

# GXS Data Distribution

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May 22, 2024

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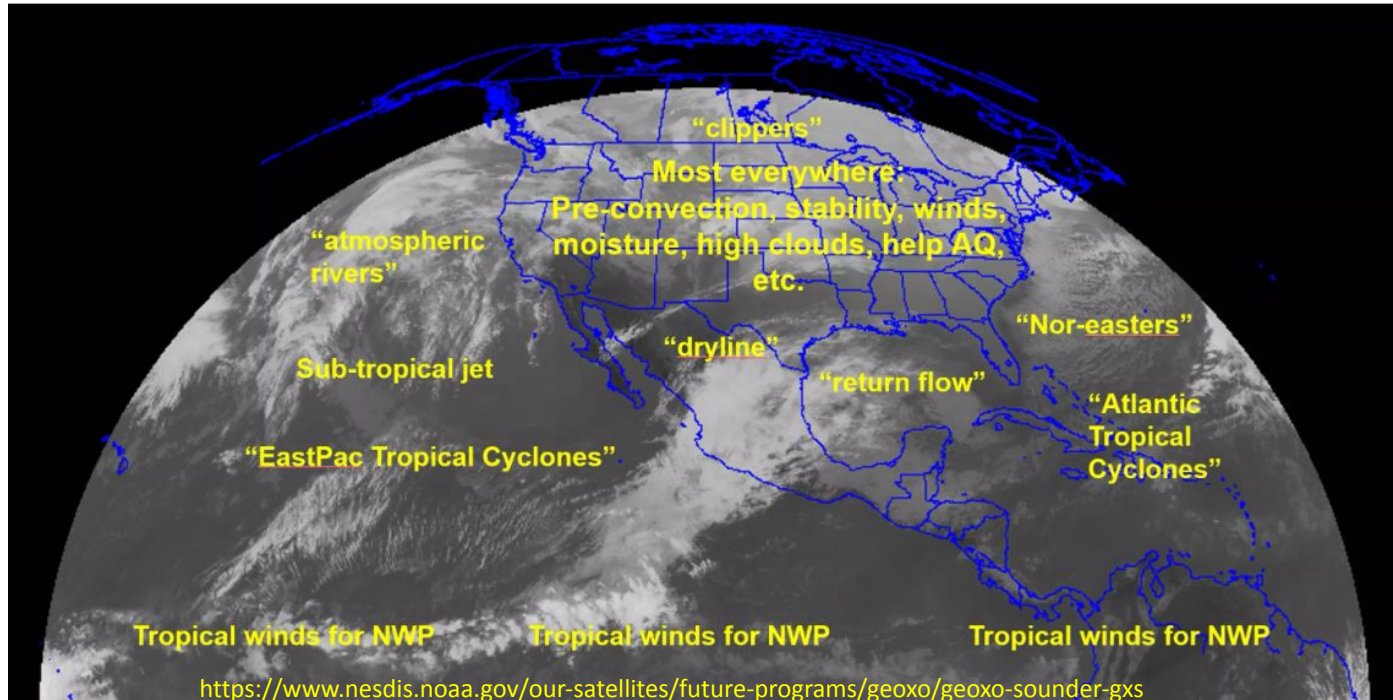
