Meteor shower identification and characterization with Python

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The short development time associated with Python and the number of astronomical packages available have led to increased usage within NASA. The Meteoroid Environment Office in particular uses the Python language for a number of applications, including daily meteor shower activity reporting, searches for potential parent bodies of meteor showers, and short dynamical simulations. We present our development of a meteor shower identification code that identifies statistically significant groups of meteors on similar orbits. This code overcomes several challenging characteristics of meteor showers such as drastic differences in uncertainties between meteors and between the orbital elements of a single meteor, and the variation of shower characteristics such as duration with age or planetary perturbations. This code has been proven to successfully and quickly identify unusual meteor activity such as the 2014 kappa Cygnid outburst. We present our algorithm along with these successes and discuss our plans for further code development.