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Relative paleointensity records of upper Pleistocene marine sediments from the sub-polar North Pacific and the Bering Sea

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During cruise SO-202 (INOPEX – Innovative North Pacific Experiment) with RV Sonne in 2009 five sediment cores (kasten cores) were collected in the sub-polar North Pacific and the Bering Sea with core lengths of about 3 to 10 m. These kasten cores with a cross section of 30 x 30 cm allow for the recovery of sediment sequences with only very minor disturbances due to the large volume of the kasten cores. Therefore, these sediments should be extremely suitable for geomagnetic investigations.
The aim of our measurements, besides achieving age models for the recovered sediments on basis of their geomagnetic signal, was a more detailed insight into the behaviour of the Earth's magnetic field and the development of relative paleointensity records of this sub-polar area for the younger past.
The cores investigated comprise three sites in the Bering Sea (Bowers Ridge SO202-12-1, north-eastern slope SO202-18-6, Umnak Plateau SO202-22-4) completed by two sites in the (sub)polar North Pacific (Detroit Seamount SO202-07-6, Patton Seamount SO202-27-6), all located north of 51°N between longitudes of 167° East and 149° West. Sediments were recovered from water depths of about 1100 to 2925 m. After sub-sampling by U-channels, they were subject to step-wise alternating field (AF) demagnetization of the natural remanent magnetization (NRM) using a 2G long-core rock magnetometer. In order to normalize the intensity of NRM to the present concentration of magnetic minerals an anhysteretic remanent magnetization (ARM) was imparted to the sediment. The relative paleointensity (RPI) was calculated as NRM / ARM, both demagnetized at an AF level of 20 mT. Mean inclination of the stable characteristic remanent magnetization (ChRM) of all cores matches the values expected from the site locations under the assumption of a geocentric axial magnetic dipole. Nevertheless, it turned out that the sediment sequence from the Umnak Plateau in the Bering Sea was probably affected by early diagenesis of magnetic minerals resulting in a magnetic overprint. Thus the RPI signal was altered to such an extent that the data set was rejected. The remaining four sediment cores allow for the development of relative paleointensity records back in time to almost 100 ka. Sedimentation rates range from 5 to 11 cm/kyr providing reasonable high resolution of the data. Despite some still existing differences in detail, e.g. for the amplitudes of certain RPI features, the general pattern of the RPI curves of all cores show an appropriate correlation. This holds also for comparison of the RPI signals of sediment sequences from the Bering Sea with those from the sub-polar North Pacific giving reason to establish a common RPI curve for the investigated region.