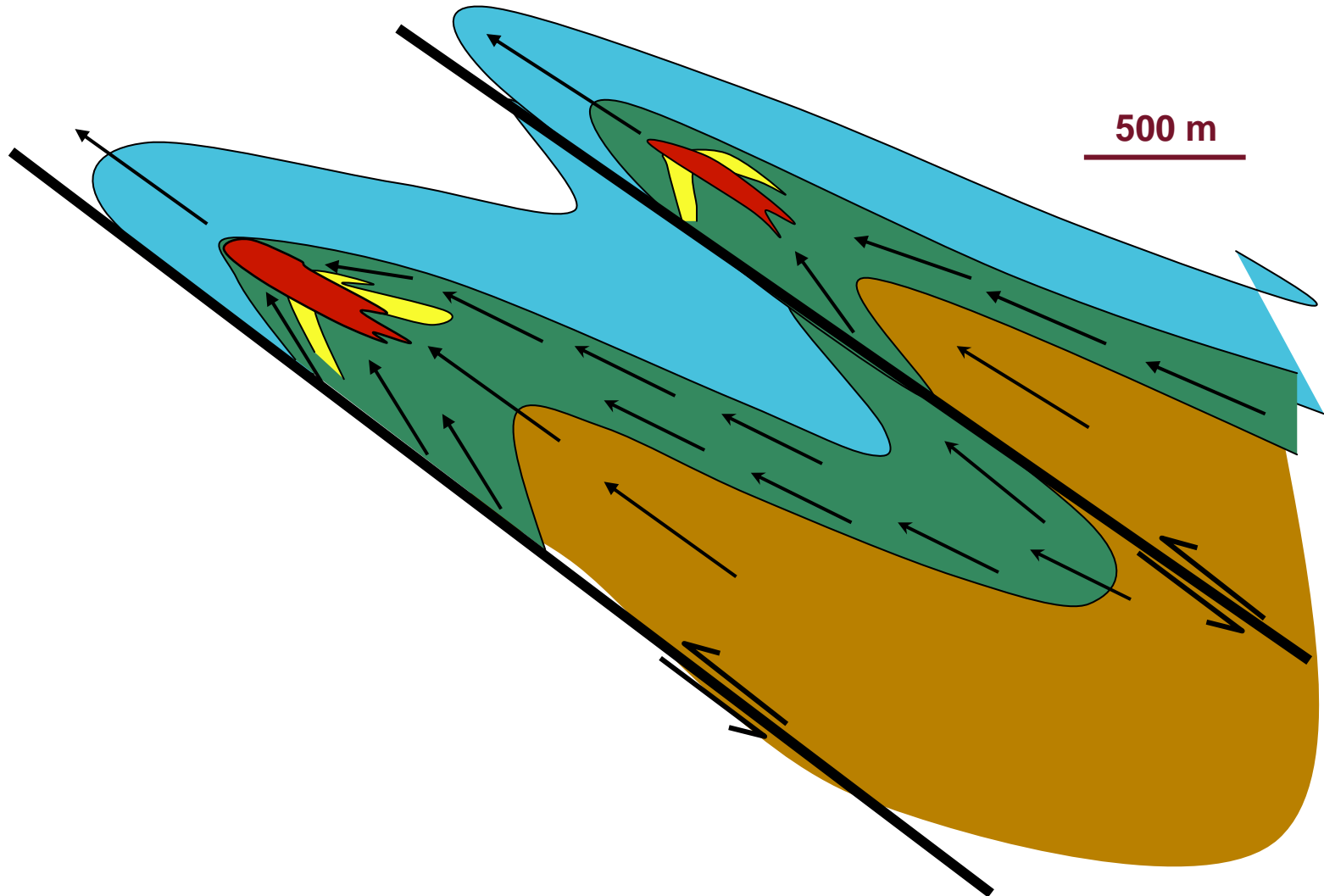
Stage 2: Deformation; Normal faults Reactivated as Thrust Faults



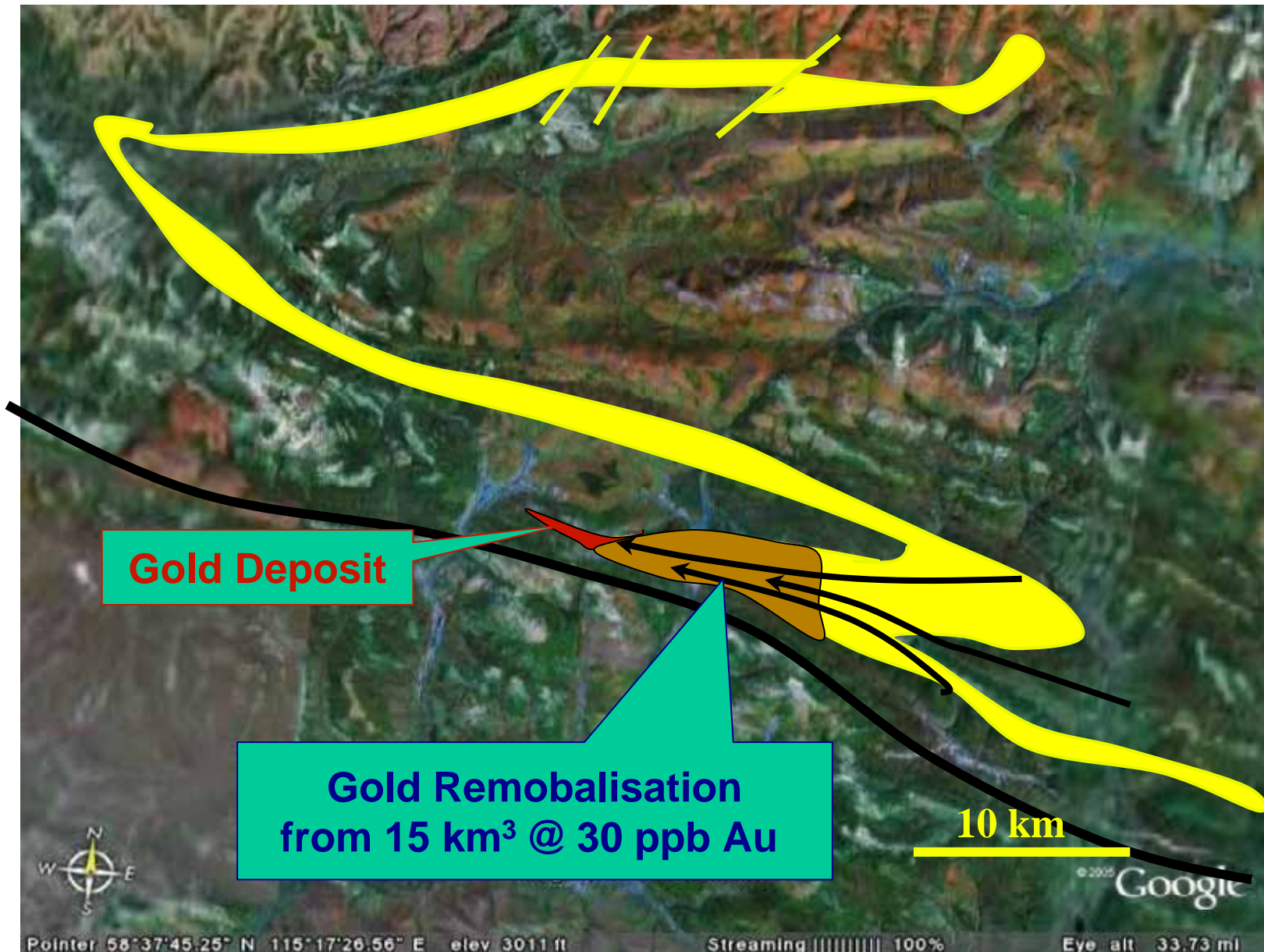
Stage 2: Fluids focused into anticlinal cores below impermeable carbonates; leach gold in py1 from fold limbs



