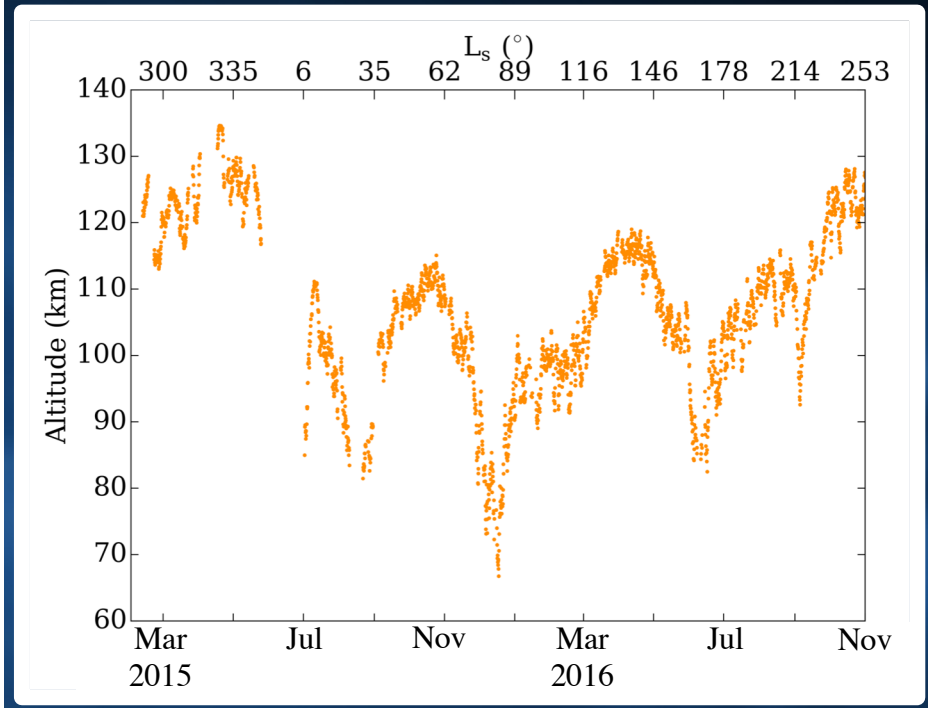
“Breathing” in Mars’ Upper Atmosphere

Variations in the Martian homopause inferred from MAVEN data show much more variability than previously thought.



The homopause, or bottom of the upper atmosphere, moves up and down by ~60 km as MAVEN samples it. Some of the variation can be attributed to seasonal changes (top axis).

Slipski et al. (2018), *J. Geophys. Res.*

- The transition from the middle atmosphere to the upper atmosphere is called the homopause. MAVEN measurements of N_2 and Ar in the upper atmosphere are used to infer its location, below which the atmosphere is turbulent and well mixed and above which profiles of compounds vary independently.
- The homopause is much more variable than previously thought, and can be found as low as 70 km. Its altitude varies (‘breathes’) with season and location on the planet.
- Above the homopause, the atmosphere becomes increasingly enriched in light species (e.g. H and O vs. CO_2 and O_2) with altitude, and therefore its location determines the relative abundance of escaping species at the top of the atmosphere.
- This finding suggests there should be significant regional and temporal variability to compounds escaping Mars’ atmosphere.