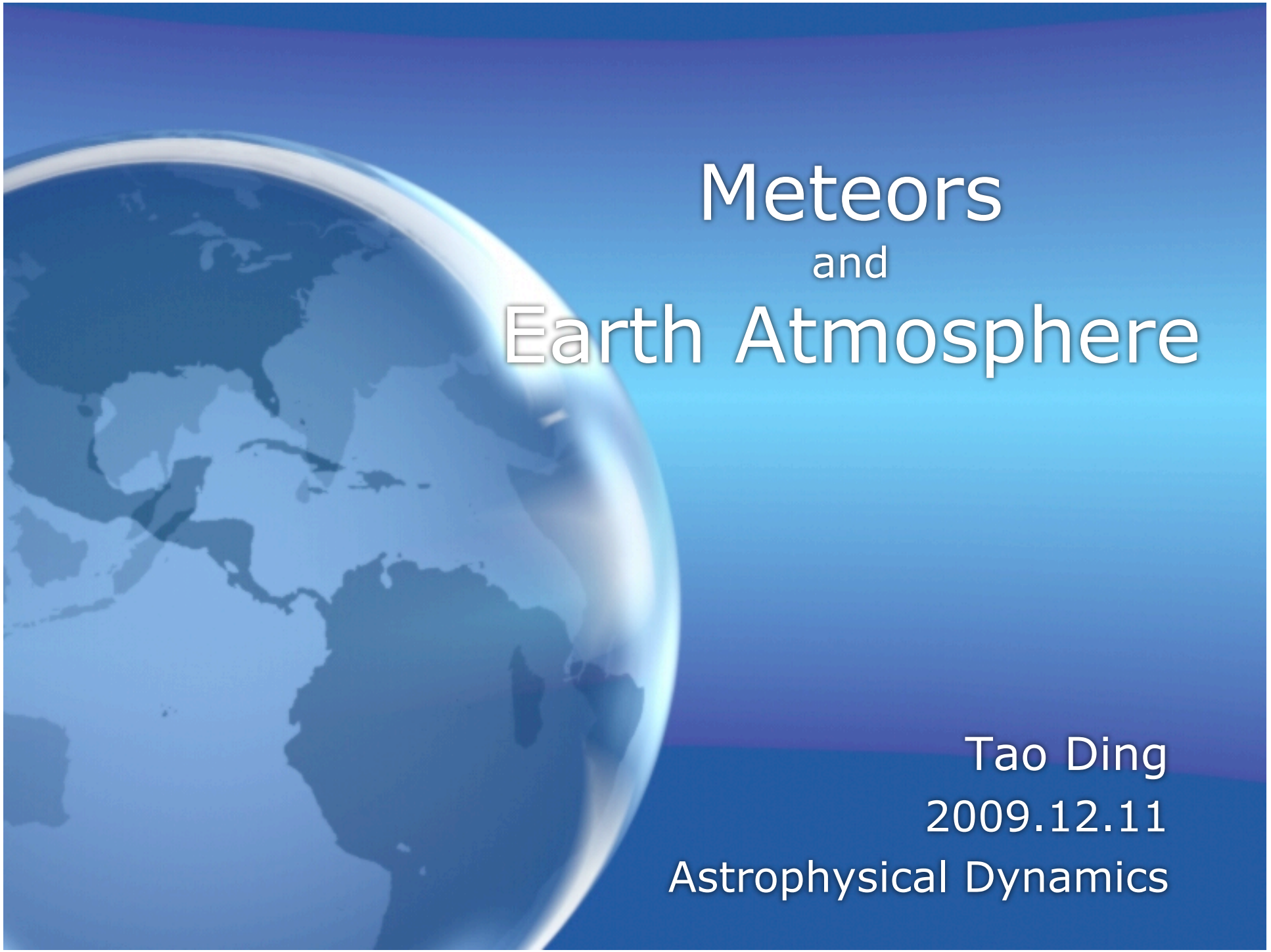
Meteors
and
Earth Atmosphere
Tao Ding
2009.12.11
Astrophysical Dynamics

Outline

- 1. Clarification
- 2. Meteor characteristics
- 3. Earth Atmosphere
- 4. Meteors in Earth atmosphere
- 5. Meteor observations
- 6. Motivation and Future

Gallery - Meteors

Leonid meteor shower
in Jordan's Azraq desert
2002/11/19

Meteor
In Colorado

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Questions?

