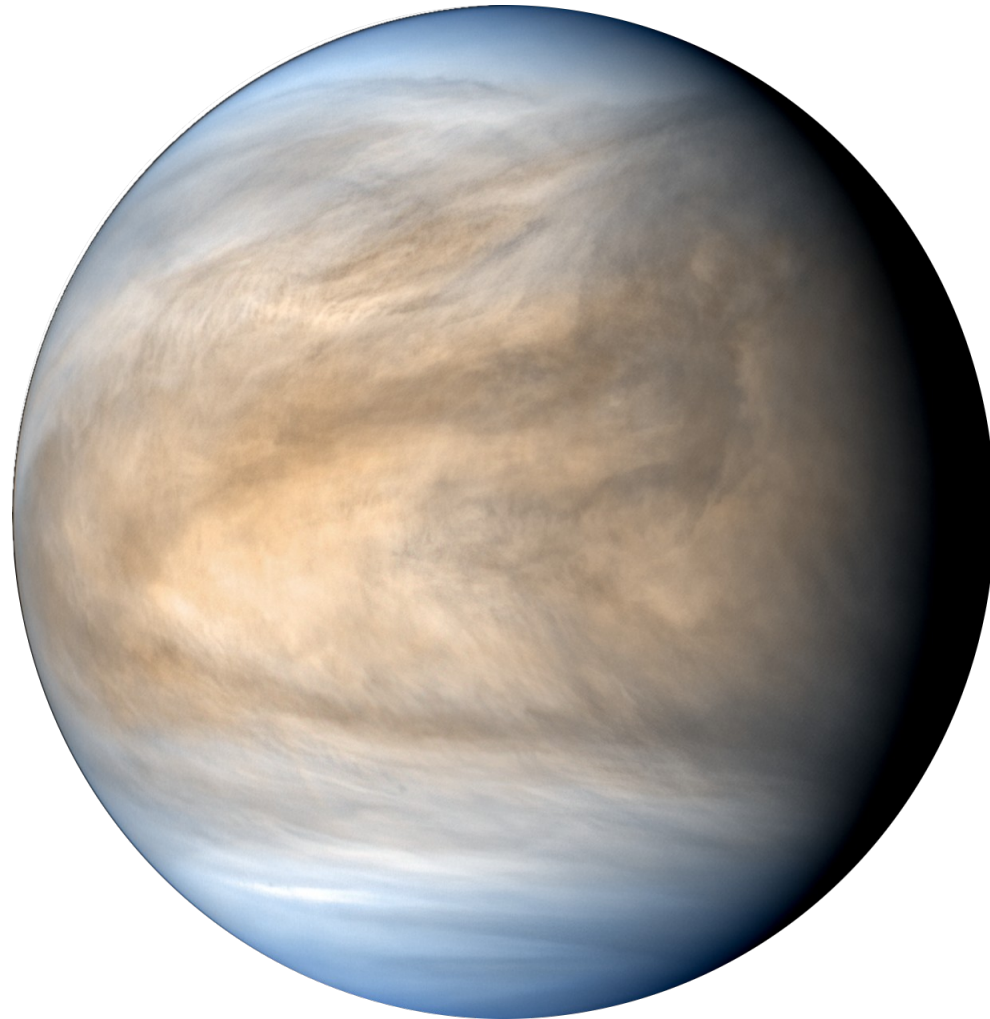


# **SO<sub>2</sub> stability issue in the Venus PCM**

what's not working?



# Updates of the Venus PCM

(compared to Stolzenbach et al 2023)



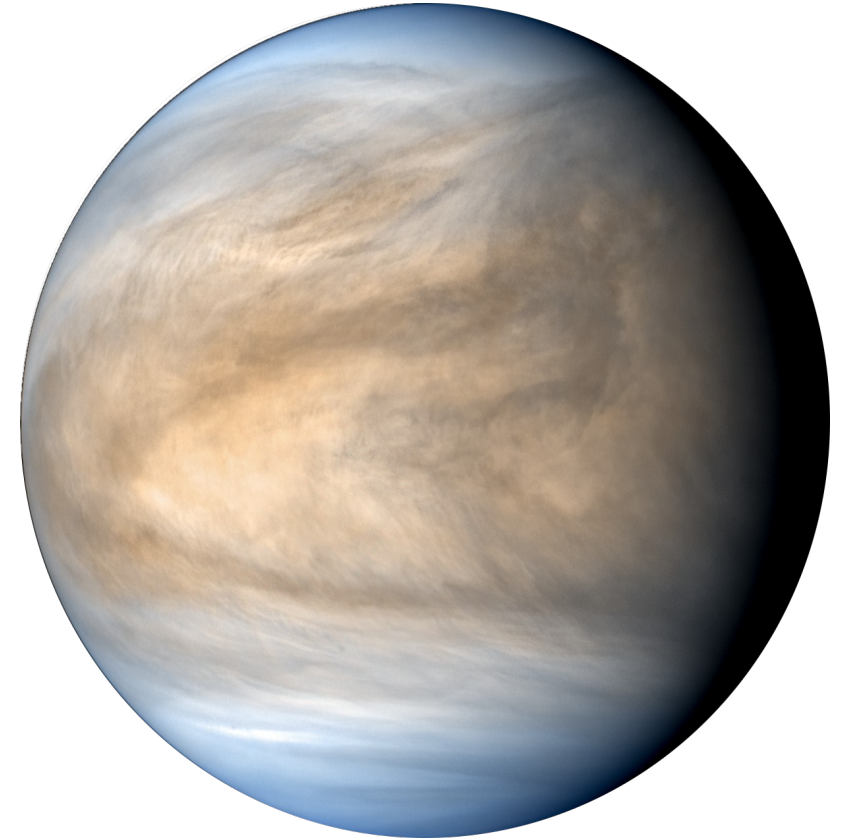
Resolution 96x96x78

Photochemistry online (N. Stree1)

