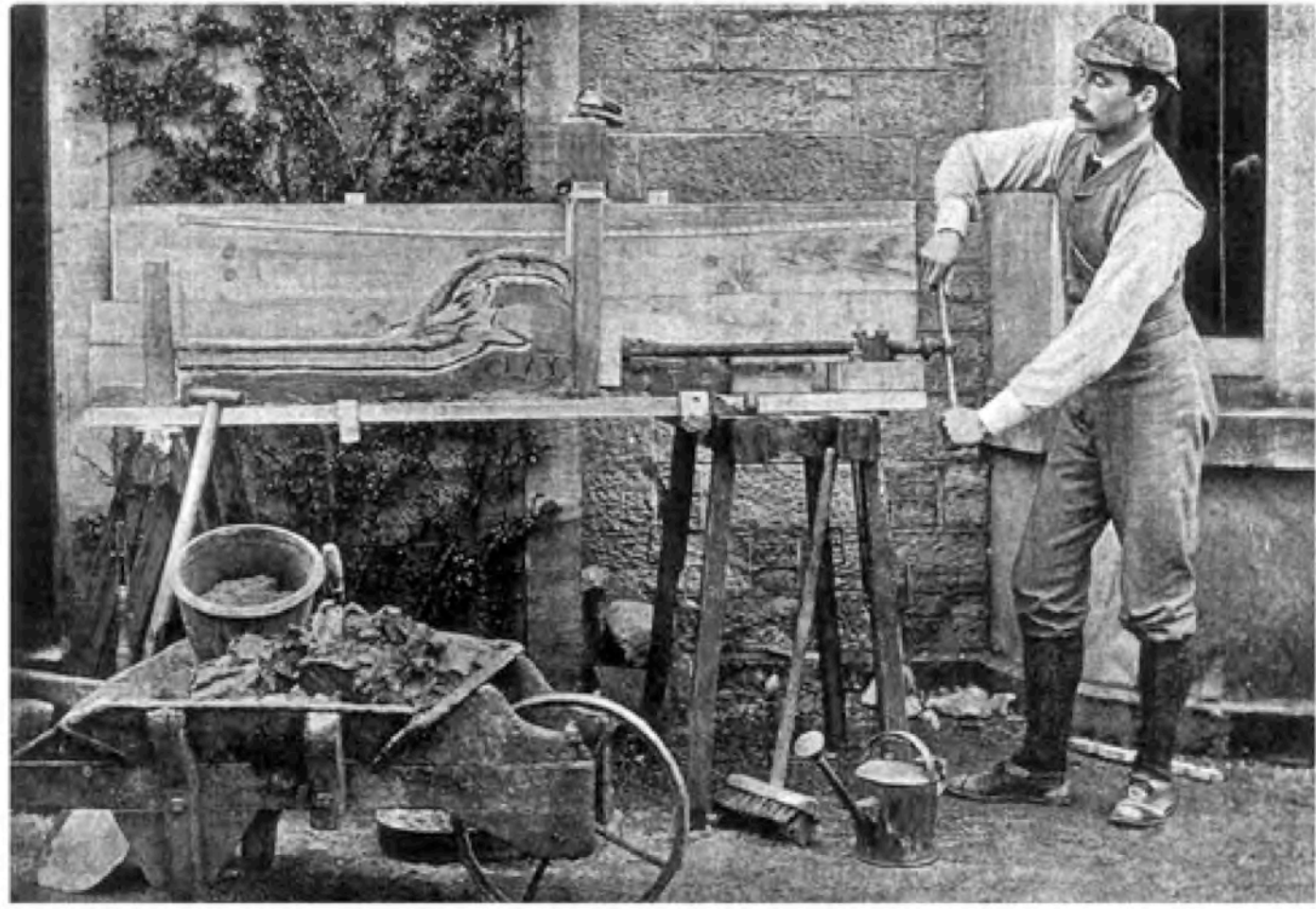




# Geodynamic Modeling on an Xgrid Cluster

Patrice Rey - School of Geosciences - The University of Sydney

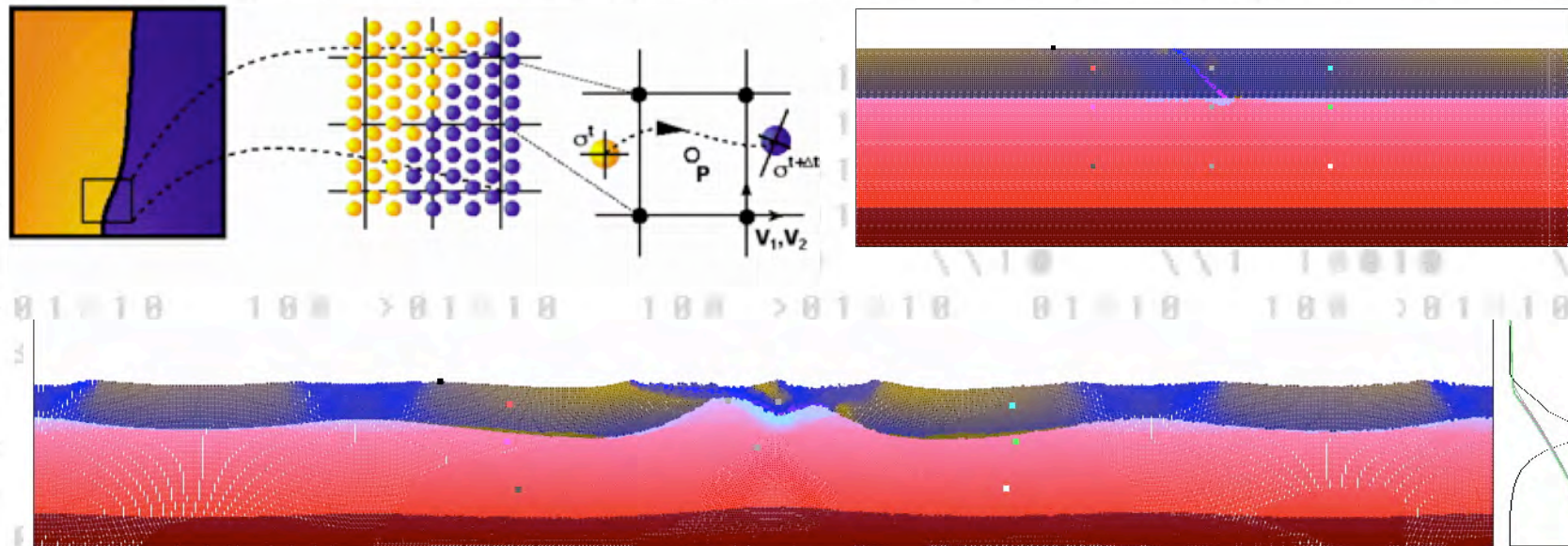
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- Progresses in High Perf. Comp. and affordability => Eulerian/Lagrangian approaches economically viable.