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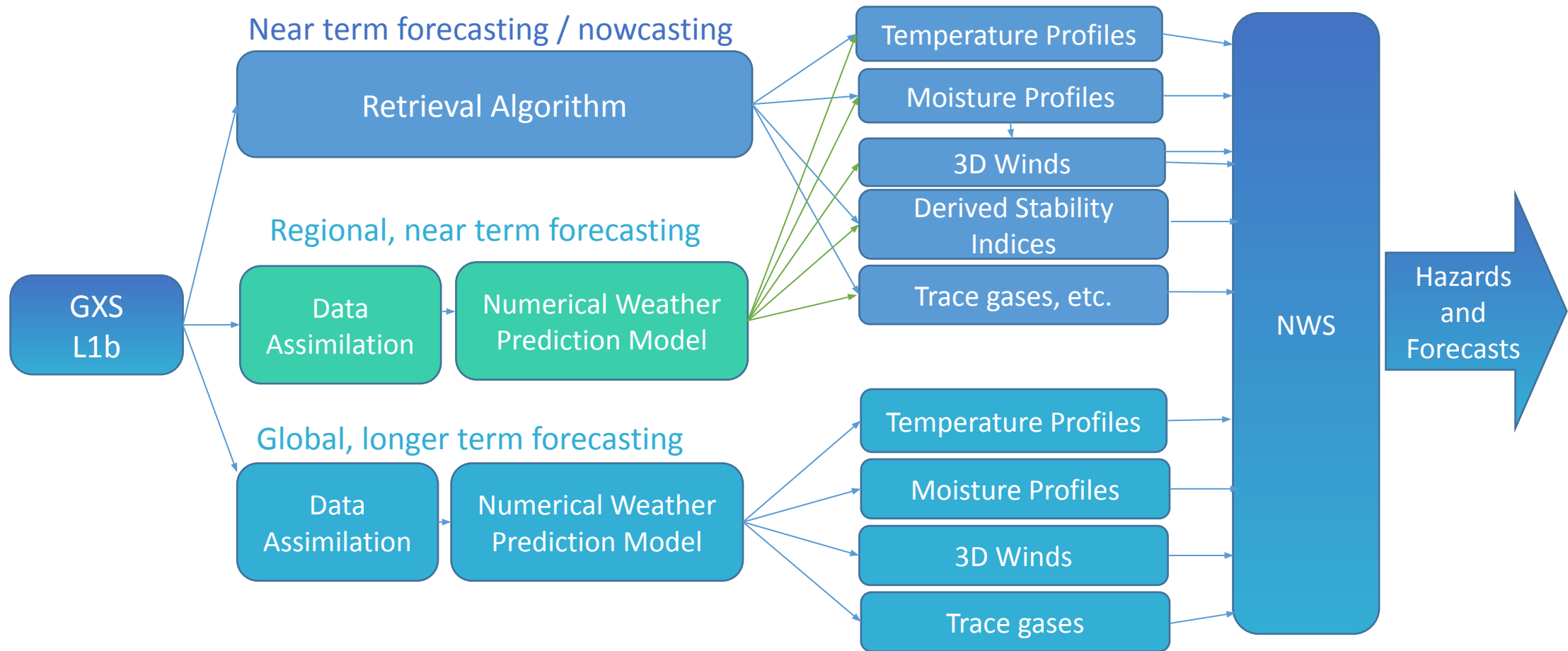
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# GSX Level 1b Data Usage