- Describe the meteor phenomenon?
- Recognize a meteor?
- What is the meaning of Meteoroid and Meteorite?
- Sporadic meteors and meteor showers?

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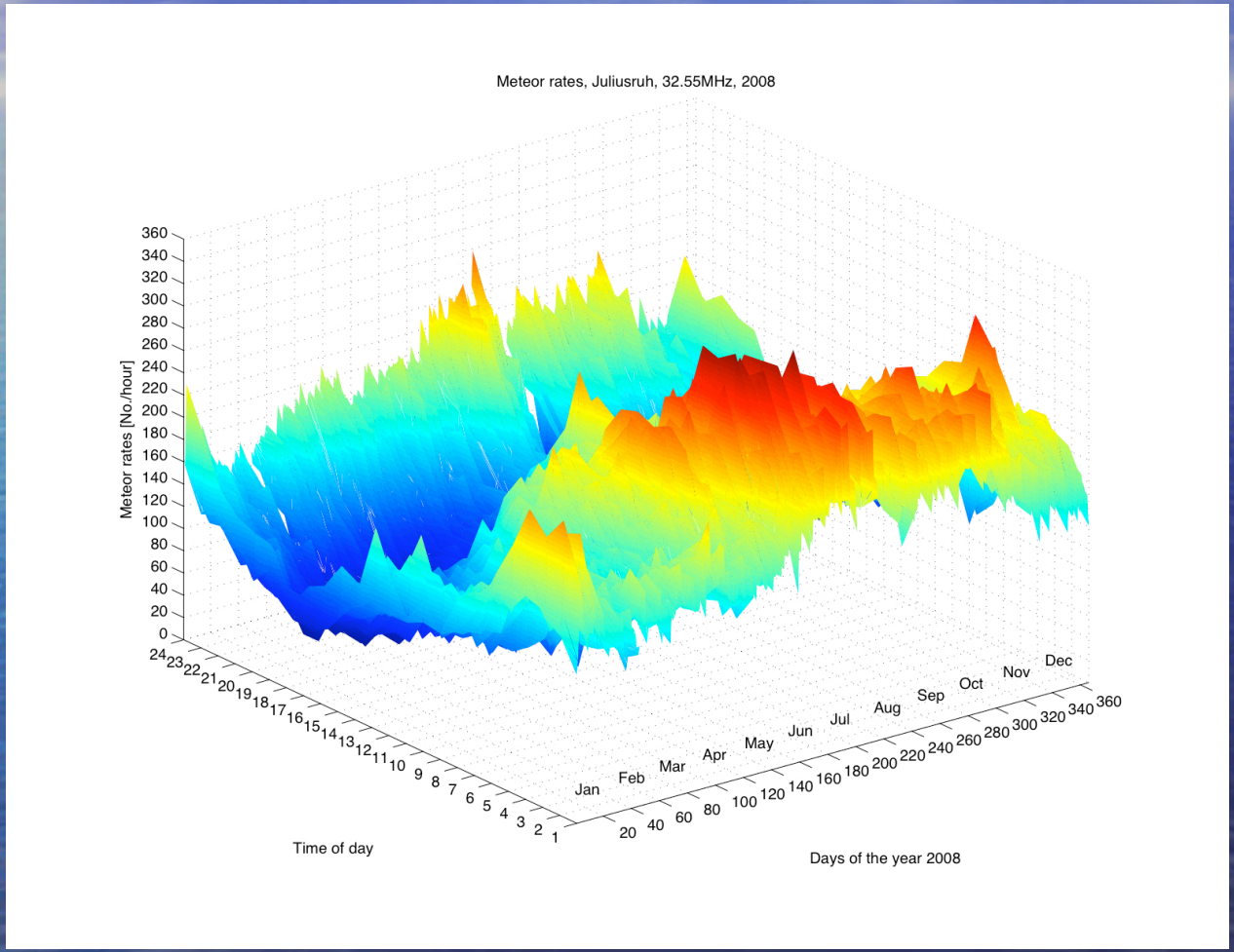
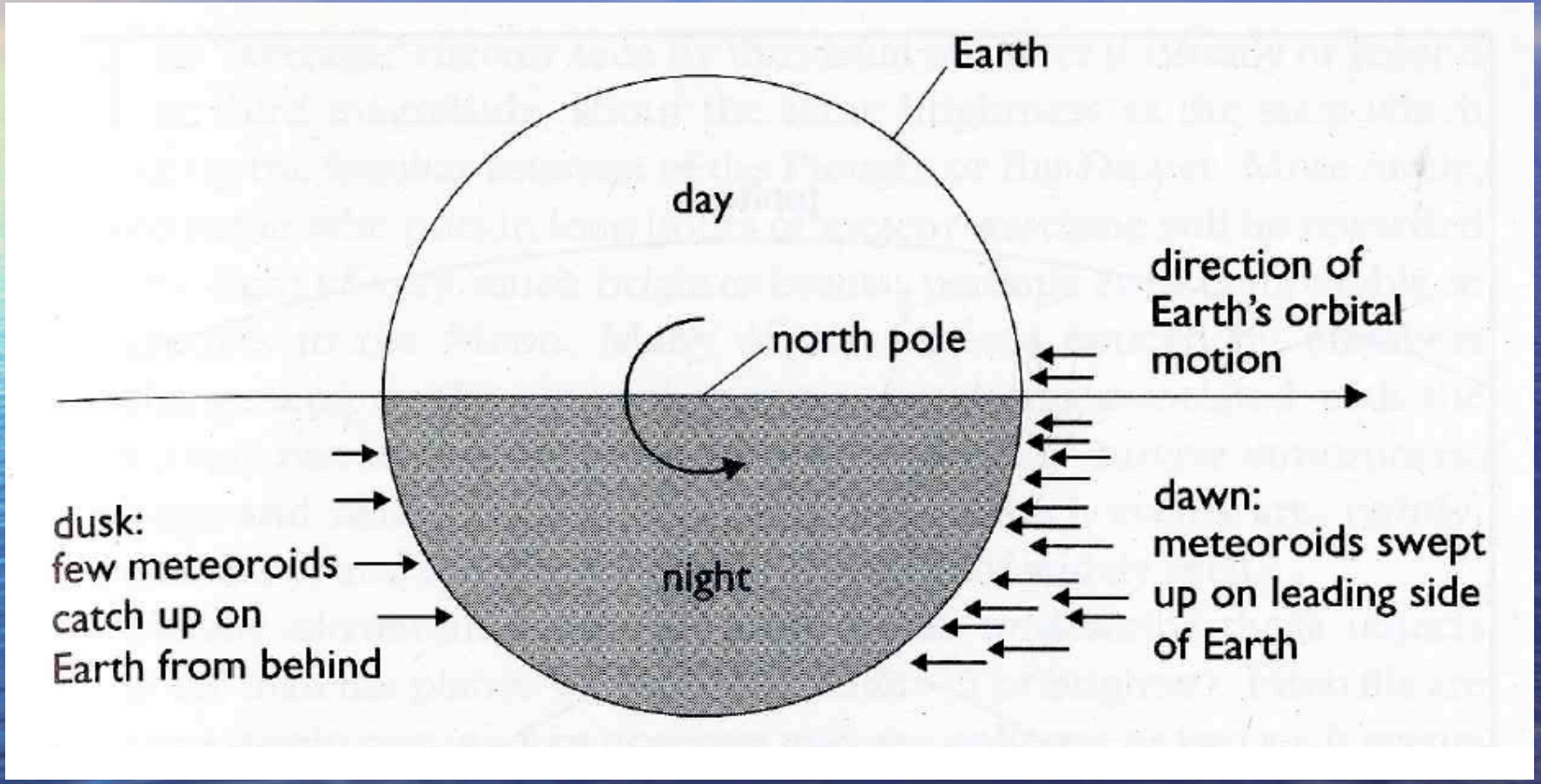
Meteor rates