Nitrogen chemistry for NO airglow (N. Stree1)

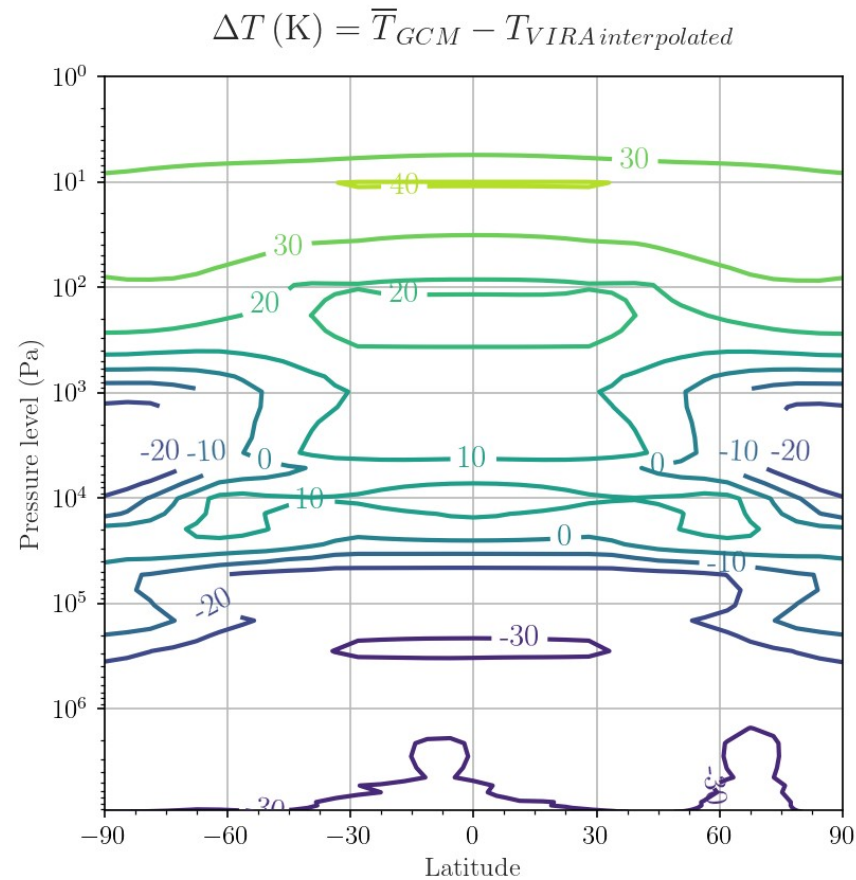
New cloud vertical structure

Optical vertical cloud structure from Haus et al, 2016

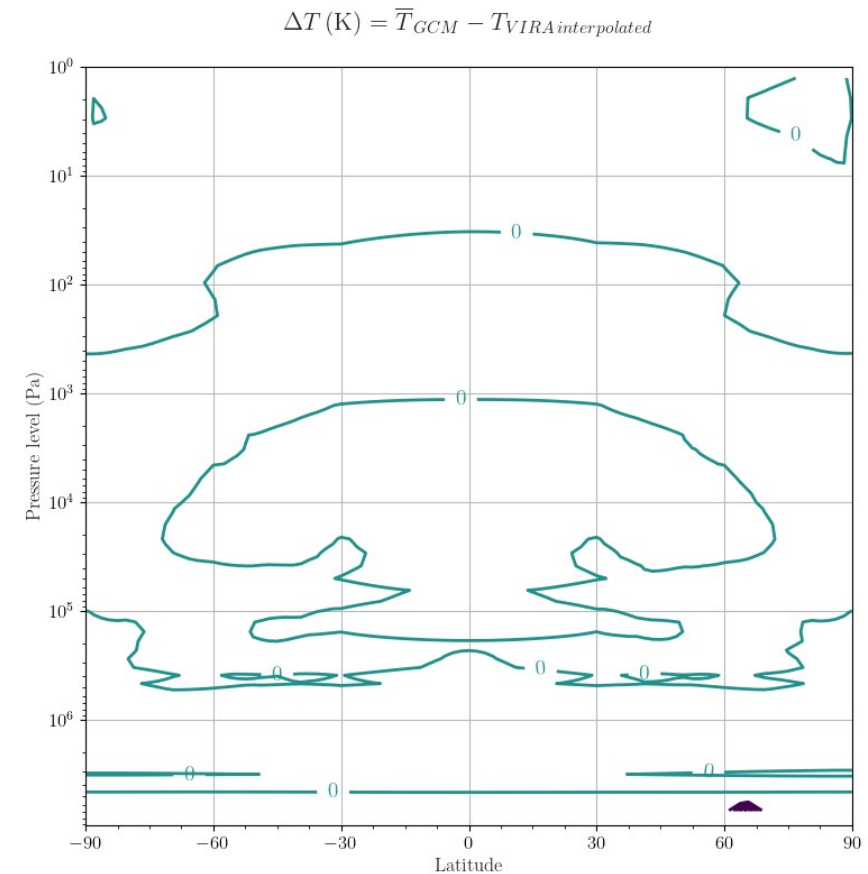


# Updates of the Venus PCM

## Impact on the temperature



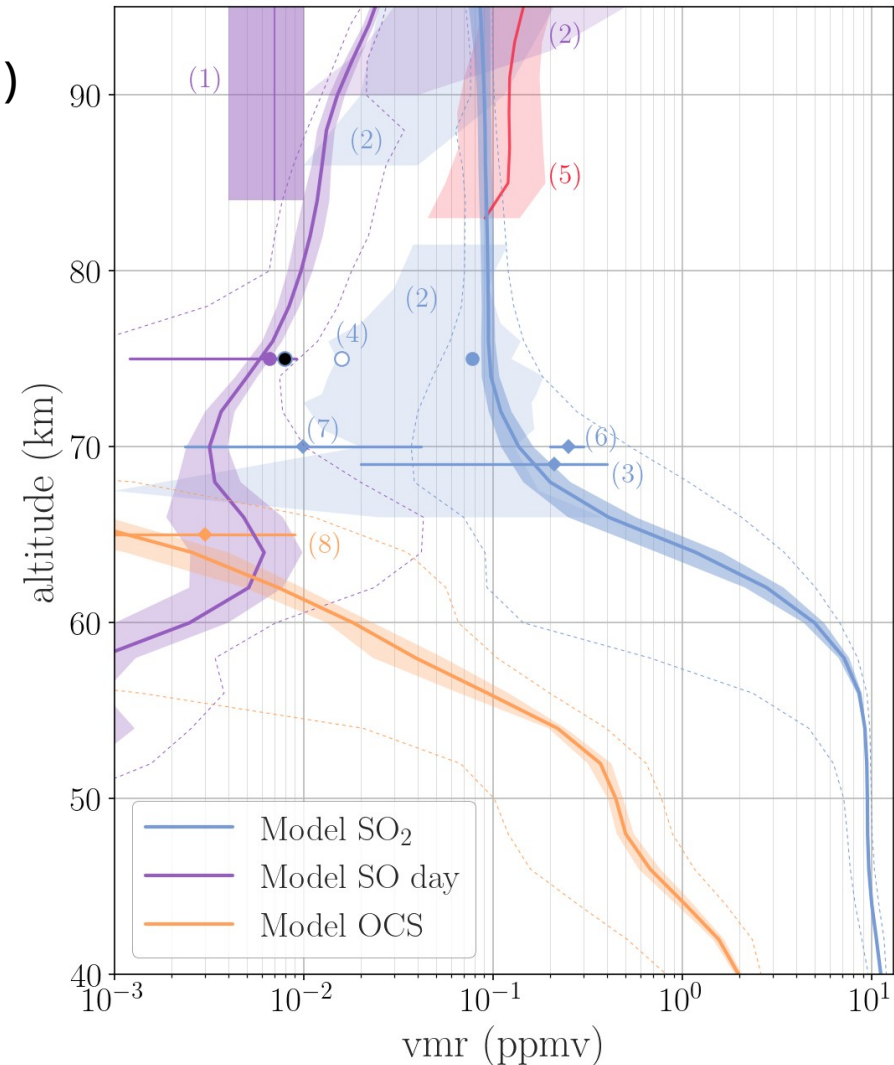
