Data Mining for Meteor Echoes Using High Power UHF Radar

- Introduction
- Lincoln Lab Meteor Processor
- Pulse/Threshold
- August 7, 2003

Results

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Introduction

- Micrometeors
  - $10^{-5} - 10^{-4}$ m$^2$
- Sporadic
- Detected at 90-140 km
- <Microsecond Duration
3) IONIZED PLASMA

2) ABLATED ATOMS

1) MICROMETEOR

4) 'HEAD ECHO' DETECTED

5) Altitude Range (km)

90 km

140 km
Translation Program

“nrs_reformat”

 RAW DATA

Meteor Processor

- NASA Meteor Project
  - Millstone Hill Collaboration
  - A. Coster, S. Close
- Meteor Processor Program
  - D. Durand
Raw Data Sample

Single Meteor Streak

Single Meteor Streak

Time Past 12:51:44 UTC (seconds)
Radar Clutter From White Mountains

Color Indicates Amplitude
Pulse Length: 40 microseconds
Raw Data Sample

Double Meteor Streak
Pulse Wave Form Results

MIDAS-W Transmitter Pulse Shape Comparison

Double Pulse

Single Pulse

Graph of mwd1037703150.unt.all (Range vs Time)

Graph of mwd1037703150.unt.all (Range vs Time)

Graph of mwd10523676704.unt.all (Range vs Time)

Meteor Streak Graph of mwd10523676704.unt.all (Range vs Time)
Threshold Results

Best Results: 2.00 – 3.25
Manually Changed
Gate Index = 15

239 Meteors Logged
68 Visibly Detectable
30 Manually Tagged
Conclusions

Why Double/Single Streak Phenomenon?

Why is There Such a Difference in the Log vs. Plots

Would Different Thresholding Give Better Results?

Statistics:

- Peak Range Rate: 50 – 60 km/sec
- Peak Mean Altitude: 106-108 km
- Duration: 50-100 milliseconds
- Peak Correlation Coefficient: -1

Questions:

- Why Double/Single Streak Phenomenon?
- Why is There Such a Difference in the Log vs. Plots
- Would Different Thresholding Give Better Results?
Thank You So Much!

Phil Erickson

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