PRF 58209-DNI8
Project title: Sensitivity of sea level to sediment erosion and deposition in massive
sedimentary systems
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This project has progressed well over the past year since its inception in summer 2017. It
has supported me and one PhD student, Amelia Winner, in our research on sea-level
responses to massive sediment redistribution from the Ganges-Brahmaputra drainage
basin to the Bay of Bengal, the system with the world's largest land-to-ocean sediment
flux. Our preliminary investigations show that the signature of sediment redistribution on
sea-level changes in this region should be large, as hypothesized in my proposal, and thus
should yield new insights into the co-evolution of sea level and marine sedimentary
deposits.

This project has facilitated research progress for both me, as PI, and Amelia, as the
primary student supported by this grant. After the onset of the project, we spent the first
semester training Amelia in sea-level modeling and in the construction of sediment
redistribution scenarios, which will be used to drive sea-level responses in the numerical
model. This student training was a necessary first step, because a formal grounding in the
geophysical sea-level theory is a requisite foundation for the application of the numerical
model simulations that we have planned. The training has been valuable for Amelia in
other ways too, as it has given her new skills in data acquisition, numerical modeling, and
mentorship of other students.

Since the beginning of the project, we have initiated new collaborations with experts on
sediment redistribution in the Ganges-Brahmaputra system to strengthen this work. This
includes new collaborations with Professor Steve Goodbred (Vanderbilt University),
Professor Mike Steckler (Columba University), and postdoc Celine Grall (Columbia
University), all of whom are experts in the Ganges-Brahmaputra sedimentary system and
the associated crustal responses to the sediment redistribution. We were able to invite
Celine to Georgia Tech using independent funds in August 2018, and thereby work
together as a group intensively for two days. This was invaluable for making progress.

The Fall 2018 semester has brought in two additional new collaborators as well. The first
is undergraduate researcher Galen Raney (Georgia Tech), who is helping construct
sediment redistribution scenarios for the study region, and who Amelia is mentoring in
the process. The second is postdoc Greg Ruetenik (Georgia Tech), who is bringing
critical expertise in landscape evolution modeling to our research team.

In summary, this project has borne a great deal of fruit in new collaborations, and our
research team is stronger than it was at the time of my proposal submission. I expect the
first paper from this work to be submitted this winter, which Amelia will be first author
on, and which will form an important component of her thesis. This will be the first
building block for further studies of sea-level responses in the same region that we plan to
continue in Year 2 of this project.