Stolzenbach et al, 2023



Latest Venus PCM

# SO<sub>2</sub> vertical profile

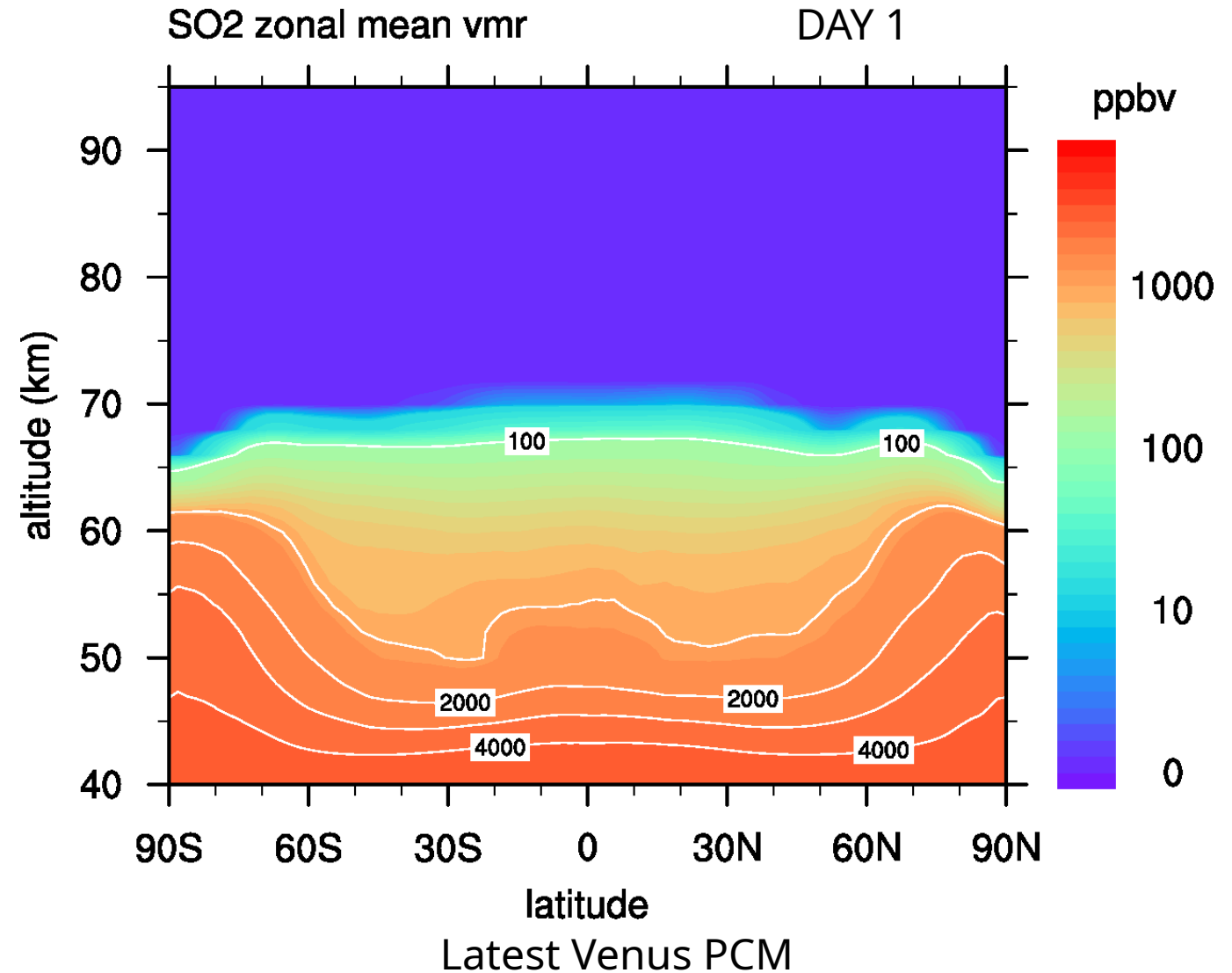
- Decrease from 10 ppmv below the clouds (50 km) to 0,1 ppmv above the clouds (70 km)
- Good overall agreements for by-products, SO, H<sub>2</sub>SO<sub>4</sub>
- H<sub>2</sub>O is also well reproduced