Lagrangian particles move through a stationary Eulerian mesh. The relevant equations are solved at the nodal points and information relayed to particles.

Particles (moving integration pts) carry the material history & stress rates.



- Open source codes and codes easily accessible (Ellipsis3D, SNARK, SNAC...) => New opportunities for tectonicists to design better more robust models and from them create new knowledge.



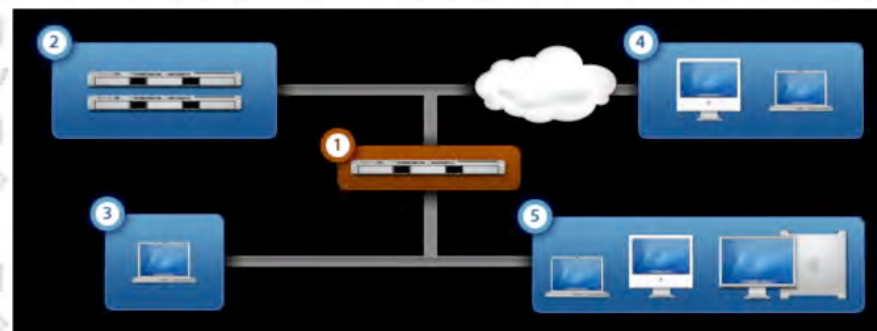
# Xgrid



Xgrid - A controller receives jobs from a clients, splits jobs into tasks, distribute tasks to agents, retrieves and send notification of results to clients.

## Agents:

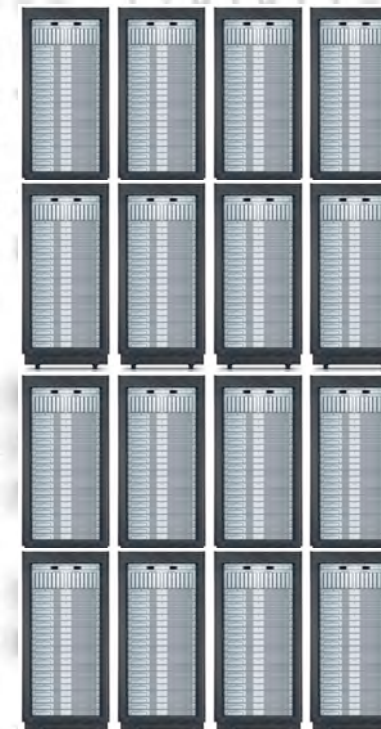
- Cluster of processors
- Local inactive processors
- Remote internet connected processors



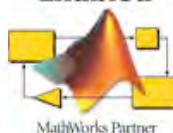
\$2,500 > 1 Proc.

\$50, 000 > 20 Proc.

\$2,500,000 > 1000 Proc.



MATLAB Enabled

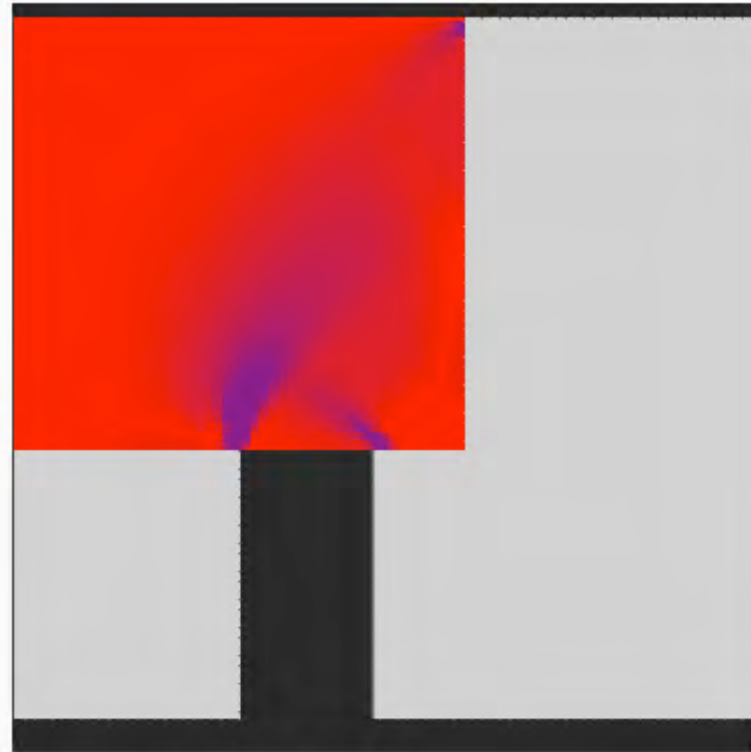
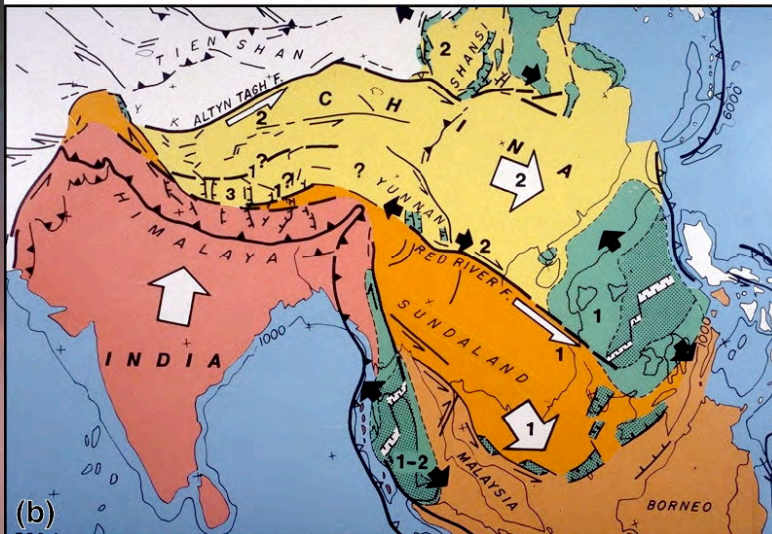
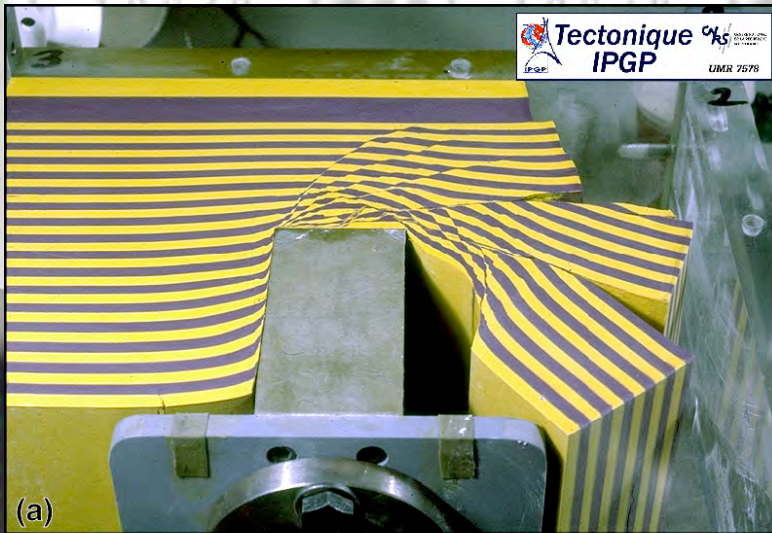


