Geoscience education for the Google generation

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Google Earth: Visualizing the Possibilities for Geoscience Education and Research

https://sites.google.com/site/gepenrose/

Outline

- Students – how will their skills/needs change in 21st century?
- HE Landscape – how will this evolve in next 5-10 years?
- Educators – what do we teach in the future and how?
- Resources/tools – what is available to us – and how do we make use of them?

Students

- highly skilled in internet, gaming, smartphones and other emerging IT/media technologies
- Google, Facebook, YouTube, flickr,
- SMS, blogs, video messaging, Twitter
- Wii, PS3, Xbox, Second Life

Skills

- Increase in spatial cognitive skills - a result of TV from early age, computer games internet etc?
- but decrease in more abstract reasoning skills – perhaps attributed to decrease in reading books
- Against background of increasing IQ due to improved education and other environmental factors

Greenfield, P.M. (Science 2009)

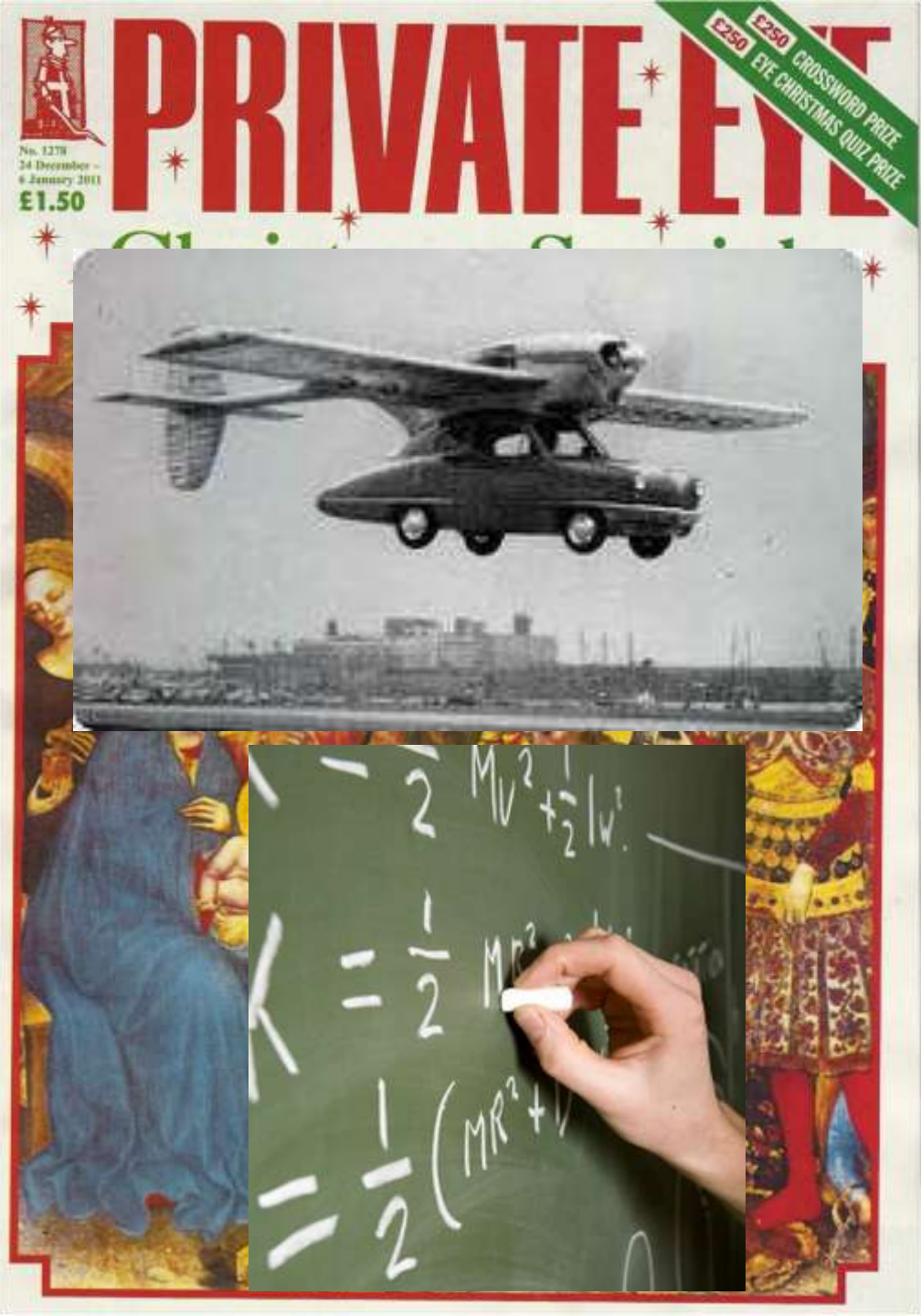
Needs – (Employability)

- What will work environment look like? How do we know?
- The Google model?
  - Flat organisation,
  - Organic structure around teams
  - Entrepreneurship key
- Remote working likely to be important but staying connected will be key - 'the Cloud'!

Develop close links with employers - Employer forums, advisory panels – placements, secondments – CeREES model

HE Landscape

- Uncertainty post-Browne
  - High tuition fees
- Students' school experience
- Increasing complex technology-rich society
  - Wide array of tools at our disposal –
  - What to use/when to use?
  - How can we be sure of effectiveness?

