

# Augmented Reality for Field Studies

## What the Heck is Augmented Reality?

AR allows the user to see the real world, with virtual objects superimposed upon the real world. [1]

## How Could AR be Used in Geological Field Studies

Like the figure below, AR allows for the overlay of stratigraphic highlights on to a view of an exposed hillside while in the field. While moving the virtual highlights remain registered in correct location in camera view.

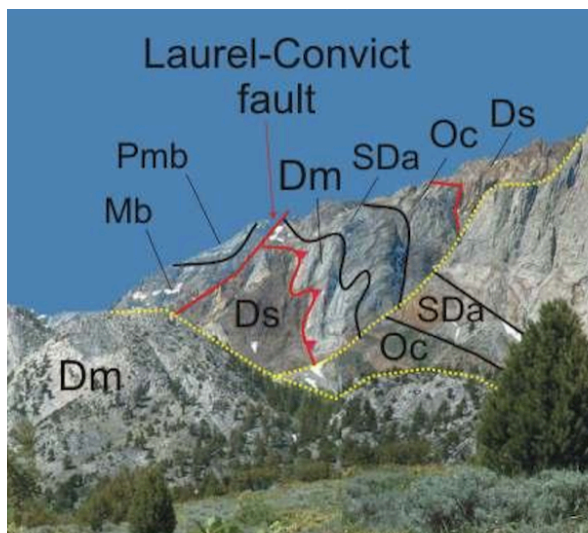
Visualizing Geology in the Field with Augmented Reality – a concept video [2]

## AR Functions for Field Studies

- See geological information as live objects in the real world
- Draw on the world around you: draw geological features on the tablet screen
- Store the markup and the camera image for later use
- Share the features as ARML for viewing from other perspectives
- Share ARML file in real time with other members of the field trip

## Benefits

- Increased accuracy in communicating stratigraphy between researchers
- New media for geological research
- New geologists can learn quicker



## Cyber Technical Approach

- Steps in design/development
  - Create 3D geological model [3]
  - Transform 3D to OGC ARML2 [4]
  - Display in an open AR Browser
- What accuracy is required for research?
  - < 1 minute of arc? [1]
  - Response time with movement: tens of milliseconds? [1]
- Open standards based
  - ARML2 - candidate OGC open standard
  - Initiated by Wikitude [5] and GA Tech [6]
  - First demo of open, interoperable AR [7]

## References

- [1] Azuma, R. "A Survey of Augmented Reality" *Teleoperators and Virtual Environments* 6, 4 (August 1997), 355-385.
- [2] "Visualizing Geology in the Field with Augmented Reality" Egil Tjaland, Norwegian University of Science and Technology 2012. <https://www.youtube.com/watch?v=gWrDaYP5w58>
- [3] Walsh, G.J., 2009, A method for creating a three dimensional model from published geologic maps and cross sections: U.S. Geological Survey Open-File Report 2009-1229, 16 p., available online only at <http://pubs.usgs.gov/of/2009/1229/>.
- [5] Wikitude AR Browser <http://www.wikitude.com/wikitude-ar-interoperability-going-live/>
- [6] Argon AR Browser <http://ael.gatech.edu/argon/>
- [7] AR Interop Demo at Mobile World Congress 2014 <http://www.opengeospatial.org/pressroom/pressreleases/1960>