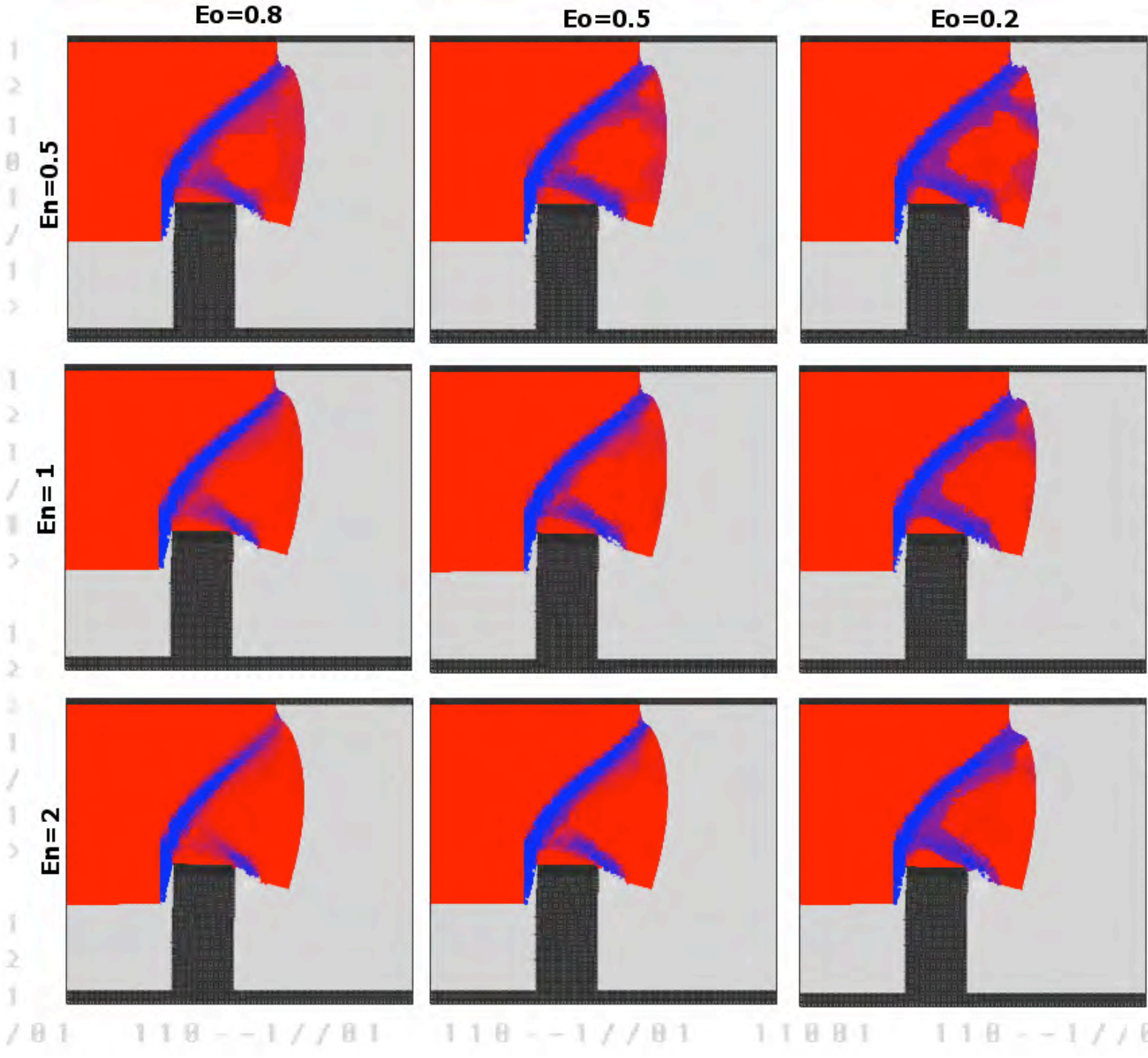
gridMATHEMATICA™2

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# Testing Ellipsis...