Stage 2: Deformation; gold remobilisation into bedding parallel py3-py4-py5-quartz veinlets in anticlinal cores



Gold concentration in anticlinal core



Gold Deposit

Gold Remobilisation
from 15 km³ @ 30 ppb Au

10 km

Is Sukhoi Log Unique?



- Many other black-shale and turbidite hosted gold deposits may have a similar origin to Sukhoi Log
- E.g. Muruntau, Nataika, Macraes and the Victorian Goldfield
- Early concentration of syngenetic/diagenetic gold in sedimentary arsenian pyrite may be the key to the formation of these deposits

Latest Edition of AJES:



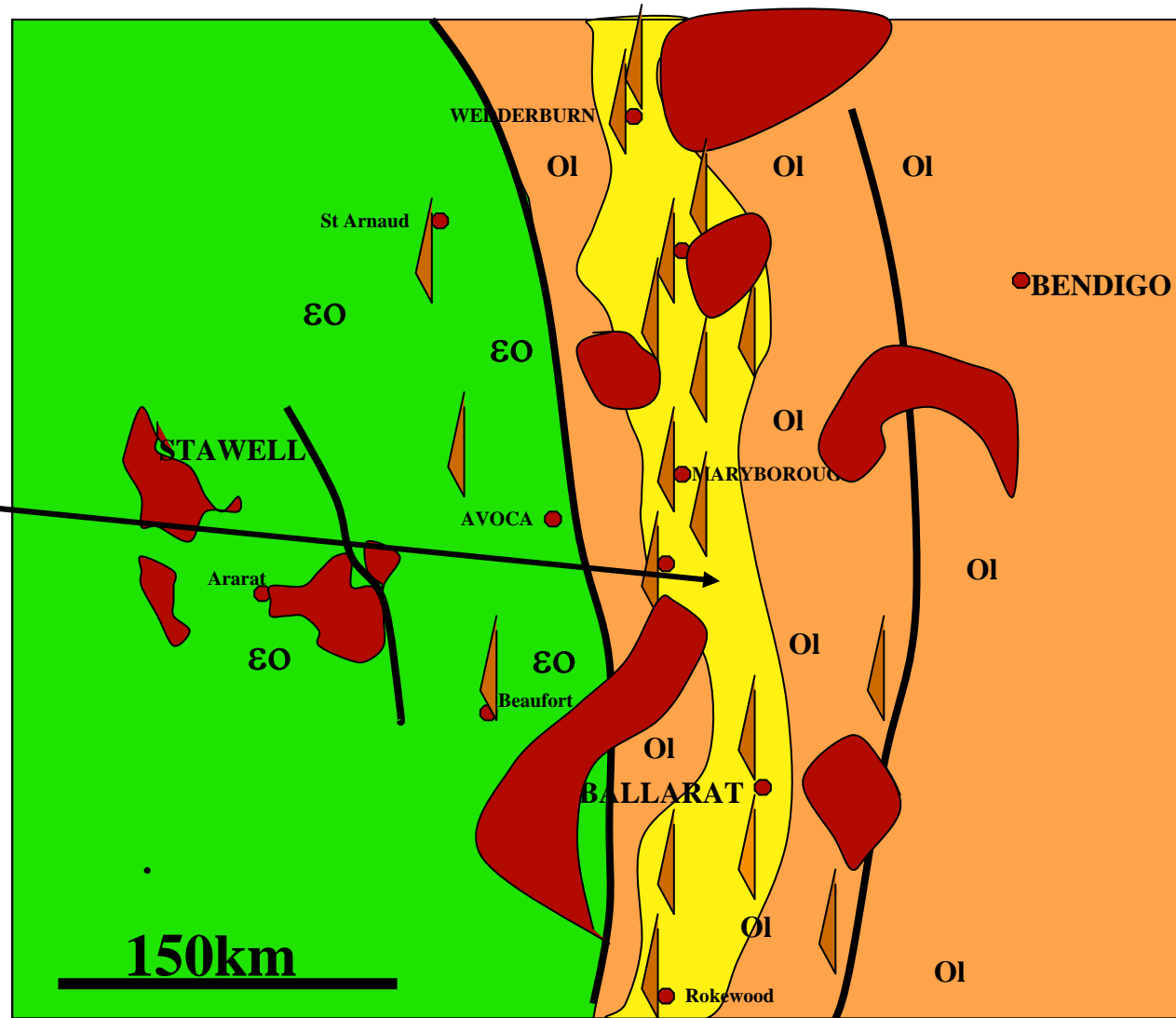
“Syngenetic Gold in Western Victoria” BL Wood and RR Large