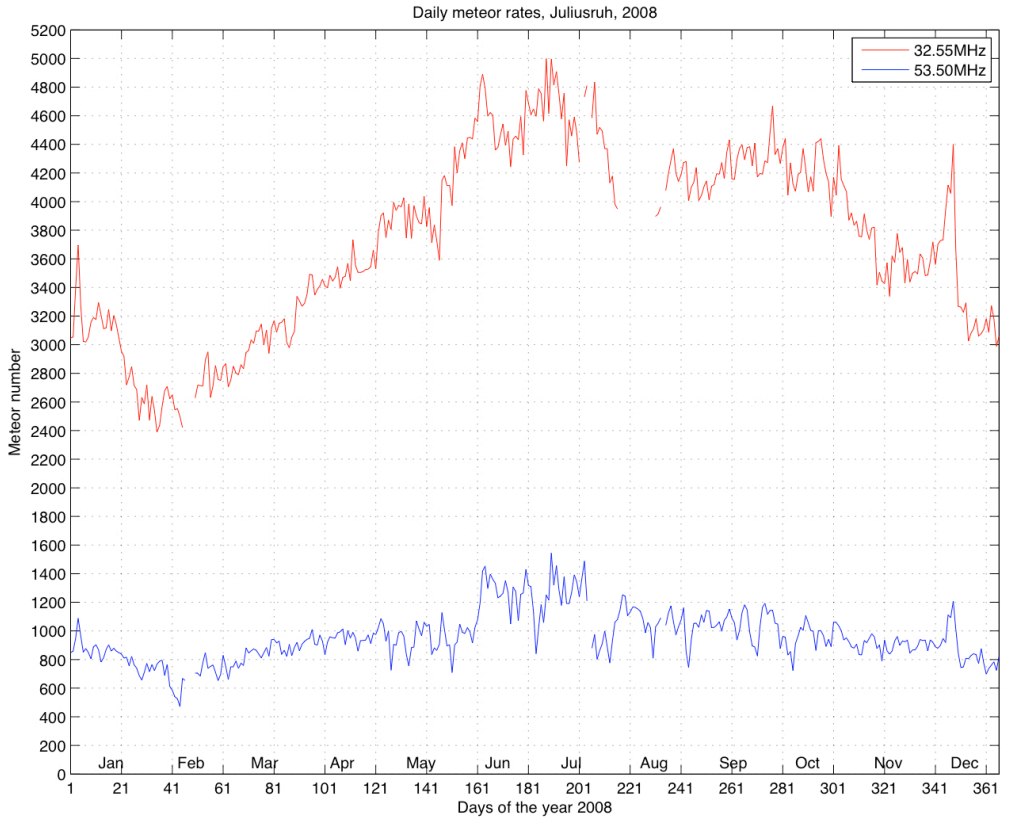
meteor rates obtained with meteor radar on 32.55MHz
at mid-latitude 54^{o} N (Juliusruh) 2008