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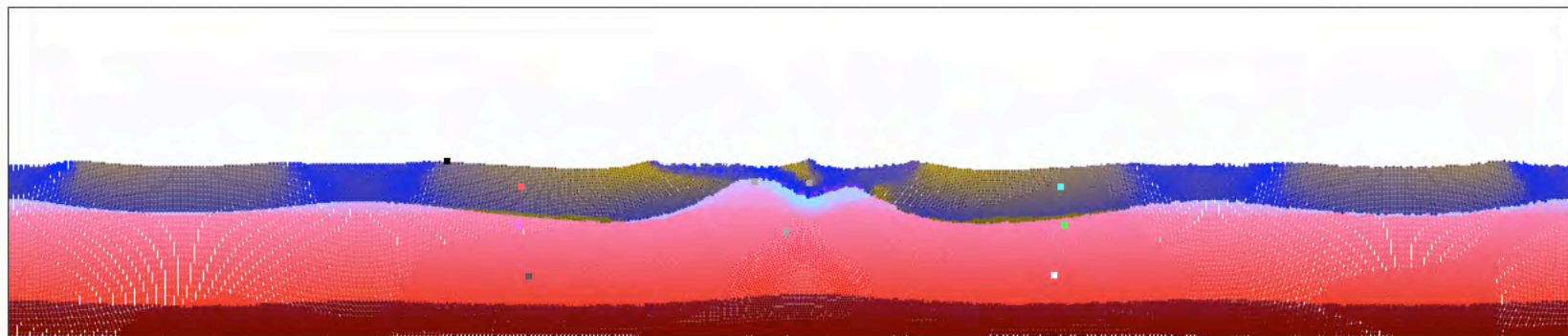
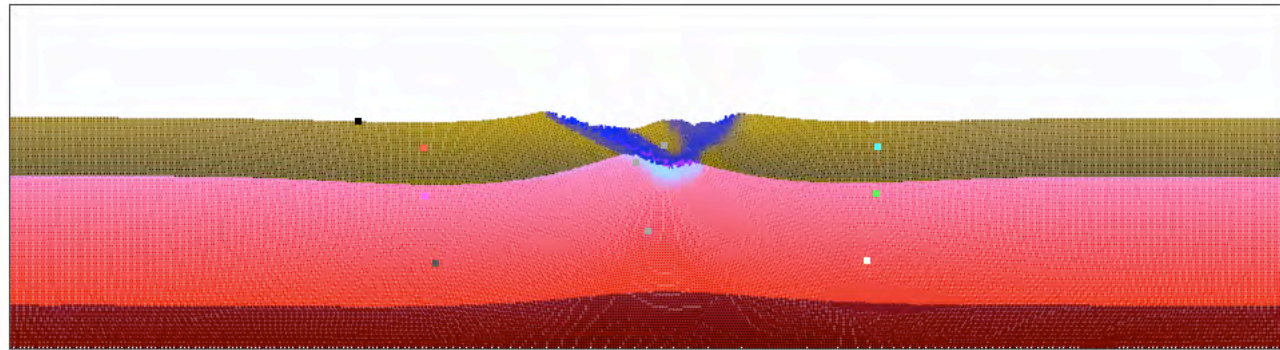
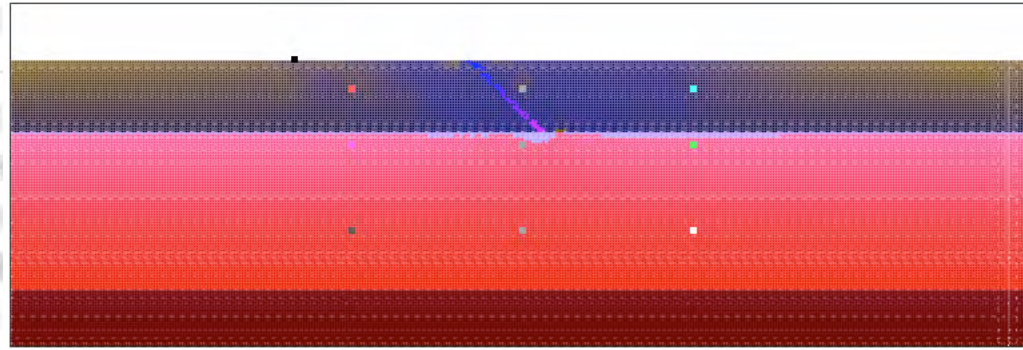




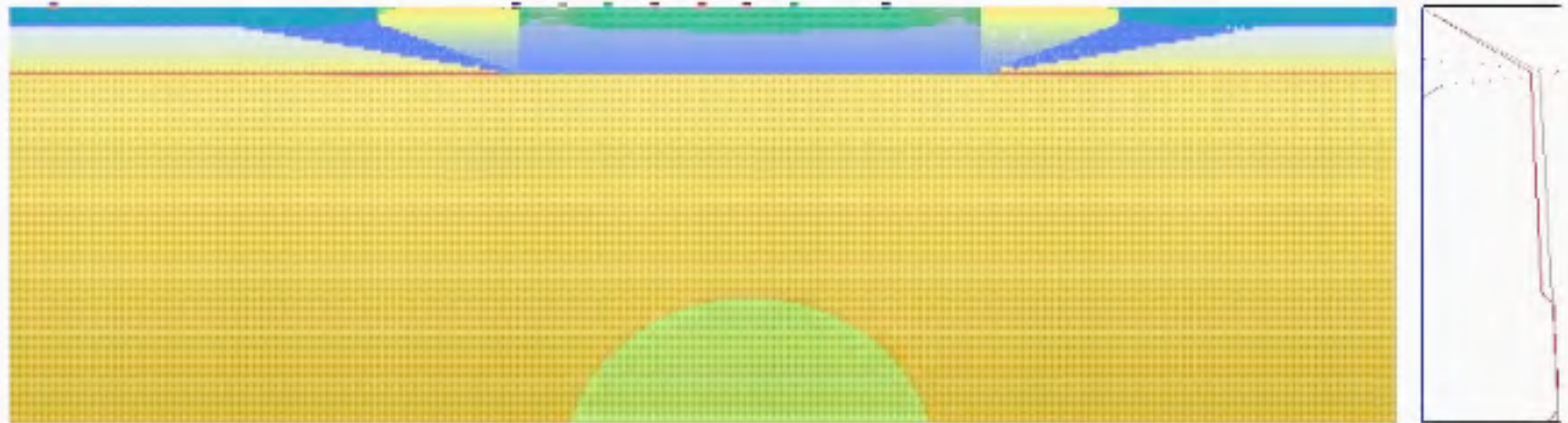
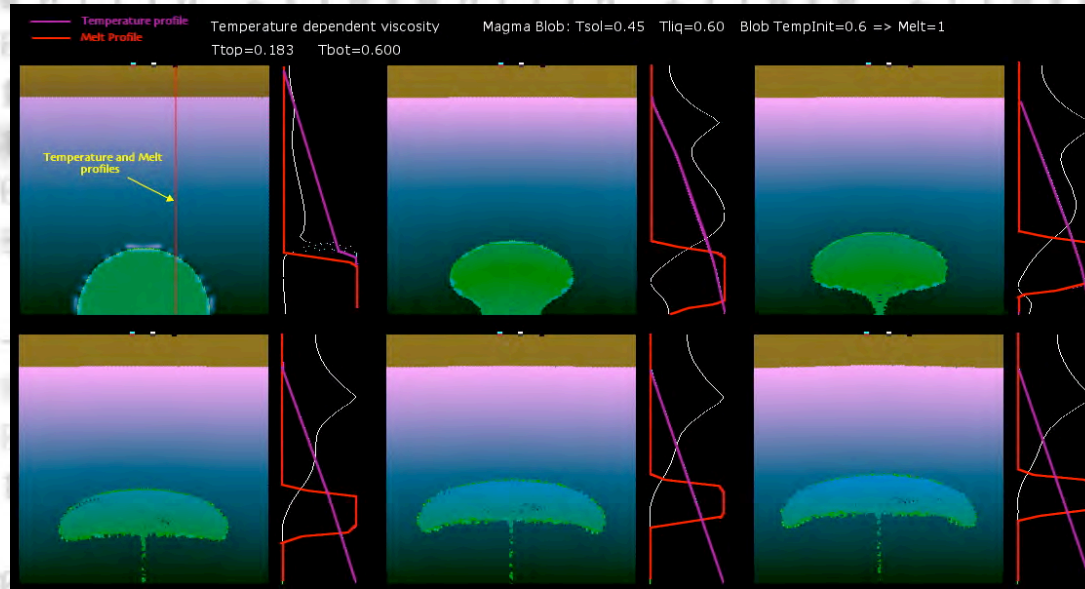
$B_0=1600$   $B_p=0.044$   $E_a=0.1$  Levels=3

