Mastering the Data Explosion in the Earth and Environmental Sciences

Australian Academy of Science Elizabeth and Frederick White Conference

19-21st April 2006, Shine Dome, Canberra

Frederick William George White 1905-1994

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The White Conference Reception is to be held at "the deck" on Regatta Point From 6:15pm to 8:15pm this evening. Drinks and finger food will be provided

Bus from Shine Dome to Regatta 6.00pm
Bus from Regatta to Shine Dome 8.30pm

The walk from the Shine Dome to Regatta Point will take ~25 min
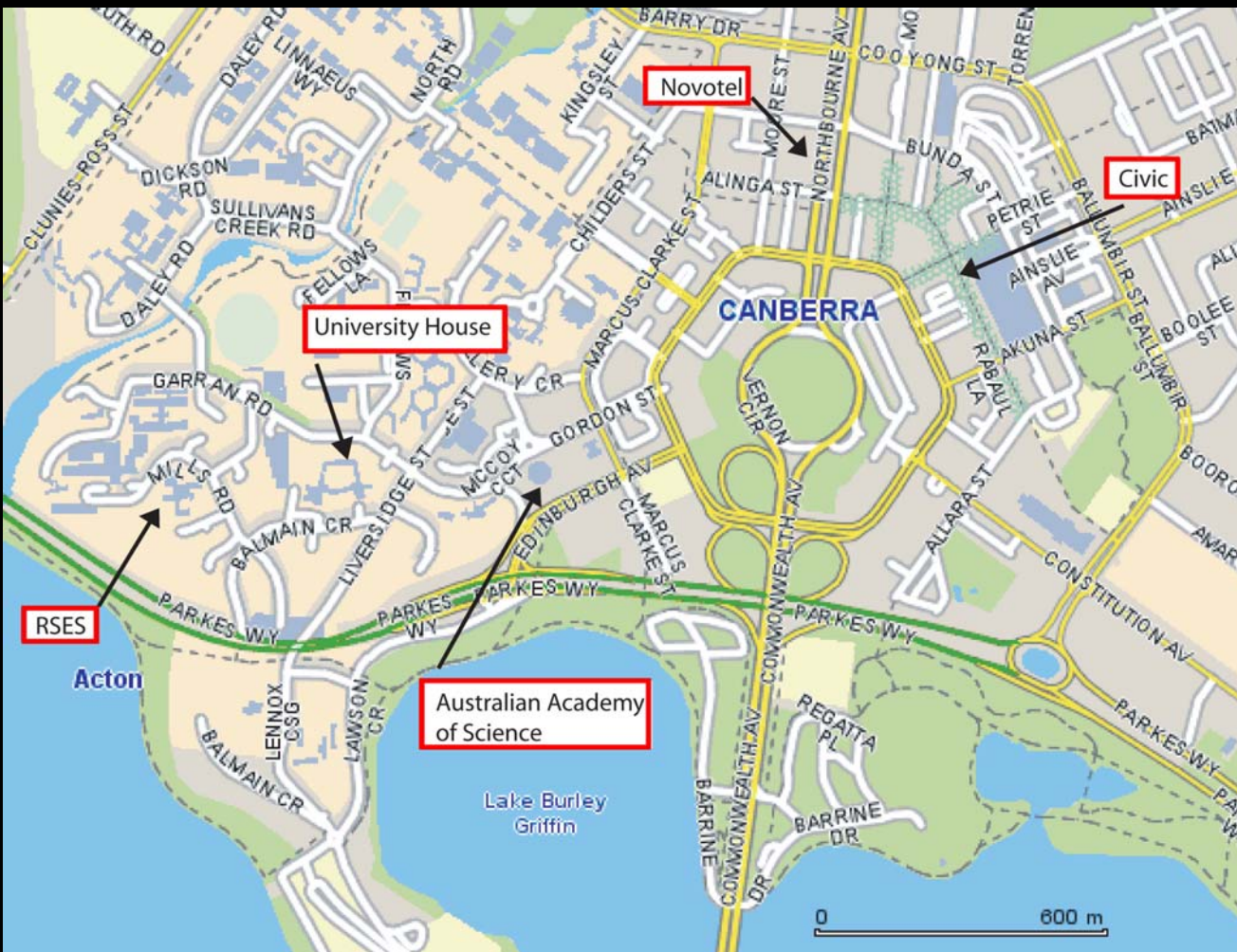
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Places of interest around the Shine Dome

The White Conference Dinner will be held on Thursday 20th in the "Drawing Room" University House At 7:00pm for 7:30pm

The amount of data stored by businesses nearly doubles every 12 to 18 months. And the very biggest--those at or near the 100-terabyte mark--probably triple every three years

C. Babcock (Information week)

Data is not information,

information is not knowledge,

knowledge is not understanding,

understanding is not wisdom.

