Reconstructing the Strength and Position of the Westerlies Over the Last Glacial Cycle

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The westerlies are prevailing winds that blow from west to east in the mid latitudes, and are important to study because of their effect on atmospheric circulation, wind patterns and aridity. Most studies agree with modern changes in the westerly winds, but past shifts in their position and strength are still widely debated. This project aims to fill in gaps in the paleoclimate record by reconstructing the strength and position of the Northern Hemisphere westerlies over the North Pacific Ocean for the last ~150 ky using marine sedimentary records of dust deposition. Specifically, we will test the following hypotheses: (1) the westerlies were located poleward and were weaker during the last interglacial compared to today and (2) the westerlies shifted equatorward and strengthened through the last glacial cycle. We present new major, trace, and rare-earth element concentrations and U-Th isotopes in sediment core SO202-37-2, analyzed on an Element II ICPMS at Lamont-Doherty Earth Observatory, and reconstruct dust deposition using $^{230}Th_{xs}$-normalized mass accumulation rates (MAR) of multiple dust proxies (Al, Fe, Ti, and ^{232}Th). Preliminary data from the SO202-37-2 core using ^{232}Th as a proxy for dust indicate a higher dust MAR during colder periods due to the increase of dust production during these periods. Higher dust fluxes during colder periods, correlate tightly with the benthic $\partial^{18}O$ record from the site and indicate a tight coupling between dust flux and climate. Analysis of major elements shows changes in dust composition and chemistry. The changing $^{232}Th/Ti$ ratio is evidence of changes of where the dust is coming from in addition to temperature changes. Lastly, we will use the relative amount of dust deposition between SO202-37-2 and an additional sediment core SO264-15-2 to investigate the latitudinal shift of the westerlies over the past 150 ky. Ultimately, studying past climate can help us understand future climate by reconstructing the westerlies over the last glacial cycle.