Stolzenbach et al, 2023

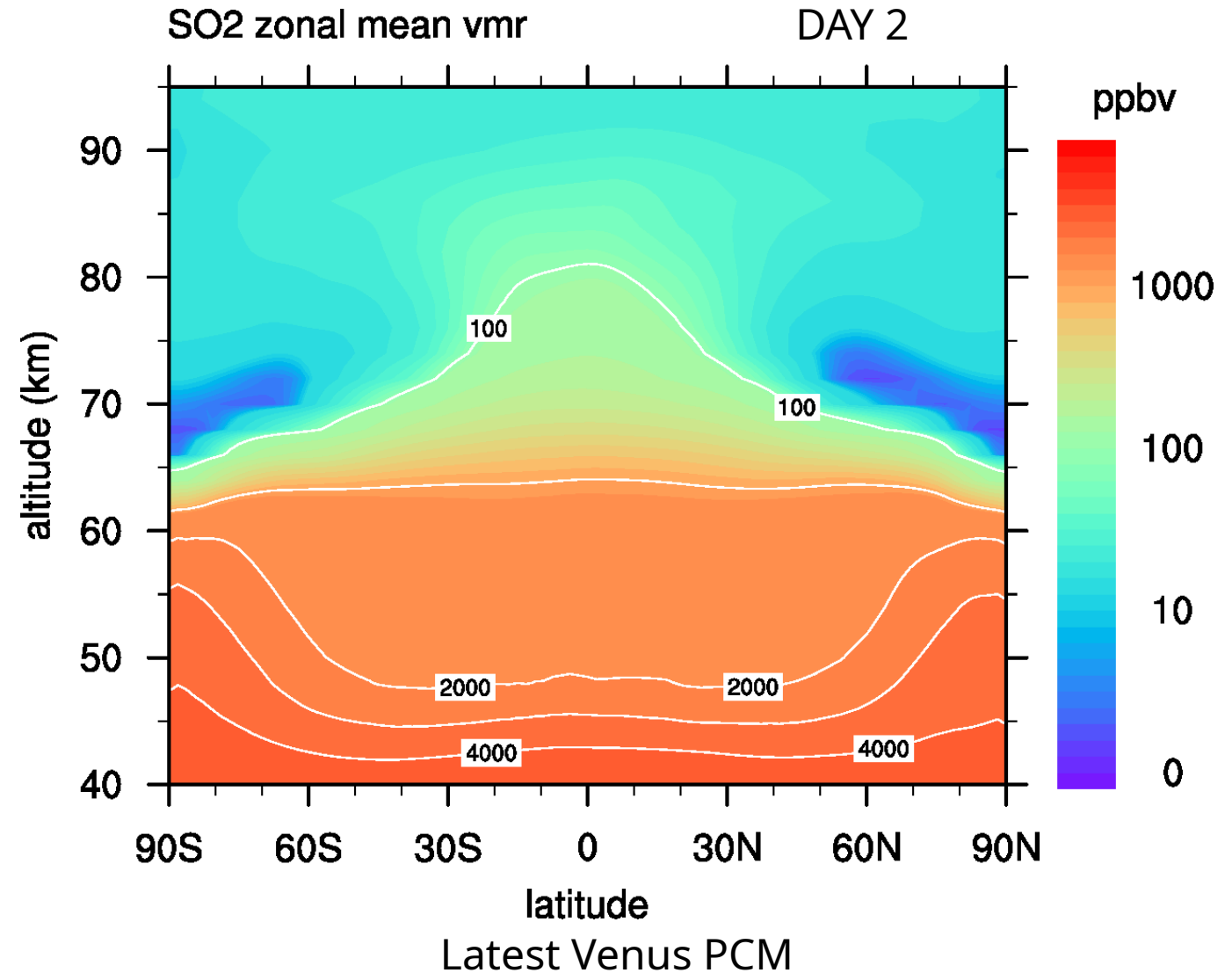
# SO<sub>2</sub> vertical profile

- Newest version of the Venus PCM
- 5 ppmv below the clouds



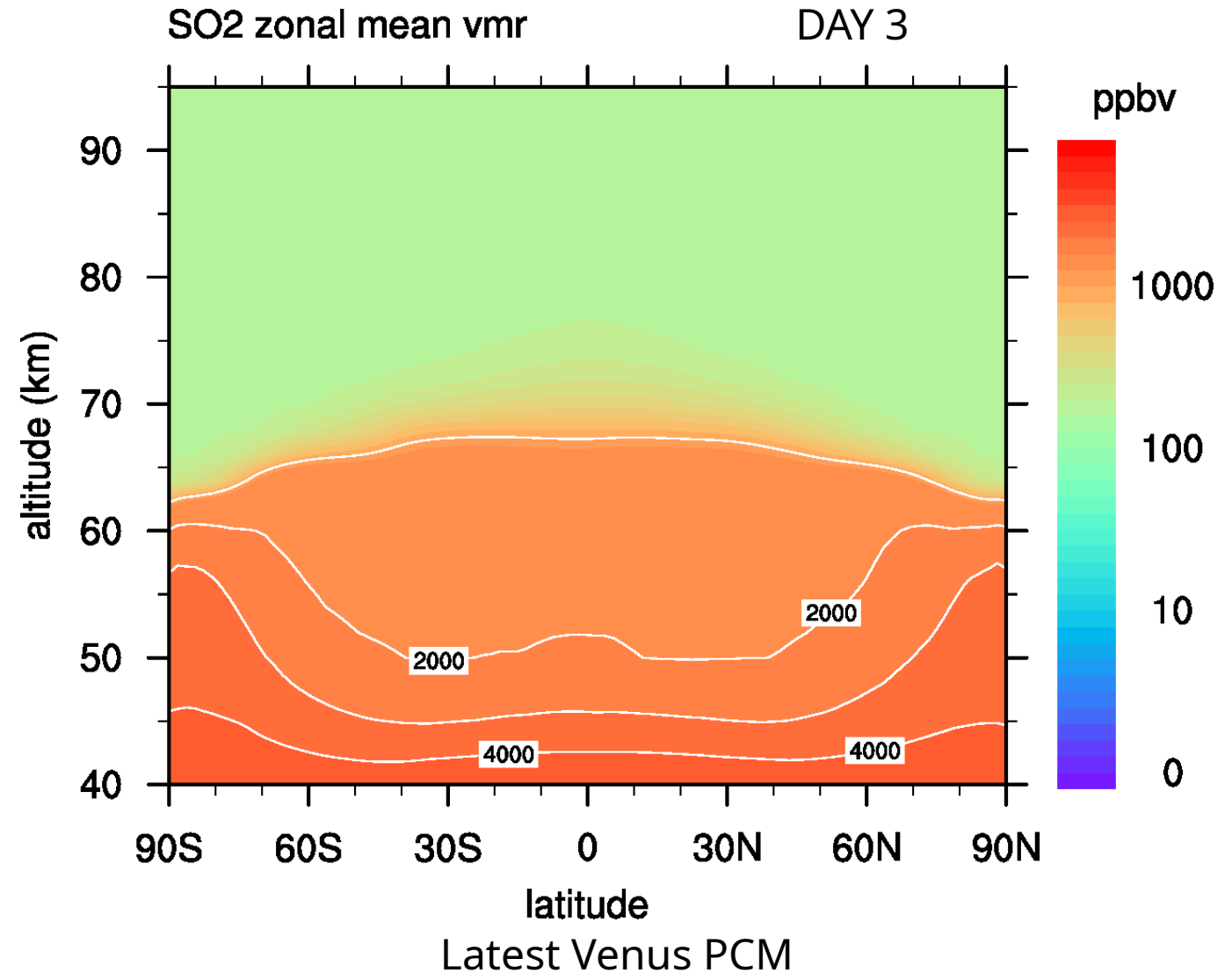
