**ESS 480/580**

**Proposal summary and presentation capstone assignment** (in lieu of final exam)

The goal of this assignment is to synthesize what you have learned in this class to propose an original future research project that uses clumped isotopes to answer a scientific question. You will write a summary of the proposed research project (max 1 page), give a brief individual oral PowerPoint presentation in class summarizing the project and explaining it in more depth (max 5 minutes; list relevant references cited throughout on the slides), and field questions from the class following your presentation.

The content of the summary is modified after the NSF Project Summary criteria. Each student must turn in a summary of the proposed project not more than one page in length, including the title of the project and your name. The Summary consists of an overview and a statement on the intellectual merit of the proposed activity. The overview includes a description of the activity that would result if the proposal were funded and a statement of objectives and methods to be employed. The statement on intellectual merit should describe the potential of the proposed activity to advance knowledge. The Summary should be written in the third person, informative to other persons working in the same or related fields, and, insofar as possible, understandable to a scientifically or technically literate lay reader.

The Summary should answer the following questions:

* What is the main goal of the project (typically first sentence in overview)?
* What is the big-picture context for the study?
* What is the specific problem or question?
* What is the specific proposed work and methods to address the problem/question?
* What are the expected results?
* *How will the results directly address the specific problem or question?*
* What are the broader scientific significance and implications of the proposed work/expected results/answer to the question?

Notice that this list starts with “big picture” questions, narrows in focus to the motivation, proposed work, and outcomes of the specific study, then broadens out to the big picture again to discuss the implications of the work.

Your presentation will answer these questions in more depth, as well as:

* Is the approach going to work (field area, samples, applicability and precision of methods, etc.)?

I have also posted some presentations pointers FYI.

An example modified after the Project Summary from a proposal that was recently submitted to NSF follows. This is an example of a very developed project idea, and your project can be much, much simpler and smaller in scope if you wish! I have annotated the Summary with comments to highlight the structure.

Finally, consider your budget (expense, time and effort) unlimited – pretend you have access to any samples, equipment, and resources you want to make your project happen.

**Impact of Quaternary megafloods on erosion of the Tsangpo River gorge, SE Tibet**

Katharine W. Huntington (NSF grant EAR-1349279)

**Overview**

|  |  |
| --- | --- |
| *The proposed three-year project investigates the history, hydraulics, and erosive impact of Quaternary megafloods through the Tsangpo River gorge of the eastern Himalaya, with the goal of understanding how rugged topography influences flood hydraulics, erosion, deposition and hazard, and the role of these low-frequency, high-magnitude events in long-term river incision.* At the Tibetan Plateau’s southeastern margin, the Tsangpo River plunges through the Himalaya to drop more than 2 km through the >5 km deep Tsangpo gorge. The steep river gradient and high discharge through the gorge produce bed shear stresses that have been hypothesized to have the erosional capability to match extremely rapid long-term rock uplift rates. However, upstream, relict glacial dams and impounded lake terraces indicate that enormous Quaternary lakes repeatedly and catastrophically drained through the gorge as megafloods, raising questions about the relative importance of annual peak flows and extremely large but infrequent megaflood events in river incision and long-term landscape evolution. It has been proposed that glacial dams impeded bedrock river incision into the Tibetan plateau upstream, and that catastrophic dam failures and megafloods focused erosion in the gorge, but to date, direct evidence of the floods and their impact on erosion has been lacking. This project will integrate published glacial lake deposit chronologies, new field observations and radiocarbon and luminescence dating of flood deposits, zircon (U-Th)/Pb data and sedimentological provenance data for sediments deposited in different magnitude flows, and numerical simulations of flood events to (1) model flood hydraulics, flood hazard, landslide triggering and slackwater sediment deposition through the Tsangpo-Brahmaputra River valley; (2) relate flood conditions to erosion processes and evaluate the extent to which megafloods focus erosion in the gorge; and (3) begin to constrain the timing and frequency of megaflood events to better understand their relationship to climate and impact on long-term (105-106 yr) erosion. | 🡨Overall goal and context of big-picture problem.  🡨Specific problem.  🡨Proposed work and methods to address problem. |

**Intellectual Merit**

|  |  |
| --- | --- |
| The last decade has seen a resurgence of debate over the role of extreme events such as earthquakes, landslides and floods in long-term erosion and landscape evolution. Yet progress in this area is fundamentally limited by the difficulty of observing extreme events on human timescales and linking them to million-year average erosion rate measurements. The proposed project will help bridge this gap by combining field, laboratory and numerical modeling approaches to investigate the first direct evidence of the legacy of ancient megafloods in one of the most rapidly eroding natural landscapes on Earth. The results will test the idea of a non-linear relationship between river discharge and bedrock erosion suggested by our pilot study, which we hypothesize reflects a threshold change in erosion processes acting across the river channel and adjacent hillslopes. Ultimately, our novel use of zircon U-Pb data from single-event deposits to investigate erosion processes should improve our understanding of possible feedbacks between fluvial incision and rock uplift, Tibetan plateau margin evolution, and links between climate and erosion on glacial-interglacial timescales. | 🡨Broader scientific implications  Expected results, related to overall project questions/goals  🡨  🡨More broader scientific implications |