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High resolution paleo-geomagnetic field variations as recorded in sediments from Prince William Sound, Alaska

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The dynamic changes in the Earth's magnetic field, caused by fluid motions in its outer core, can be captured in global marine sediments. Here we extend recent efforts to reconstruct Holocene paleomagnetic secular variation and environmental conditions in the mid-high latitude North Pacific with analyses of a marine sediment core taken from Prince William Sound, southern Alaska. Natural and laboratory remanent magnetizations were studied by progressive alternating field (AF) demagnetization of u-channel samples from jumbo piston core EW0408-95JC (60.66278N, 147.70847W, water depth 745m). The lithology is monitored by physical properties measurements, including CT Scans and core descriptions. The lithology of the upper 8.5 m of the 17.6 meter core consists primarily of magnetically homogenous bioturbated muds. Component directions calculated by PCA analysis are characterized by low MAD values (<4°) with inclinations consistent with GAD predictions and declinations varying in a manner consistent with PSV. Normalized remanences are comparable using a variety of normalizers and show minimal scatter through demagnetization suggesting that reliable paleointenisty estimates may be preserved. A detailed chronology developed from calibrated radiocarbon dating of benthic forams shows that the 8.5m spans ∼1500 years, and yields sedimentation rates of several hundred cm/kyr – ultra high for marine sediments. Comparison with Pacific Northwest and broader North American records, provides a degree of reproducibility and allows us to assess the spatial scale of signal coherence at centennial resolution . The resulting record of paleosecular variation (PSV) and relative paleointensity are consistent with predictions from global geomagnetic field models, yet allow investigations of rates of change of the local field, that cannot be accessed from global field models.