Distribution of Indicators

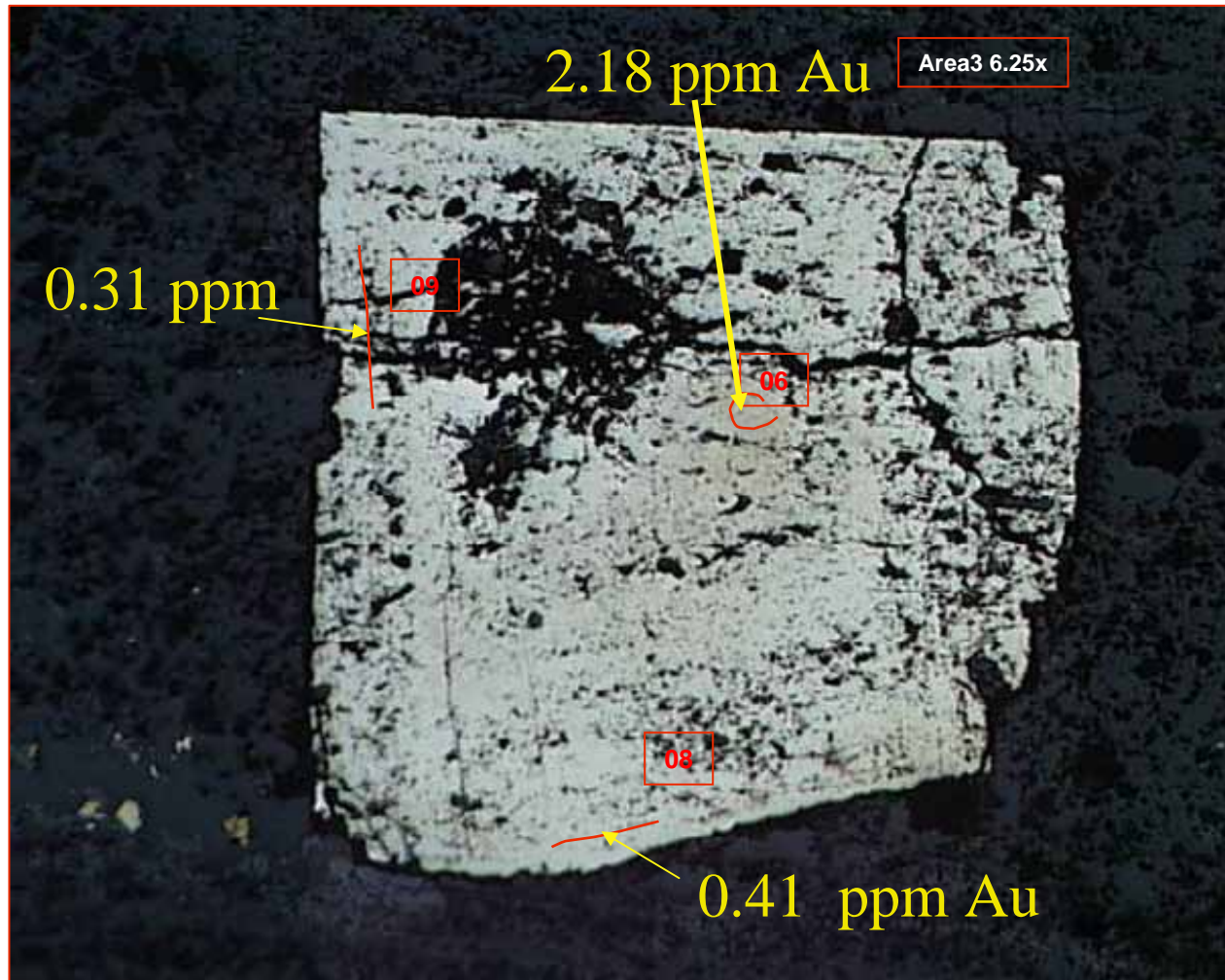


Ballarat
Indicator
Zone

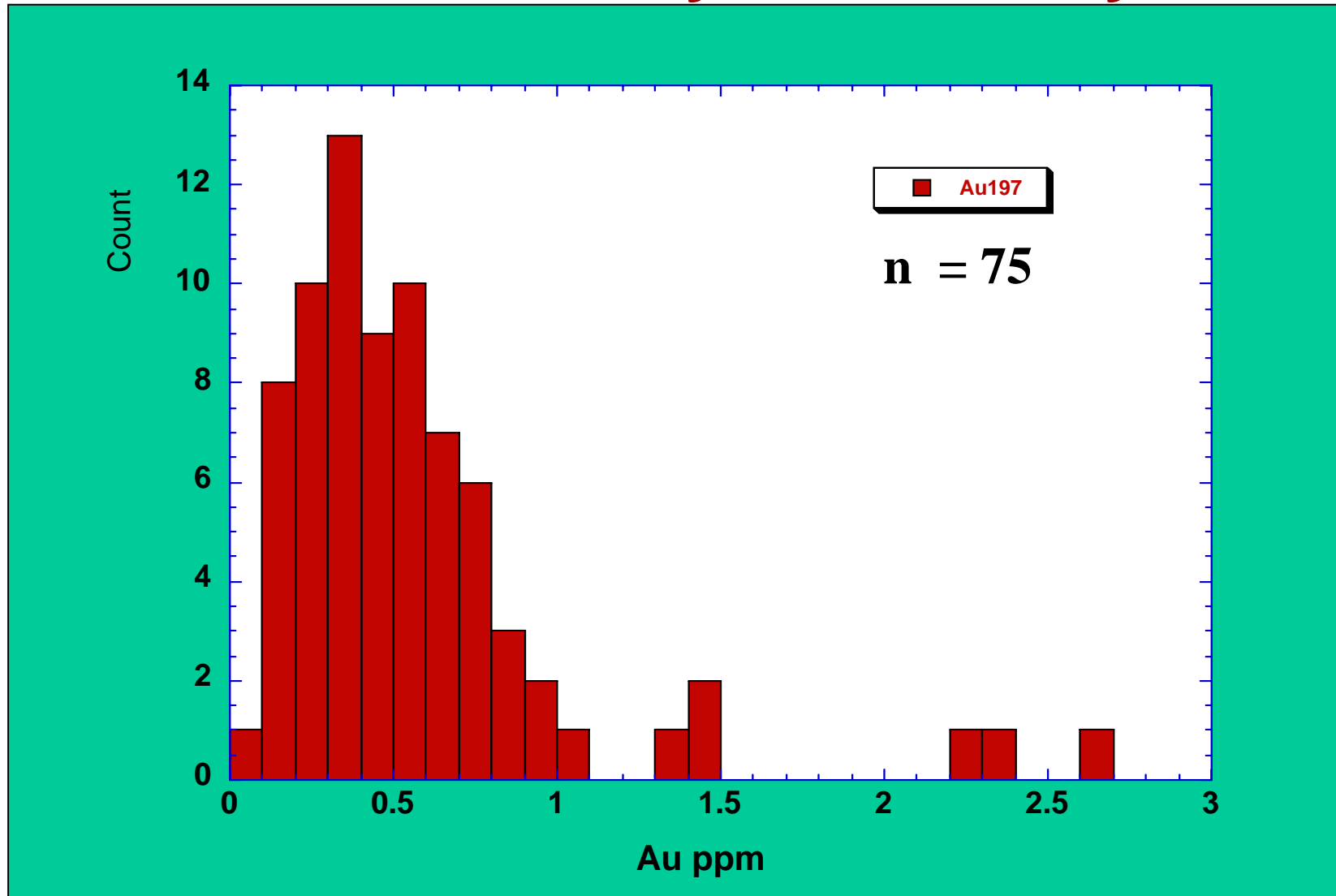


From Wood and Large (2007)