Meteor rates



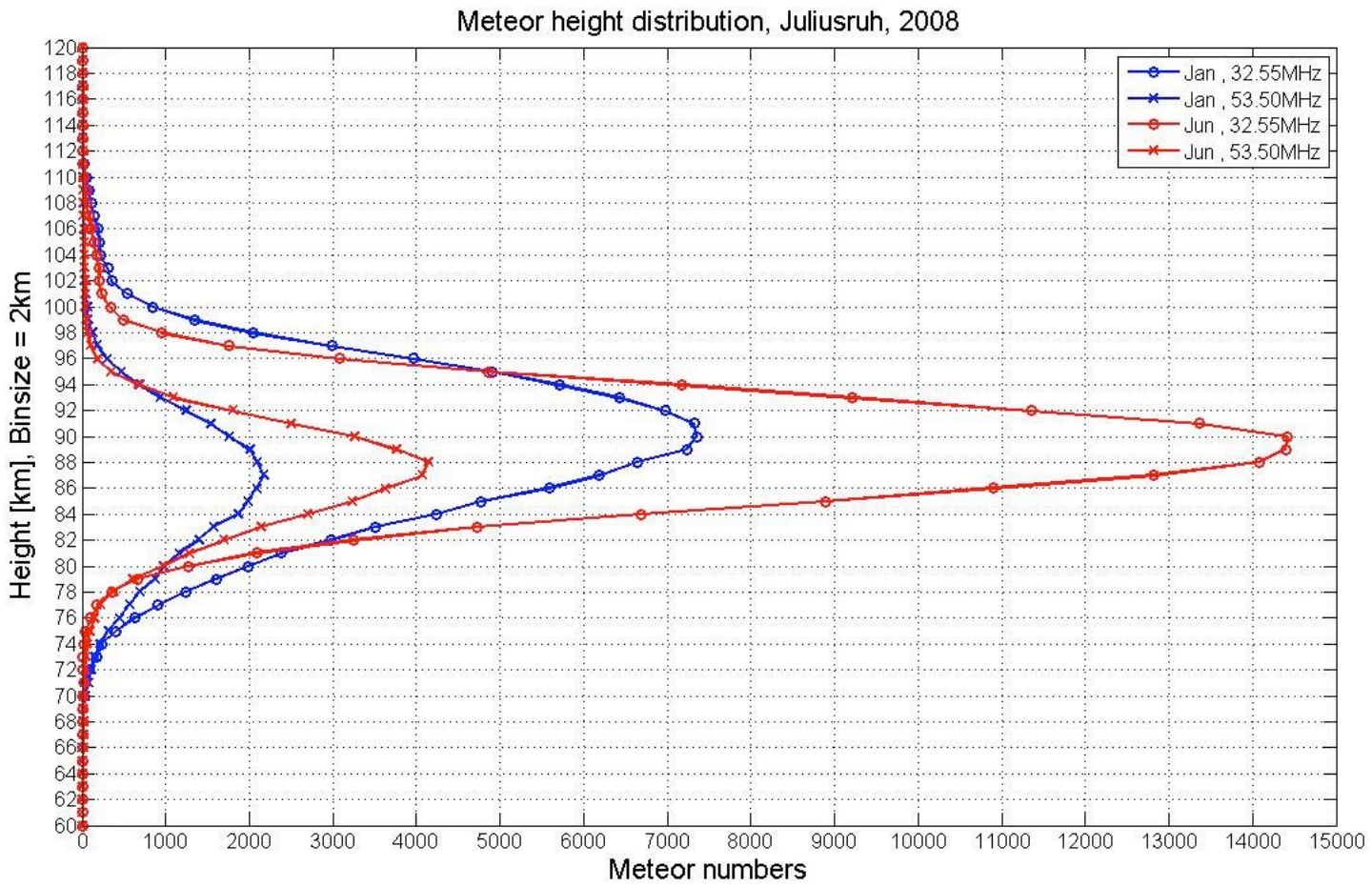
Hourly meteor rates variation principle

Meteor rates



Seasonal meteor rates variation, 54° N, 2008

Meteor location (Height)



Meteor height distributions at mid-latitude 54^{o} N (Juliusruh) 2008
for June (summertime, red-line) and January (wintertime, blue-line)

