Meteors May Masquerade as Lightning Above the Atmosphere of Venus

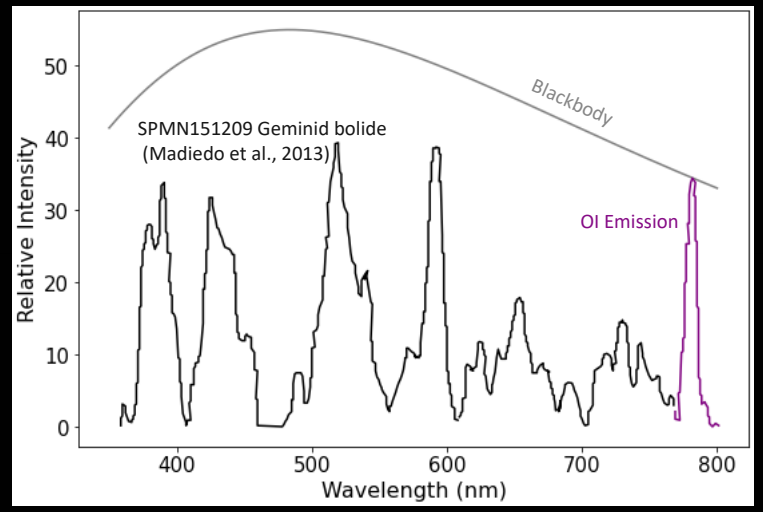

Figure 1: 1-2 kg meteors do not produce blackbody emission spectra on Earth – or on Venus?

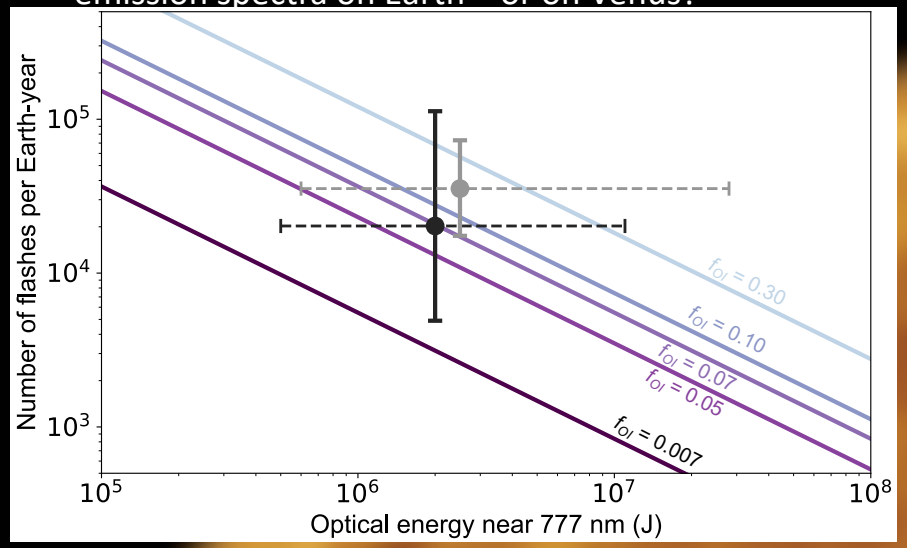

Figure 2: The fraction of optical energy contained in the OI line tells us how many flashes of a certain size we'd see per year.

The existence of lightning at Venus is heavily debated. Meteors cannot be ruled out as the source of observed flashes in the atmosphere that have been previously attributed to lightning.

- The current proposed evidence for lightning at Venus are optical flashes and whistler-mode waves. However, they provide wildly different estimates of the flash rate in the atmosphere.
- Constraining observations of lightning in Venus' atmosphere provides insight into its chemistry, dynamics, and even habitability.

Meteors have previously been discounted as sources of observed optical flashes due to their *assumed* emission as blackbodies. However, fireballs from ~1–2 kg meteoroids are not blackbodies (Figure 1). The fraction of optical energy emitted near 777 nm (where flashes at Venus are imaged) is at least an order of magnitude higher for real meteors than for blackbodies. Therefore, we found that the rate of optical flashes observed at Venus by the Akatsuki mission (black) and by the Mt. Bigelow survey (grey) is almost exactly the rate expected from meteors.

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