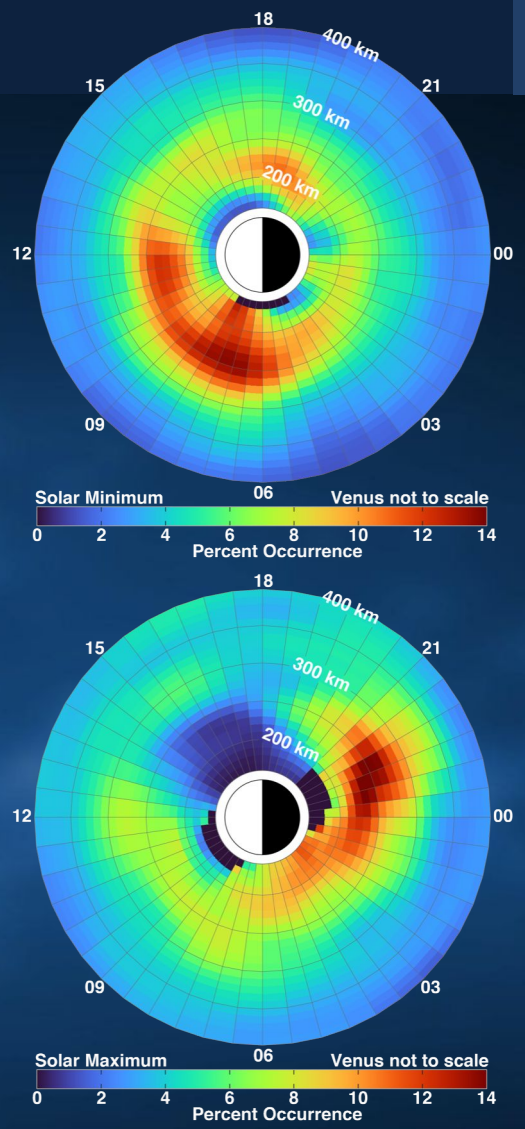
Statistical Wave Study Confirming Lightning on Venus!



Percent occurrence of whistler-mode wave observations as a function of altitude and local time. Solar Minimum (Top) and Solar Maximum (Bottom).

Lightning on Venus is difficult to observe optically because the thick clouds do not allow the light to escape easily. However, Venus Express observed lightning-generated whistler-mode waves in the ionosphere of Venus from 2006 through 2014.

- The magnetometer on Venus Express detected ~17 hours of cumulative wave activity caused by lighting with over 75% of the wave detections occurring below 400 km altitude.
- Lightning is the only known source of the occurrence of these waves at such low altitudes.
- The waves were mostly observed post-dawn during solar minimum (top figure) and near midnight during solar maximum (bottom figure), illustrating that that magnetic field controls the propagation.
- With the conservative assumption that the waves typically travel 60º from their sources, scientists estimate a minimum global lightning rate of 320 s^{-1}, 7x the rate on Earth!

Hart et al. (2022) *Icarus*