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TITLE: Tephrostratigraphic investigations of the Late Pleistocene-Holocene deposits in the northwestern Pacific Ocean and adjacent seas (Okhotsk and Bering)

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ABSTRACT BODY: Ash layers (tephra) in both continental and marine deposits bear information about history and nature of volcanic eruptions which could influence climate, processes of sedimentation, and even cause ecological disasters. Tephra layers of Quaternary age have been identified in various marine and continental deposits within the northwestern part of transition zone from the Asian continent to the Pacific Ocean. Tephra layers from the areas adjacent to the Japanese Islands are better studied while those from the areas farther north including Okhotsk and Bering Seas have received less attention until recently. More than 40 sediment cores were obtained during numerous expeditions performed by Russian, German, Japanese and Chinese scientists during the last fifteen years. We have identified and sampled a total of 74 tephra layers and lenses from these cores including 22 layers in the Okhotsk Sea, 14 layers in the Bering Sea, and 38 layers - in the northwestern Pacific (Kronotsky Bay and Meiji Seamount). Ages of tephra layers have been estimated based on age-depth models for the cores developed in the result of litho- and biostratigraphic studies, paleomagnetic and oxygen-isotope research, and ¹⁴C dating. Tephra from all these layers have been characterized based on morphology of glass shards, optical properties (refractive indices), and chemical composition of glass (major and trace elements) and minerals (major elements). About 3500 precise and consistent electron probe and ~200 LA-ICP-MS analyses of volcanic glasses and 1200 electron probe analyses of minerals comprise the core of our new data base. Processing of these data has allowed us to correlate a number of tephra layers between the cores in each of the studied regions. Several tephra layers have been correlated between the Bering Sea and Pacific cores. These results permit direct comparisons of the paleoceanological records over the vast area in the northwestern Pacific domain. Studied tephra layers form the basis of the tephrochronological framework for the Quaternary deposits, necessary for correlation of various sediments, and paleoceanological and paleogeographical reconstructions. This research has allowed us to obtain unique data on the large-scale volcanic eruptions in the Kurile-Kamchatka volcanic arc and identify the periods of enhanced explosive activity. At this stage, the obtained paleovolcanic record is more complete than that obtained on land (e.g. Bindeman et al., 2010; Braitseva et al., 1995), and may serve as a basis for estimation of environmental impact of the volcanic eruptions. A few tephra layers have been correlated between sea cores and on-land sites providing the first links between the marine and terrestrial depositional successions. In the Okhotsk Sea, the areas of ash fall for some large eruptions from Kamchatka and Kurile Islands volcanoes have been identified that

permits estimations of tephra volumes and eruptions magnitudes. This work was supported by the Russian-German KOMEX and KALMAR Projects, Russian-Japanese (06-05-91576 JP, JSPS) and Russian-Chinese (40710069004, 41076038 NNSF of China, SOA) grants as well as grants from the Russian Foundation for Basic Research (10-05-00160a and 11-05-00506a).

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