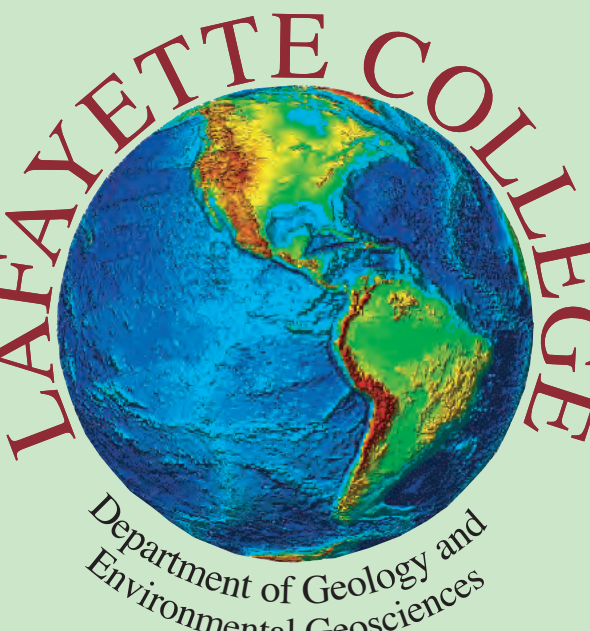


Digital Recording and Presentation of Geologic Field Data in Sedimentology/Stratigraphy and Structure Courses

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Abstract

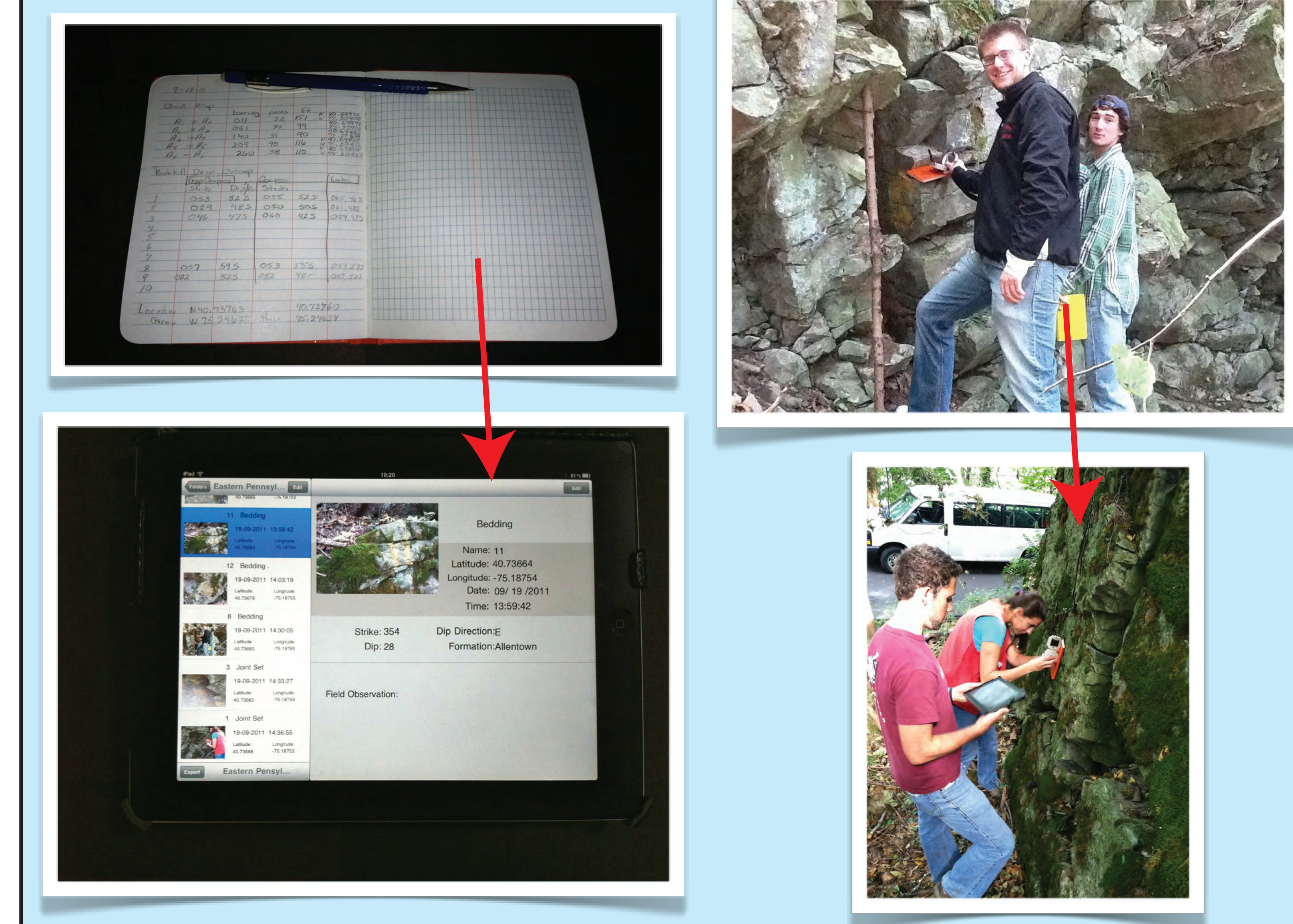
In our Sedimentology/Stratigraphy and Structural Geology courses we have moved to digital collection, interpretation and presentation of mapping, stratigraphic and cross-section information. This is different from traditional field-based classes where students are often trained to collect field data manually on paper maps and in the traditional "orange field notebooks." Because spatial presentation, analysis and interpretation of geologic data is commonly done using digital methodologies (GIS, Google Earth, Stereonet, spreadsheet and drawing programs), upon returning from the field, data need to be manually transferred into digital formats for processing, mapping and interpretation. The transfer process is both cumbersome and prone to transcription error.

In order to simplify the transcription process we have developed an application (App) for iOS (the iPad) and Android platforms that can be used to digitally record data measured in the field. This is not a mapping program, but rather a way of bypassing the field book step to record digital data directly that can then be used in various analysis and display programs. The application allows the user to select from geologic data situations: contact, bedding, fault, joints, stratigraphy and "other." Observations are stored as individual records, just as they would be in a field book. The exact information gathered depends on the nature of the observation, but common to all pages is the ability to log date, time, and lat/long directly from the tablet. The use of scroll wheels for data entry improved accuracy of the record and also insures uniformity in the creation of the digital records from day-to-day and across mapping groups. Pictures can also be taken using the tablet's camera and they are linked to each record. Post fieldwork, the data (including images) are easily exported to a .csv file that can be opened in Excel for digital preparation for use in other programs. The real power came with the ability to have each individual data entry spatially located in Google Earth and the associated data immediately available. This greatly improved the efficiency of subsequent field days.

The app was tested in the fall of 2011 as part of an extensive mapping project that the students do mid-semester in Wyoming. The data collected become part of a geologic data base that they then use to construct a report on the geologic history of the region. We also decided to have all of the material in the report presented digitally. All the maps, cross-section, stereoplots, and structural information were entered into different layers in Adobe Illustrator. Not only did this result in a powerful way to present the data it allowed the students to gain a much greater understanding of the geologic relationships because they could easily turn layers on and off and develop a much better appreciation for the 3-dimensional relationship.

Support

This work has been supported with grants from the National Science Foundation and Lafayette College.

