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## Is there a Seasonality of the Martian Seismic Event Rate?

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We analyze the sequence of seismic events of different types as recorded by the SEIS instrument of the InSight mission. After several weeks without any detection, event counts started to increase at the end of May 2019. The majority of recorded events belongs to the class of 2.4 Hz events, which prominently excite a continuously observed natural resonance frequency.

After a sudden onset of seismic detections by the end of May 2019 (about sol 180,  $L_5 \approx 32^\circ$ ), especially the combined event rate of the High Frequency, Very High Frequency, and 2.4 Hz family of events increased from 3.6 events/sol in June 2019 to more than 9 events/sol until late August 2019, i.e. increased by a factor of about 3.

Estimating event rates as if events are the result of a constant-rate Poisson process leads to contradictions with the statistical properties of those, either in the cumulative event count or in the lag time distribution. These contradictions can be overcome by assuming a step-wise increase of the event rate.

Any deviation from a purely random occurrence of quakes, in both time and space, requires a mechanism to suppress or support the source process. The seismic activity of the Moon is mainly controlled by tidal deformation, at least in terms of source time. What controls the event rate of Martian high frequency events is currently elusive.