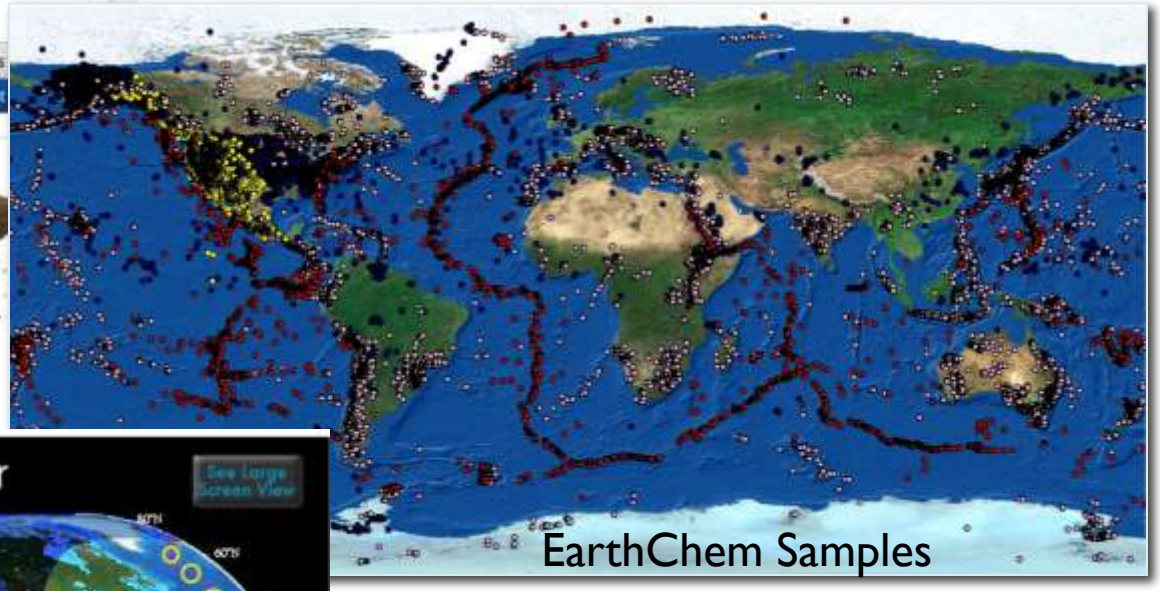


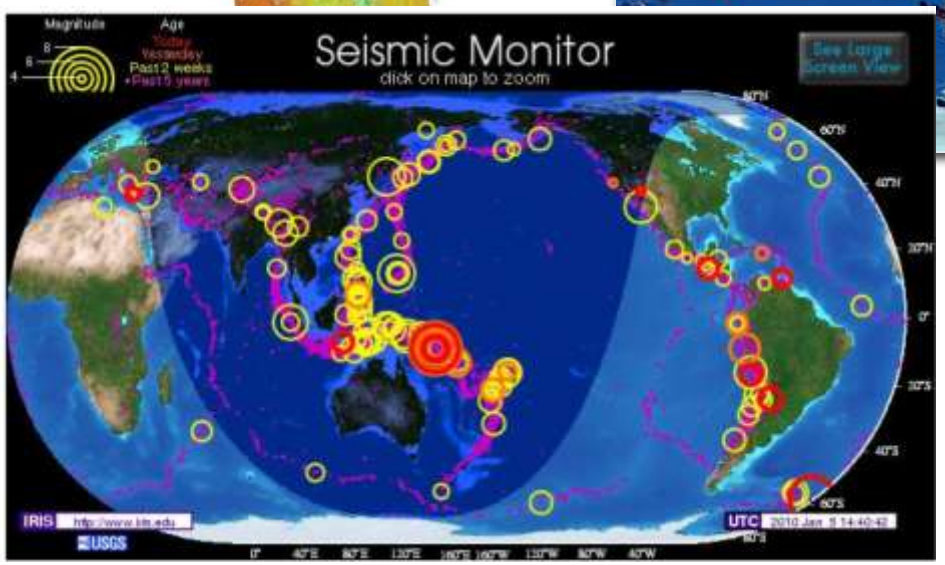
What do we teach students?

- how to address real-world problems;
- to critically evaluate the validity of data
- methods, and scientific concepts
- build scientific, technical, quantitative, and communication skills.

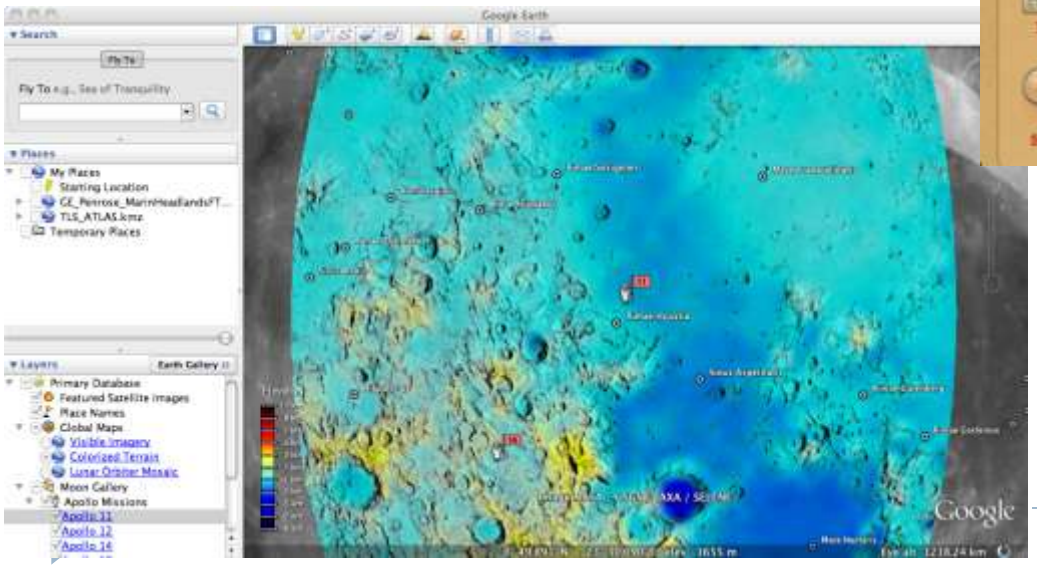
But now also data mining – global datasets, Multi-attribute geospatial visualisation, and scale issues
How best to teach the 'soft' skills alongside the 'hard' science? What else?