- Weather Forecasting
  - Provides detailed information about atmospheric conditions, including temperature and moisture, which are essential for improving the accuracy of weather forecasts
  - Is a critical input for real time atmospheric profiles and winds, as well as for data assimilation for short-term, and longer-term numerical weather prediction models for NWS forecasts
  - Provides essential, and critical data to plan for, and prepare for extreme weather events like hurricanes, thunderstorms, and severe precipitation, allowing for improved disaster preparedness, resource allocation, and life savings.
- Industry
  - Sounder data is used in aviation, agriculture, and other industries that rely on accurate weather forecasts

# GXS Level 1b Data Flow



- **GXS rapid observations and data flow will permit timely data ingest as well as rapid winds updates for forecasts and warnings**

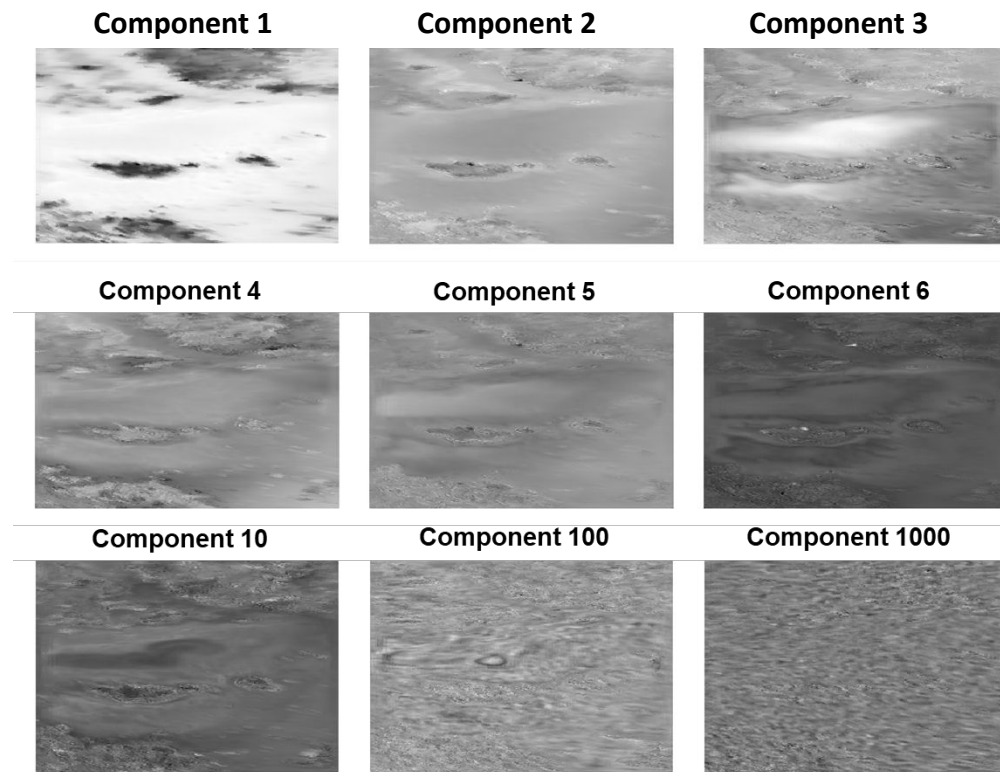
# GXS Data Distribution and Compression

- GXS Radiance data (Level 1b) will be made available to the NESDIS Common Cloud Facility (NCCF)
- GXS Level 1b is large and may overburden some user systems
  - NOAA/EMC Numerical Weather Prediction will ingest full L1b data
- All others Level 1b users will access compressed Level 1b data from NCCF



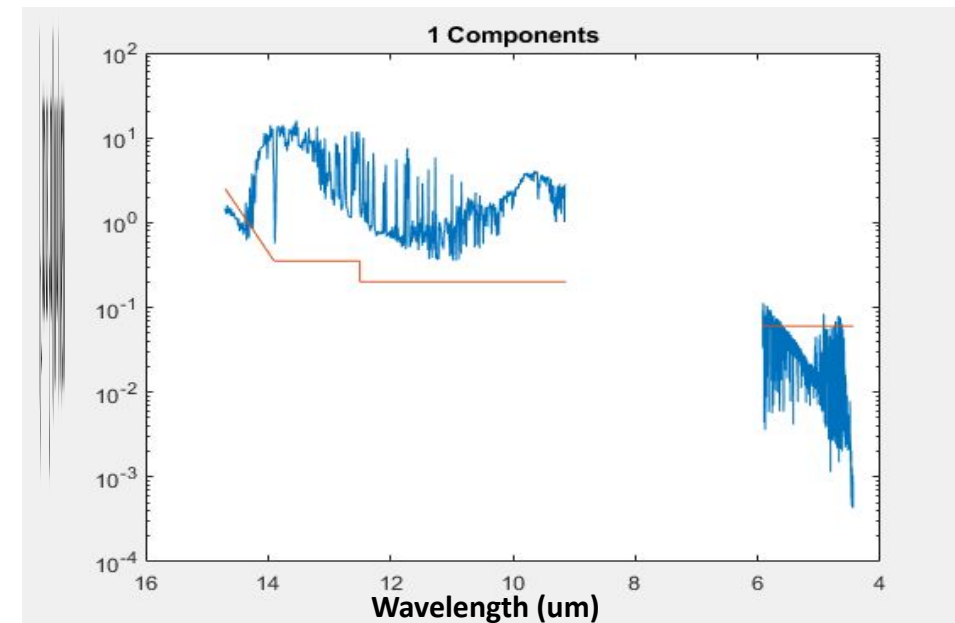
# GXS Data Distribution and Compression

- Multiple compression methods were studied for efficiency
  - Principle Components (PCs) meets the need
  - EUMETSAT and ESA plan MTG-IRS\* L1b data distribution via PCs (hybrid methodology)
- Principle Components reduce data volume
  - Number of PCs must be large enough to reduce radiance reconstruction factor

