

CONTRIBUTIONS OF VOLATILES TO THE VENUS ATMOSPHERE FROM THE OBSERVED EXTRUSIVE VOLCANIC RECORD: IMPLICATIONS FOR THE HISTORY OF THE VENUS ATMOSPHERE (J. Head, L. Wilson, M. Ivanov, R Wordsworth).

1. The **current high atmospheric pressure severely inhibits degassing of mantle-derived S, H₂O and CO₂** brought to surface by volcanism and contributed to atmosphere. This **severely inhibits plinian explosive eruptions** to deliver volatiles to the atmosphere.
2. The **total volume of lava erupted in the stratigraphically youngest period of the observed record (pl, rift-related, volcanic edifices): Insufficient to account for current atmosphere SO₂ abundance**. Thus, **highly unlikely that current/recent ongoing volcanism could be maintaining observed 'elevated' levels of atmospheric SO₂**.
3. The **total volume of lava erupted in the period of global volcanic resurfacing (psh, rp₁, rp₂): Insufficient to produce the CO₂ atmosphere observed today!** True even if the ambient atmospheric pressure was 50% of today. Therefore, **a very significant part of the current CO₂ atmosphere must have been inherited from a time prior to the observed geologic record, sometime in the first ~80% of Venus history**.
4. The **amount of water degassed to the atmosphere during the period of global volcanic resurfacing: Would have been minimal**, even if the atmospheric pressure was only 10% of what it is today. The current low atmospheric water content **may be an inherent characteristic of the ambient atmosphere and not require enhanced loss rates to space in the last 20% of Venus history**.
5. Current Venus atmosphere: May be a **"fossil atmosphere"**. Largely **inherited from a previous epoch in Venus history**. May provide **insight into conditions in first 80% of Venus history!**
6. If episodic periods of **global volcanic resurfacing built up the "fossil atmosphere"**: Assuming an initial 1 bar atmosphere, **more than 90 similar global volcanic resurfacing periods would be required to produce the currently observed CO₂ atmosphere**.
7. A critical question: **What was the atmospheric pressure/water content/solar insolation 'tipping point' that led to the stabilization of this "fossil atmosphere"?**