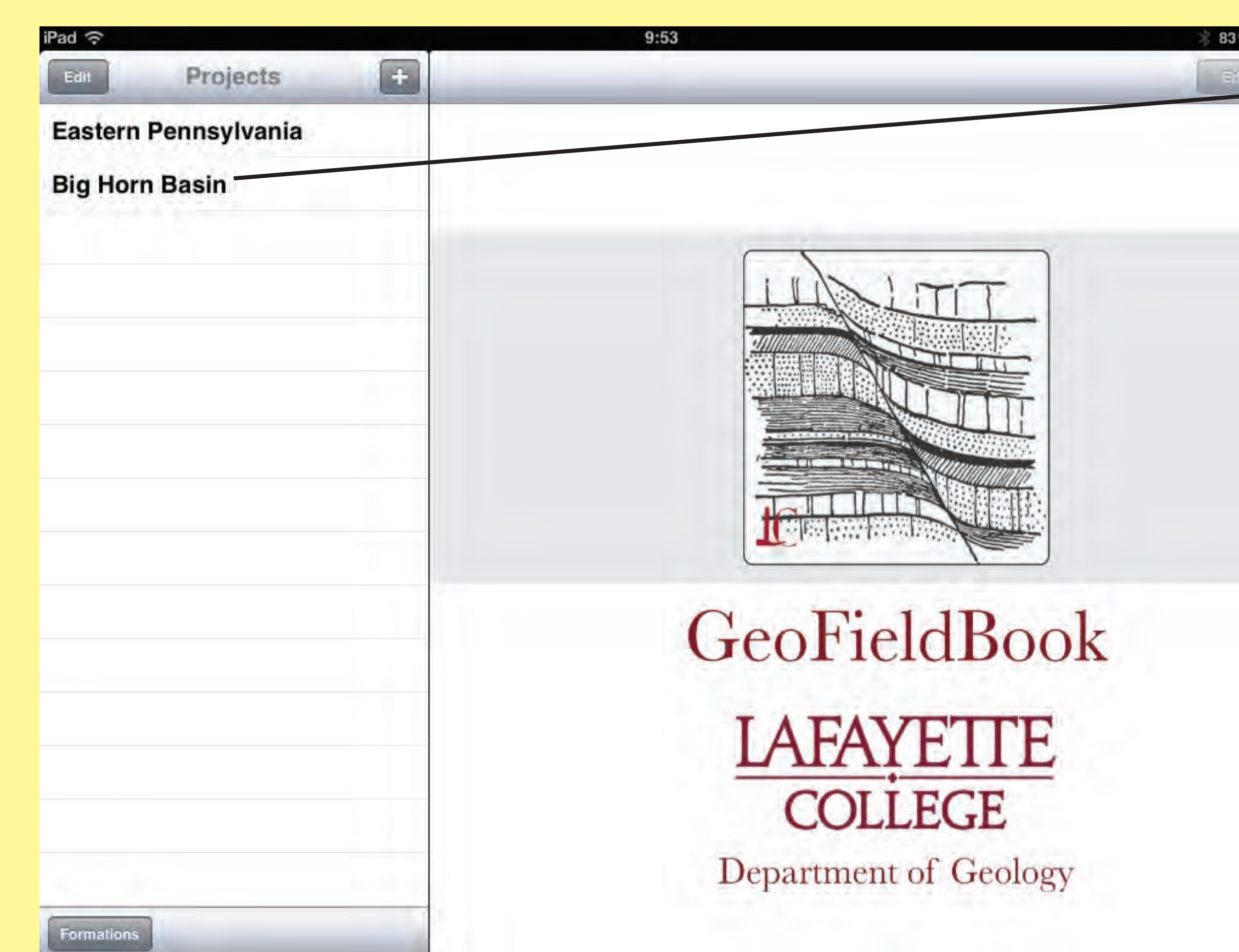


The Digital Field Notebook - Objectives

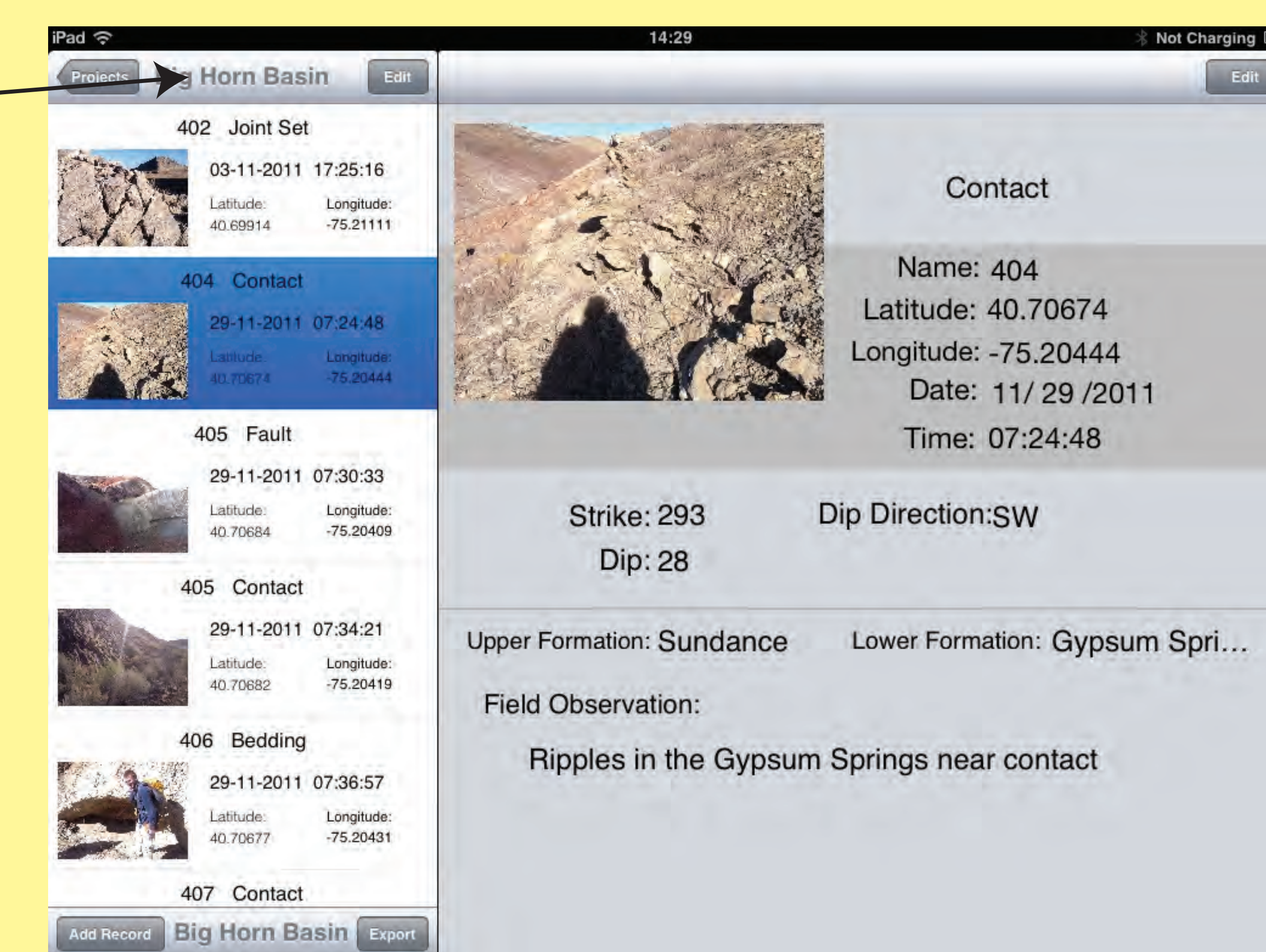
To develop a digital method of recording field data

Use the rapidly evolving tablet technology that could mimic, and possibly replace the use of traditional field notebooks. second-generation Apple iPad & Android-based tablets

Projects Stored as Folders:



Field Observations Stored Within Folders:



The Digital Field Notebook - Advantages

Automatic logging

Imaging of each field location using the integrated iPad camera images are geo-registered using the gps data.

Location information from the built-in gps; date and time

Formation Lists and Names can be modified within the application and exported or imported to your computer.