Cliff Stoll & Gary Schubert

Conference themes:

Challenges in Data Mining and Inference

Challenges in Computational Simulation of Natural Processes

Challenges in Inverse Problems

Handling the Data Explosion

But to get real value...

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Programme Wednesday 19

8:30	Registration	
		Session Chair: Sambridge M
10:00	**Sambridge M**	Welcome & Introduction
10.10	**Dzeroski S**	Plenary Talk: *Data Mining and its environmental applications*
10.50	Break	
11.20	**Cressie N**	Plenary Talk: *Spatial Prediction for Massive Datasets*
12:00	**Kennett B.**	Plenary Talk: *Inversion and Imaging for the Solid Earth*
12.40	Lunch	

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Programme Wednesday 19

Session Chair: Rawlinson N

2:00 pm	**McFadden P**	Plenary Talk: *Data explosion: The challenges for Geoscience Australia*
2:40	**Moresi L**	Plenary Talk: *High performance computing in geodynamics some outstanding issues in matching models to observations*
3:20	**Fraser & Dickson:**	*Data Mining Geoscientific Data Sets Using Self Organising Maps*
3.45	Break	
4.15	**Gallagher, Stephenson & Holmes**	*Dealing with unknown discontinuities in data and models*
4.40	**Laffan S**	*Exploiting the data explosion using geographically local analyses*
5.05	**Appelbe & Quenette**	*Computational Frameworks enabling multi-scale multi-Physics models*
5.30	Close	
6.15	Welcome reception: `the deck' at Regatta point.	

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Programme Thursday 20

Session Chair: Moresi L

Time	Authors	Title
9:00	**Sdrolias, Muller & Gurnis**	*Linking Observations to Subduction Process Modelling*
9.25	**Braun, Fullsack & deKool**	*Lithosphere-Hydrosphere interactions: Stokes flow with a free Surface*
9.50	**Roberts & Nielsen:**	*Simulating the effect of Tsunamis within the Build Environment*
10.15	Break	
10.45	**Haile, Mulhlaus & Bourgouin**	*Simulation of Lava Dome Growth Considering shear thinning, thermal feedback and strain softening*
11.10	Discussion – Modeling of Natural Processes – Chair: Moresi L	
12.30	Lunch	

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Programme Thursday 20

Session Chair: Gallagher K

Time	Speaker	Title
2.00	Larson J	*The run-time data challenge in climate system modelling*
2.25	Muller D	*GP-Plates and GPML*
2.50	Potma & Poulet	*Application of interactive geological inversion techniques and grid computing to numerical modeling of geological processes*
3.15	Break	
3.45	Ballester & Carter	*A New Methodology for Addressing Nonlinear Inverse Problems and its Application to Characterise a Real Petroleum Reservoir*
4.10	Discussion – Data Mining, Data Exchange and Software – Chair: Muller D	
5.30	Close	
7:00	Conference Dinner: Drawing Room 7.00pm University House	

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Programme Friday 21

Session Chair: Braun J

Time	Presenter	Title
9.00	Rawlinson & Kennett	*Teleseismic Imaging in South East Australia, using data from Multiple high density Seismic Arrays*
9.25	Norris R	*Desperately Trying to Cope with the Data Explosion in Astronomical Sciences*
9.50	Woodcock & Fraser	*Towards Service-Oriented Geoscience: SEE Grid and APAC Grid*
10.15	Break	
10.45	Sircombe K	*Temporal Explosion: the need for new approaches in interpreting and managing geochronology data*
11.10	Discussion – Inverse Problems & Data Inference – Chair: Sambridge M	
11.50-12.10		*The CADI inversion toolkit – P. Rickwood*
12.10-12.30		*APAC initiatives – B. Evans*
12.30	Lunch	