Data Resources for Geoscience Research

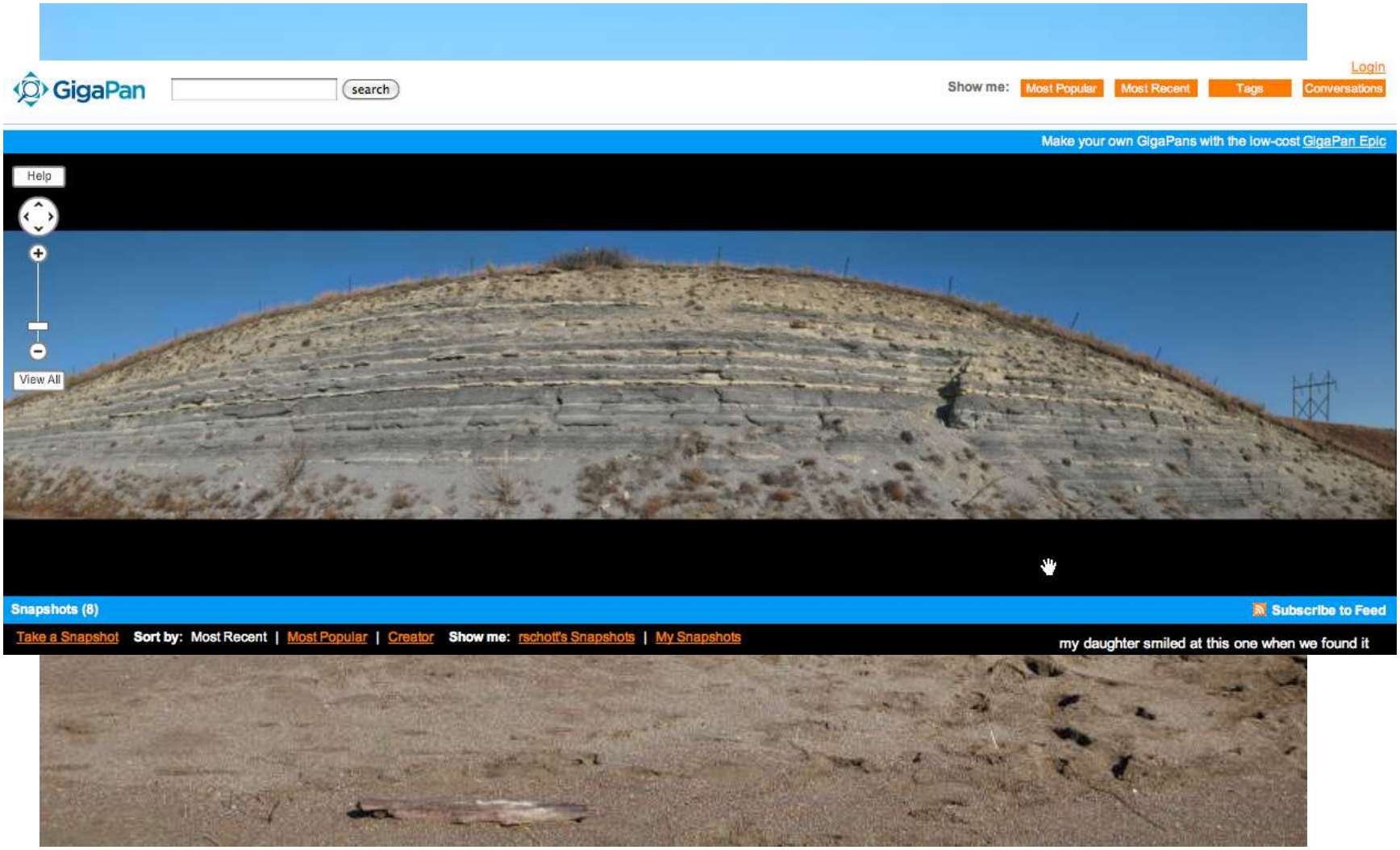




‘Virtual’ environments

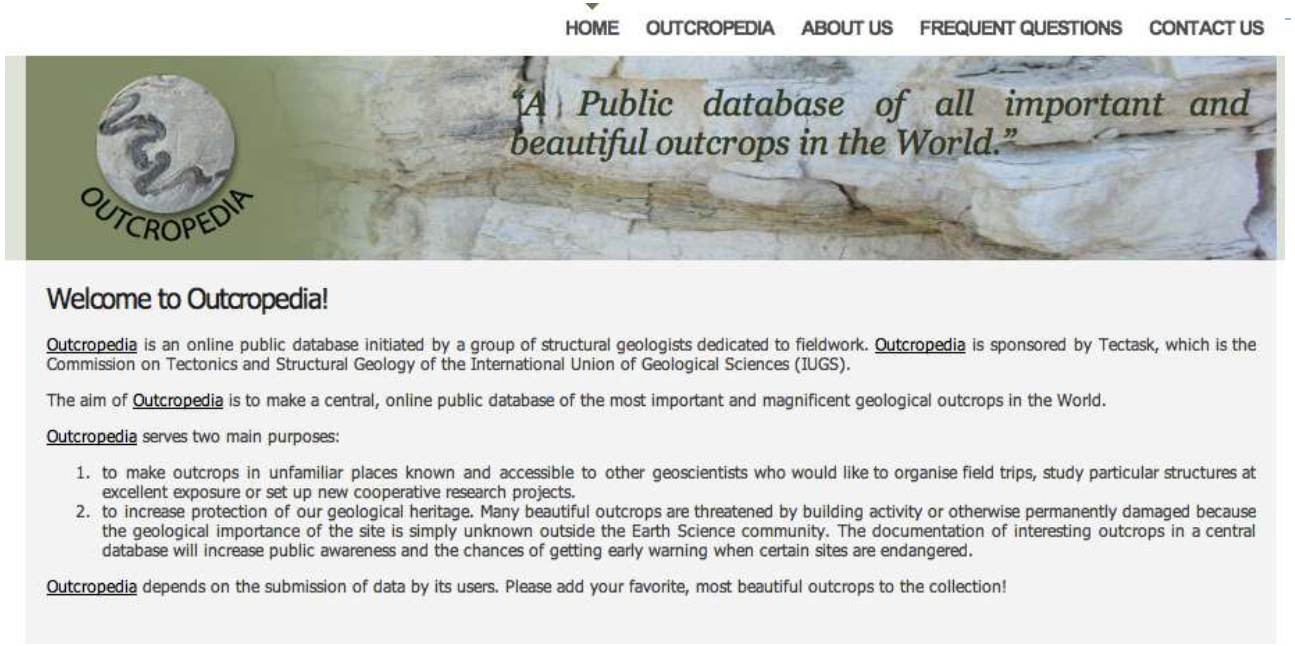


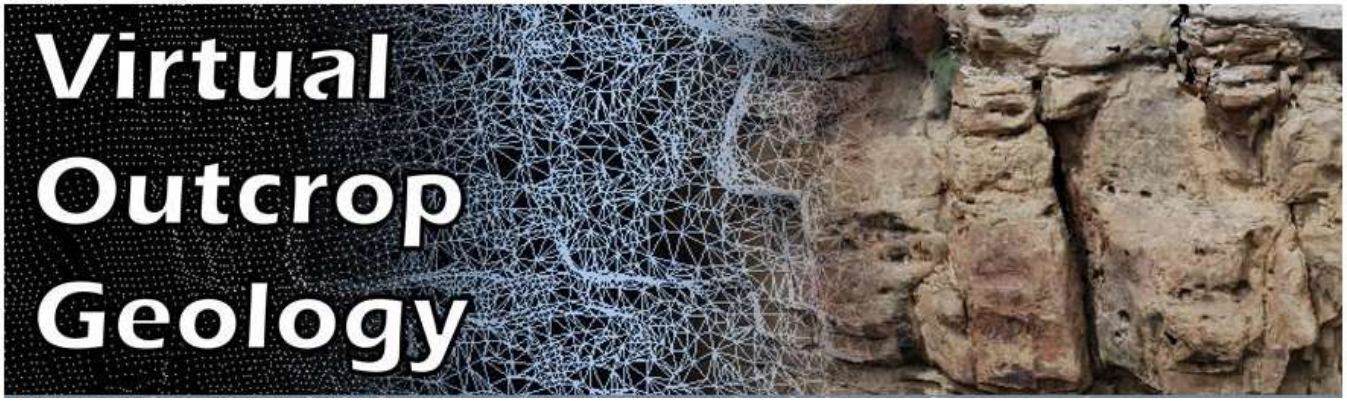
High resolution imagery



- http://www.gigapan.org/gigapans/2575/

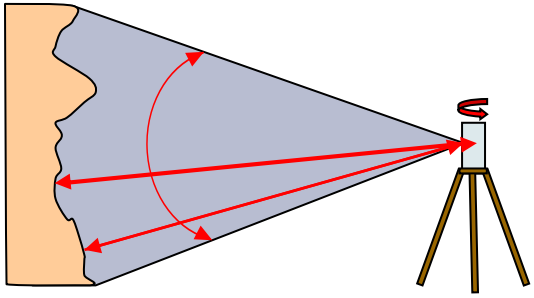
Virtual Outcrops

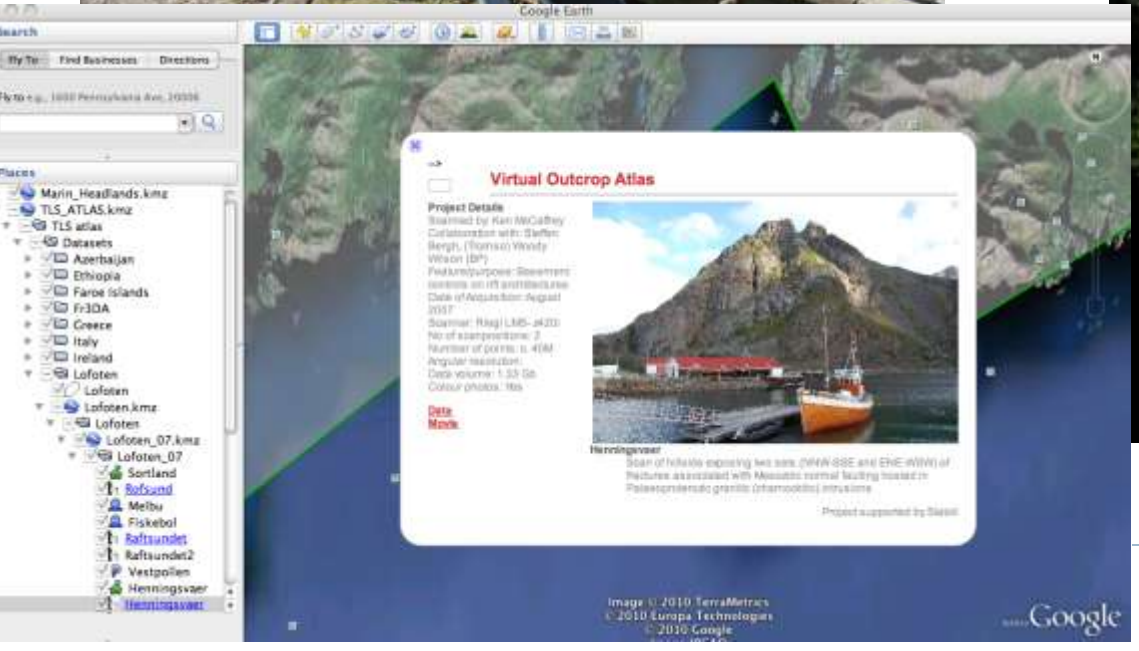




http://org.uib.no/cipr/Project/VOG/

Example Virtual Outcrop – Kepier Quarry, Durham, UK





Industry/Academic partnerships

Academic Software Initiative

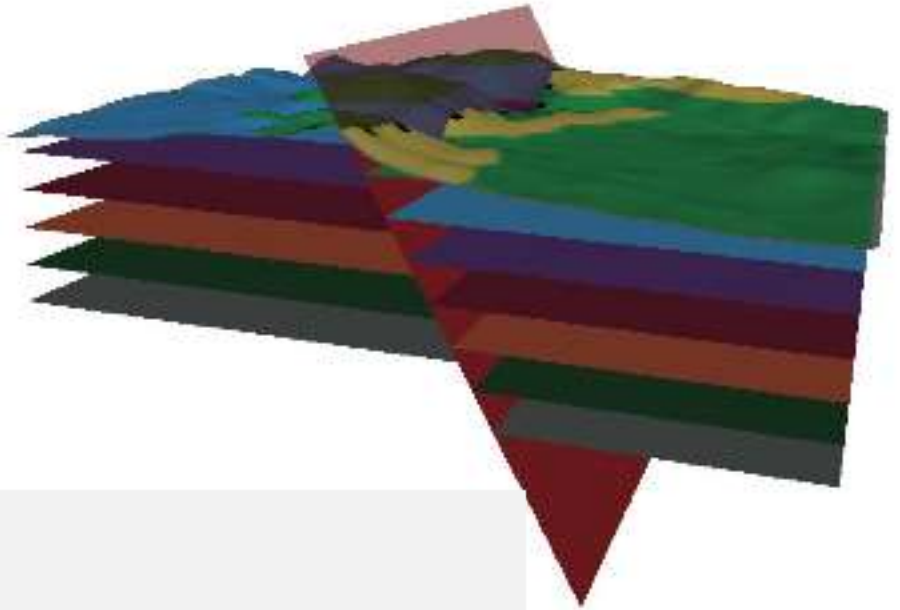