Observation block can be used to record additional information as necessary

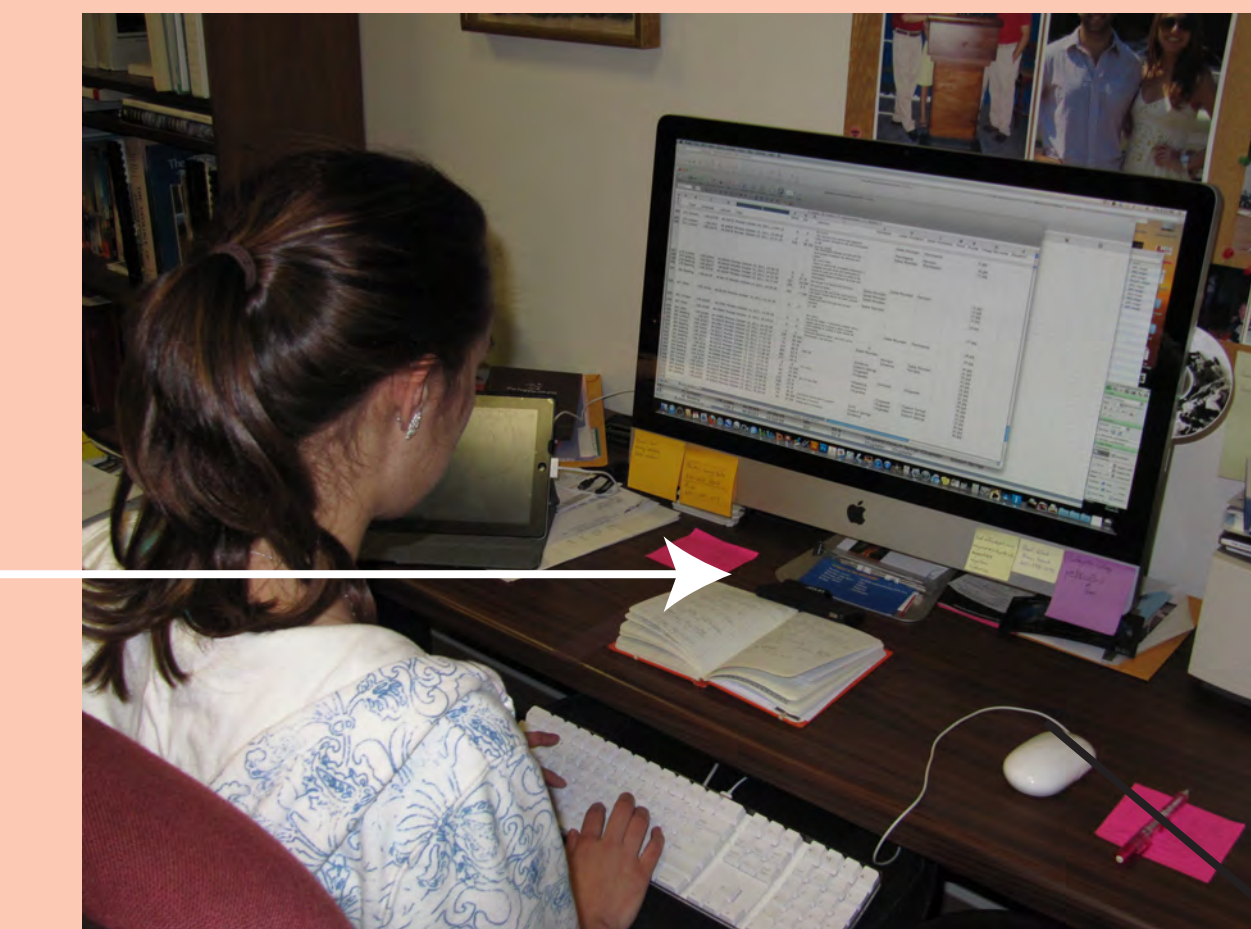
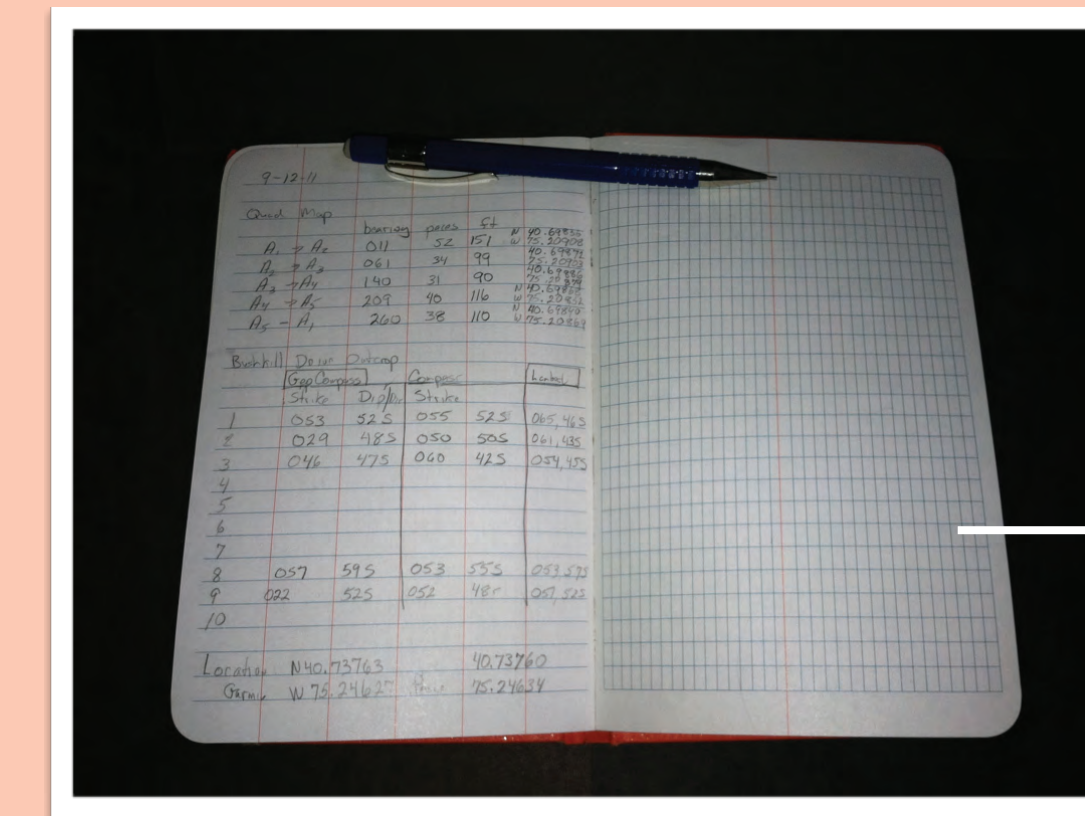
Screens are customized for the type of observation

- * control on what data should be collected
- * especially important for students

