

Basil Tikoff, University of Wisconsin-Madison

basil@geology.wisc.edu

Geoscience discipline: Tectonics

Summarize 2-3 computing innovations in recent years that you believe have had the most impact in your field.

-Specific software packages have had a major impact. Google Earth is generally used by almost everyone. GMT (Generic Mapping Tools) is widely used in geophysics. GIS software (not recent) has had a definite impact on the solid Earth Sciences. It should have had more – but it has serious drawbacks (cost, steep learning curve) and is not broadly used for those studying the Earth's interior.

- The ease of GPS (Global Positioning Systems) information and the integration of LiDAR/other remote sensing packages has significantly altered our workflow.

-Shared databases. The geophysical communities have led the way in these, and the geochemistry community is now developing them. Development of shared databases (and, databases generally) has lagged behind in disciplines that collect field data.

Discuss science challenges that you think would benefit from innovations in intelligent and information systems research.

- Integration of datasets. Science is interdisciplinary and we need to be able to work with data from different sources. Most of the hard problems require that we work across sub-disciplinary boundaries, especially with the increasing specialization of experts. Most experts will trust their data more than other people's data, but the reality is that there is a hierarchy of what data to believe in what situations. Or, alternatively stated, each expert brings a dataset with advantages and disadvantages, which are not viewed objectively by the expert. So, what I'd like is CI systems that can allow me access to data that I cannot generate, but can use. But, also, it would be ideal to have systems that help one understand different datasets. It would also help to have computational tools that facilitate combining those different datasets.

-Intelligent "filtering". A geophysicists and geochemists often get data, and then they filter the data (and put it in a database). Field scientists have to filter nature before collecting data. But, the act of filtering requires an enormous amount of expertise, and is very difficult to teach. I realize that this is "pie in the sky", but some intelligent system helping filter information from the field would be great.

If it helps, I have a colleague who keeps quoting this, which is often useful in thinking about computing advances:

*I can't integrate what I can't find
I can't use something I don't understand
I don't want to use something I don't trust
I can't use something that isn't there any more*