**NASA COAST and OCEANIA Airborne Missions in Support of Coastal Ecosystem and Water Quality Research**

Liane Guild1, Stanford Hooker2, Raphael Kudela3, John Morrow4, Philip Russell1, Jeffrey Myers5, Stephen Dunagan1, Sherry Palacios6, John Livingston7, Kendra Negrey3, Juan Torres-Perez6

Worldwide, coastal marine ecosystems are exposed to land-based sources of pollution and sedimentation from anthropogenic activities including agriculture and coastal development. Ocean color products from satellite sensors provide information on chlorophyll (phytoplankton pigment), sediments, and colored dissolved organic matter. Further, ship-based in-water measurements and emerging airborne measurements provide *in situ* data for the vicarious calibration of current and next generation satellite ocean color sensors and to validate the algorithms that use these observations. Recent NASA airborne missions over Monterey Bay, CA, have demonstrated novel above- and in-water measurement capabilities supporting a combined airborne sensor approach (imaging spectrometer, microradiometers, and a sun photometer). The results characterize coastal atmospheric and aquatic properties through an end-to-end assessment of image acquisition, atmospheric correction, algorithm application, plus sea-truth observations from state-of-the-art instrument systems. Utilizing an imaging spectrometer optimized in the blue to green spectral domain enables higher signal for detection of the relatively dark radiance measurements from marine and freshwater ecosystem features. The novel airborne instrument, Coastal Airborne In-situ Radiometers (C-AIR) provides measurements of apparent optical properties with high dynamic range and fidelity for deriving exact water leaving radiances at the land-ocean boundary, including radiometrically shallow aquatic ecosystems. Simultaneous measurements supporting empirical atmospheric correction of image data were accomplished using the Ames Airborne Tracking Sunphotometer (AATS-14). Flight operations are presented for the instrument payloads using the CIRPAS Twin Otter flown over Monterey Bay during the seasonal fall algal bloom in 2011 (COAST) and 2013 (OCEANIA) to support bio-optical measurements of phytoplankton for coastal zone research.

1NASA Ames Research Center, MS 245-4, PO Box 1, Moffett Field, CA 94035,

2NASA Goddard Space Flight Center, Bldg 28, Rm W120D, Greenbelt, MD 20771

3University of California - Santa Cruz, 1156 High St., Santa Cruz, CA 95064

4Biospherical Instruments, Inc., 5340 Riley St., San Diego, CA, 92110

5UCSC/NASA Ames Research Center, MS 244-115, PO Box 1, Moffett Field, CA 94035,

6Bay Area Environmental Research Institute/NASA Ames Research Center, MS 245-4, PO Box 1, Moffett Field, CA 94035,

7Stanford Research Institute/NASA Ames Research Center, MS 245-5, PO Box 1, Moffett Field, CA 94035