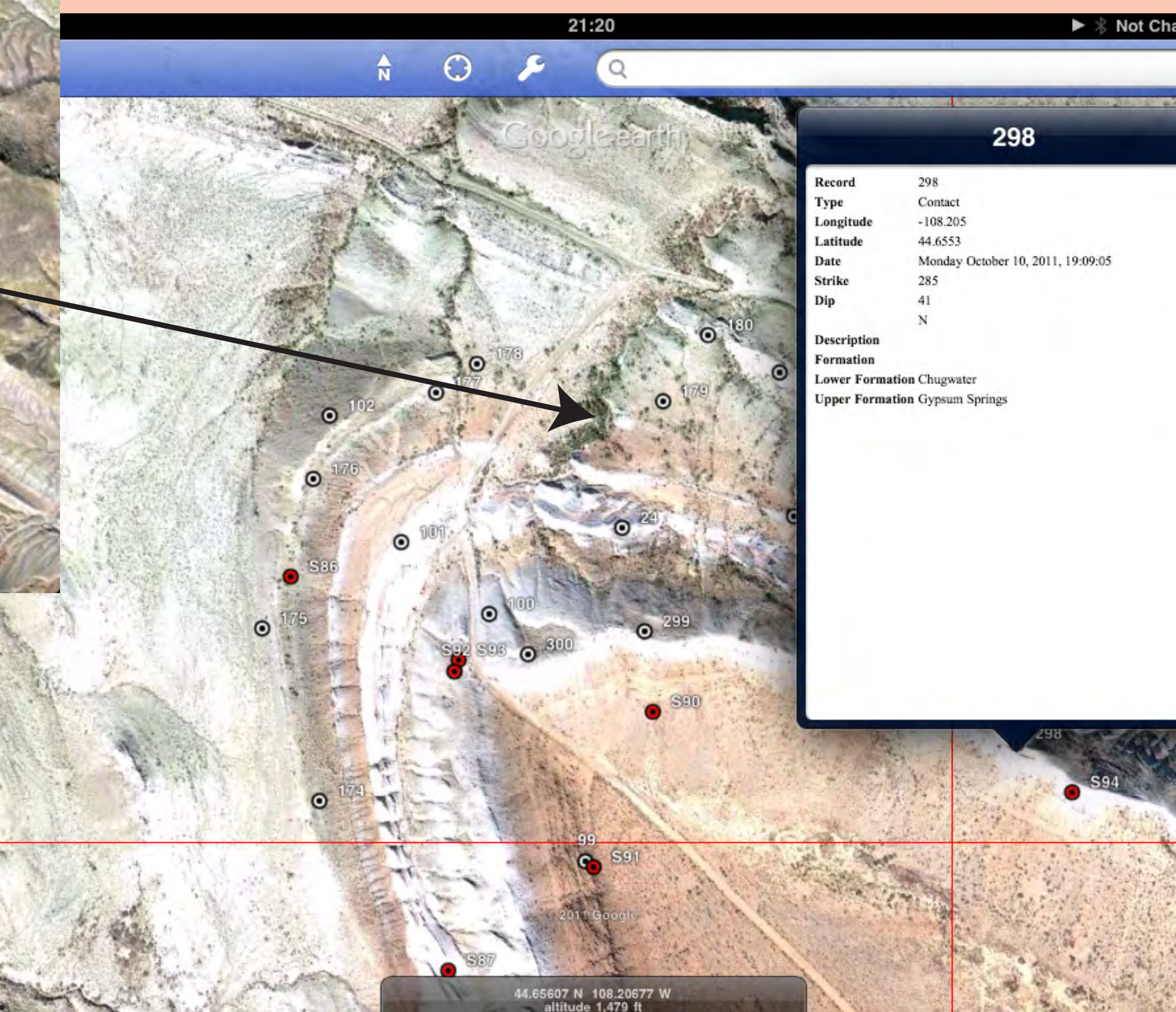
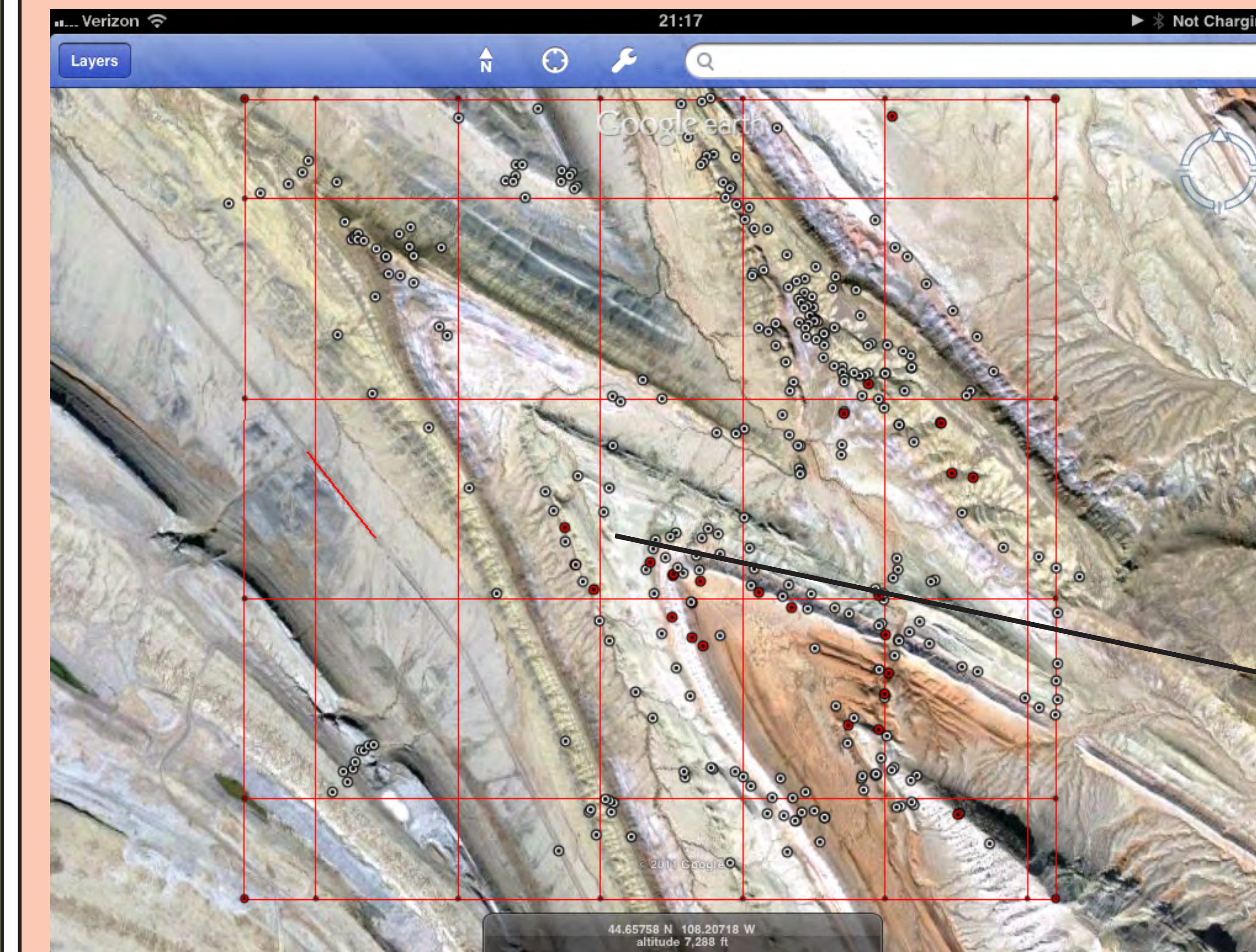
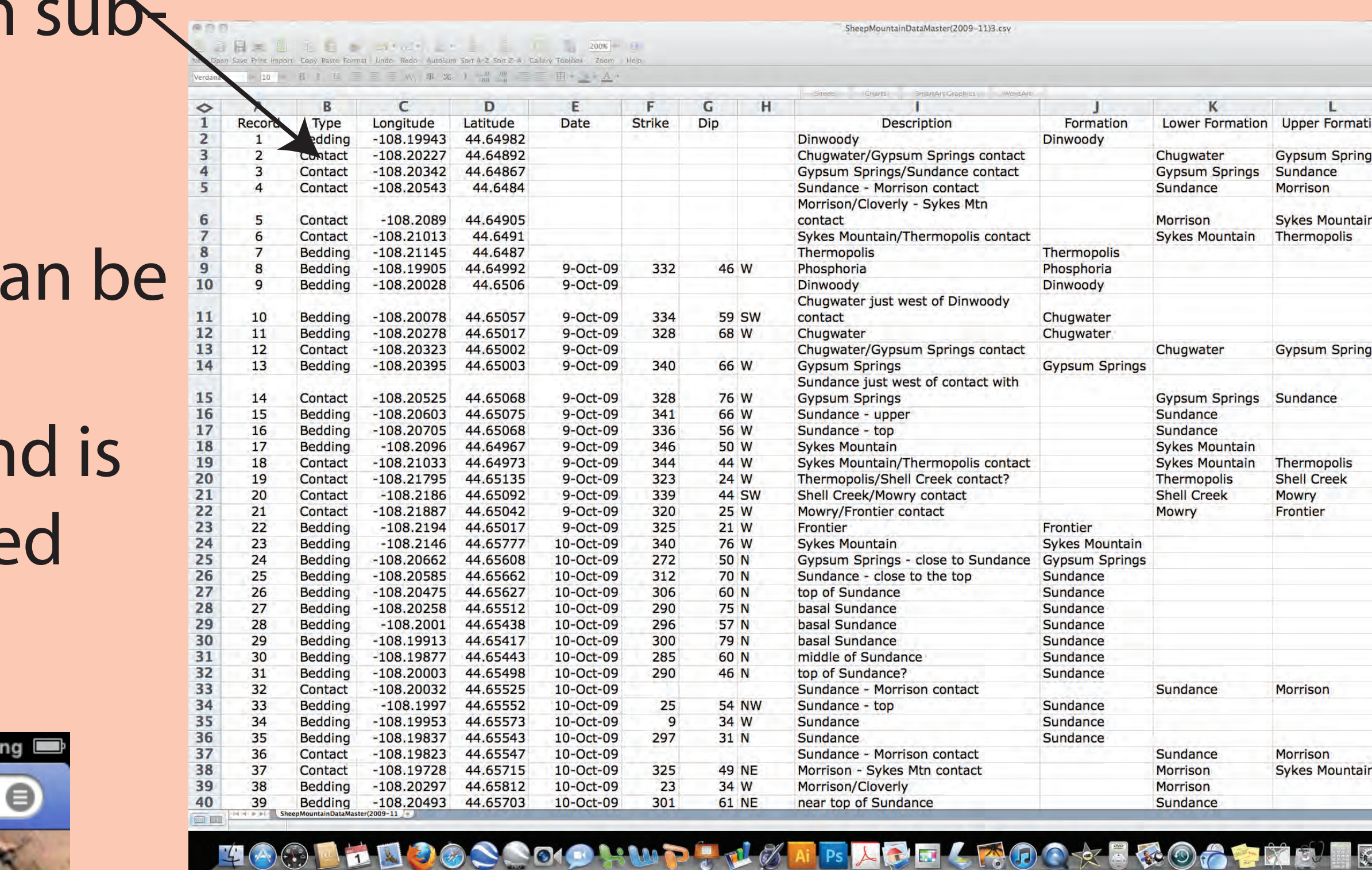
