Advanced Field Geology Course

Earth and Planetary Science 118

Pioneer Mountains, Montana

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Objectives

Science

The Objectives of this course are to raise each person’s abilities as functioning geologists to the highest possible level within the time allotted and to have some fun while engaging in intensive field work, all the while working safely. The theme is to develop an understanding of major chapters in crustal evolution and climate-driven events building on what you learned in EPS 101 and your other courses. By working in key locations you can develop a tangible knowledge of the geological evidence for models of key crustal processes. In your previous field work in California in EPS 101 and other courses you had opportunities to study the accreted Japanese style margin, Andean and California strike slip margin. The Atlantic style margin and the older continental crust were not as evident in the training to this point. However, in Montana, we have excellent opportunities to study the Paleozoic Atlantic style margin and earlier crustal blocks (Belt Basin and more metamorphosed older rocks) that form the craton. Later process of deformation have modified these sequences of rocks. We will study a few of the paleo-environments such as the Permian Phosphoria Formation that are particularly illuminating as far as what the Miogeocline represents as an Atlantic style tectonic margin and the paleo-geography and oceanography. This course hopes to take you from the student role in the classroom environment to performance at a higher level of project work including oral and written communication of original work and understanding of maps as vivid archives of geological history of processes through time that you animate in your mind. We do this by providing an opportunity to concentrate on one project at a time, requiring your undivided attention without distraction. This means maintaining a professional standard of behavior. We want to make this course as useful as possible. It is an intense course, but all of you can do very well if you work at a steady pace, complete the required reading by the date specified, and start on your field report soon.

Location

We will be mapping in the Pioneer Mountains of Montana near Wise River on the Big Hole River, and making road field trips to surroundings areas to round out your geological experience, including the Glacier Park, Yellowstone Park, Stillwater layered mafic complex and platinum mine, and the Butte porphyry copper deposit.

Expectations of a professional in the field: Participation and Safety

Put simply, mutual respect is the main guideline. Respect of each other, local personnel, the facilities, vehicles, equipment and our time together which is at a premium. This means thinking beyond just yourself at all times and having concern for other people and the experience in general.

It is essential also that you understand that each student has a responsibility to always show up, rain or shine and be on time. If you are not present you cannot be learning what is expected. Additionally, it is expected that you think outside yourself, and contribute to the group experience everyday. This means being an engaging person in discussion, listening, and sharing. It also means taking an active role in camp duties including the very last day in cleaning up
the camp. Your role is not done until the last of the equipment is put away, each room in
the bunkhouse is clean, the refrigerator is cleaned out, and the vehicles are washed. Your
course grade will reflect your full daily participation in all these activities.

Personal and group safety at all times is paramount in the field, on road trips, and in camp.
No one will put themselves, the group, equipment, or the vehicles in jeopardy through carelessness,
excess speed, drinking or drugs or in taking unnecessary chances like rock climbing during the
course. While there will be one day off each week, students must not engage in any activity that
raises the risk of accidents. Be aware that you need all of your faculties intact if you are to work
and complete the mapping expected. Having to break our routine to take care of an unnecessary
accident costs all of us precious time and compromises the academic experience of everyone. It is
important that each student is prepared to learn so that the presentation of the material is absorbed
and put to good use. The staff assumes that everyone will behave as mature responsible adults at all
times during the next 4 weeks: during the work week and the days off. When outside the camp, the
same expectations stand. As students, you enjoy a special opportunity not afforded to all people. You
will be viewed by the public and tax payers who underwrite your educational experience as being
representatives of the state government. Please behave in such a way as to strengthen their
confidence. Because of this, our students in past years have been very welcome in the towns near our
field camps. Please uphold this tradition. Fire is a constant hazard in the field and near our base
camp. Do not start a wild fire.

Given the mountainous nature of the area, driving must be done with great care at all times.

Drive safely at all times. Any driver must not drink at all and drive. Passengers and the driver must
not be distracted.

Respect for the equipment is absolutely necessary for us to succeed. Maintain it correctly, and report
problems immediately.

Each student is expected to fully participate in camp chores each day. A routine of camp chores will
be established so that the camp runs smoothly. Respect for each other's time is critical. You have to
think independently, prepare yourself, to complete the required reading, get yourself up each
morning sufficiently early to eat breakfast when it is ready, get your gear together, and ready for our
morning session, and out to the field on time without wasting time. Meet back at the trucks at the
predetermined time, get through the showers and ready for dinner on time. Respect for each others
privacy is essential. We will not make wake up calls. It is your responsibility to be where you are
supposed to be. All students are expected to do cleanup after dinner. There is no custodian. Keep the
base camp clean and clean out vehicles daily. Maintain a professional atmosphere conducive to
working effectively at night. Do not lose truck keys, or lock them in the vehicles. Think about the
consequences of your actions.

Warnings: rattlesnakes and ticks may be out. Always be alert for bears in the field.

Goal of Course

Meeting these expectations will elevate the morale and will motivate people to do their best, and will
minimize unnecessary detours which cause frustration, and wasted time. To alleviate tensions, we
like to start each morning off with a brief meeting just before we depart for the field. Remember, the purpose of this course is not the preceding details, but rather, what science can be learned if we attend to these details. A key goal of this course is to develop a culture of scientific discovery, collaboration, safety, and above all, an appreciation of the gravity of the work of earth scientists in service of society.

**Oral presentations, Quizzes, and Norms**

We will ask for frequent, oral presentations by each of you to encourage effective communication, planning of mapping sequence, coordination of field vehicles, and to help you progress in your communication and real world leadership skills leading up to your final report. Please stay within the allotted time for such presentations and follow the norms of such sessions. Only one person at a time talks. The speaker addresses the audience directly and engages each person in the room with eye contact. Quizzes to test reading comprehension may be scheduled.
Reading List

6. Hildebrand, T., Berger, B., Jachens, R. and Luddington, S., 2000, Regional crustal structures and their relationship to the distribution of ore deposits in the western United States, based on magnetic and gravity data: Econ. Geol., v. 95, p. 1583-1603.
21. Wallace, S., 1995, The Climax-type molybdenite deposits: What they are, where they are,
and why they are: Econ. Geol., v. 90, p. 1359-1380.


20 Wallace, S., 1995, The Climax-type molybdenite deposits: What they are, where they are, and why they are: Rcon. Geol., v. 90, p. 1359-1380.