Transport and vertical structure of dust and biomass burning aerosols over West Africa from airborne lidar, *in situ* and CALIPSO measurements during AMMA dry season campaign

S.-W. KIM[1]*, S.-C. YOON[1], P. CHAZETTE[2], F. DULAC[2], J. SANAK[2] AND B. JOHNSON[3]

[1]School of Earth and Environmental Sciences, Seoul National University, Seoul, Korea (*correspondence: kimsw@air.snu.ac.kr)
[2]Laboratoire des Sciences du Climat et de l'Environnement, Gif-Sur-Yvette, France
[3]Met Office, Exeter, UK

This study demonstrates the importance of synergy between ground-based, airborne and space-borne measurements in improving our knowledge about the Earth aerosol-climate system. We have investigated tropospheric aerosol transport over West Africa and the associated meteorological conditions during the AMMA dry season experiment, which occurred in West Africa in January–February 2006. This study combines data from ultra-light aircraft (ULA)-based lidar, airborne *in situ* aerosol and gas measurements, standard meteorological measurements, satellite-based aerosol measurements, airmass trajectories, and radiosonde measurements. At Niamey (13.5° N, 2.2° E) the prevailing surface wind was from the northeast bringing dry dusty air from the Sahara desert. High concentrations of mineral dust aerosol were typically observed from the surface to 1.5 or 2 km associated with the Saharan airmasses. At higher altitudes the prevailing wind veered to the south or southeast bringing relatively warm and humid airmasses from the biomass burning regions to the Sahel (<10° N). These elevated layers had high concentrations of biomass burning aerosol and were typically observed between altitudes of 2–5 km. Meteorological analyses show these airmasses were advected upwards over the biomass burning regions through large-scale ascent, presumably driven by surface heating rather than pyro-convection. Aerosol vertical profiles obtained from the space-based lidar CALIOP onboard CALIPSO during January 2007 also showed the presence of dust particles (depolarization ~30%, color ratio <0) at low levels (<1.5 km) and biomass burning smoke aerosol (depolarization ratio <10%) between 2 and 5 km. CALIOP data indicated that these distinct continental dust and biomass burning aerosol layers likely mixed as they advected further south over the tropical Atlantic Ocean.

Semi-quantification of factors affecting temporal variation of water quality using statistical analysis: A case study for Saemangeum Lake, Korea

SEOK-HWI KIM[1], KANGJOO KIM[1]*, MIN-HYEONG LEE[1] AND WON-JANG KIM[2]

[1]Department of Environmental Engineering, Kunsan National University, Jeonbuk, 573-701, Korea (*correspondence: kangjoo@kunsan.ac.kr)
[2]Saemangeum Project Office, Korea Rural Community & Agricultural Corporation, 576-804, Jeonbuk, Korea

We could quantitatively evaluate the role of factors controlling the temporal variation of nutrient concentrations in a saline lake recently constructed by tideland reclamation using multivariate statistical techniques. Using 336 water data for 14 chemical parameters collected from the surface and bottom of the lake, factors affecting water quality were identified from factor analysis and their contributions to the concentrations of nutrient species were estimated based on multiple linear regression analysis. Factors indicating the freshwater input and the decomposition of organic matter in the sediment play major roles increasing concentrations of NH_4, NO_3 and PO_4. In contrast, photosynthesis exerts the opposite effect. The results show that NH_4 and PO_4 concentrations supplied by the organic matter decomposition were largely enhanced and were even greater than those supplied from rivers during the rainy season. It was revealed that this was caused by the formation of strong salinity stratification due to increased river discharge. This result shows that the increased river discharge during the rainy season also indirectly raises nutrient concentrations in coastal environments.