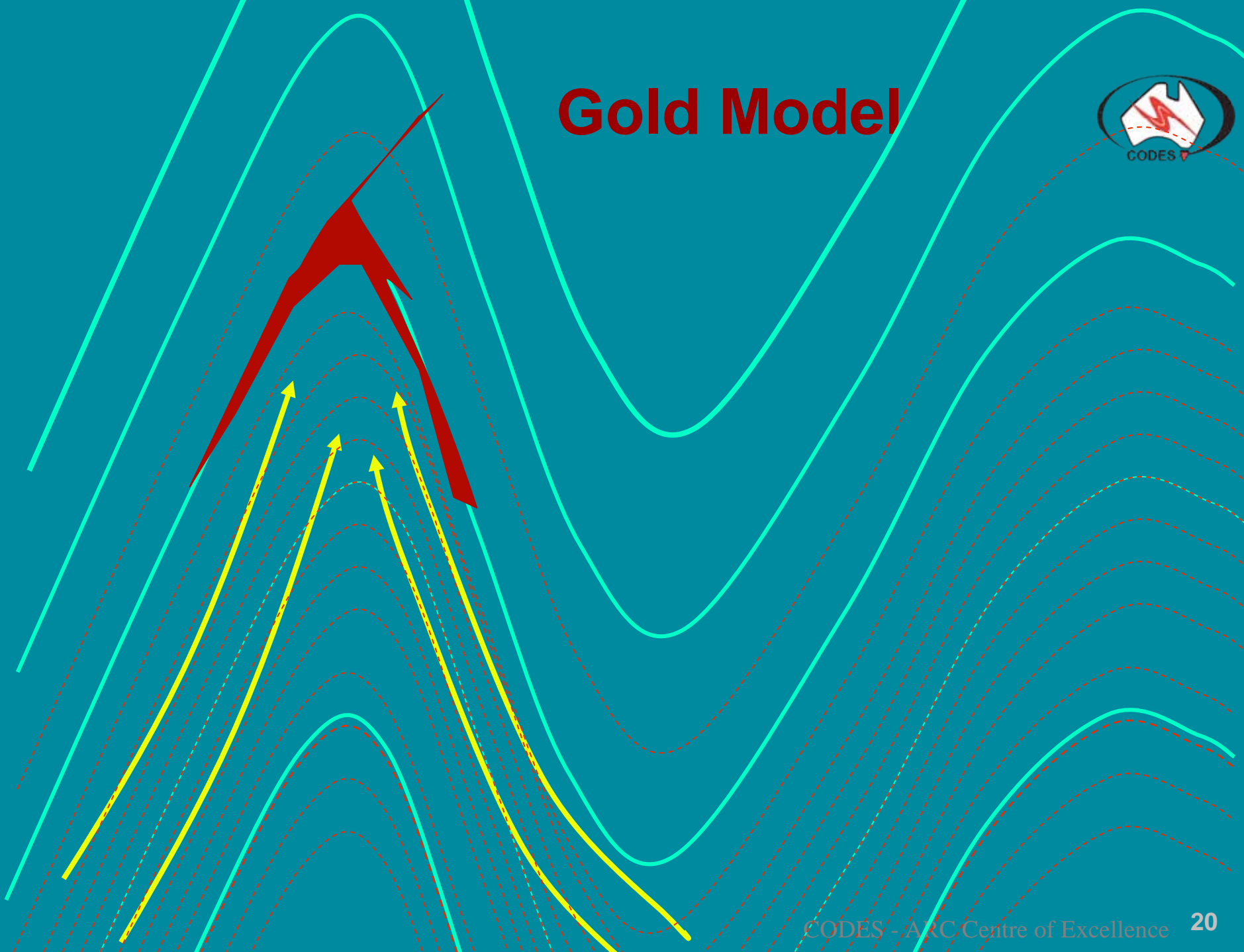
Sample 2A; zoned pyrite



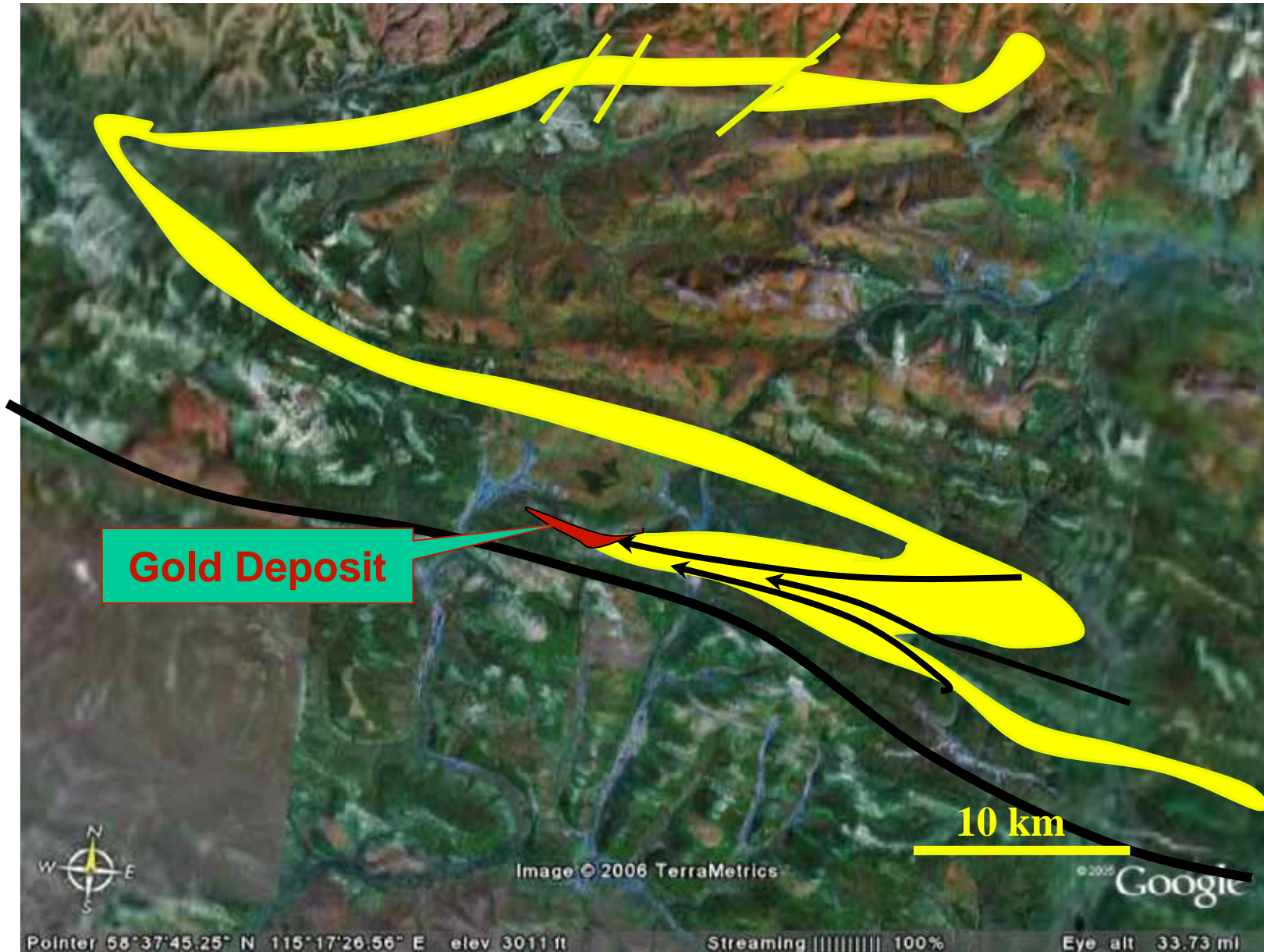
Indicator beds - Vic Goldfields revised sensitivity for Au analyses



Gold Model



Gold concentration in anticlinal core



This Research Challenges Three Current Dogmas Related to Orogenic Gold Deposits



**Dogma 1: “Gold is coming from some
deep source or from
crustal granites”**

No.....

***Gold is Already Present in the
Sedimentary Basin***

Dogma 2: “Organic-Rich Sediments are Good Trap Rocks for Gold”

Yes, But.....

***Organic-rich Sediments are
Ideal Source Rocks for Au & As***

plus Zn, Mo, Ni, Se, Te, V, PGE.....

**Dogma 3: “Gold is introduced Late;
i.e. Syn-tectonic or Post-tectonic”**

No.....

***Gold is Introduced Early;
i.e. Pre-tectonic and Moved Around
Late During Tectonism***

Finding Gold in the Tasman



- Target black shale & reduced turbidite basins
- Focus on arsenic-rich parts of stratigraphy
- Test anticlinal and shear structures
- Join CODES Project on Sediment-Hosted Gold

Finding Graduate Geologists.....

.....harder than finding gold.

Why?