# SO<sub>2</sub> vertical profile

- Newest version of the Venus PCM
- 5 ppmv below the clouds



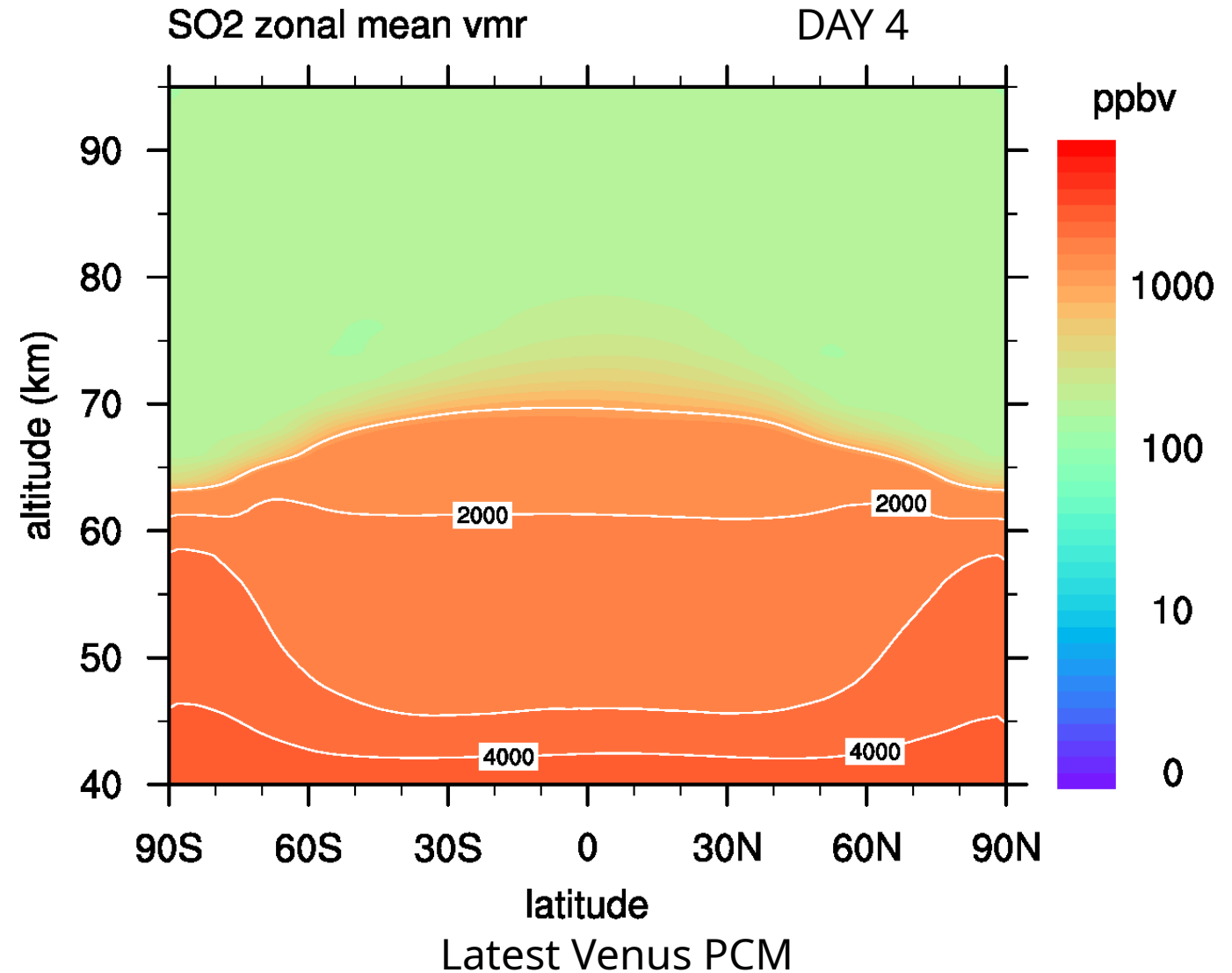
# SO<sub>2</sub> vertical profile

- Newest version of the Venus PCM
- 5 ppmv below the clouds