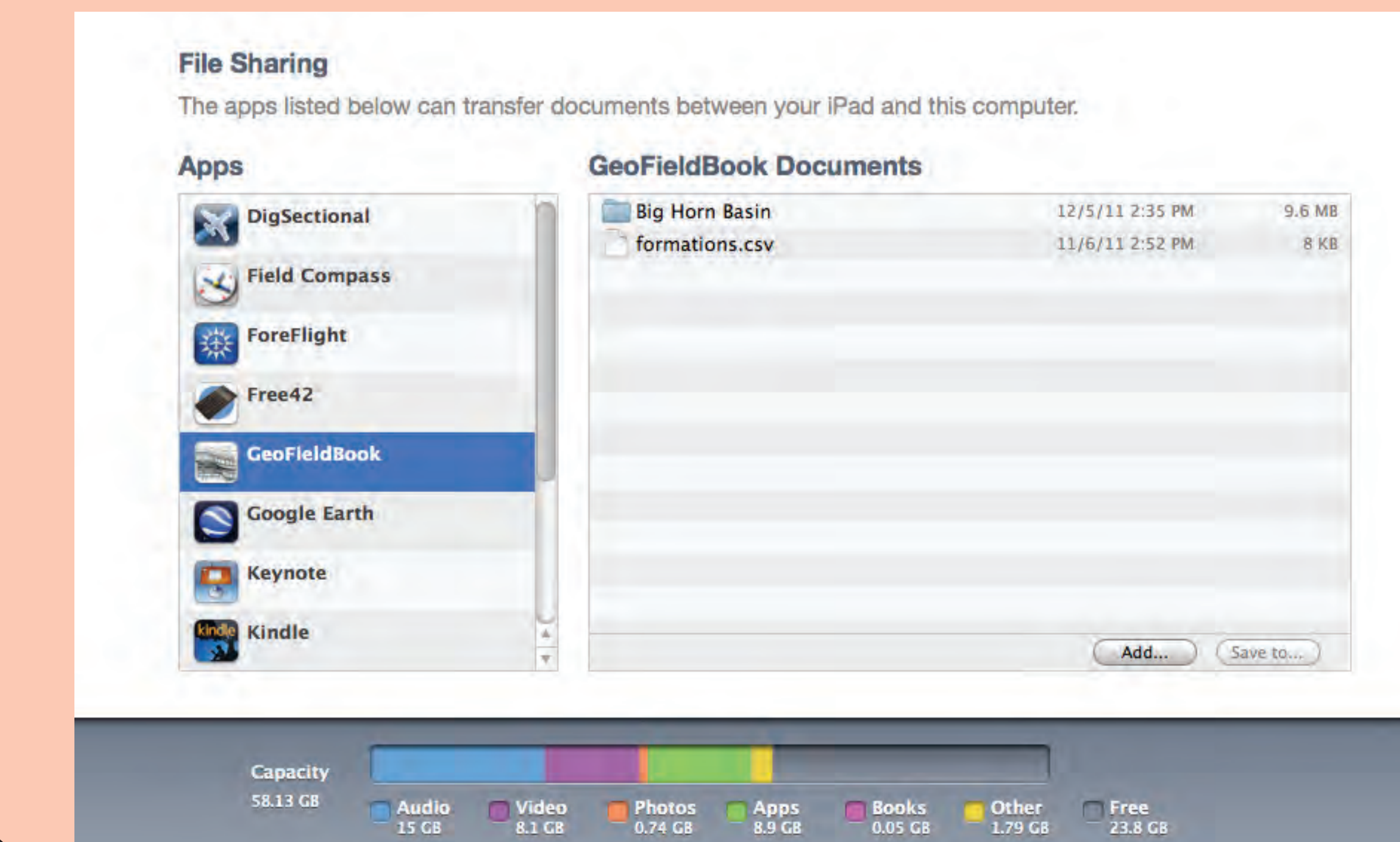
The Real Bottom Line - Rapid and Accurate Transfer to Mapping and Interpretation Platforms