100 99 98 97 96 95 94 93 92 91 90 89 88 87 86 85 84 83 82 81 80 79 78 77 76 75 74 73 72 71 70 69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

# Lithospheric scale extension: Solving the problem of low angle detachments.



# Ellipsis3D with Partial Melting: A way towards thermo-mechanical and geochemical modeling.



# Archaean Crustal Geodynamic: The role of gravitational instabilities



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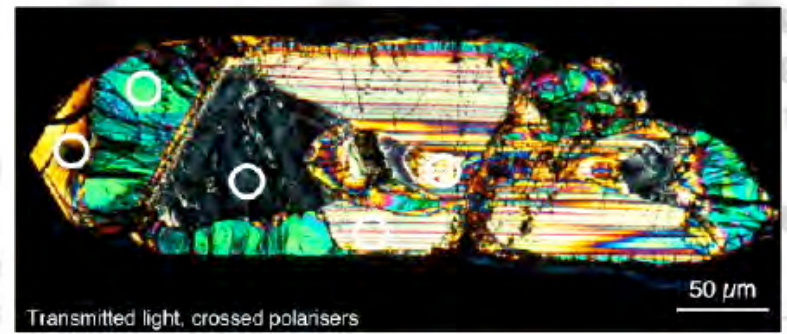
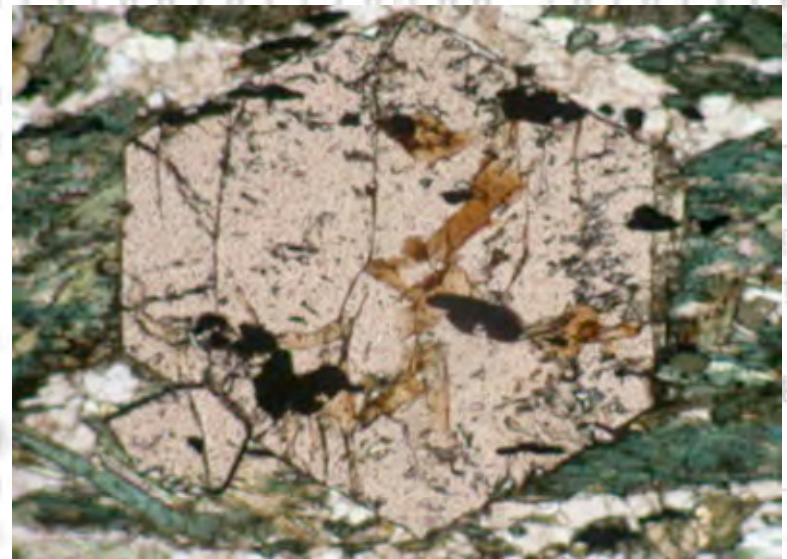
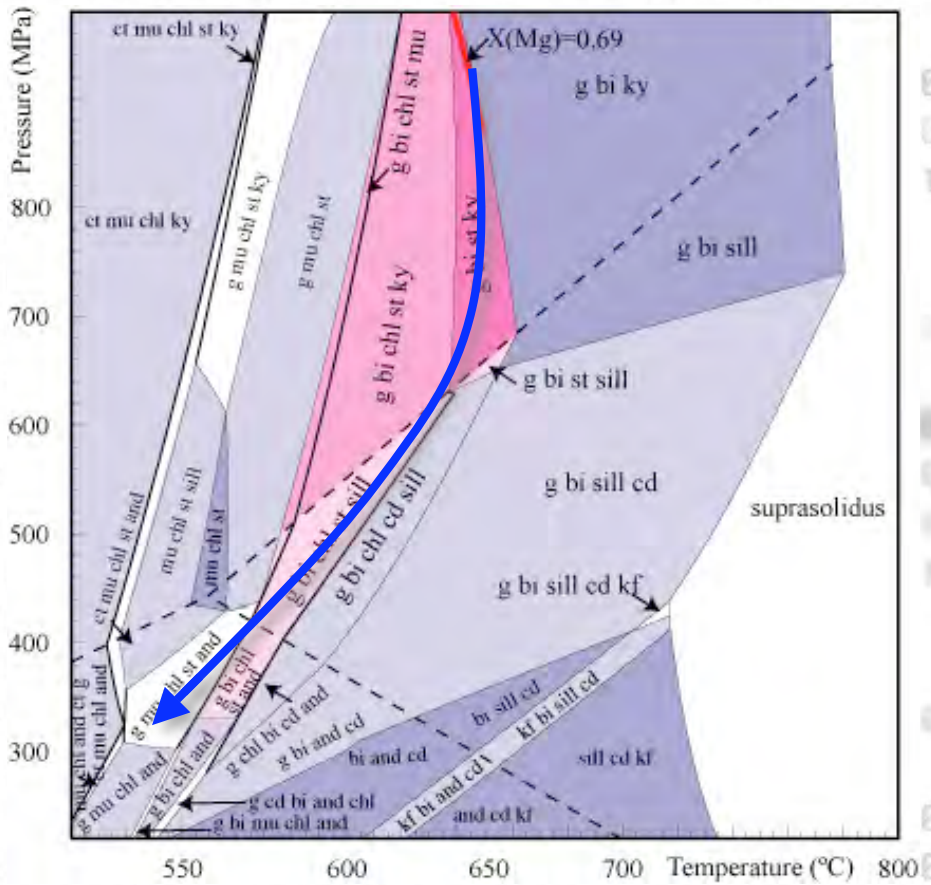
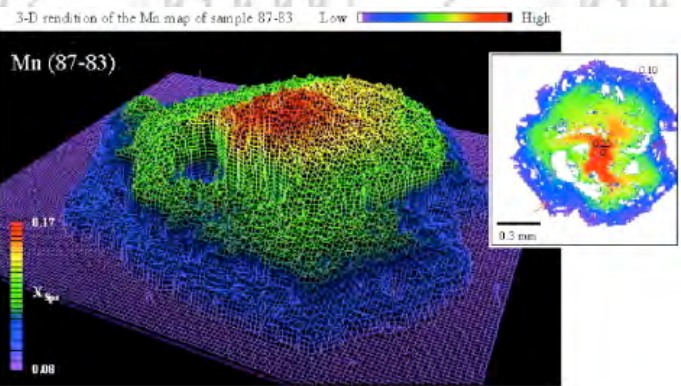


