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The joint Russia-US-Sweden studies in the East-Siberian Arctic Shelf (ESAS) during the last decade (1999-2009): an overview

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The Arctic Ocean is surrounded by permafrost, which is being degraded at an increasing rate under conditions of warming which are most pronounced in Siberia and Alaska . A major constraint on our ability to understand linkages between the Arctic Ocean and the global climate system is the scarcity of observational data in the Siberian Arctic marginal seas where major fresh water input and terrestrial CNP fluxes exist. The East-Siberian Sea has never been investigated by modern techniques despite the progress that has been made in new technologies useful for measuring ocean characteristics of interest. In this multi-year international project which joins scientists from 3 nations (Russia-USA-Sweden), and in cooperation with scientists from other countries (UK, Netherlands) we focus on he ESAS which is poorly explored areas located west from the U.S.-Russia boundary. In this report we overview the main field activities and present some results obtained during the last decade (1999-2009). Siberian freshwater discharge to the Arctic Ocean is expected to increase with increasing temperatures, potentially resulting in greater river export of old terrigenous organic carbon to the ocean. We suggest that rivers integrate variability in the components of the hydrometeorological regime, including soil condition, permafrost seasonal thaw, and thermokarst development, all the variables that determine atmospheric and ground water supply for the rivers and chemical weathering in their watershed.. It has been found that 1) carbon dioxide and methane fluxes are significant (and non-counted) components of the carbon cycling in the Arctic Ocean; 2) transport of eroded terrestrial material plays a major role in the accumulation of carbon in the ESAS (Dudarev et al., Gustafsson et al., Vonk et al., Sanchez-Garcia et al., Charkin et al., Semiletov et al., this session) ; 3) the seabed is a major CH4 source over the ESAS (N.Shakhova et al., this session); 3) eroded carbon is biodegradable (all reports, this session); 4) oxidation of eroded carbon onshore and offshore is a strong source of carbon dioxide (Piko et al. and Semiletov et al., this session). Thus studying carbon cycling in the East Siberian Arctic marginal seas has a high scientific priority in order to establish the carbon budget and evaluate the role of the Arctic region in global carbon cycling, especially in the coastal zone where the redistribution of carbon between terrestrial and marine environments occurs and the characteristics of carbon exchange with atmosphere are unknown. Initial scientific plan for the next decade is discussed.

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