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Observations of coastal systems using low-cost, high-resolution, balloon and kite-based aerial imagery

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Remote-sensed aerial imagery has been one of the primary methods for tracking shoreline change, but the low availability of high-quality data that is temporally relevant to the area of interest is often too expensive for small scale studies, if the data even exist. The Program for the Study of Developed Shorelines (PSDS) at Western Carolina University has been using balloon and kite mounted cameras for two years to make observations of highly dynamic, near shore systems in the southeastern United States. Through a partnership with GrassrootsMapping.org, our program was introduced to the system of aerial photography which collects images for under $200 USD at resolutions of 5-10 cm/pixel. The system is field transportable and can collect imagery on an as-needed basis, instead of scheduling aerial over flights or waiting for Google Earth imagery to be updated.

Successful research trips to Beaufort County, South Carolina have identified buildings and infrastructure that are at risk of inundation from sea-level rise. The region experiences daily tidal fluctuations in excess of 2 m, allowing imagery to be captured at a variety of tidal cycles. The method has identified wetlands adjacent to developed areas lacking a buffer area allowing them to expand as sea levels rise. Due to the high resolution of the images, changes over shorter time intervals can be observed, such as the transition from high marsh to low marsh, as sea levels rise. After the 2010 Deepwater Horizon oil spill, PSDS staff mapped the oil spill on several trips to the Gulf of Mexico. Repeated visits to the same area have yielded a time series of images with greater frequency than more expensive methods. Finally, offshore sand movements at tidal inlets have been observed in detail on beaches in southern Georgia.