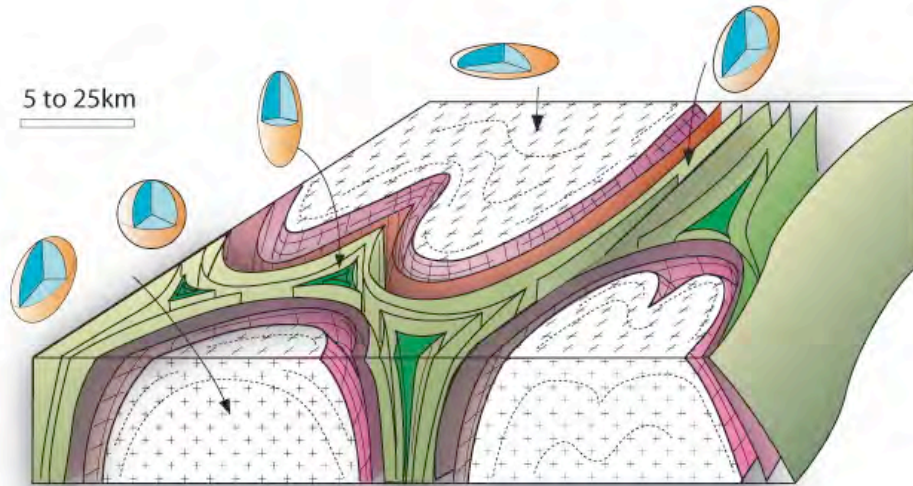
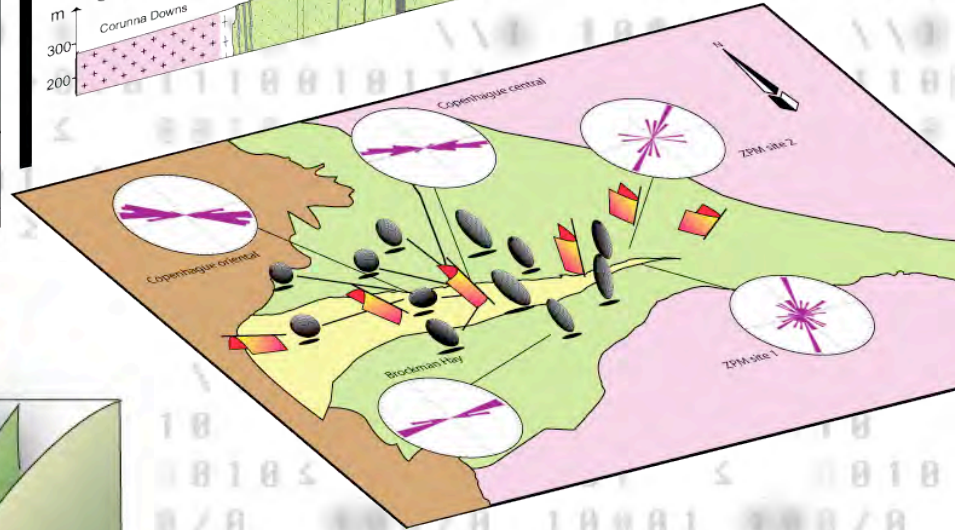
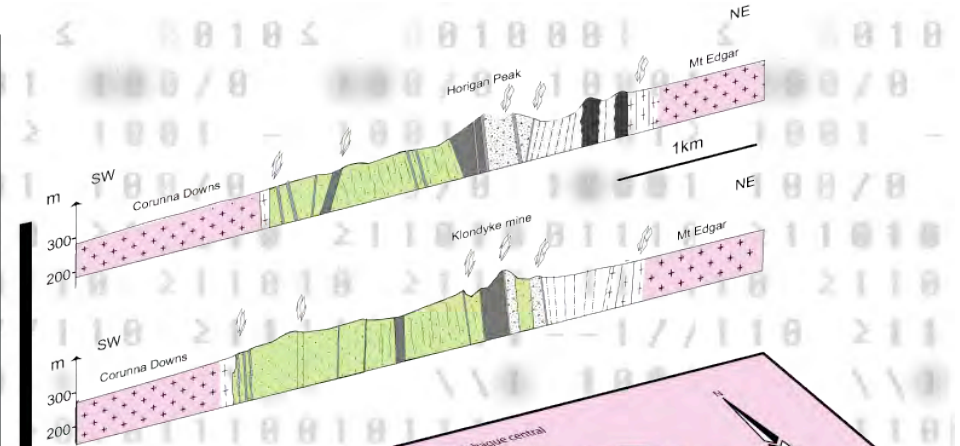
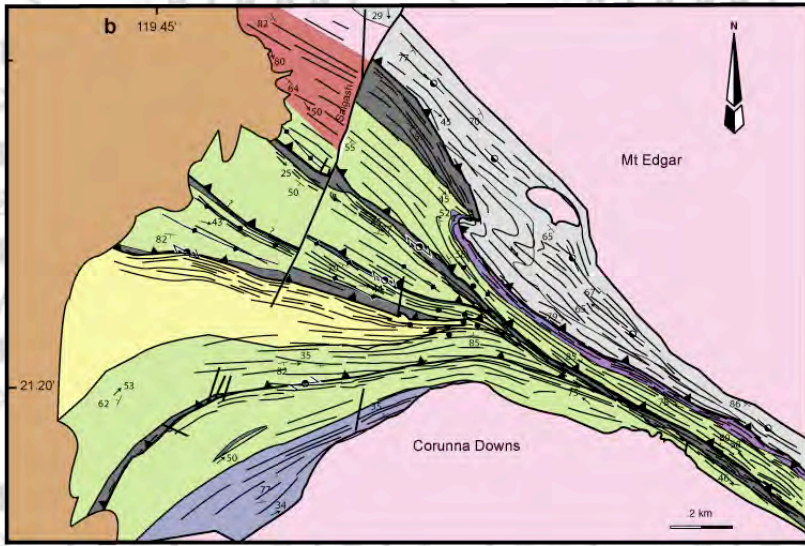
ARC DP - 0666295 - Early Earth Processes: P.Rey USYD; J. Dunlap & S. McLaren RSES ANU; J. Brugger - SA Museum & UniSA; P. Philippot & N. Thébaud IPGP - Paris; F. Le Hebel - USYD

