

Annual variations in meteor shower fluxes from radar observations

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1 Extended Abstract

Many meteor showers have different maximum activity levels in different years. The activity of the Geminid meteor shower, whose parent is asteroid 3200 Phaethon, is currently increasing, according to models of the stream evolution and visual observations [1]. The η -Aquariid shower, which comes from comet 1P/Halley, shows occasional outbursts where the activity increases by a factor of two or more [2]. Understanding the variations in meteor shower activity helps to constrain models of meteoroid stream evolution, which in turn improves predictions of the future activity of showers. It can also shed light on the past activity of comets or asteroids and the mechanisms by which they lose mass.

The Canadian Meteor Orbit Radar (CMOR) has been running since 1998. It consists of three radar systems, at 38.15, 29.86 and 17.45 MHz. The number of shower echoes received by a radar depends on the transmitting power, the receiver noise, observational biases like the initial radius effect, and even the activity of the Sun. Using careful calibration of each of the systems, the change in activity in meteor showers can be measured, and verified on at least two independent systems. The 17 MHz system is often swamped with terrestrial noise, and so is not used in flux studies.

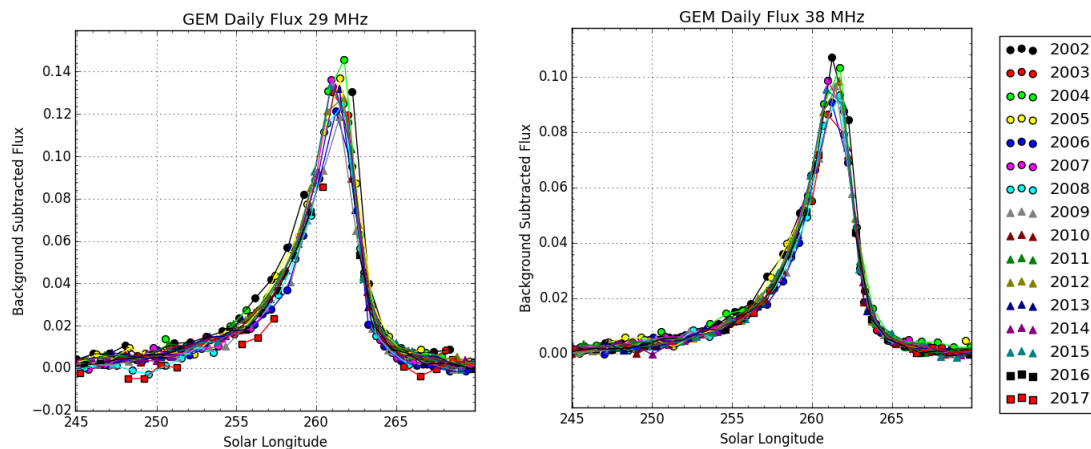


Figure 1. Flux (in meteoroids $\text{km}^{-2} \text{hr}^{-1}$) of the Geminid meteor shower as measured on CMOR's 29 and 38 MHz systems

After correcting for observing biases, activity curves have been generated for all the major meteor showers. The variation in peak flux, in the timing of the peak flux, and the shape of the shower activity profile will be compared on the two systems. For example, figure 1 shows the flux of the Geminid meteor shower on the two frequencies. The small difference in the absolute peak fluxes shows unresolved, frequency-dependent observing biases which will be addressed.

References

- [1] Ryabova, G., Rendtel, J. (2017) "Increasing Geminid meteor shower activity." *MNRAS*, Accepted.
- [2] Campbell-Brown, M., Brown, P. (2015). "A 13-year study of the η -Aquariid meteor shower." *MNRAS* **446**, 1580–1597.