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Middle to late Miocene Middle Eastern climate from stable oxygen and carbon isotope data, southern Alborz mountains, N Iran

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The Alborz mountains of northern Iran intercept and divert the northern hemisphere westerlies carrying moisture from the Mediterranean Sea, and form an orographic barrier to moisture sourced in the Caspian Sea. This implies that sediments along the leeward side of the southern Alborz mountains can potentially track changes in the moisture regime and mirror local to regional and global variations in atmospheric circulation, especially for the Miocene when the present-day climate conditions started to develop.
Here, we present the results of a stable isotope analysis and a clay mineral study of the Miocene Upper Red Formation in the foreland of the southern Alborz mountains. Sedimentological processes, depositional age, and evolution of the sediment source areas of these deposits are well constrained. The changes recorded by stable oxygen and carbon isotope data from the southern Alborz mountains suggest: 1) an increase in aridity related to the topographic evolution of the Alborz orographic rain shadow, which became more efficient between 17.5 and 17.2 Ma; 2) an increase in precipitation between 11 and 10.3 Ma, possibly related to perturbations in atmospheric circulation pattern in the northern hemisphere, and 3) a decrease in aridity from ca. 10 to 7.6 Ma due to an increase in seasonality of precipitation, probably in response to the topographic evolution of the Himalayan-Tibetan system.