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KALMAR: "Kurile-Kamchatka and Aleutean Marginal Sea-Island Arc Systems: Geodynamic and Climate Interaction in Space and Time“ an Integrated Polar Science Approach between Russia and Germany

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The Russian German Cooperation in polar marine science has a long tradition. Since the last decade of the last century, there is a continous joint effort for geoscientific studies in the arctic and subarctic Far East. The new initiative of KALMAR II will concentrate on the complex geosystem of the Kurile-Kamchatka-Aleutean arc including the adjacent regions of the arctic Bering Sea and the NW Pacific. This giant and unique natural laboratory will allow the study of interactions and fluxes between the asthenosphere, the lithosphere, the hydrosphere, the cryosphere, and the atmosphere in order to provide detailed insights into natural risks (volcanic eruptions, tsunamis) and regional dynamics of the climate impacting on the global system. The envisaged integrated investigation will built upon the existing network of scientists from both countries who studied geodynamic and volcanologic as well paleoceanographic and paleoclimatic issues successfully in the past in the Far East.

Two main research foci, ocean and climate dynamics as well as volcanisms and geodynamics, form the scientific backbone of the new KALMAR II initiative which will comprise in total five interlinked subprojects: Two subprojects will focus on the paleoclimatic and paleoceanographic evolution of this arctic region in relation to the development of the NW Pacific on millennial and decadal as well as seasonal times scales. This approach will test existing hypothesis with respect to water mass structure and water mass exchange through the Bering Strait, intermediate water mass formation, which, until know, is still not understood, marine productivity and their impact on the CO2 cycle, the glaciation history of Kamchatka and the continental oceanic (arctic) teleconnection between Atlantic and Pacific. The closely linked terrestrial subproject will study the marine influenced arctic region of Northern Kamchatka focusing on the geomorphologic and paleoclimatic evolution within the context of the northern hemisphere climate.

One subproject within the volcanic and geodynamic focus will study experimentally petrologic and magmatic processes to better understand the evolution of magma and their volatiles in this volcanic arc system and how eruptions impact on the regional and global climate. Extremely linked to this subproject is the second one, which concentrates on the differentiation and alteration of volcanic rocks and their related volatile production. Special emphasis will be laid on fluid rock interactions in order to provide information about the input of fluids into the atmosphere and the hydrosphere. In a third aspect we envisage to study the origin of the volcanism within the western segment of the Aleutean Arc. This young volcanic activity ranging from Attu Island to Kamchatka was recently discovered from KALMAR scientists. The investigation of these volcanic rocks may reveal the transition from intraplate volcanism (North Kamchatka) to island arc volcanism (Attu Island) and may also shed light on the influence of the inclination of the subducting plate on the composition and intensity of the volcanic activity. All three magmatic and volcanological subprojects will use off shore as well as on shore material. To investigate the influence of major volcanic eruptions on the atmosphere and ocean, climate models will be employed.