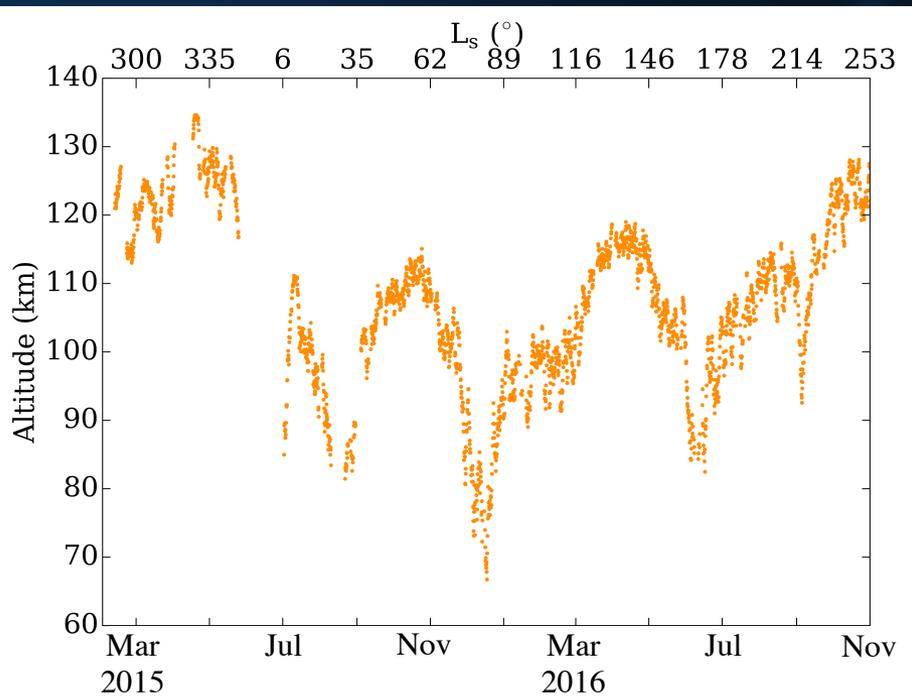


The Gateway to the Mars Upper Atmosphere Breathes In and Out

The transition from the middle atmosphere to the upper atmosphere is called the *homopause*.
How does its location vary at Mars?



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).

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

- MAVEN measurements of N₂ and Ar density profiles in the upper atmosphere are used to infer the homopause location, below which the atmosphere is turbulent and well mixed and above which molecular diffusion causes the altitude profiles of different species to be independent
- The homopause ('gateway') is much more variable than previously thought, and can be found as low as 70 km in some instances. 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. O₂ and CO₂) with altitude. The location of the homopause therefore determines the relative abundance of escaping species at the top of the atmosphere.
- This work suggests the relative abundance of escaping species should have significant regional and temporal variability