# SO<sub>2</sub> vertical profile

- Newest version of the Venus PCM
- 5 ppmv below the clouds





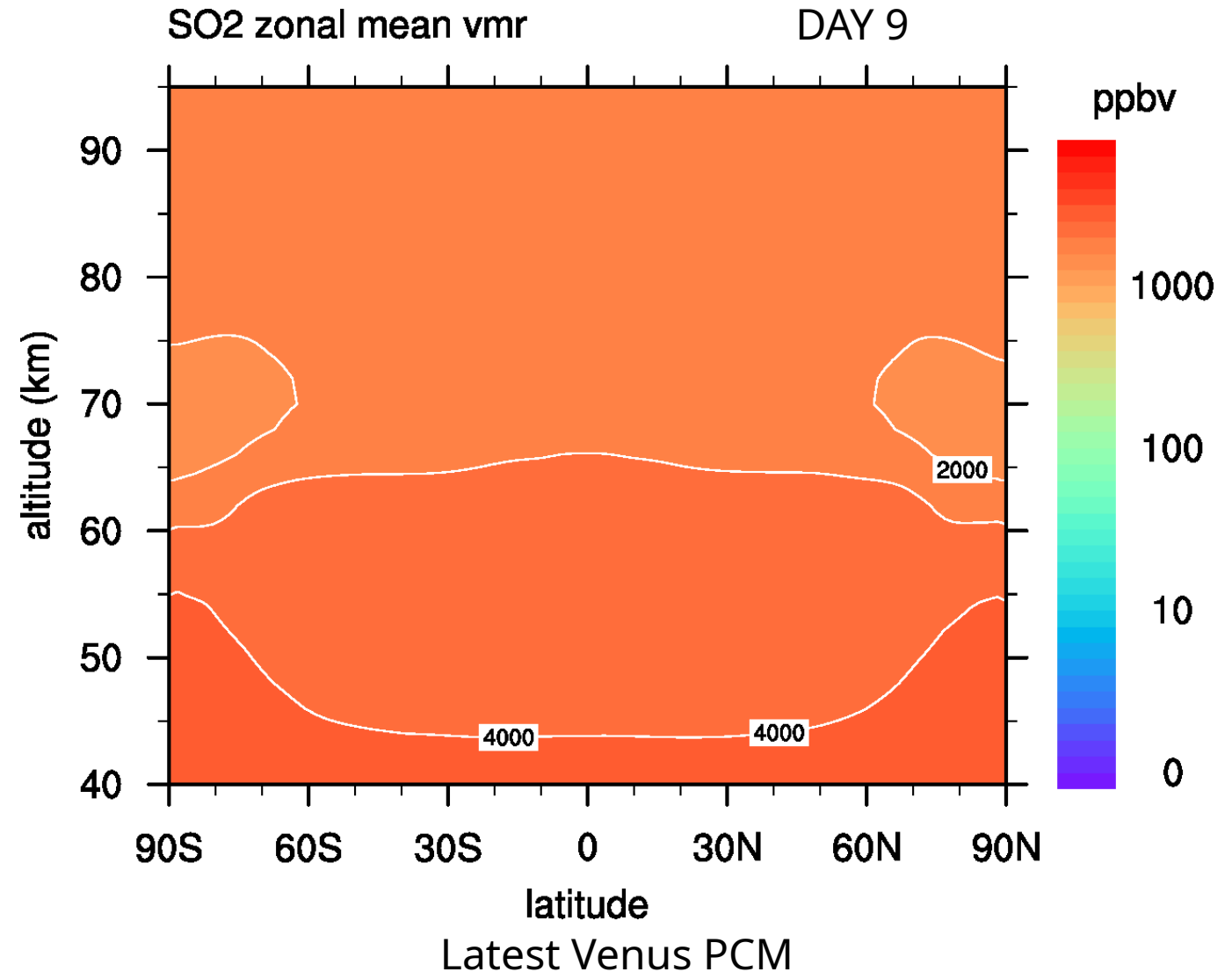




# SO<sub>2</sub> vertical profile

SO<sub>2</sub> accumulates  
with only 5 ppmv below clouds...