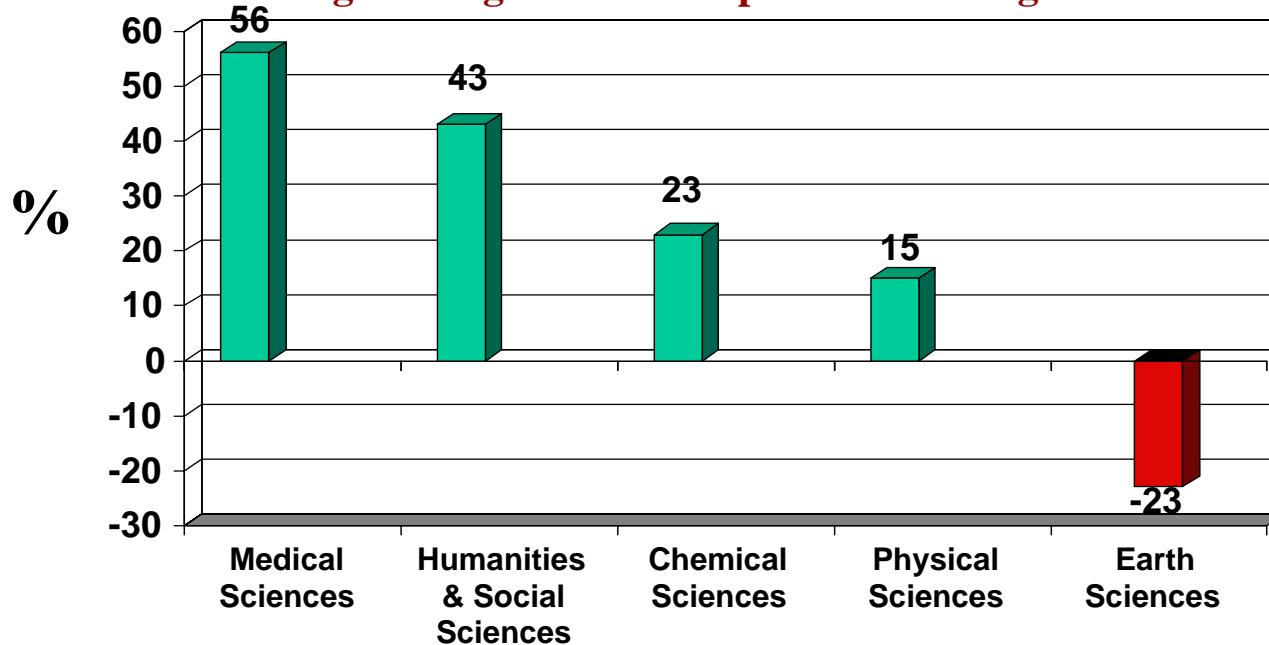
- **Indiscriminant sacking spree in late nineties by industry - turned many off geology**
- **Mining is not flavour of the decade**
- **Reduction and downsizing of Geology Schools at Universities**
- **Less Geology taught in high schools**
- **Government bums-on-seats funding model**

Government Funding Model



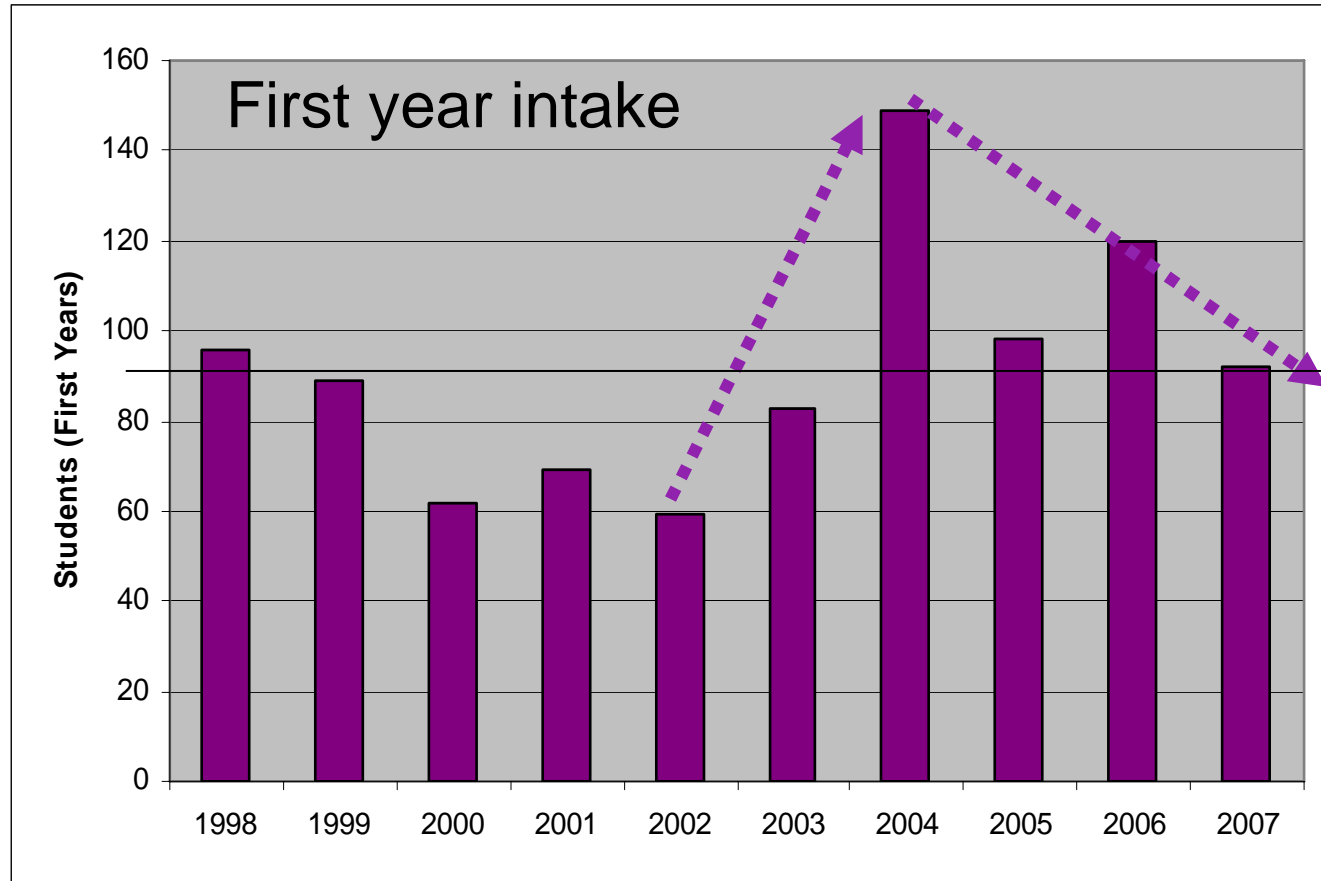
- Totally driven by student numbers
- Geology Department funds continue to decline leading to staff reductions and department amalgamations
- Insufficient funding for geology research means that earth science research is in decline