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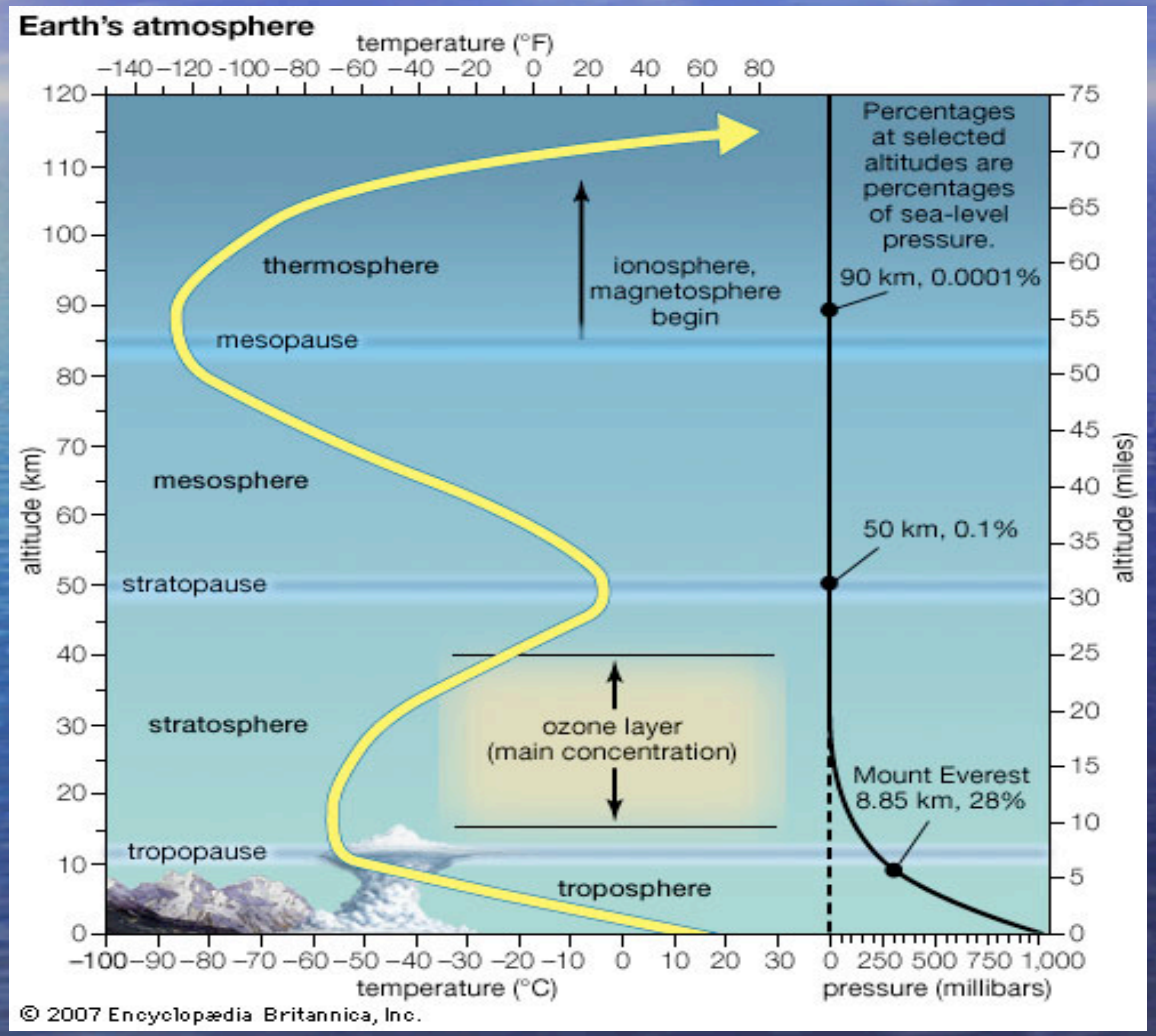
Gallery - Earth’s atmosphere

View from space

Dynamics of Earth's atmosphere



Atmosphere Height profile

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What is the process of meteor phenomenon in Earth atmosphere?

- Orbital motion
- Preheating
- Ablation
- Dark-flight
- Impact

Meteor trail behaviors in Earth atmosphere

A Leonid Fireball Meteor from 1966.
Photographer: J. W. Young. Source: TMO, JPL, NASA.