- Adding Haus et al, 2016 opt. vert. structure with latitudinal does not change the results
- Photolysis rates are OK ✓
- Sedimentation rates are OK ✓



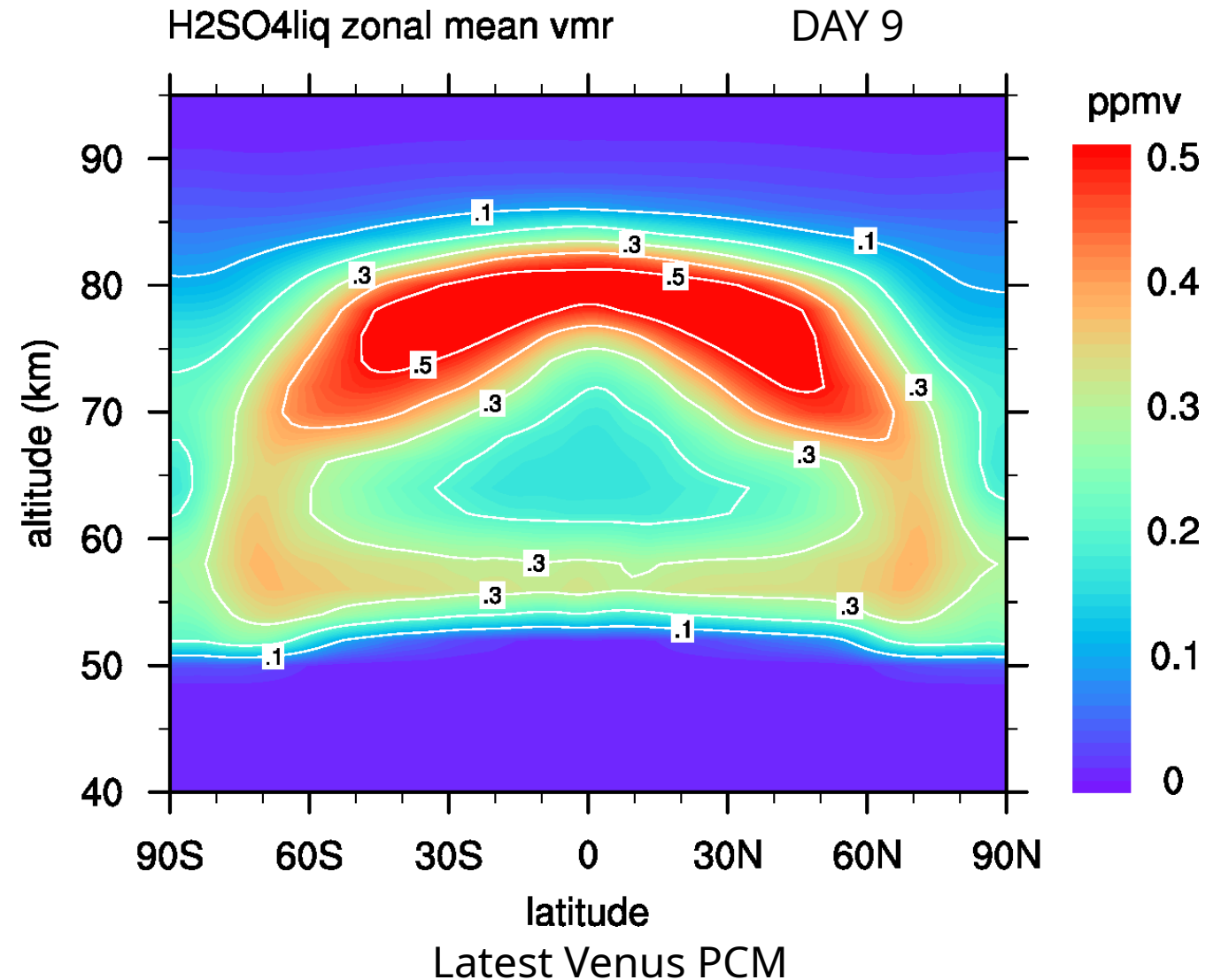
# SO<sub>2</sub> vertical profile

SO<sub>2</sub> accumulates

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- Photolysis rates are OK ✓
- Sedimentation rates are OK ✓

