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^{4}He in modern Cape Verde corals: A high-resolution proxy record of dust flux from Africa.

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Mineral dust from arid and semi arid regions is an important component of climatic processes. The amount of dust emitted off continents is intimately linked with precipitation, which may itself be linked to atmospheric circulation driven by oceanic sea surface temperatures. Hence, reconstructing dust fluxes off continents with sub-decadal resolution can provide us with important insights into feedbacks in the climate system. Here we show that ^{4}He concentrations in annual bands in corals provides a high-resolution, reliable, and robust proxy record of dust flux from continents.

Some traces phases in dust, such as zircons, are rich in U and Th and have extremely high concentrations of ^{4}He. As some fraction of the dust settles out of the atmosphere and through the water column, corals incorporate the dust in their skeletons. The alpha stopping distance is greater than the particle size of wind blown dust and mineral grains will not accumulate ^{4}He after the dust is incorporated into the corals.

We have measured ^{4}He concentration in annual bands dating back to 1960's in a modern coral that was collected in 1996 off the island of Sal, part of the Cape Verde archipelago. The coral is situated close to and directly west of the dust source in the Sudano-Sahel region of the African continent. The ^{4}He record from the coral shows remarkable similarity with the record from the Barbados dust sampling station. Pronounced peaks in ^{4}He concentration occur in the early 1970's and early 1980's associated with severe drought in the Sudano-Sahel region. The ^{4}He record in the coral also shows a strong negative correlation with the previous year's precipitation in the Sudano-Sahel region. Our proxy record from the Cape Verde Island demonstrates that ^{4}He concentrations in corals can be used reliably to reconstruct dust fluxes and the hydrologic cycle at sub-decadal resolution.