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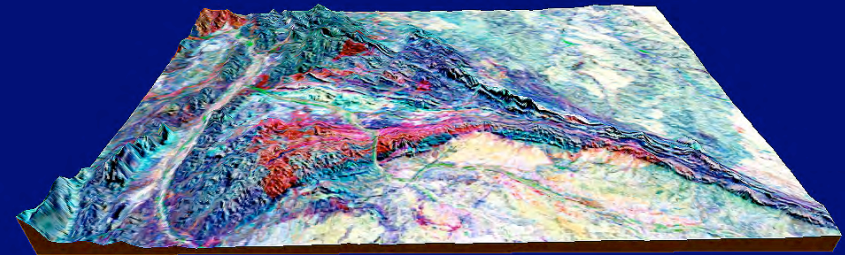
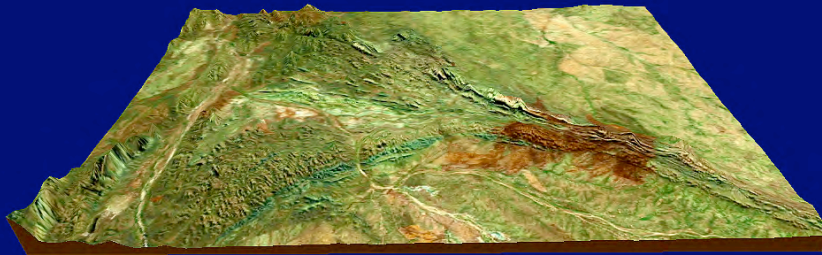
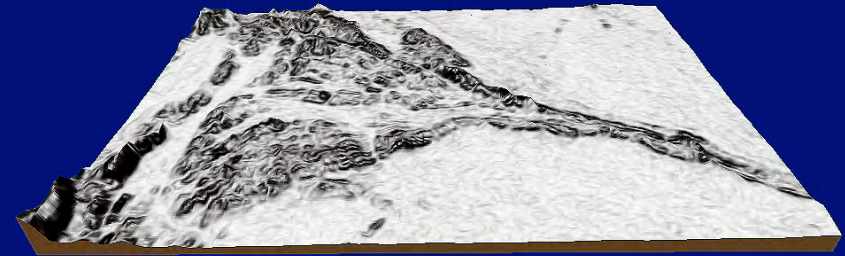
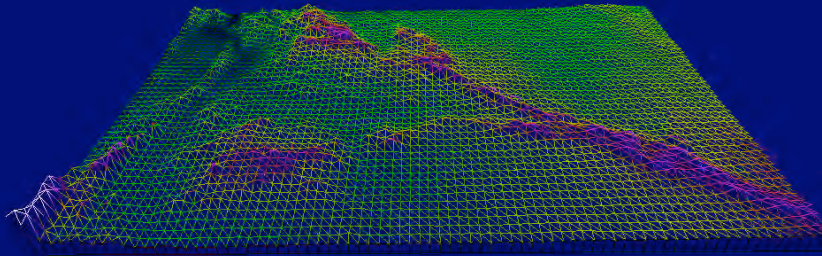


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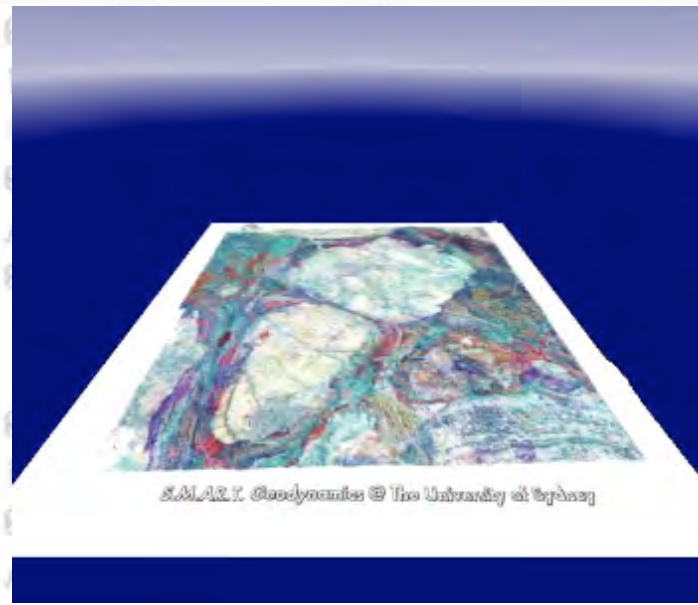
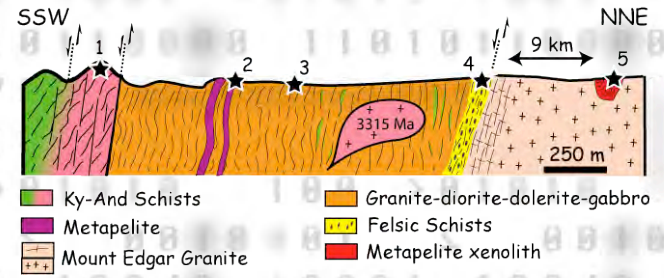
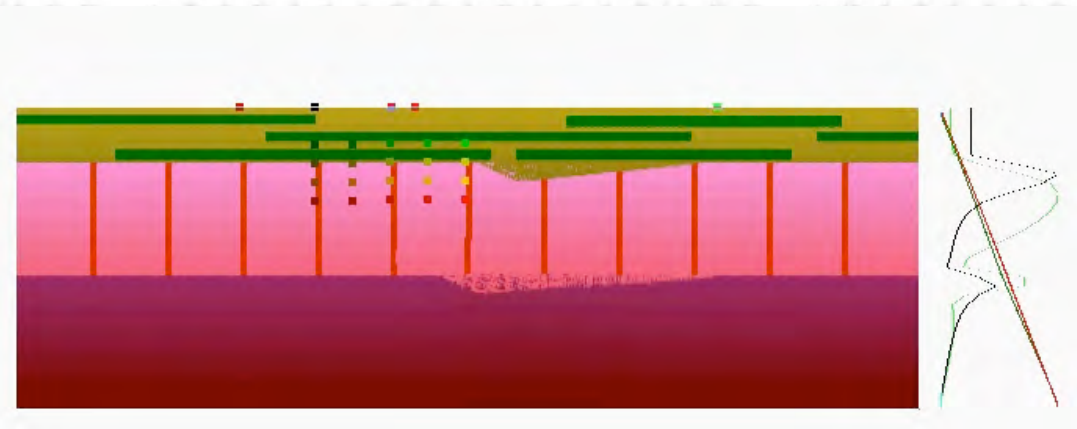
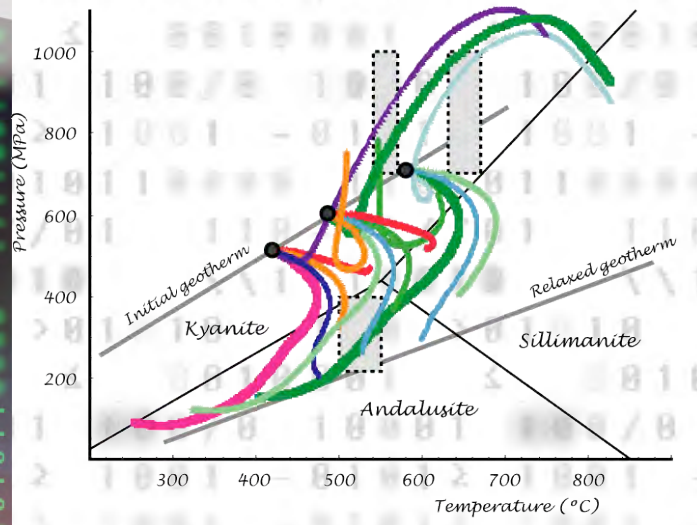




