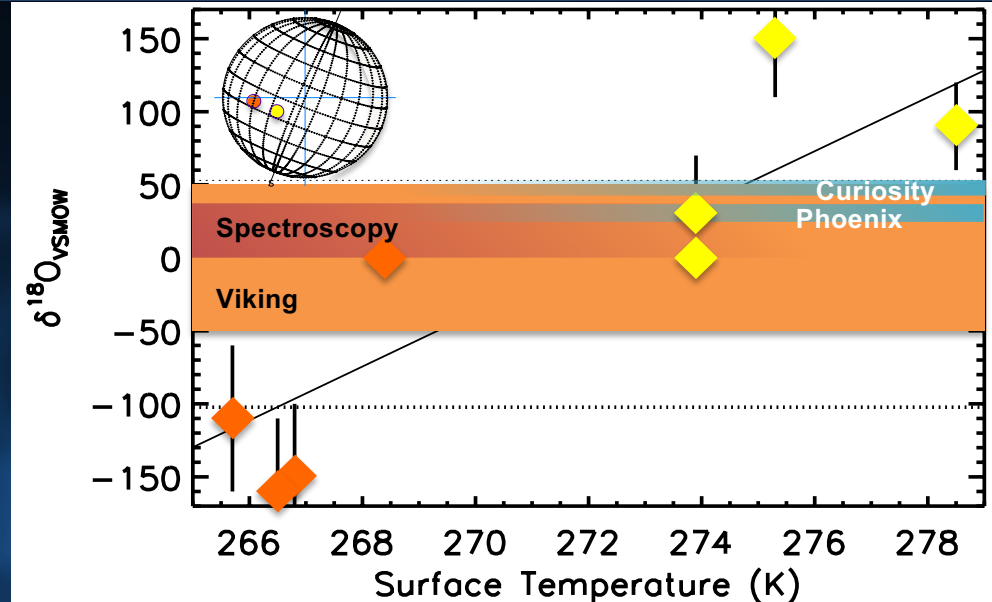


Time-Dependent Heavy Oxygen in Mars' Atmosphere

The amount of the heaviest oxygen isotope, ^{18}O , in Mars' atmosphere varies throughout the day and has implications for how much atmosphere loss has occurred.

- Ground-based Infrared Telescope Facility (IRTF) measurements of Mars' atmosphere, show that the amount of the heaviest isotope of oxygen in Mars' CO_2 atmosphere depends on surface temperature (which changes with time of day), providing an explanation for differing atmospheric $\delta^{18}\text{O}$ values obtained by different missions and ground-based observations.
- The fraction (or "enrichment") of heavy oxygen ($\delta^{18}\text{O}$) on Mars' today constrains how much atmosphere Mars has lost – greater enrichment indicates greater loss, as lighter isotopes are lost faster than heavier ones, enriching the heavy isotopes over time.
- These new measurements suggest there could have been twice as much air in the early Mars atmosphere as previously thought. Mars is the most Earthlike planet in our Solar system, making it good study in how planets can become uninhabitable.



The amount of isotope ^{18}O in the CO_2 atmosphere of Mars correlates with ground temperature. Orange data points refer to measurements made at local noon on Mars at subsolar latitude, while yellow points are for measurements made at about 1:20 PM on Mars.