Transcription from analog field data to digital interpretation.

- * time consuming
- * reduces transcription errors



App exports Project Folders as .csv files which can subsequently be opened in: Excel; Google Earth

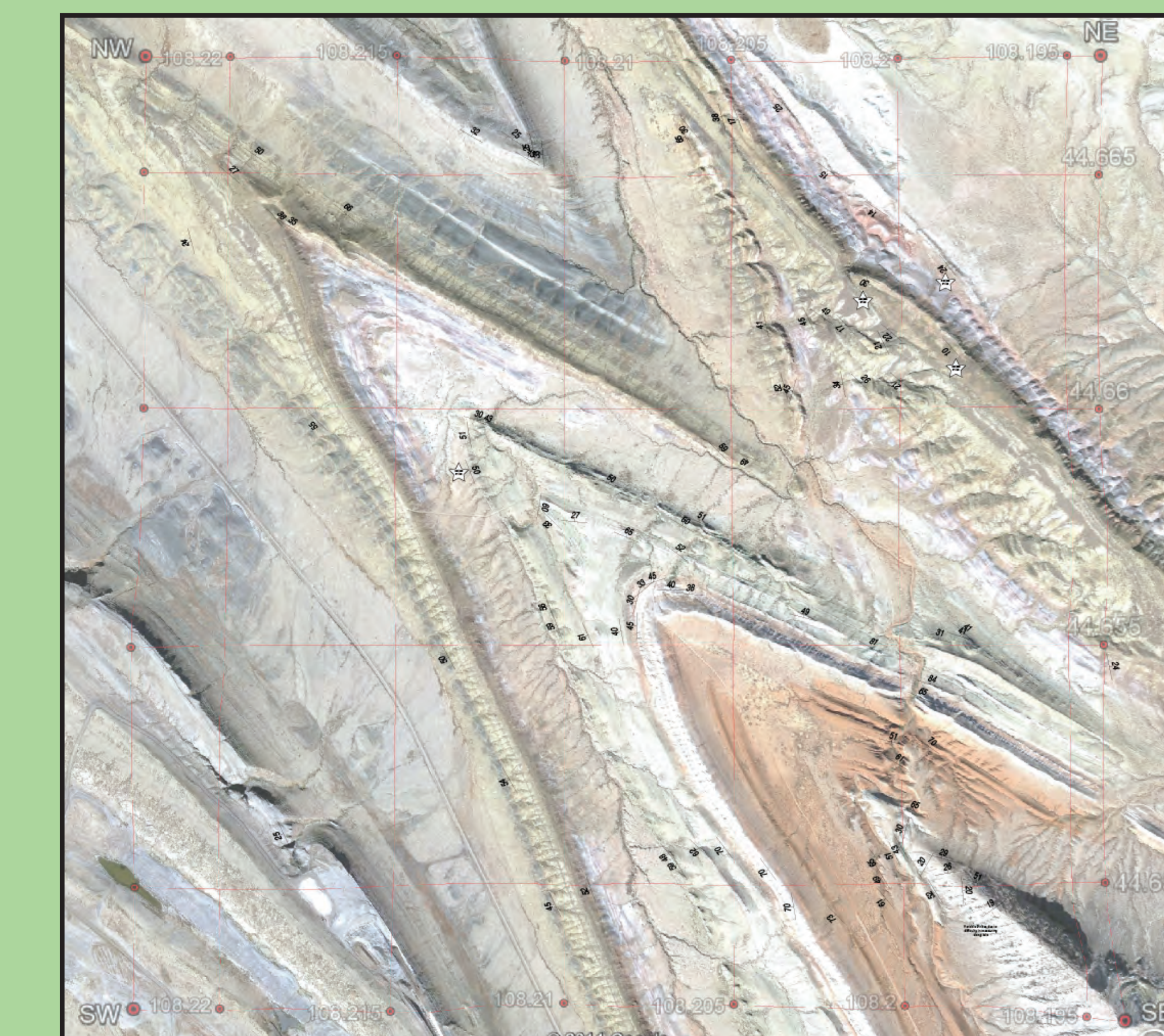


Subsequent App Enhancements:

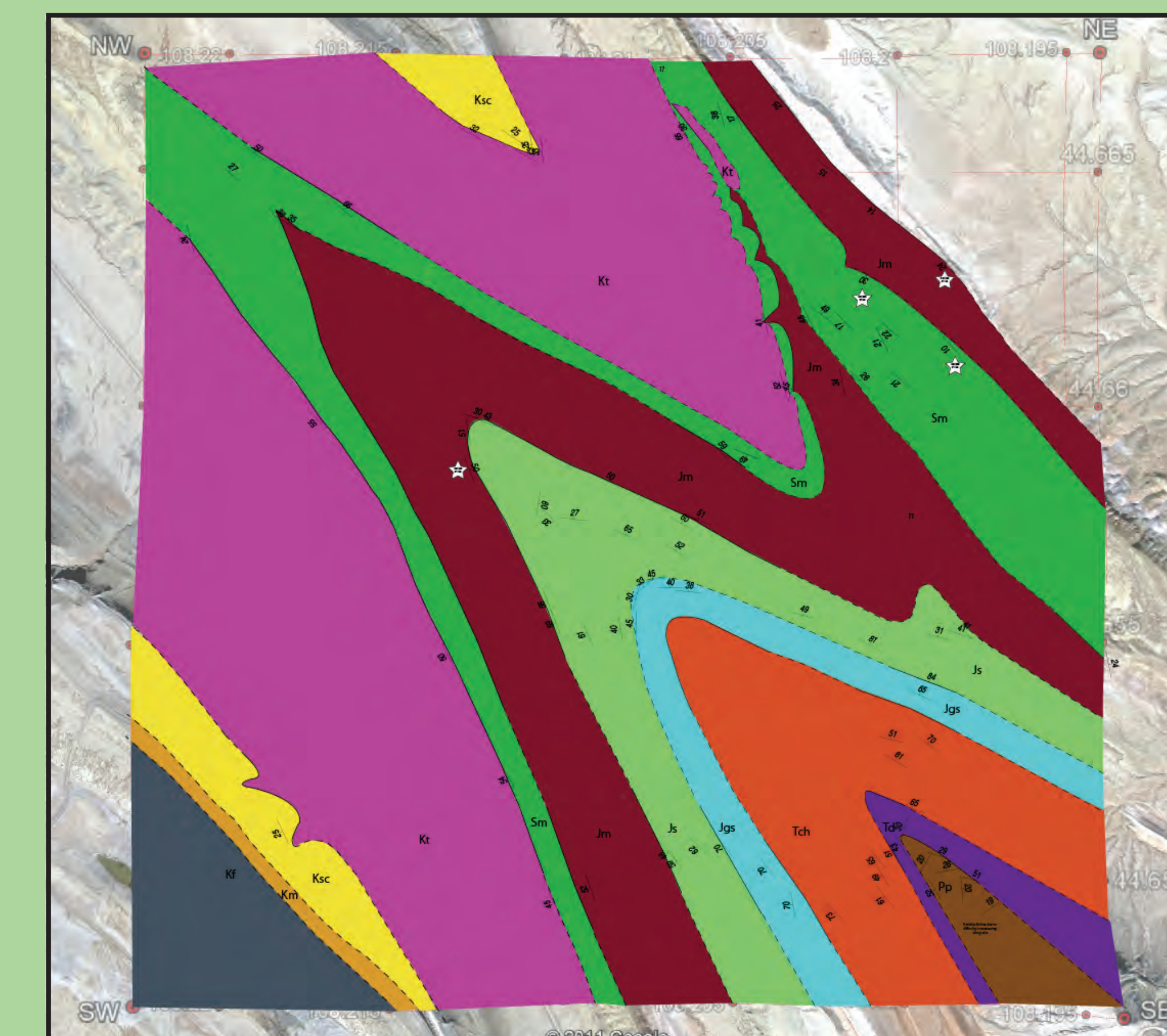
- 1) Ability to Customize a Data Page
- 2) Export to Dropbox
- 3) Use accelerometers for automatic measuring of Strike and Dip
- 4) Interface with Google Map Sets as the Front End
- 5) Two-way transfer of data files