# High resolution GIS - modeling ...

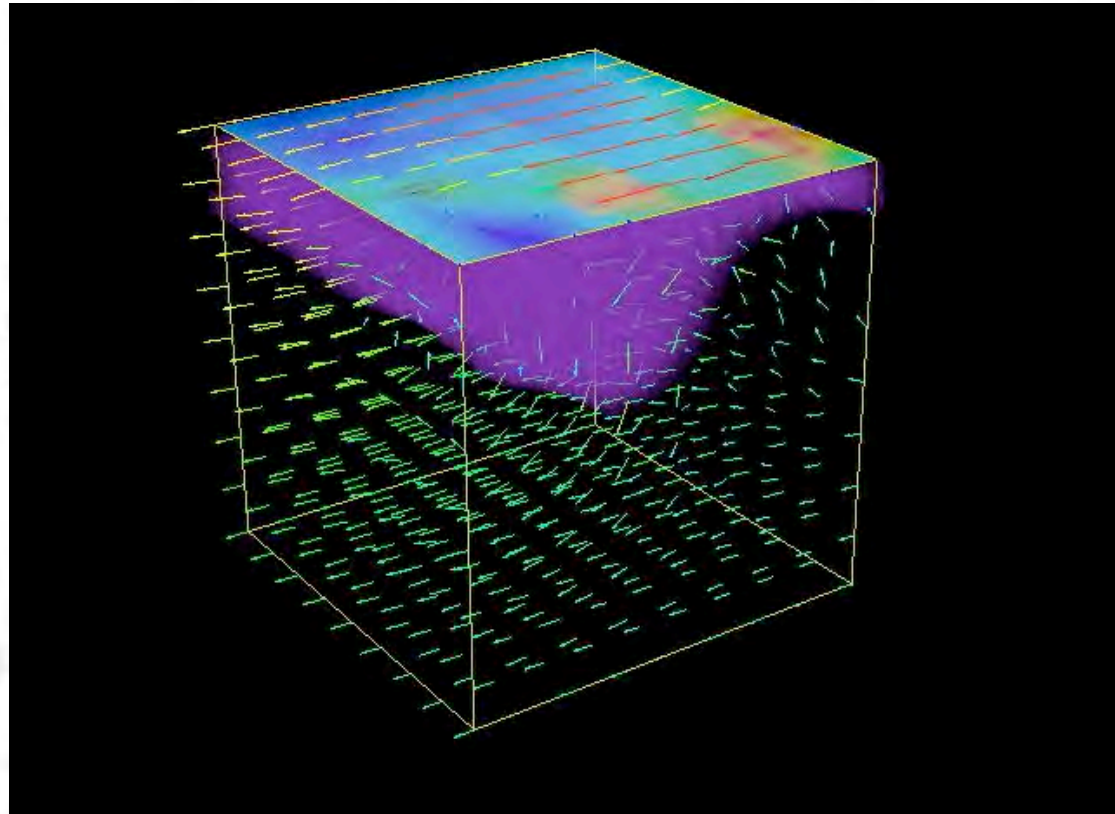
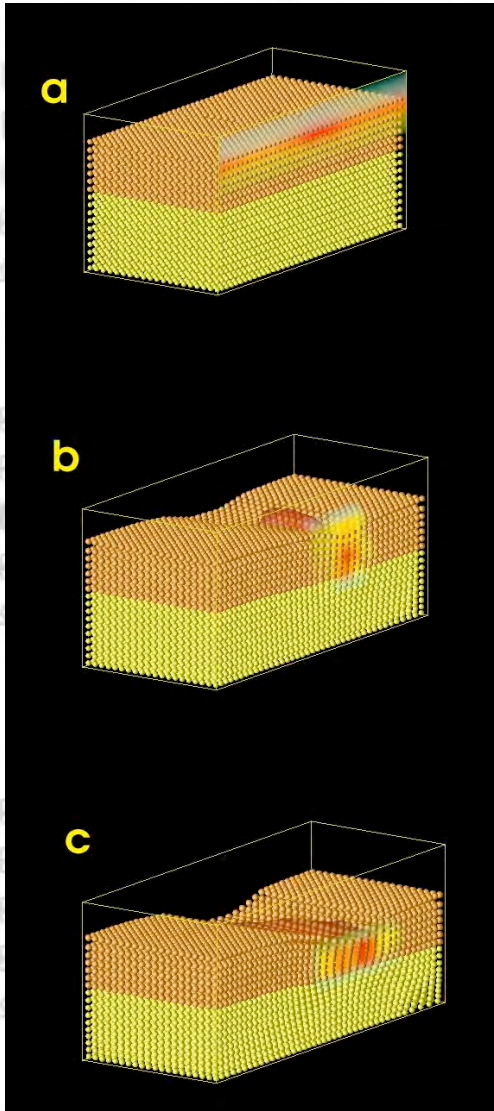


Geodynamic modeling => massively parallel problems



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# 3D models...



C. O'Neill