Synergy of Multiple Remote Sensing for Aerosol-induced Ocean Biogeochemical Response in the Western North Pacific Ocean

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Abstract

Atmospheric aerosol - ocean biogeochemical interaction processes are complex, dynamic and interdisciplinary. This important field of research is critical to climate and environmental changes as ocean primary production affects the carbon dioxide uptake. Each spring massive dust storm episodes come from the Gobi desert to the Northwest Pacific Ocean (NWPO) and neighbouring Yellow/East and South China Seas (Y/ECS and SCS). However, how these dust storms, which carry critical biogeochemical elements of nutrient and iron, impact the biogeochemical cycle and primary production in the NWPO, Y/ECS, and SCS are still unclear. The progress in this field has been much hindered by the lack of observation. Clearly, ship-borne measurements are inadequate to meet the observational needs to characterise these complex and highly dynamic processes over the vast size of the dust-NWPO/YECS/SCS system. This study proposes to utilise a comprehensive set of advanced remote sensing data in synergy to systematically investigate the NWPO/YECS/SCS biogeochemical responses to Asian dust storms from year 2000 onwards. Multiple advanced remote sensing data sets include NASA/MODIS (Moderate Resolution Imaging Spectrometer) aerosol data(aerosol optical thickness & fine mode fraction), NASA/MODIS and SeaWiFS (Sea-viewing Wide Field-of-view Sensor) ocean colour data, NASA/AMSR-E (Advanced Microwave Scanning Radiometer) and TRMM (Tropical Rainfall Measuring Mission) precipitation rate and cloud-penetrating microwave Sea Surface Temperature (SST) data, NASA/QuikSCAT sea surface wind vector data, and TOPEX/Poseidon and JASON-1 satellite radar altimetry data.