LECTURE AND DISCUSSION GUIDELINES

Teams will present our alternating lecture/discussion sessions. That is, one 2-person team will be responsible for the lecture and the follow-up discussion. Associated with every lecture will be several publications that correspond to the topic of that particular lecture/discussion combination. While the 2-person team will be responsible for giving the lecture and leading the discussion, each and every one of us is responsible for reading the literature that will be posted on the web that is associated with the lectures and discussions. Below we frame our general expectations associated with lectures and discussions. We distinguish between the 2-person team and the remaining people in the room by referring to the 2-person team as "leaders", and the rest of us as "group".

Lecture Responsibilities

Leaders & Group: Before each lecture, download and read the PDFs of the publications associated with that lecture. The instructors will either have already chosen the publications corresponding to each lecture, or help the leaders choose them. You should read the papers well enough to be familiar with the material, determine what components of the methodologies applied are not familiar to you, and thus be prepared for the lecture on the methology.

Leaders: Prepare a PowerPoint presentation that will be projected and shown in the Lecture meeting. The pair of leaders will choose who is responsible for giving the lecture, which should center on the *methods* or *techniques* used in the papers. It is our intent that every student will lecture and lead discussion twice. Both persons in the leader team are responsible for the content in the presentation – it is a team presentation, even though 1 of the persons will give the presentation. The presentation should clearly introduce the method/technique so that a 1st-year graduate student of any field can understand it. The presentation should not depend upon the paper; rather, it should be a standalone presentation presented as a methods lecture, drawing from a broad range of background material beyond just the papers assigned for reading for that session.

Group: Come to class with questions about the method, inspired from the paper. Here we are most interested in questions that help you comprehend and understand the method or technique, as opposed to specifics about the papers conclusions (which we will discuss in the follow-up discussion class meeting).

Discussion Responsibilities

Group: Before each discussion, group members must prepare for class by developing questions and ideas relating to the required reading associated with the topic. We encourage you to discuss the material outside of the classroom with one another before the discussion, but everyone is required to come to the discussion prepared to discuss the paper individually, particularly in light of what we have collectively learned about the method in the preceding method/technique lecture.

Leaders: Prepare a PowerPoint presentation that will be projected and shown in the lecture meeting. The team member that did not lead the lecture will lead the discussion, but the team will collectively establish the content for the discussion presentation. The presentation should have about 5 slides, each of which highlights a specific discussion topic. The style of the discussion can be flexible, but one possibility is that the leader presents their material, 1 slide following by classroom discussion, then the next slide, etc., until the room is really bopping! The team member not leading the discussion is responsible for taking notes relating to interesting questions and discussion topics, which must be electronified and submitted to the instructors in a timely fashion, and will be posted on the course website.

It is common for discussion to go flat and run out of gas. Most of us have experienced this at conferences, where time is specifically budgeted for an inspiring discussion session. That time arrives, and the room is silent! Everyone looks around, smirking, yawning, etc. *This will not be our mode in this course, or everyone gets a failing grade, since all grading is based on the lectures and discussions.* For those who may be new to this mode of interaction, we offer a couple approaches to thinking about the methods we will cover, and the publications to which they are central. We welcome any ideas you may have to add to this list of discussion approaches. We encourage you to think about the following items as you develop your discussion points. Also, feel free to talk to or email other faculty or scientists (including authors of the papers in question) to get these answers to your queries. Do this before discussion, and bring your findings to class – it's a great way to spur on discussions.

Spatial scales: Consider the physical distance between sensors used in the measurement (e.g., seismic, GPS, etc.). How might this spacing or sampling density affect the resolution that results from the method? Ponder the spacing cut in ½, or even a lot more. Does that change things?

Time scales: In many cases, time is an important factor in methodologies (length of time of measurement period, time between events of interest, time sampling interval, etc.). Consider how things might be different. Has the results always been that way? If it is some imaged shape in the sub-surface: was it different in the past? How long ago? Is it a process that has always been going on in Earth?

Frequency: (not independent of above…) Think about measurements in the frequency or spectral domain. Where are the data of a particular method in frequency or wavelength? What if those bounds were different? How does it affect the method or results?

Data: How many data are needed for the method to work well, i.e., how many data are needed for us to believe the results of a study using that method? What if we double the number of data? Do more data mean a better answer? What about data quality? Signal to noise ratio? Artifacts?

Crossing disciplines: What other disciplines does a particular method or study relate to? Think broadly, from hydro to bio, from structural geologic mapping to heat flow, and so on. Think about it in a planetary context. Is this something that could also be happening on Mars, Venus, the Moon, or beyond? What about about in the past? Does it relate to hazards or hazards mitigation? Is there a better sensor that can be developed to advance that field?

Resolution and uncertainties: What is the most uncertain aspect of each paper we read? In any study, there are myriad assumptions. Of these, which are the least well constrained? How do results or conclusions change if different assumptions are not correct?

Reference model or state: Many studies present result relative to some assumed reference model, whether it be seismic wavespeed, temperature, compositional model, etc. That is, we often do science with residuals – relative anomalies. Colors are used to express answers relative to such references. What happens if the reference is wrong or inappropriate (thus, mandating a "shift" in our measured or derived anomalies, sometimes shifting the color scale)? In other words, the "zero" in the residual field is often assumed. Is it justified? What if it is wrong?

Region or depth: If this is a regional study, are there other similar like-kind regions? Is the study on a global scale? Is it justified? Are ocean versus continental regions possibly different for the results? If a depth feature, are other depths possibly with such a feature?

Future directions, improvements: What are the most important next steps to further progress the field, or the method? How much would you have to spend to get significantly improved results? Is there another location that the experiment can be done to significantly understand things?