Digital Presentation of Stratigraphic and Structural Data

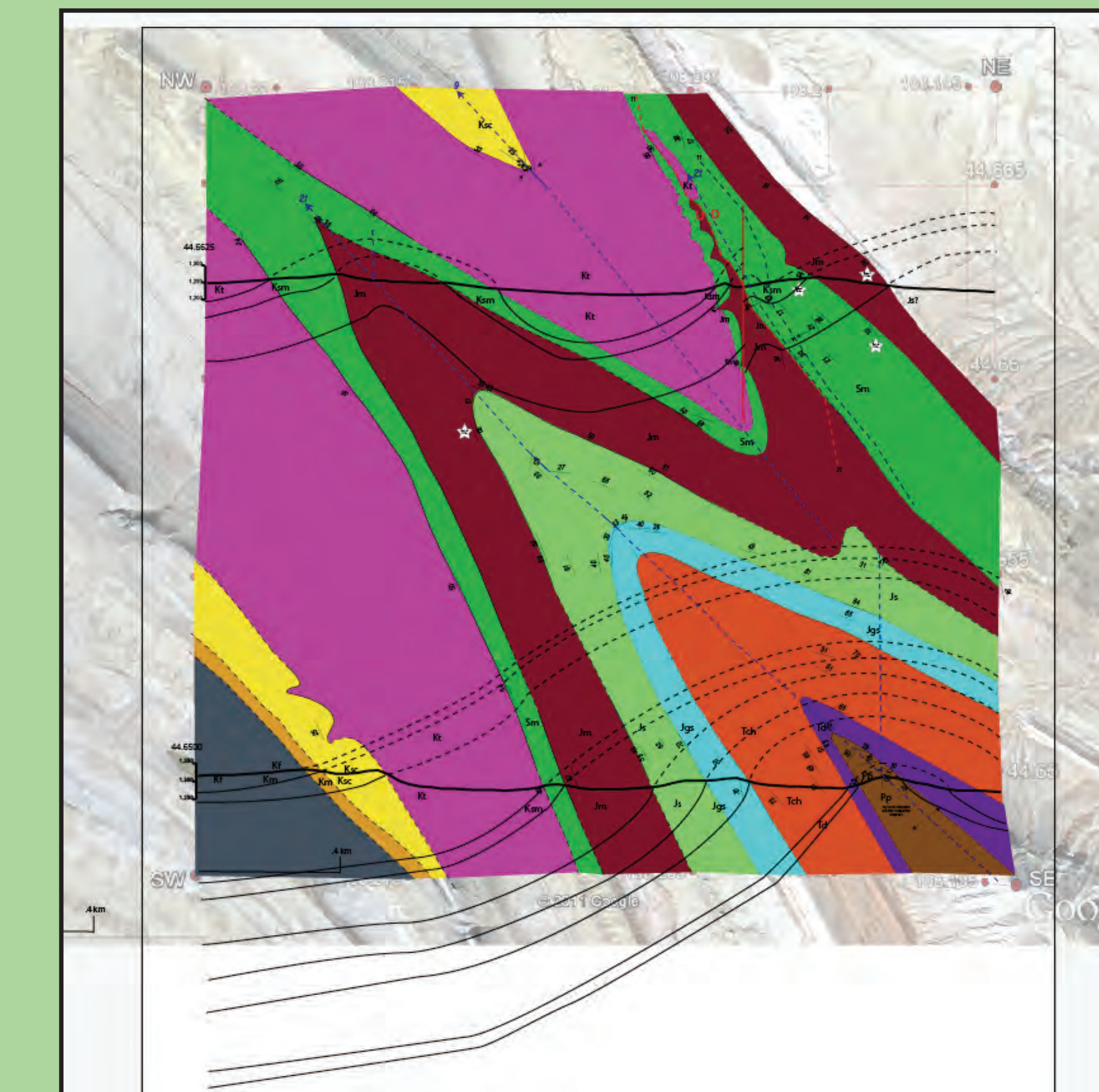
Capstone Report for full-year sequence is the geologic history of the Sheep Mountain Region. The geologic and structural information is summarized and presented in Adobe Illustrator layers; observations (including strike and dip), formations (boundaries), structural information.



