

GeoOptics
The Environmental Data Services Company

Weather Research and Forecasting Innovation Act of 2017

Weather Satellite Data Innovation

2018 AMS Washington Forum
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Washington DC
April 24-26, 2018

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Agenda

- Weather Bill Requirements
- Commercial Satellite Data
- Status of the Industry
- Preparedness
- Radio Occultation Example
 - Refractivity 1
 - Refractivity 2
 - Pressure
 - Temperature

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Weather Bill Requirements

- Operationalize COSMIC 1 and 2
 - COSMIC at end of life
 - COSMIC 2 cancelled
- Satellite Systems & Data NAS Study
 - Constellations of many small satellites
 - Cost Benefit of purchasing data
- Purchase of Weather Data
 - Strategy & Plan
 - Standards
 - Enter into at least one pilot contract
 - Assessment
- Successful Pilot
 - Obtain data from commercial sources
 - Continue to meet WMO Resolution 40
 - Avoid public & private duplication

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Annotations:

- RO purchase part of draft future sat plan
- Deadline for contract Sep 2018
- First pilot contract done. Second in work.
- Successful pilot not yet completed

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Weather Bill Requirements

Pilot Program Criteria

Radio Occultation - think small

- LEO
- Measures GPSS atmospheric bending angle
- Provides direct vertical resolution
 - Temperature, Pressure, Moisture
 - Nano Satellite
- Companies
 - GeoOptics, PlanetIQ, Spire


Lemur - Spire

Does not include hyperspectral Sounder

Hyperspectral Sounding - think big

- GEO
- Radiometer/Spectrometer (passive)
- Provides vertical sounding data
 - Multiple Spectral bands
 - Large Instrument
- Companies
 - GeoMetWatch, Tempus Global


NOAA - GOES

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Weather Bill Requirements

Pilot Program Assessment

Assessment of Data Viability

- Required 3 years after entering into pilot contract
- Submit to the Senate CST and House SST Committees
- Determination of extent to which data met:
 - Viability of assimilation into NOAA met models
 - Degree to which data add value to forecasts
 - Accuracy, Quality, Timeliness, Validity, Reliability
 - Usability, IT security,
 - Cost-effectiveness

Suitability of Radio Occultation (RO) Data

- RO data recognized universally as useful and valuable
- Already embedded in weather models around the world
- High on the NWS list of numerical model input priority
- COSMIC development supported by NOAA/NESDIS
- Relatively easy to understand collection/processing
- Easy introduction to coming nanosat revolution