SO<sub>2</sub> by-products are also wrong



# SO<sub>2</sub> vertical profile

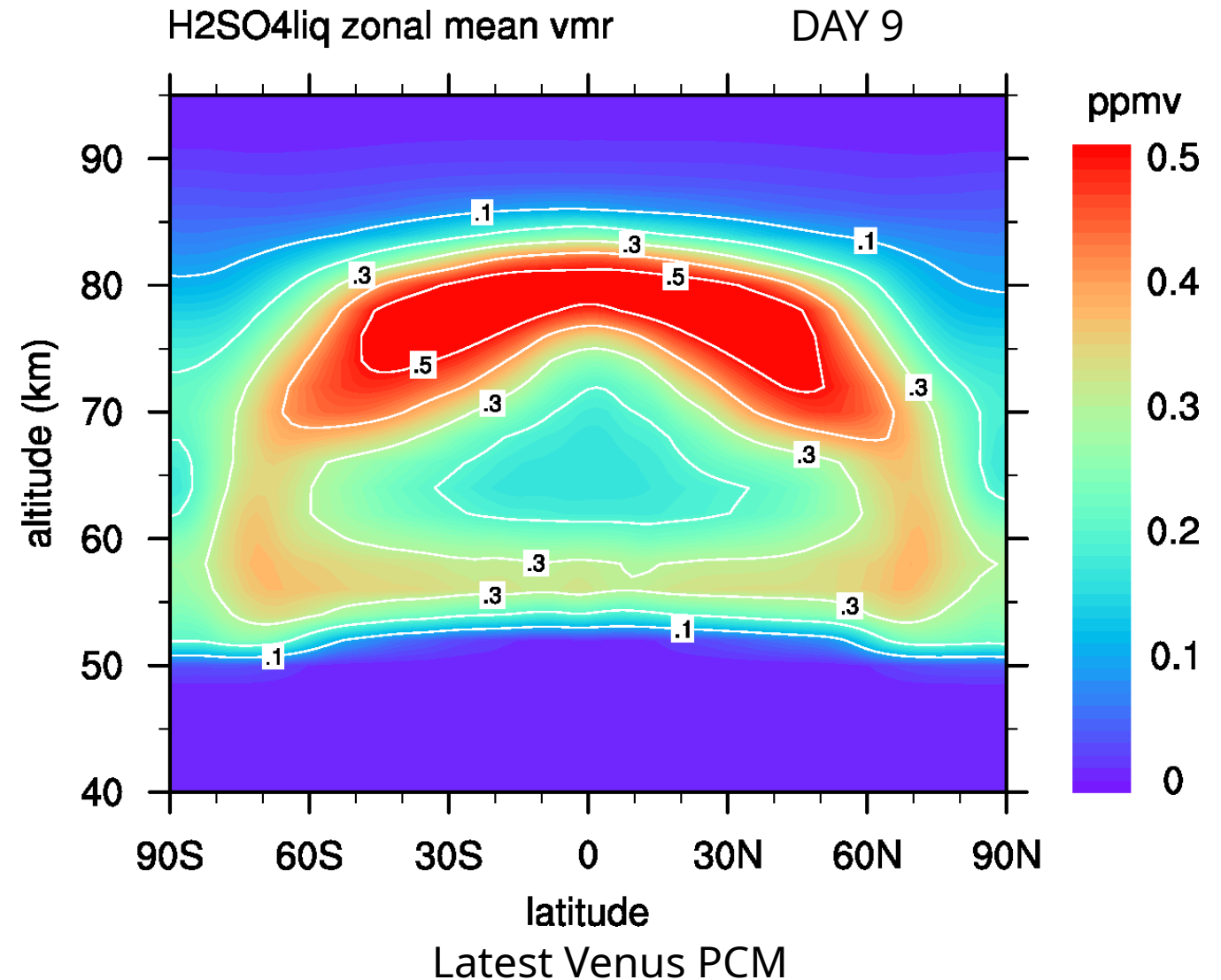
SO<sub>2</sub> accumulates

with only 5 ppmv below clouds...

- Adding Haus et al, 2016 opt. vert. structure with latitudinal does not change the results
- Photolysis rates are OK ✓
- Sedimentation rates are OK ✓

SO<sub>2</sub> by-products are also wrong

- Liquid parts too high
- Too much H<sub>2</sub>O
- SO, OCS, etc are wrong

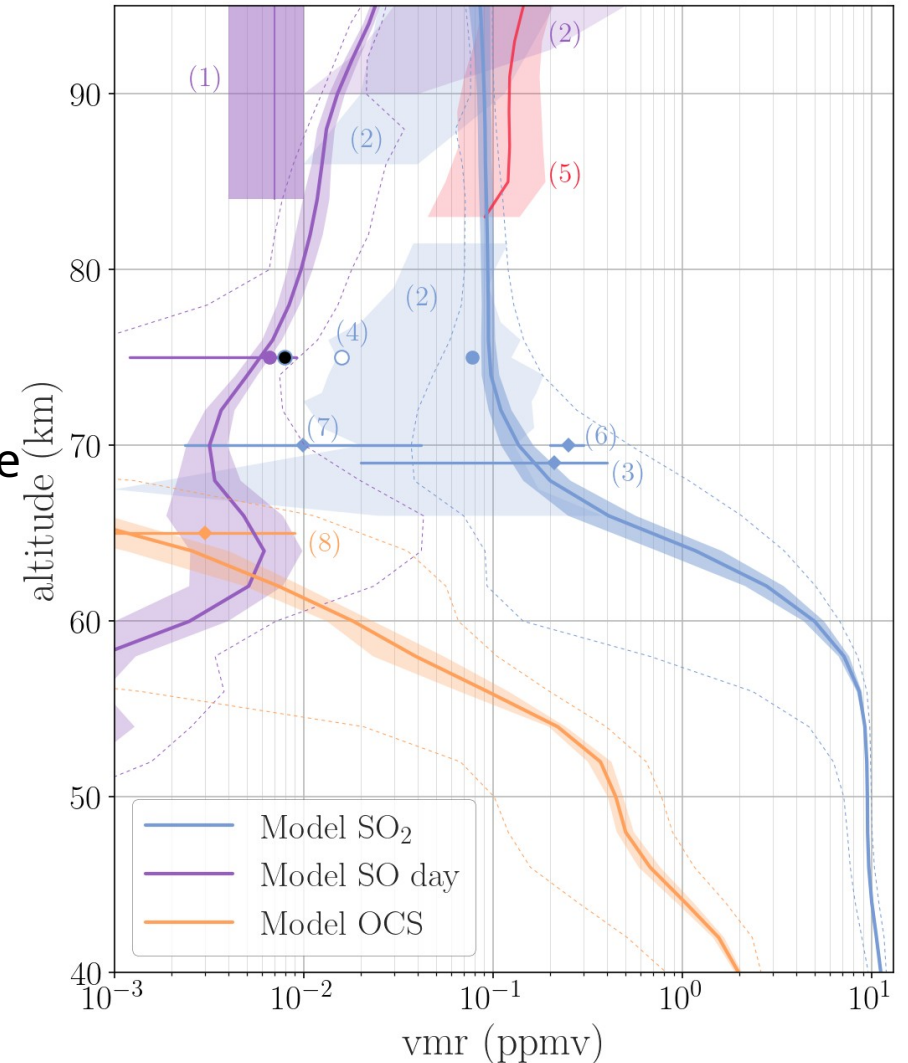


# Conclusions

## GOAL

Having a nominal SO<sub>2</sub> simulation  
like in Stolzenbach et al, 2023

- Need of a nominal SO<sub>2</sub> simulation for the VCD
- Addition of NO<sub>3</sub> and ClNO chemical system to better describe the mesospheric nitrogen chemistry
- Bug hunting
- Deeper analysis of SO<sub>2</sub> loss/production rates



Stolzenbach et al, 2023

Thank you for your attention