Impact of possible volcanic eruptions on the SO2 composition of the Venus cloud top (> 70km)

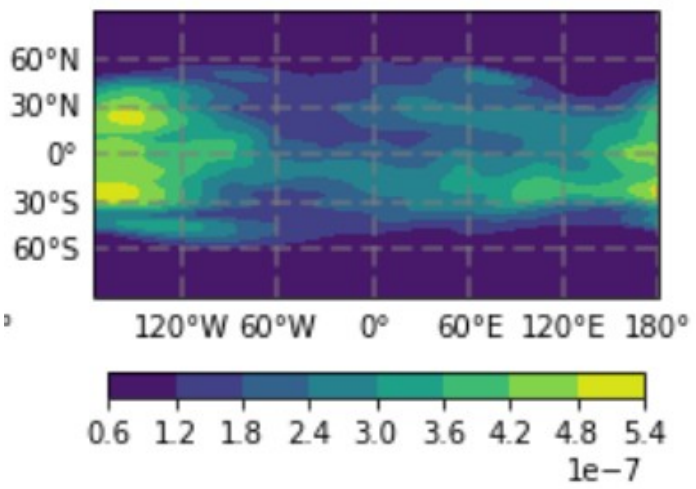
Aim & Model

- **Aim** : Space detection of eruptions & SO2 temporal variability at the cloud top
- **Model** :
  - Explosive eruption on a surface as big as Austria (one GCM cell)
  - SO2 : tracer (no chemistry)
  - Uniform profile of SO2 flux *[Eckhardt et al. 2008]*
  - Total SO2 flux in the plume 10 kg/s *[Gaillard and Scaillet 2014]*
- **Plume height** : up to 70 km (/!\ cloud top) *[Glaze et al. 2011]*

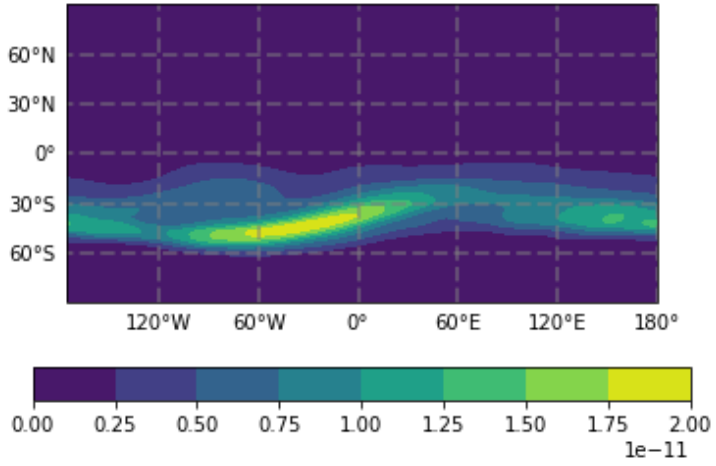
Results

Venus : 10-100 ppb of SO2 at the cloud top

Simulations : max 0.01 ppb for 0.5 Venus day eruption (59 Earth days) with 70 km height plume



Environment



Eruption 0.5 Vd

Conclusion

→ With theses simulations we can not see an impact of the eruption

→ We need at least a flux of 1000 kg SO2/s

Références

Lori S. Glaze, Stephen M. Baloga, and Jesse Wimert. **Explosive volcanic eruptions from linear vents on Earth, Venus, and Mars : Comparisons with circular vent eruptions**. Journal of Geophysical Research : Planets,116(E1), 2011. doi : https://doi.org/10.1029/2010JE003577.

Fabrice Gaillard and Bruno Scaillet. **A theoretical framework for volcanic degassing chemistry in a comparative planetology perspective and implications for planetary atmospheres**. Earth and Planetary Science Letters, 403 :307–316, 2014. ISSN 0012-821X. doi :https://doi.org/10.1016/j.epsl.2014.07.009

S. Eckhardt, A. J. Prata, P. Seibert, K. Stebel, and A. Stohl. **Estimation of the vertical profile of sulfur dioxide injection into the atmosphere by a volcanic eruption using satellite column measurements and inverse transport modeling**. Atmospheric Chemistry and Physics, 8(14) :3881–3897, 2008. doi :10.5194/acp-8-3881-2008.