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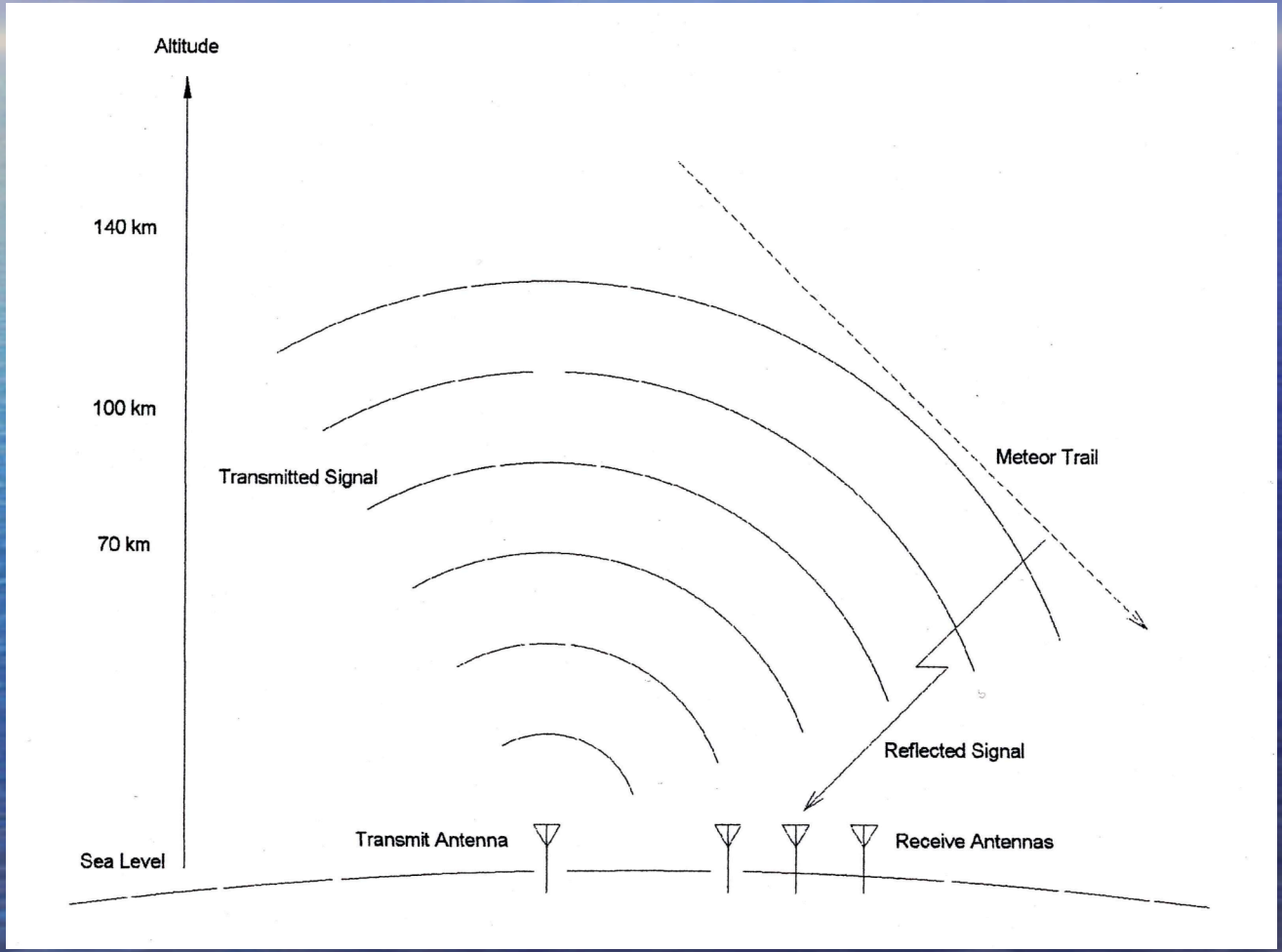
Meteor observation methods

- Visual observations
- Photographic observations
- Television and video observations
- Spectral observations
- Radar observations
- Lidar observations
- Acoustic, infrasonic, and seismic observations
- Combined observation methods

Radar techniques applied in meteor observations



The principle of the all-sky meteor radar

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Motivation

Understand the Earth's atmosphere better.

1. Atmospheric winds
2. Temperatures
3. Atmospheric compositions
4. Atmosphere dynamics

Future

- Complete observations including Southern Hemisphere
- The relationship between meteors and the Earth's electromagnetic field
- New technology for meteor observations
- Better understanding of meteor behaviors and the Earth's atmosphere
- ……

Thank you!
谢谢！
Tack så mycket!

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