Midland Valley

Get your hands on the most complete structural modelling and analysis toolkit for your teaching and research.

A deal for universities providing free access to move

To celebrate our 25th anniversary in 2008 Midland Valley launched its Academic Software Initiative (ASI), opening up access to Move, our structural modelling and analysis software, by providing licences free of charge to universities and other academic institutes.

The initiative significantly increases the investment Midland Valley makes in training the next generation of geologists and builds on our Field Mapping Initiative launched in 2007. Within the ASI academic institutes will be supplied (on an annual basis) with as many licences of Move as they require, free of charge.



http://www.mve.com/Academic/academic-software-initiative.html

Teaching Map Interpretation and Cross Section Construction Using Google Earth

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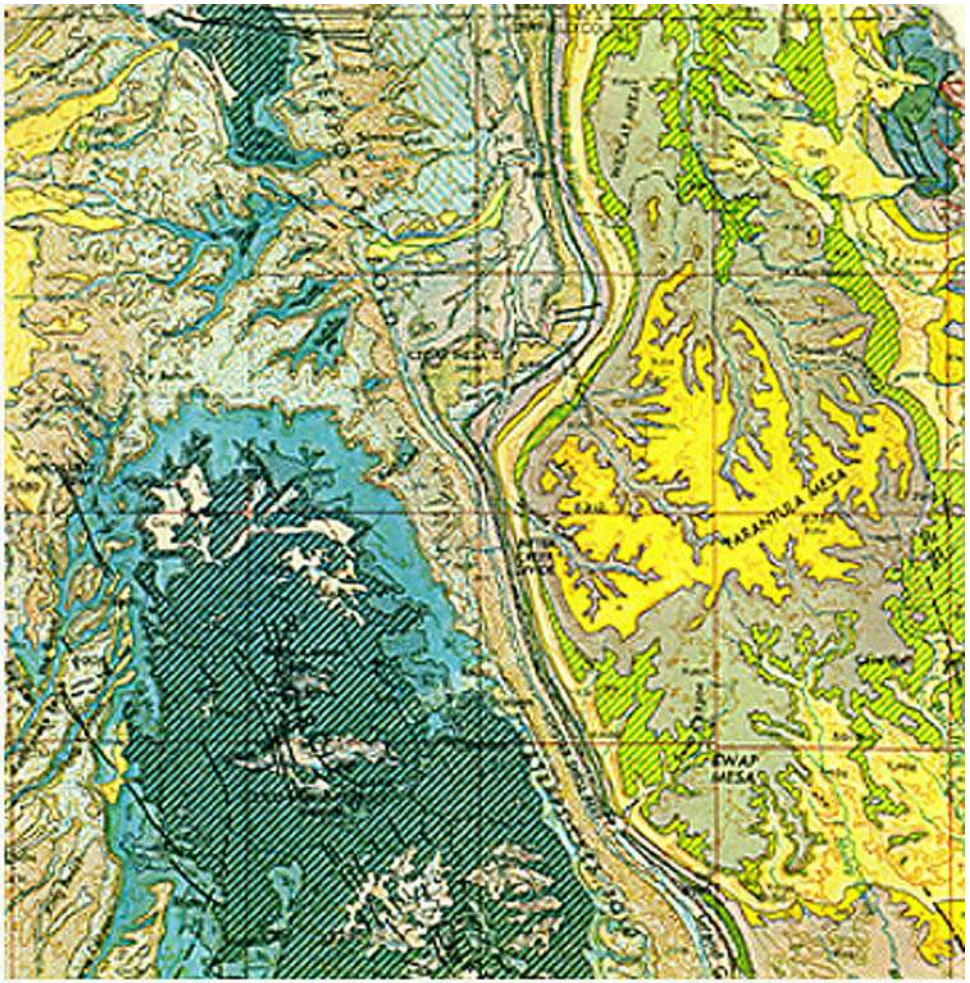
SERC - Cutting Edge
http://serc.carleton.edu/sp/library/google_earth/index.html