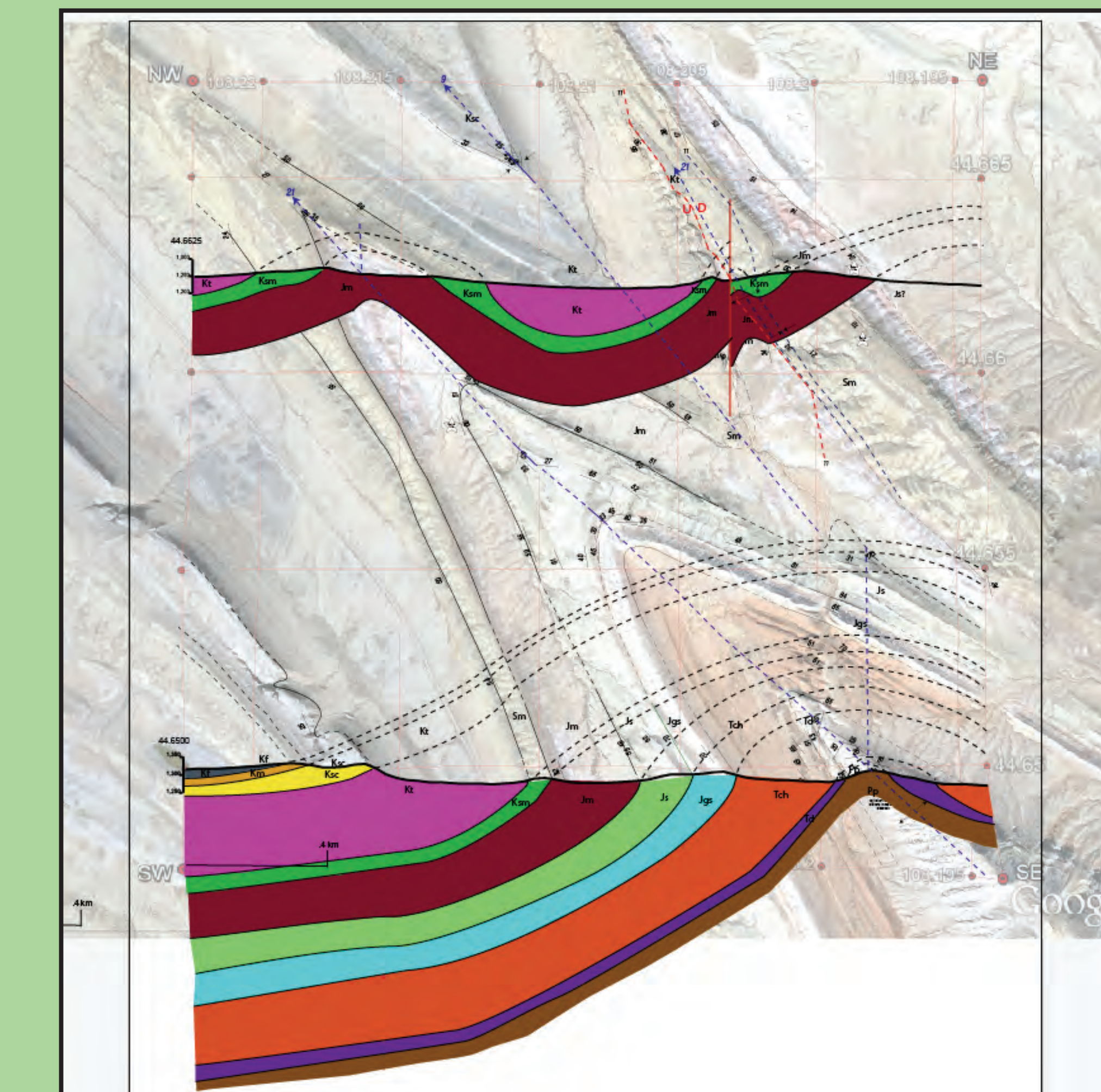
Location Map - Strike and Dips



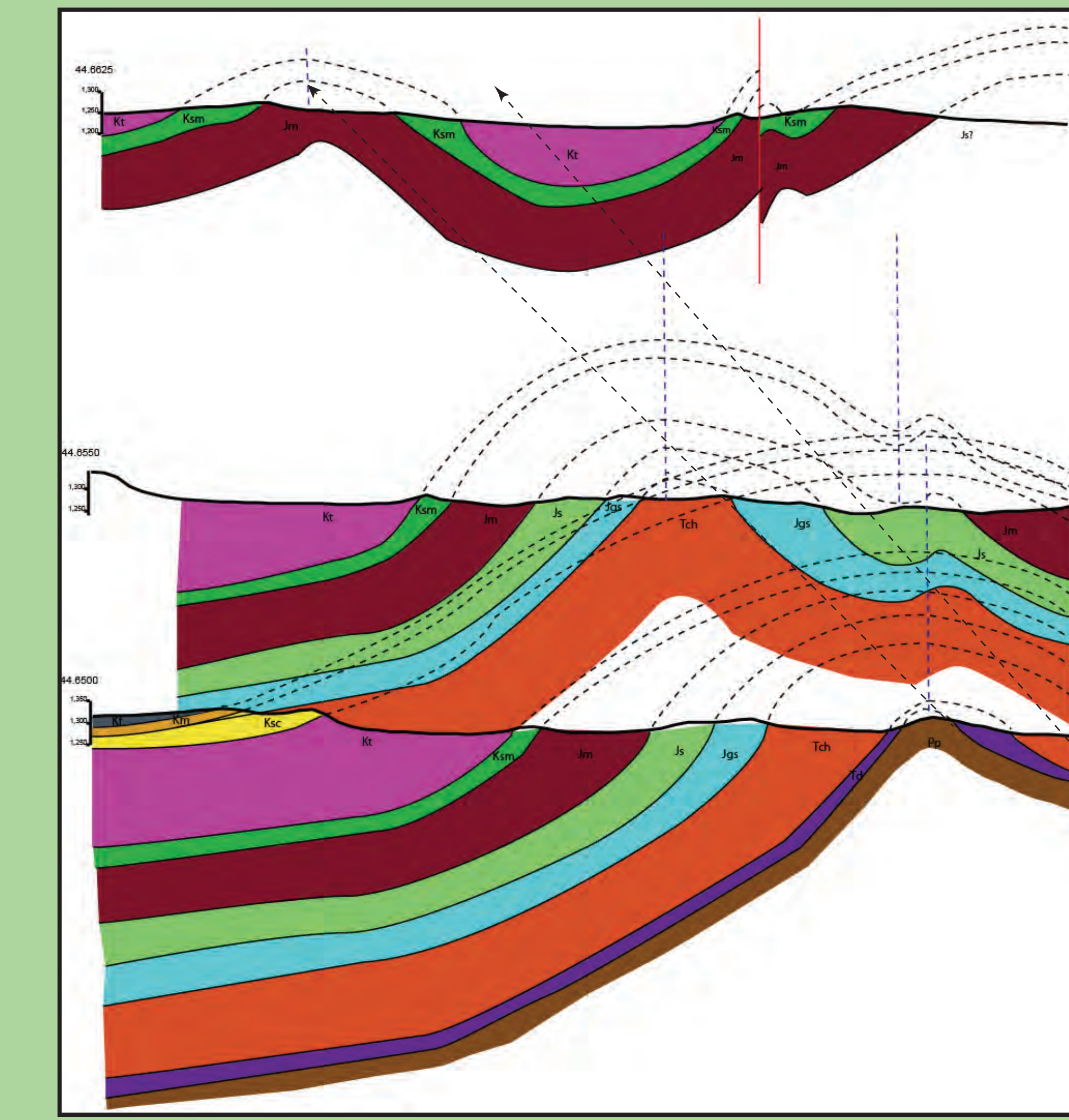
Colored Geologic Map Strike and Dips Displayed



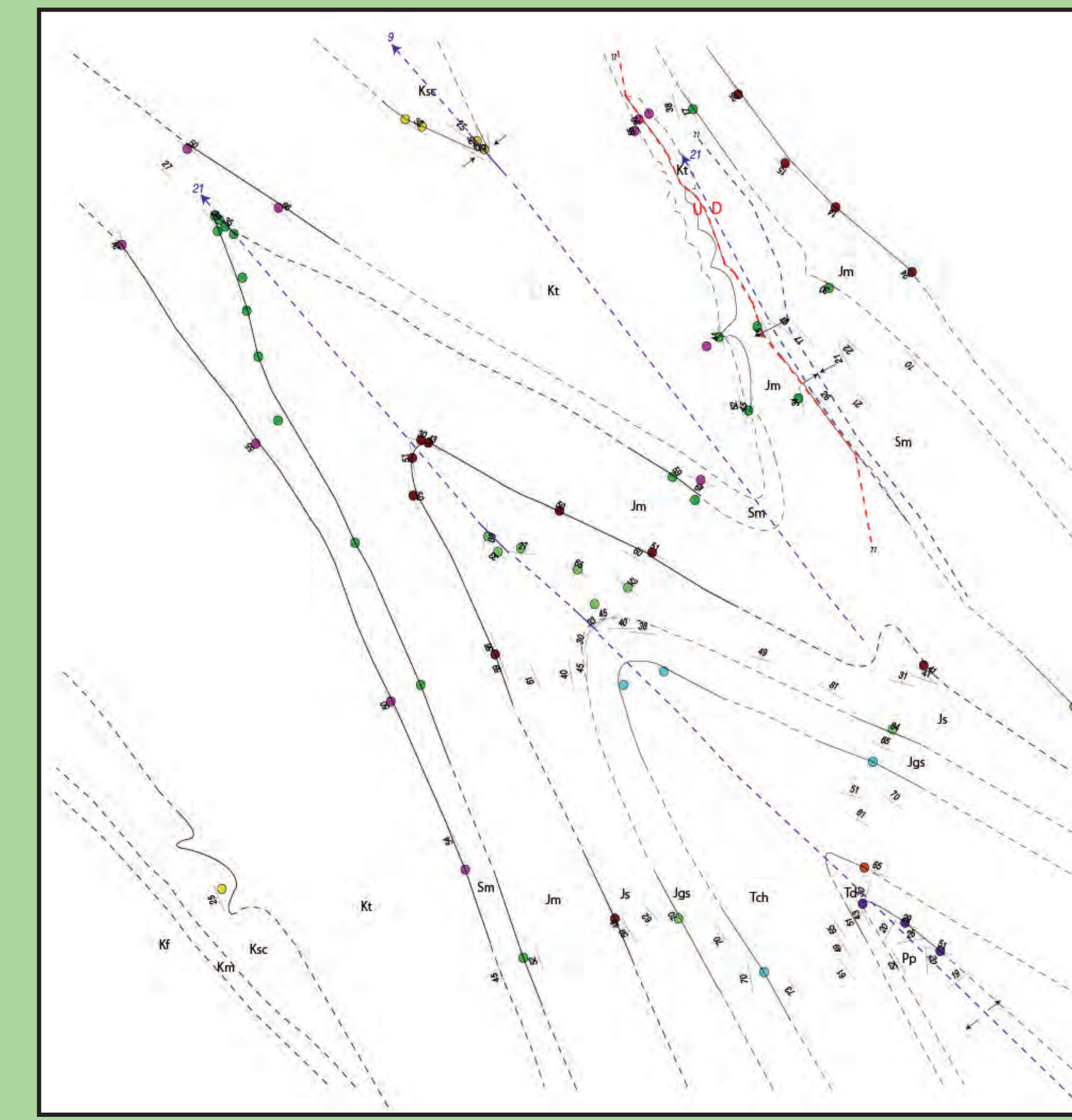
Colored Geologic Map with Line-Drawn Structural Profiles



Formation Boundaries, with colored Structural Profiles



All Three Structural Profiles displayed



Strike and Dips with Formation Boundaries, Fold Axes and Fault Shown