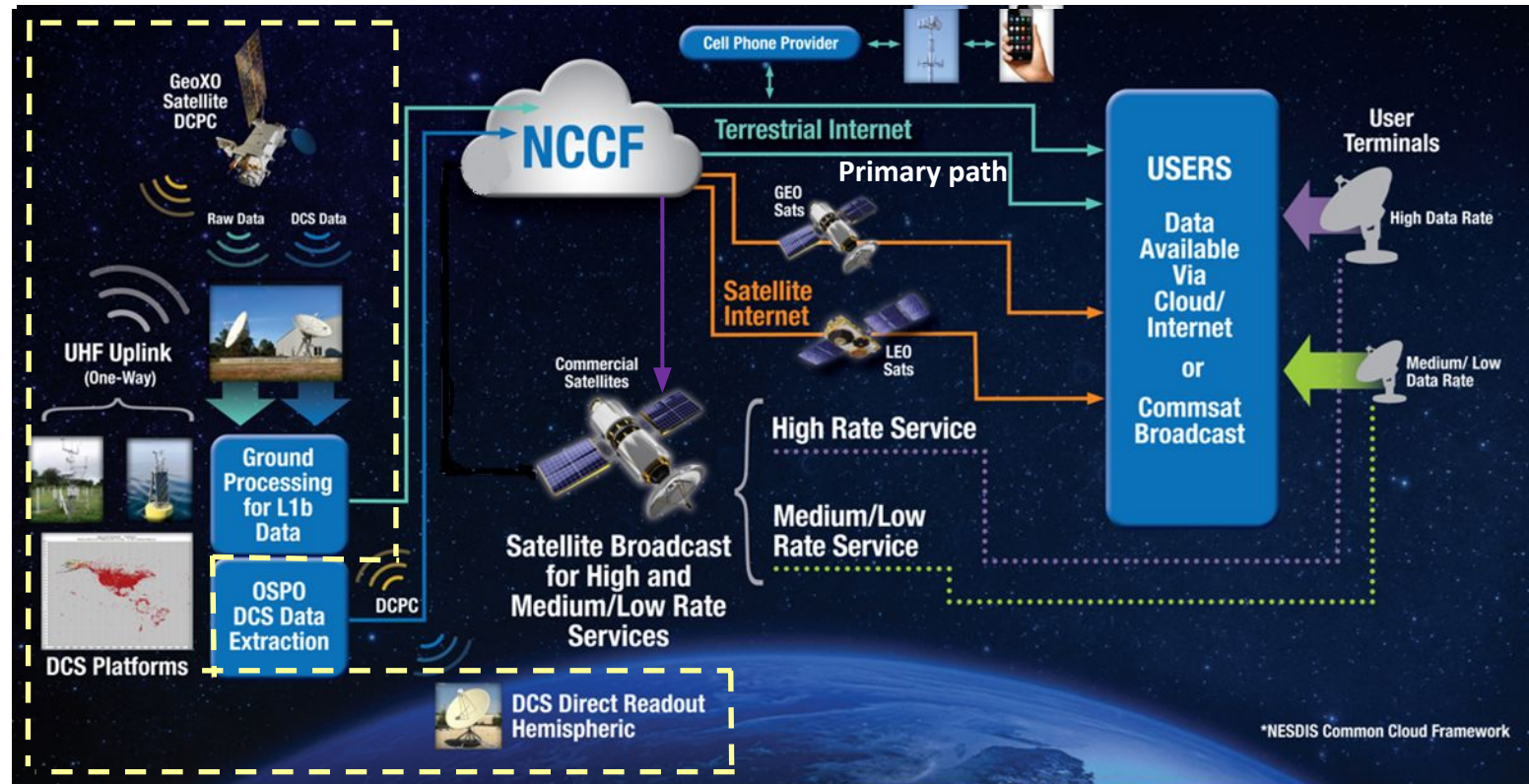


# Hybrid Compression Methodology

- Combination of global PCs (fixed, based on large set of spectra) and local PCs (regional, time/scene-dependent) are planned in the hybrid method
  - Global PCs address typical spectra
  - Local PCs ensure coverage for non-standard spectra
  - Combination of PCs coefficients and mean spectra affords reconstruction of Level 1b Radiances
- PCs will be available from NCCF
  - Compression error depend on number of components
    - Noise of true minus reconstructed spectra shown
    - 36 components reduces error to less than NEdN
    - Additional components reduces error further
  - Two arrays envisioned for distribution
    - Global PC weights per pixel; local PC weights and spectra



