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Dynamics of autochthonous and allochthonous matter in Lake Baikal surface waters assessed by Ocean Colour satellite data

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Ocean Colour satellite data were used within the EU paleoclimate project 'High Resolution CONTINENTal Paleoclimate Record in Lake Baikal, Siberia (CONTINENT)' (2001-2004) to assess information on the current dynamics of phytoplankton and terrigenous input in Lake Baikal, Southern Siberia. While discrete limnological field data from CONTINENT summer campaigns is available, the spatial extension of Lake Baikal is enormous (ca. 600 km), and the field data are limited to selected sites and expedition time windows. Therefore, this remote-sensing investigation aimed to support the multi-disciplinary investigation by enhancing the spatial and the temporal dimension. Further it evolved to become the first efficient bio-optical satellite study of Lake Baikal. After an adapted atmospheric correction of SeaWiFS (NASA) data for the case Lake Baikal, ground truth data (pigments, phytoplankton functional groups) and Chl-a algorithms were evaluated to process Ocean Colour Chl-a data of early to late summer seasons in 2001 and 2002. However, we found considerably overestimated Ocean Colour Chl-a values at locations of terrigenous input. Field investigations (field spectrometer data, SPM, DOC, cDOM) showed the remarkable effect of dissolved and particulate organic material on the optical properties of the lake's surface. In many cases, terrigenous input is expected to produce enhanced water leaving reflectance. Here, we find instead an overall reduced reflectance and enhanced absorption in the short wavelength spectral bands. This enhanced absorption in the atmospherically corrected SeaWiFS spectra leads in consequence towards local overestimation in Ocean Colour Chl-a. On the other hand, this optical behaviour serves as the tracer for the organic-rich terrigenous input into Lake Baikal. We assessed the pathways of terrige-

nous input by using the optical parameter “downwelling irradiance attenuation coefficient” calculated from the SeaWiFS satellite data. The Ocean Colour time series allowed resolving the spatial extent of short-term terrigenous input events into Lake Baikal. This was not possible by discrete sampling. Finally, the spatial Chl-a and terrigenous input data calculated from the remote sensing data were used to assist with analyzing the relationships between the different project sites.