Percentage Change in R&D Expenditure in Higher Education in last 10 years



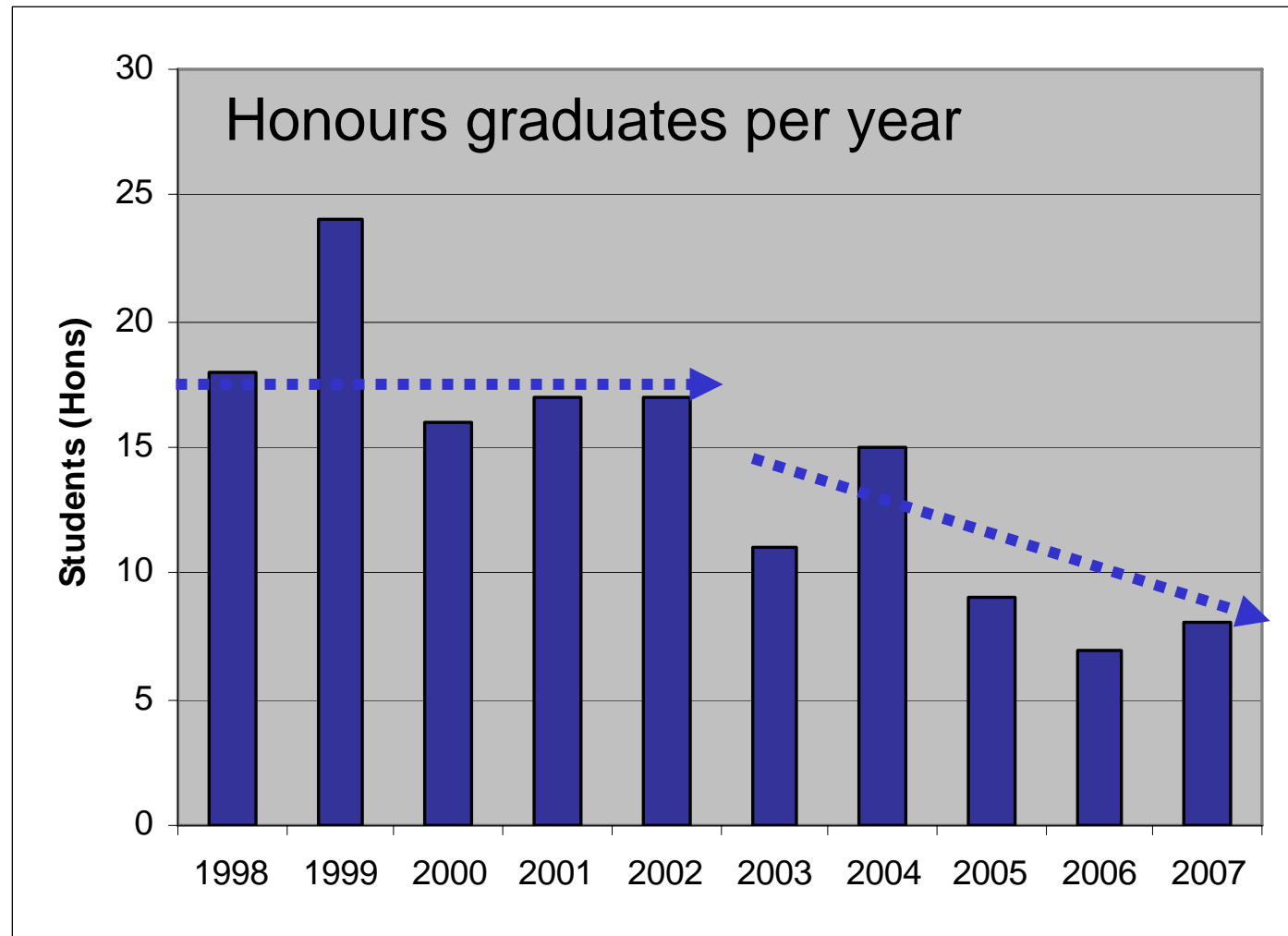


UTAS Geology Intake

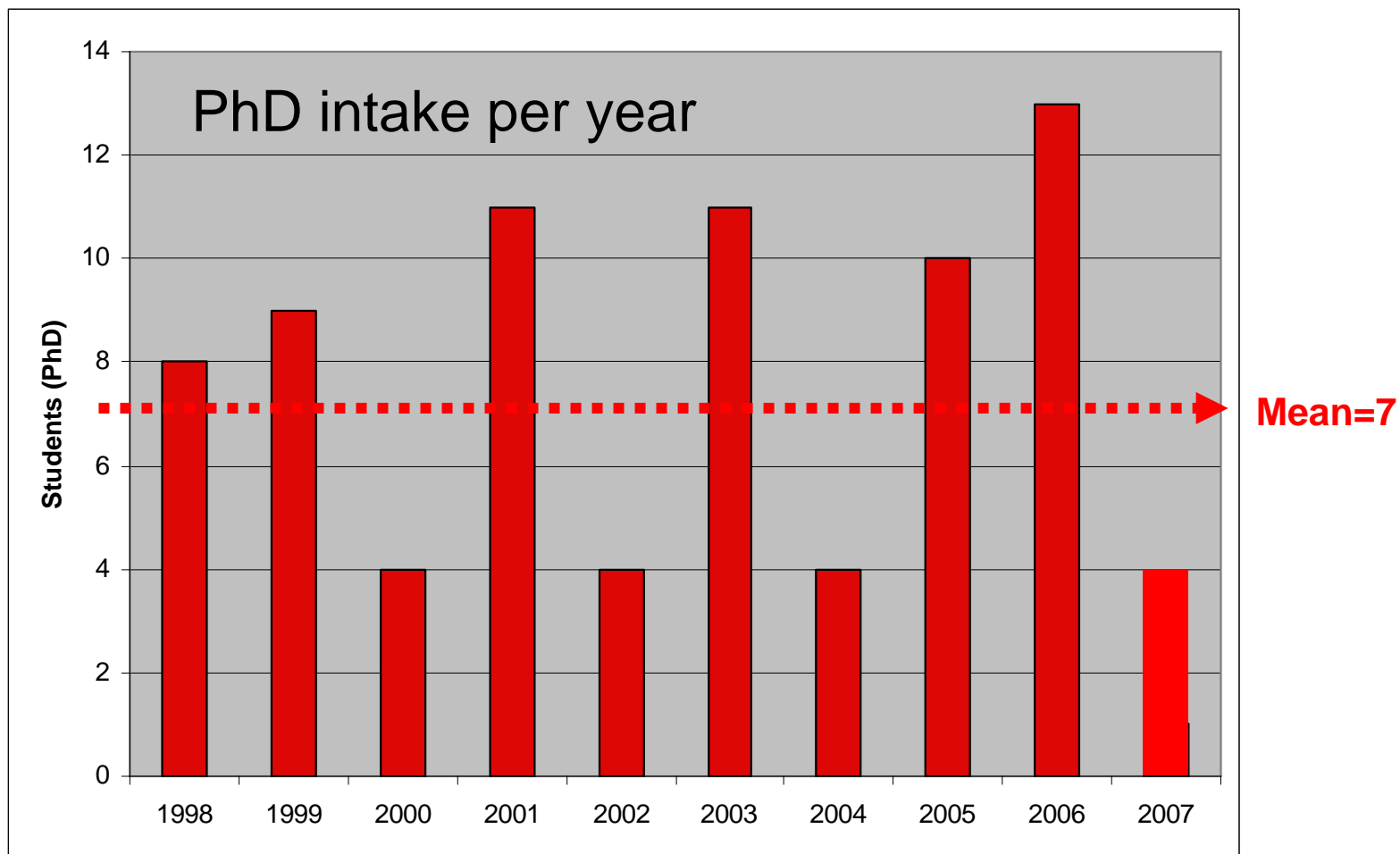


Mean=90

Supply of Graduates for Industry



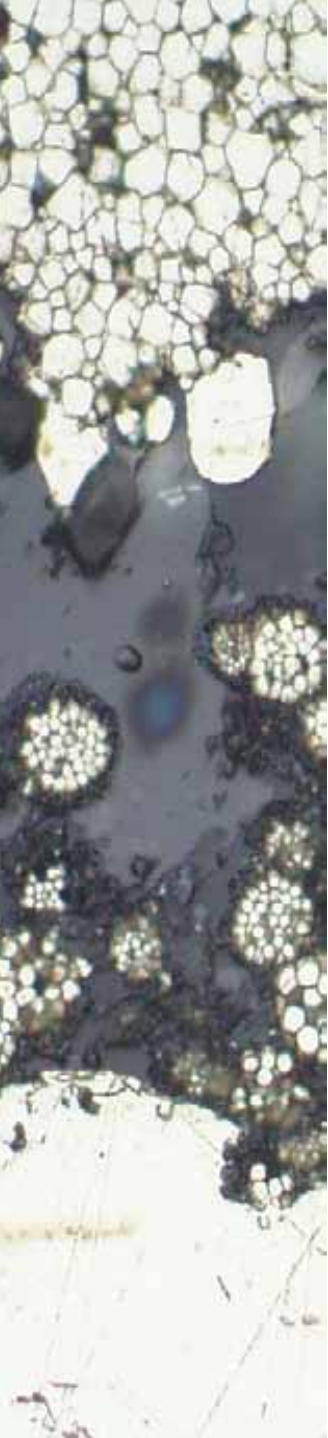
UTAS PhD Numbers



The Crisis Situation



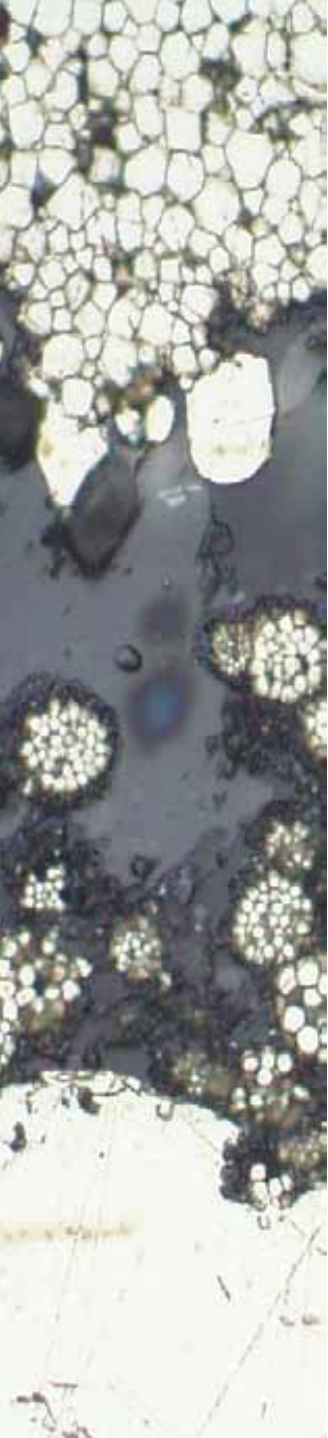
- **First year in-take has been dropping**
- **Quality of first year students in decline**
- **Honours in-take has halved because of strong jobs market**
- **Dramatic decline in local PhD numbers, but offset by increased international students**
- **Many PhD students leaving before completing thesis because of excellent job opportunities**
- **Funding for teaching has dramatically declined due to these factors**



Solution to the Problem



- **A unified Government approach to recognise the problem and increase funding per geology graduate**
- **Strong support from minerals industry to University Geoscience Departments**
- **Stop pinching our students before they graduate with Hons or PhD**
- **Send some of your geology staff to undertake the Mineral Geoscience Masters Program - UTAS, UWA, JCU.**



Solution to the Problem



- Recognise the value of Honours with a significant salary differential
- Currently graduate salaries are 65k to 100k
- I suggest:
 - *BSc only: \$50 to 70k*
 - *BSc (Hons): \$80 to 100k*
 - *Or pay a 20k hiring bonus to hons grads*

UTAS Solution to Increase Intake



- **UTAS Undergraduate Scholarship Scheme to encourage top science students into Earth Science courses**
- **Target is for 12 Industry Sponsor funded scholarships at \$10-15k pa**
- **Eight Scholarships are already funded:**
 - *AngloAmerican, Newcrest, St Barbara, Newmont, Barrick, Mineral Resources Tas., TeckComico and Oxiana*
- **We need more companies to join the program**

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