Geologic map interpretation



http://www.fas.org/irp/imint/docs/rst/Sect2/Sect2_3.html

- Really hard for students

My old approach to teaching map interpretation

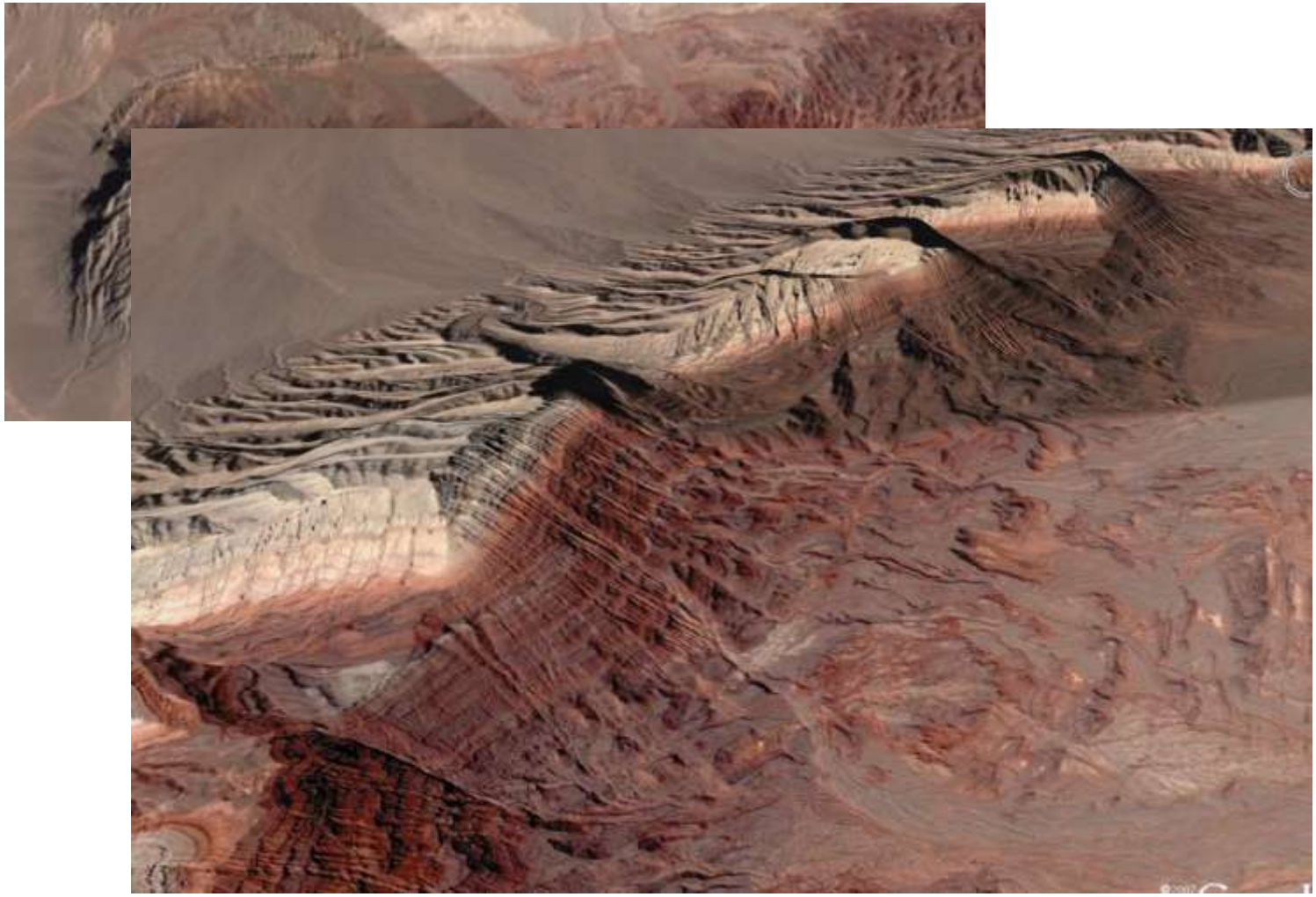
- Define s
- Define u
- Teach ou
  vertical c
- Teach ou
  rule of V
- Lots of PlayDoh®
- Have students practice interpreting geologic maps and drawing X-sections