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Radio Occultation

GeoOptics CICERO*

*Community Initiative for Continuing Earth Radio Occultation

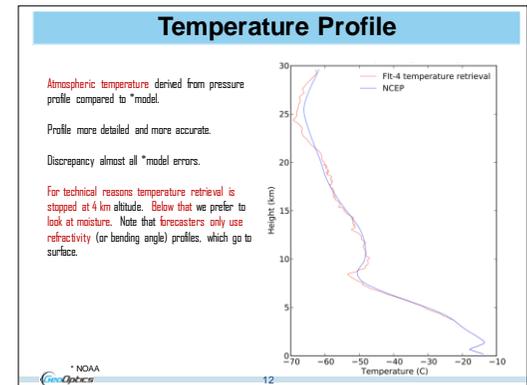
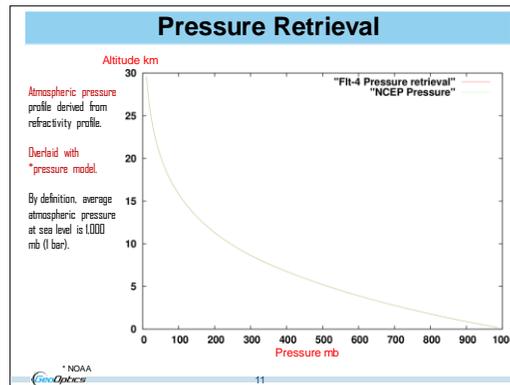
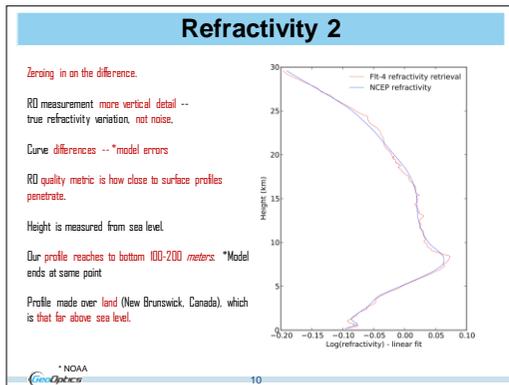
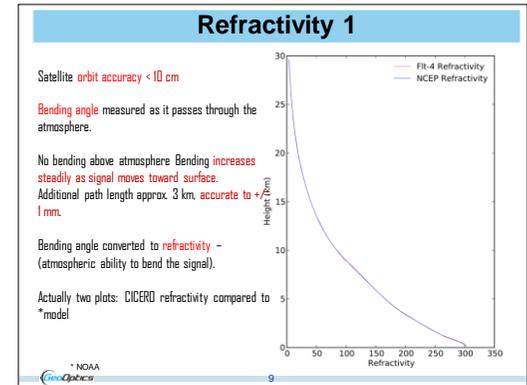
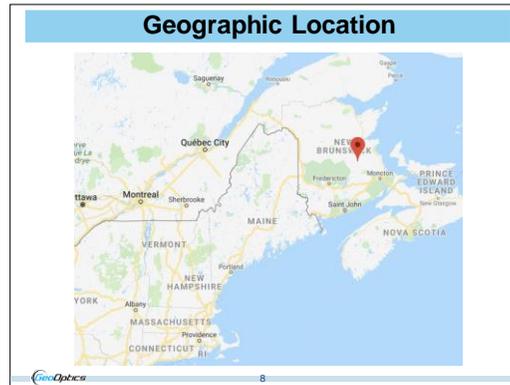
CICERO

- Nano Satellites
- 6 → 24 → 48 → ?
- Com Receiver
- Ground Command & Control
- Data Processing
- Products
 - High Resolution Atmospheric Profiles
 - Bending Angle
 - Refractivity
 - Density
 - Pressure
 - Temperature/Moisture
 - Absolute Measurement Heights
 - Ionospheric Electron Density
 - Global Temporal & Spatial avgs
 - Global pressure contours, gradients & geostrophic winds
 - Replenishment & Updating

GPS Satellite
~18,000km from Earth

RO Satellite
~500-900km from Earth

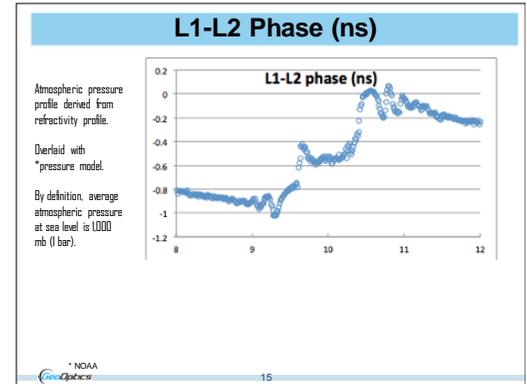
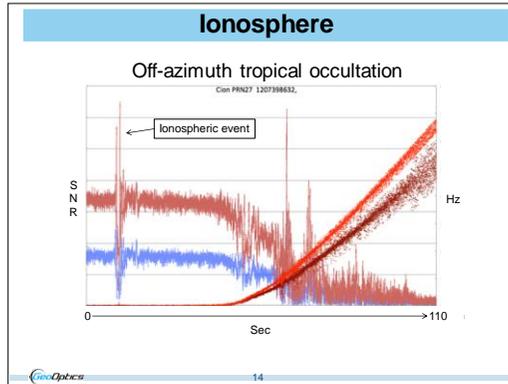
*Follow on to COSMIC





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