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A Low-Cost Approach to the Investigation of Venus Lightning

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The occurrence of Venus lightning has been detected by atmospheric probes and landers on Venus; by ionospheric satellites; by an orbiting visible spectrometer; at radio frequencies by the Galileo spacecraft while flying by Venus; and by an Earth-based telescope. However, none of these detectors has enabled us to determine the global occurrence rate of lightning in the atmosphere of Venus, nor the altitude at which this lightning is generated. Such measurements are needed in order to determine the processes that generate Venus lightning and to establish the importance of Venus lightning in controlling the chemical composition of the Venus atmosphere. A simple and affordable mission to perform this mapping can be achieved with CubeSat technology. A mother spacecraft with at least three CubeSat partners using RF detection could map the occurrence of lightning globally and determine its altitude of origin, with triangulation of precisely timed RF event arrivals. Such a mission will provide space for complementary investigations and be affordable under future Discovery mission programs.