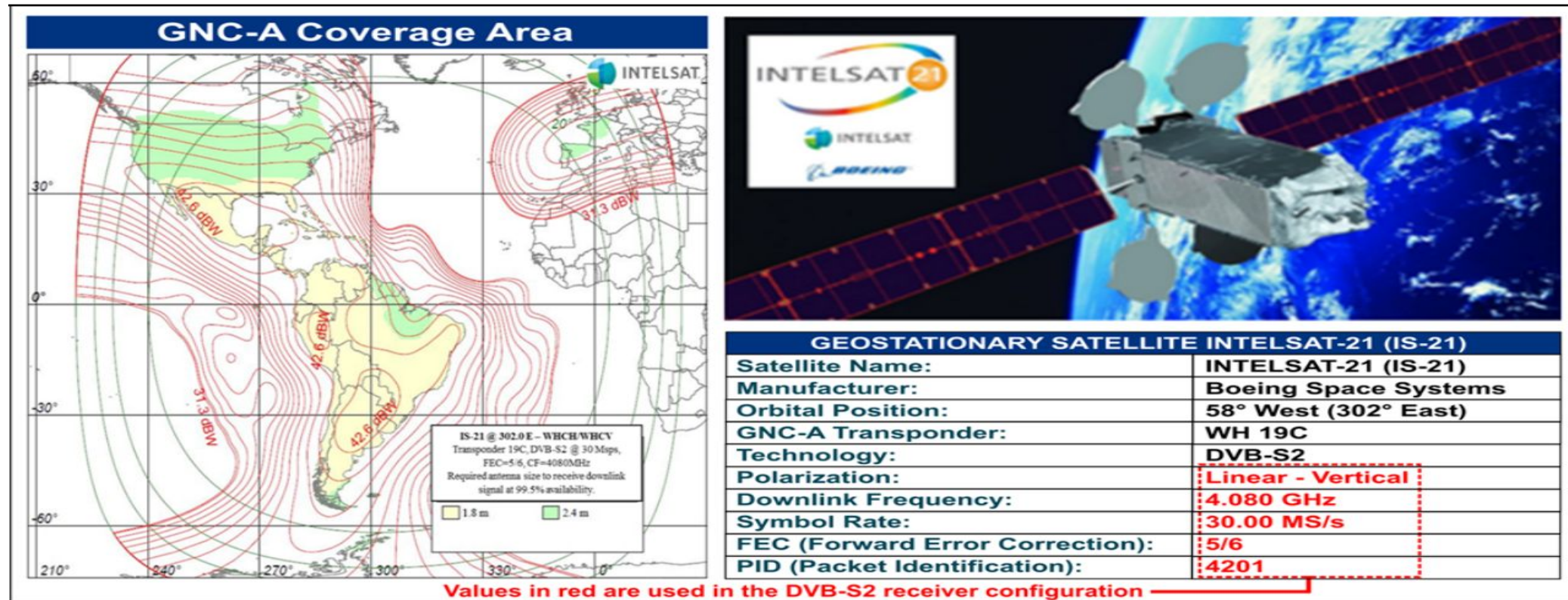




- GeoXO L0 and L1b products delivered to NESDIS's Office of Common Services (OCS's) Common Cloud Framework
- NCCF will make data available to users
  - Internet (satellite or terrestrial) – primary path
  - Cellular networks – alternate path
  - Commercial satellite broadcast (alternate) under Office of Satellite and Product Operations (OSPO) via commercial services
    - High Rate Data (potential for PCs) at ~ 50 Mbps
    - Medium /Low Rate Service at ~ 1 Mbps (including higher level products, warnings, and Data Collection Service data)
    - Users will weigh on options near 50 Mbps (e.g. GXI at no finer than 1 km resolution, skinny LMX, and GXS PCs)

# GEONETCast Example of Commercial Rebroadcast

- Market Research Activities: Example GNC-A Proxy □ Current Coverage Area
  - Example of level of service in C-Band for given price point
  - Next slide shows needed dish size
  - GOES-R L2+ CMI products, RGBs, JPSS products, etc.
- Needed dish size shown and varies with location





- GeoXO L0 and L1b products will be delivered to NESDIS's Office of Common Services (OCS's) Common Cloud Framework
- NCCF will make data available to users
- GXS Level 1b Radiance data will be compressed via Principle Components, using a hybrid of global and local PCs
  - Similar to methodology planned for use with MTG-IRS data
- MTG-IRS data will allow verification of hybrid methodology, with its launched planned for this summer

# Backup

# GeoXO High Rate Service

## GOES-R

### GOES Rebroadcast (GRB)

- Processed Level 1b data that is uplinked
- Distributed L-Band Hemispherical Broadcast
  - Dual Circular Polarization, 31 Mbps (all)
- L1b Imagery (ABI), Lightning (GLM), Space Weather/Solar Instrument Data



## GeoXO

### GeoXO High Rate Service

- