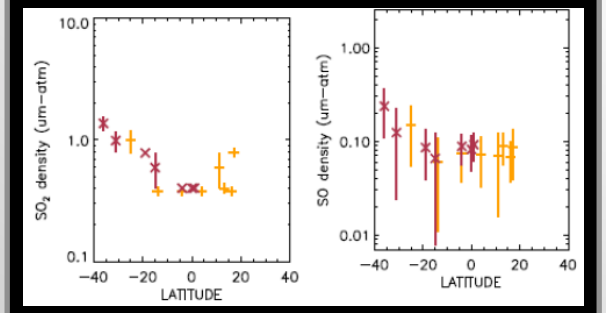


HST/STIS observations show SO_2 and SO gas densities increase and decrease simultaneously at the cloud tops

Venus' H_2SO_4 clouds drive greenhouse effect by trapping heat between surface and clouds.

H_2SO_4 is known to be formed from H_2O+SO_3

Because SO_3 is formed from the SO_x photolysis process, it is central to H_2SO_4 formation

HST/STIS observations obtained during the Venus Express Mission provide the first (and only) direct and simultaneous record of the latitude and local time distribution of Venus' 70-80 km SO and SO_2 (collectively SO_x) gas density.

These observations provide the first direct mapping of the SO_x photolysis process in the 70-80 km region, i.e. at the cloud tops.

The new observations show that the two gases are directly correlated.

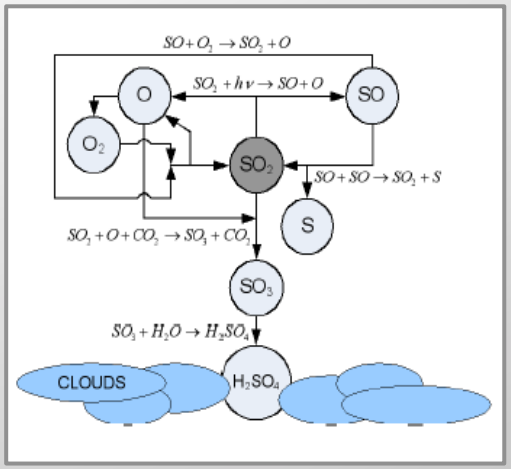
The correlation of the SO_x gases contradicts the expected photolysis behavior.

This new discovery reveals that the reservoir of gases needed for the H_2SO_4 formation process is reliant on both photochemical and microphysical processes

The new HST/STIS data provides a clear empirical constraint that must be met by models used to study Venus' H_2SO_4 formation process.

Thus, it provides a new way to improve and accurately model Venus' H_2SO_4 cloud formation through time, thus improving our ability to accurately model Venus' climate evolution

Sulfur Chemistry Cycle:

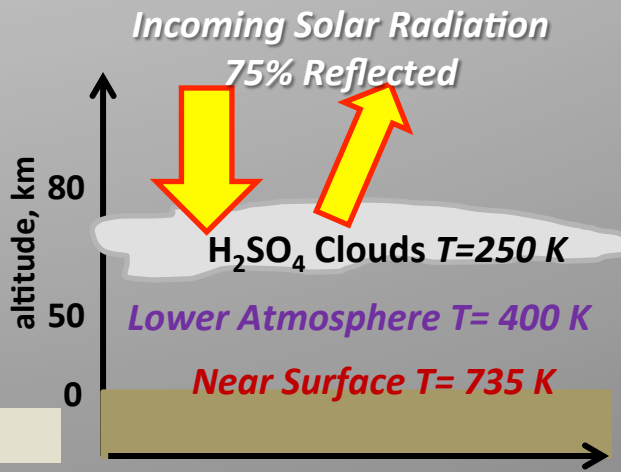


Photolysis of SO_2 → SO, S, O

Kinetic reaction with photolysis components → O_2, SO_2, SO_3

H_2SO_4 is formed from kinetic reaction of $SO_3+H_2SO_4$

Venus' H_2SO_4 formation cannot be understood independent of the sulfur chemistry cycle



Jessup et al., 2015 doi:10.1016/j.icarus.2015.05.027; this work was sponsored by NASA, ESA and STScI.