Research Statement – Tebbens

Over my career, my research has progressed from studying the tectonic evolution of the southeast Pacific seafloor to investigating coastal dynamics along North Carolina's Outer Banks to applying nonlinear analysis methods to geophysical processes. My recent work generally involves analyzing data for scaling behavior and, if present, determining the scaling parameters. In the case of a forest fire study, I also developed a cellular automata model, similar to self-organized criticality (SOC), which replicates the observed scaling behavior. Unlike SOC, which has a scaling exponent of one, my model can produce a range of scaling exponents with values that correspond to the values observed for natural forest fire frequency size distributions. In many studies, the observed scaling relationships are used as the basis for probabilistic forecasting.

In total, I have twenty-one peer-reviewed publications. I have an *h*-index of 12 (as of 9/20/2025) and a Research Gate Research Interest Score of 590.9 (as of 9/20/2025). The majority of my publications are coauthored with students (15 out of 21), which reflects my commitment to collaborative research with students and to promoting student's careers and success. My research papers, according to ResearchGate, have been cited over 1,000 times. Funding has primarily been provided by grants from NASA, the National Science Foundation, and the US Air Force Research Laboratory, with over one million dollars in funds awarded to me as Principal Investigator over my career. Over the past two decades my research has had two primary focus areas: coastal processes and nonlinear geophysical processes with an emphasis on natural hazards.

Coastal Processes. My research on coastal processes includes publications on the hydrodynamics and geologic structure of an inlet on Tampa Bay (Berman et al., 2005), the scaling of shoreline change (Lazarus et al, 2011), and longshore sediment transport (van Gaalen et al., 2016). Additional work has been completed on the scaling of shoreline motion (caused by erosion and accretion) on the Outer Banks, North Carolina.

Nonlinear geophysical processes. My research has included the scaling and forecasting of tsunami runup heights (Burroughs and Tebbens, 2005), power scaling and SOC modelling of forest fire burn areas in Western Canada (Tebbens and Burroughs, 2005), power scaling of ice floe areas in the Siberian Sea (Geise et al., 2017), and landslide scaling and modeling (Tebbens, 2019). A paper is currently in review on power scaling of ice flows in the Weddell Sea (Coffee et al, submitted).

Research at Deep Springs. At Deep Springs, I would anticipate continuing to conduct and publish in the area of nonlinear geophysics. This research area lends itself to being successful in an environment such as Deep Springs, as the concepts can be mastered by motivated undergraduate students who can then participate in the research. I could design group projects so multiple students could collaborate.

Self-Search for Tebbens (Research Gate (9/20/2025):