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Programme Friday 21

Session Chair: Muller D

2.00	Muller D	*Understanding basin evolution using global data sets*
2.25	Barton & Held	*Towards a Geoscience Information Commons: the Electronic Geophysical Year, 2007-2008 and the Global Earth Observing System of Systems*
2.50	Gross, Smillie & Throne	*On Software Infrastructure for Computational Earth Sciences*
3.15	Feeney & Busby	*How to avoid collateral damage: Principles for linking data users to data providers*
3.40	Close	

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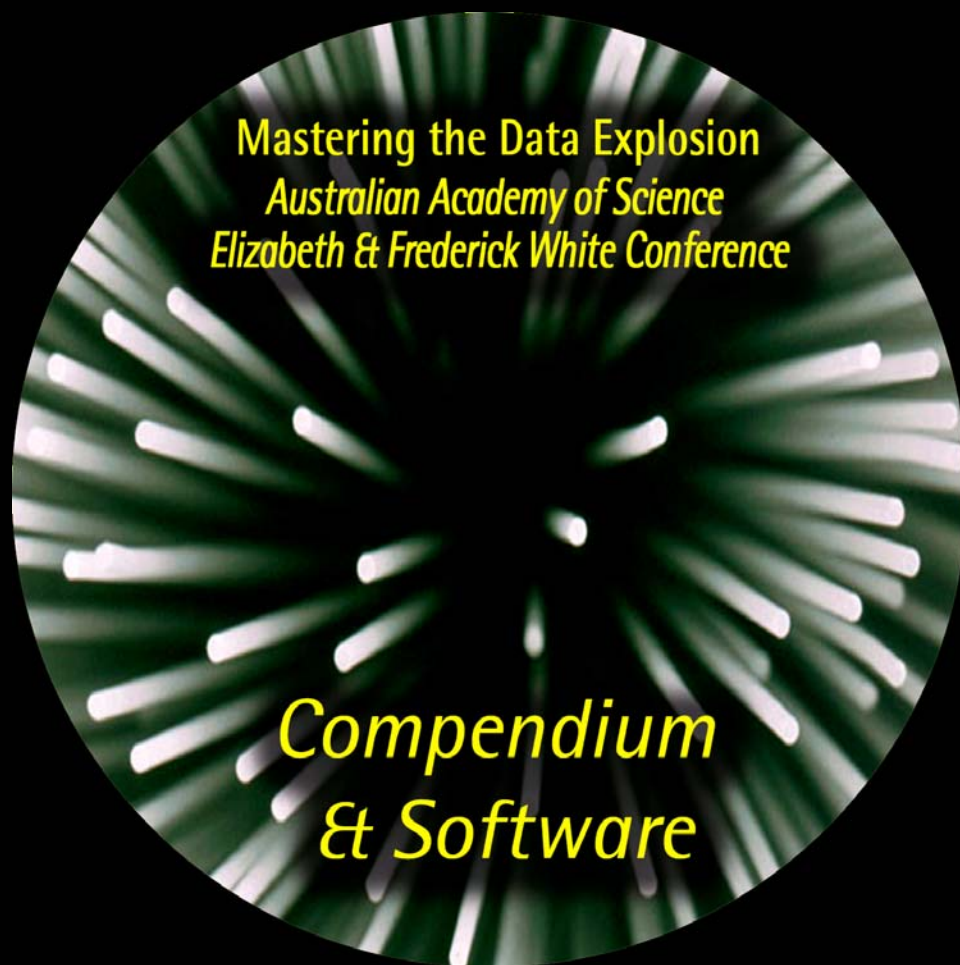Australian Academy of Science Elizabeth and Frederick White Conference

Contents of the CD-Rom

Software: CADI Toolkit

Abstracts: in full colour

Papers: in full colour

Conference Programme

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Compendium
& Software

Inverse problems & data inference discussion

0. What is an inverse problem ?

1. What is the result of an inversion (single model vs ensemble) ?

2. How can we visualize resolution and uncertainty ?

3. How to deal with errors in theory ?

4. Is parameter search now practical for computationally intensive forward problems ?

5. What do we do with an ensemble of solutions (appraisal problem) ?

6. How can we compute error propagation in nonlinear inverse problems ?

7. How do we deal with the large dimensional problems ?

8. How can we use a-priori knowledge effectively ?

9. How to combine multiple types of data, and how to measure data fit ?

10. Do we all need to write inversion software; time for a robust inversion/data inference toolkit ?

Most people, if you describe a train of events to them, will tell you what the result would be. There are few people, however, who, if you told them a result, would be able to evolve from their own inner consciousness what the steps were which led up to that result. This power is what I mean when I talk of reasoning backwards.

