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# Sea Spray Aerosol Production: Preliminary WASFAB Results

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Experiments on sea spray production were conducted from the pier of the Field Research Facility in Duck (NC, USA, see http://www.frf.usace.army.mil/) in November 2004 and October 2005. This site was selected because the pier extends 560 m into the North Atlantic Ocean, and supporting meteorological and oceanographic data are available. The objective of the campaign was to constrain the sea salt source function including bubble-mediated and spume aerosol particle production for a wide range of environmental conditions. Specific objectives were to define the sea salt source function by means of eddy-covariance techniques for a range of wind speeds and other environmental conditions, to examine the production of aerosol particles from individual wave-breaking events using particle sensors operated close to the ocean surface and to study the deposition, and production of aerosol particles using flux and gradient methods for off-shore wind directions. Instrumentation for eddy correlation measurements, including sonic anemometers and a suite of particle counters, was deployed on a meteorological mast at the far end of the pier at a height of 16.20 m above mean sea level. Specifically, sea spray fluxes were selectively measured by utilising an optical particle counter with inlet heated at $300^{o}$C to measure the sea spray fraction of the particle size distribution for particles with diameters between 0.12 $\mu$m and 1 $\mu$m, and CLASP (Compact Lightweight Aerosol Spectrometer Probe) based on fast response (10 Hz) MetOne particle counters (0.2- 20$\mu$m diameter) (Norris et al, this conference). A small float was deployed at 20 m upwind from the pier deck with a system to mea-

sure the bubble spectra in the water, and two CLASPs at 0.8 and 1.2 m above the water surface. In 2004, aerosol profiles were measured with optical particle counters at three heights above sea level, to quantitatively determine the surf zone source function. Air-sea fluxes were further characterized by the momentum, heat, water vapour and $CO_2$ fluxes. In 2005, wave modulated heat transfer and $CO_2$ partial pressure were measured and waves were accurately measured with a laser altimeter (reported by Zappa et al., this conference). Also, a novel scanning laser altimeter was used to investigate short waves riding on the dominant wind sea.

The preliminary results from the eddy correlation measurements indicate that the conditions were representative for open water and the relevant spectra of micrometeorological parameters and aerosol concentrations show the expected behaviour. Sea spray concentrations and fluxes were distinctly different for on-shore and off-shore winds, i.e. for breaking wind waves and production due to breaking in the nearby surf zone (500 m).