Field Projects 2024 Final Exam Study Guide (May 2, 2024)

Format: During the examination you will be asked to provide a clear and straight-forward answer to the class for some of the questions given below. You may bring nothing to class to help with your answers. You will have a minute to think about how you want to answer the question. You may use blank paper to make notes for your answer. Need to present a 1-3 minute answer at the white board. You may use the white board to illustrate your answer. Be as detailed as possible. After completing you answer, students will be allow to ask questions. After students have asked questions, professor(s) will likely have questions.

Grading: You are giving a list of 6 questions. Each student will pick a question, taking turns the list of questions until everyone has answered 2 questions. On the third round questions/answers, each student will pick 2 questions and choose to answer one of the questions. Presentation should start with repeating the question to be answered. For each question, the rubric has three answers. Student receive full credit if they provide the answers during their presentation. Student receive partial credit if they provide the answering questions.

Round 1 and 2 Questions

1.) Explain why calibrating an instrument is important. Discuss applications when it is important to calibrate an instrument and when it is not important to calibrate an instrument. Discuss how instrument calibrations are used to create a scientific data set.

2.) A careful error analysis that takes into account all static, dynamic, drift and exposure errors in a data set has been conducted. Analysis does not agree with your theory with in the measurement uncertainty. Discuss what conclusion you would draw about your theory. Is it possible that your theory could still be correct? Discuss methods that could be used to check on the analysis that was conducted.

3.) A scientific experiment is conducted using measurements that are made with two instruments. In experiment 1, measurements are compared from two similar instruments but not for the exact same instrument, with the measurements separated by several years. In experiment 2, measurements are compared that are made with the exact same instrument the conducts measurements at different locations on the same day. Compare and contrast the importance of accuracy and precision of the instruments for the two experiments.

4.) Describe the different size ranges over which instrumentation systems need to conduct atmospheric measurements of aerosols, water drops and ice particles. Provide a diagram that shows the size ranges of different types of particles (both aerosols, liquid particles, and ice particles.

5.) Compare and contrast the theory of operation for a cloud scattering probe, such as the cloud droplet probe (CDP) or cloud and aerosol spectrometer (CAS) probe, with a cloud imaging probe, such as cloud imaging probe (CIP) or high volume particle spectrometer (HVPS) probe.

6.) What is the difference between digital and analog measurements? What are advantages of both? Provide an example of analog and digital measurements.