Sherlock Holmes - A study in scarlet

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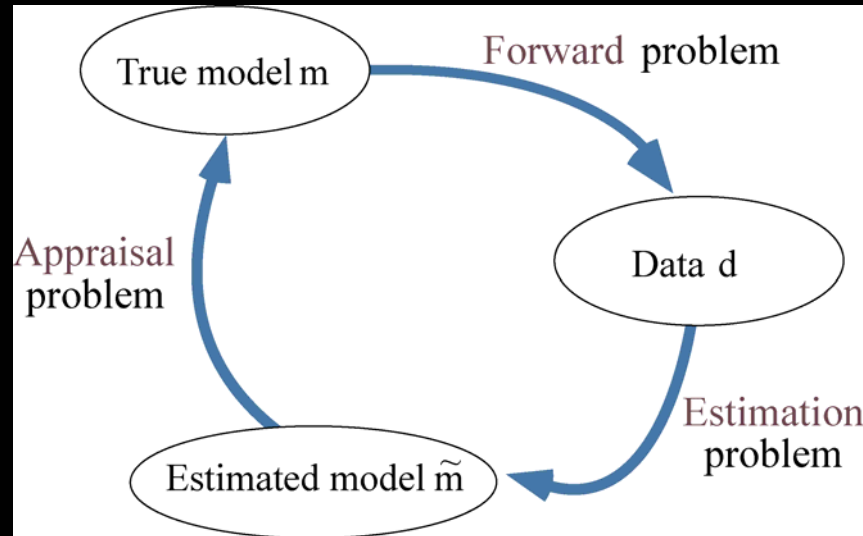Australian Academy of Science Elizabeth and Frederick White Conference
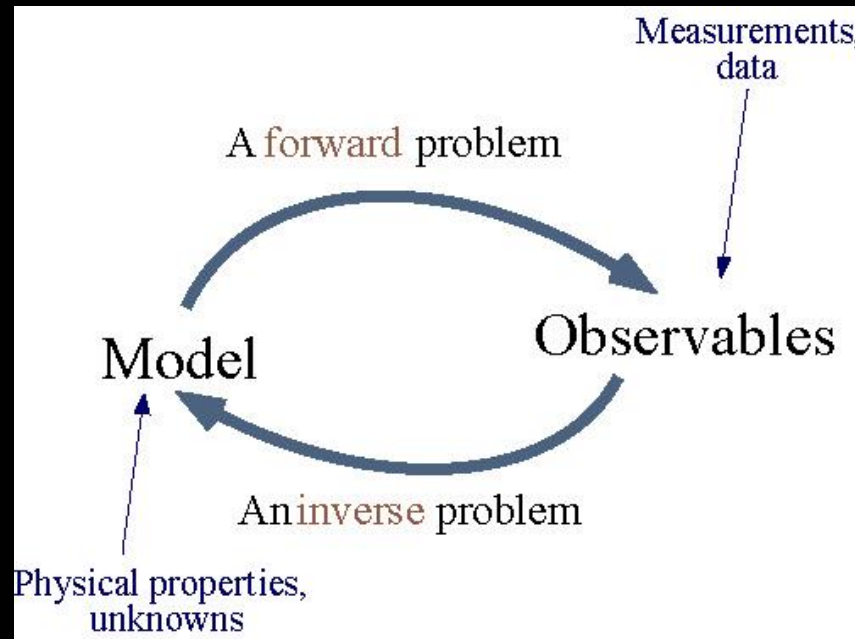
Forward and inverse problems

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The purpose of models is not to fit the data but to sharpen the questions

Samuel Karlin

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1. If reproducibility may be a problem, conduct the test only once.
2. If a straight line fit is required, obtain only two data points.

Velilind's Laws of Experimentation

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Forward and inverse problems