1 And then I discovered digital PlayDoh®

- http://serc.carleton.edu/NAGTWorkshops/structure/approach.html

2a

Value of Google Earth



East of Yazd,

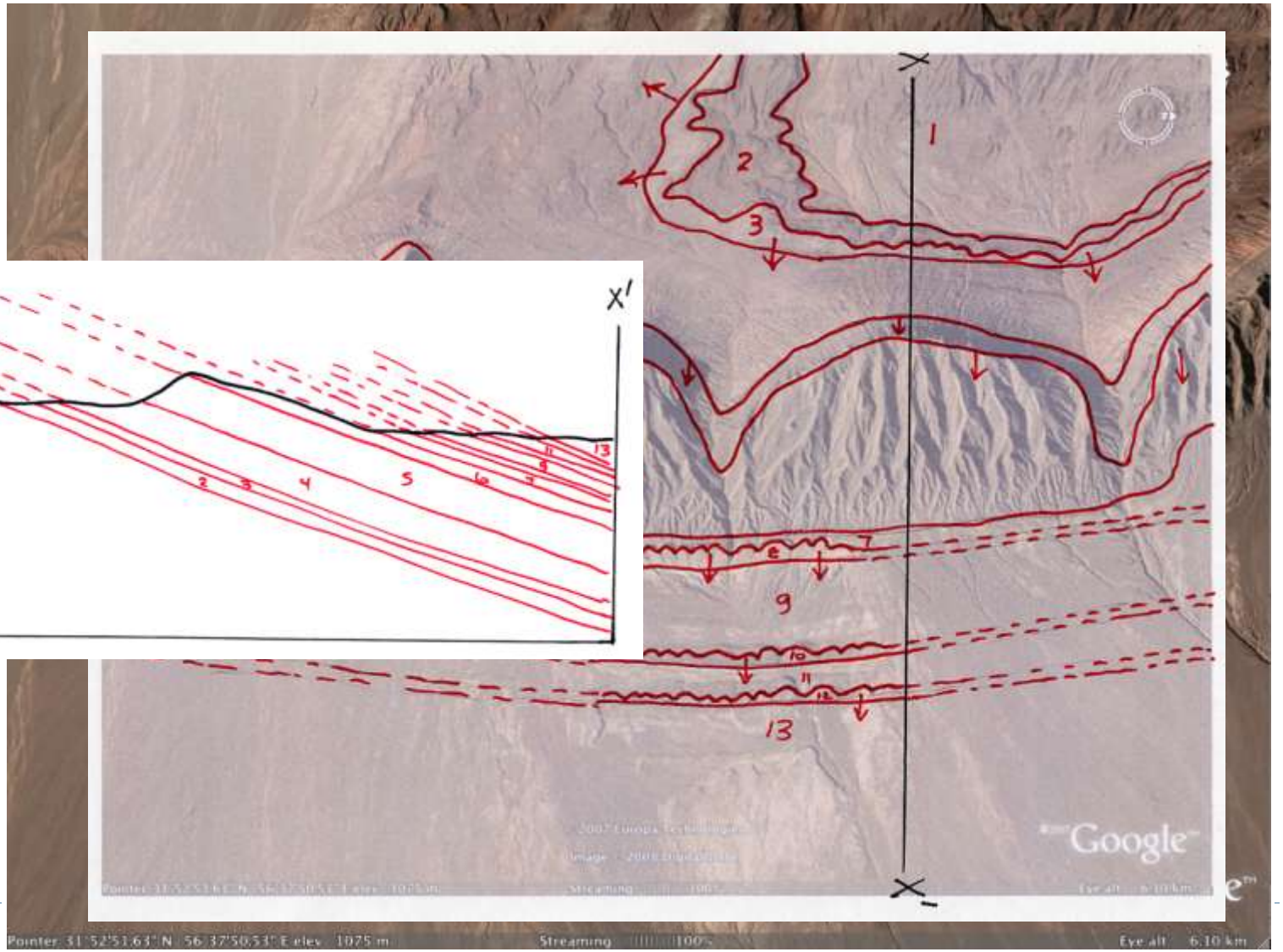
2b

Visualizing units and contacts

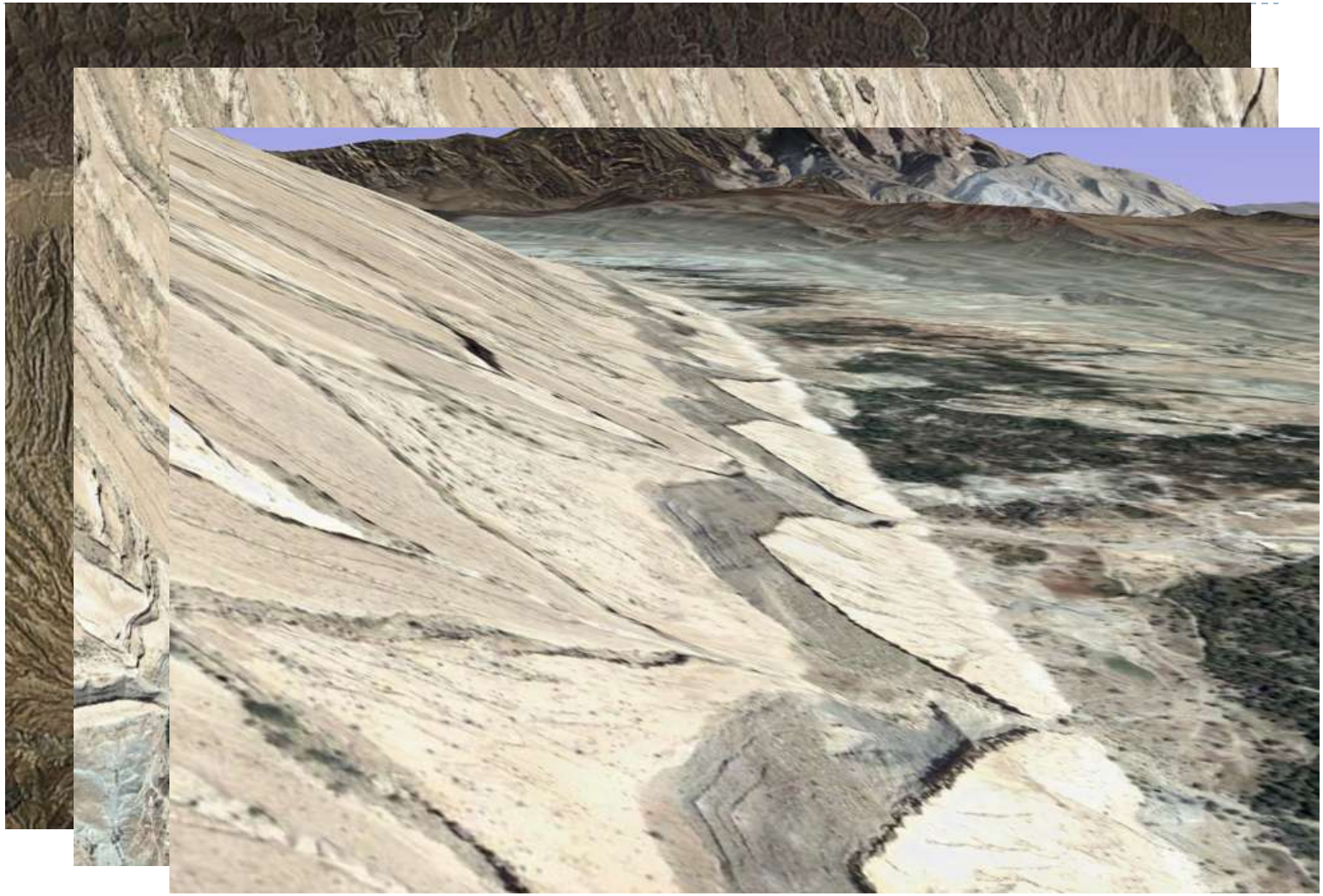
East of Yazd, Iran

2b

Visualizing units and contacts



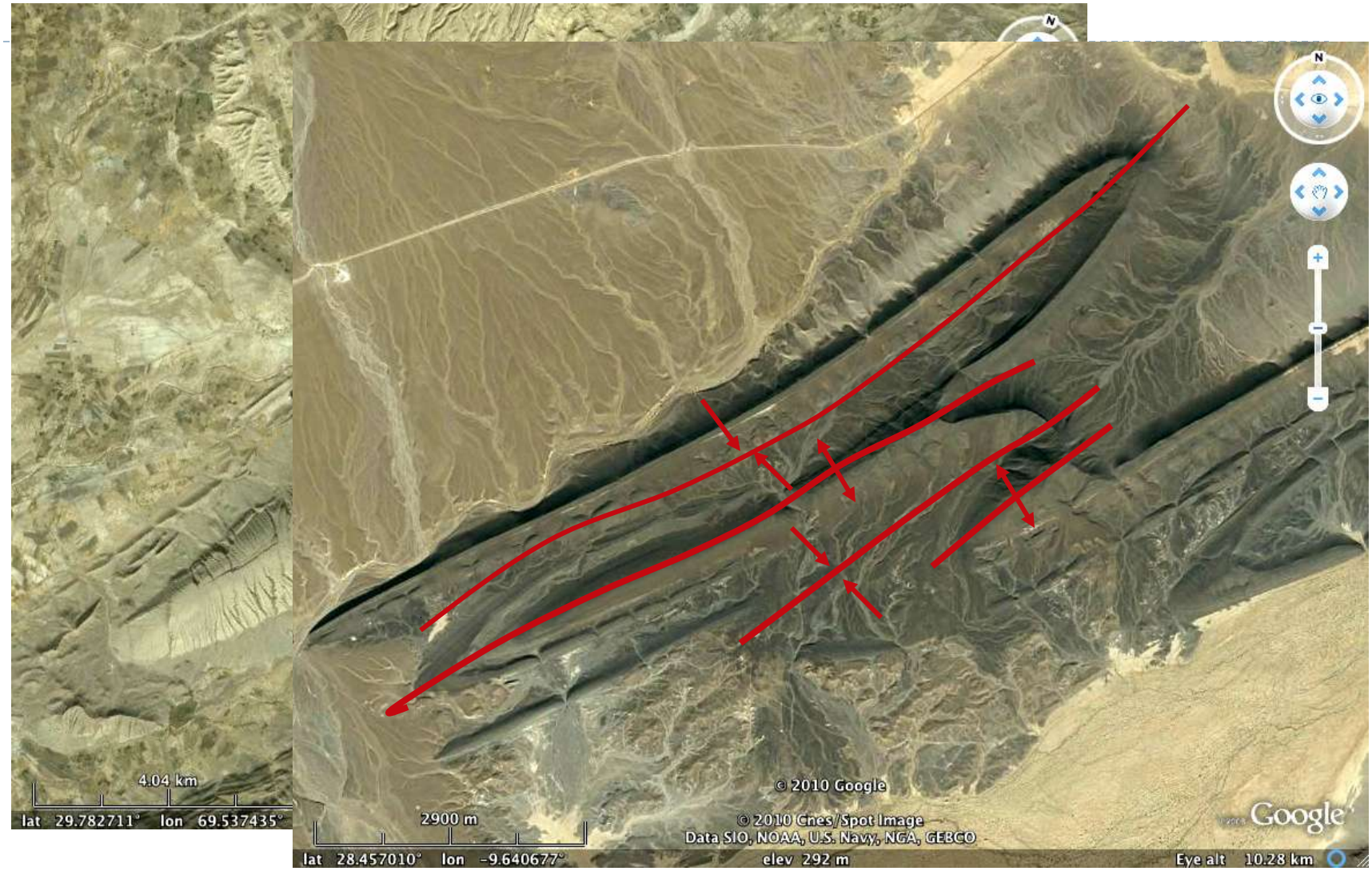
Visualizing dip



Khvorgu, Iran

Backing into strike

4,5 Visualizing folds



- Partially breached - shows limbs, hinge, plunge

Final thoughts

- Despite very high level IT skills, students are likely to need even more support on entry to University
- Do students really learn with technology and informatics tools and resources? We need evaluation and recommendations for best practice
- Simple user-needs first approach most effective?

Final thoughts

- Should we rely on the ‘open-access’ private sector tools and data systems. They are becoming the "standards" for geo-information access
- Virtual Outcrops can provide a fantastic resource for teaching and public outreach & archive purposes, but…we almost certainly will have to defend real fieldwork more vigorously than ever