Abstract
Radars detect plasma trails created by the billions of small meteors that impact the Earth’s atmosphere daily, returning data used to infer characteristics of the meteoroid population and upper atmosphere. Researchers use models to investigate the composition and evolution of the meteors and plasma trails. In this paper, we examine spectra from full 3D simulations of meteor trail evolution under a variety of conditions. We look at meteors in electric fields of different strengths, and with different collision rates. The results of this study will allow more detailed and accurate information about the meteors to be drawn from non-specular radar observations of the trails, and aid in identifying the characteristics of the meteors that are best described by the simulations.

Background and Motivation
Meteors enter the atmosphere at about 130 km. Heating, ablation and ionization create a plasma trail. Reflections from the leading edge of the plasma form head echoes. As the trail cools and expands, diffusion begins. Waves and turbulence develop in a limited range of altitudes, and reflections from plasma waves creates non-specular trails. Comparing simulated meteors with controlled parameters to data collected by radar arrays will allow us to better understand the characteristics and evolution of the plasma trails.

Simulations
We consider four simulations: three with collision rates of 2750 (electron) and 700 (ion) and E-fields of 0, 5, and 8 mV, and one with collision rates reduced by one e-folding and a 5 mV E-field, approximating an increase in altitude of one scale height. E is aligned parallel to the meteor; B is perpendicular.

Continuing Research
- Variations of more simulation parameters
- Collision rates
- Ablation angle
- Comparisons to meteor spectra collected by radars
- Resolution improvements

Spectra
A close look at the 5 mV spectra shows a possible bifurcation at shorter wavelengths. Increased resolution will be needed to determine if this is a real phenomena.

Spectra parallel and perpendicular to B. The spectra flatten out extremely quickly in z as the trail spreads along B. Mostly we see slow-moving acoustic modes at long wavelengths.

Spectra from 0, 5 and 8 mV simulations.

Fixed-k spectra at approximately 3m.

References and Acknowledgements
Work supported by NSF grant ATM-1007789 and NASA award NNX11AO96G, as well as XSEDE resources supported by NSF grant ACI-1053575.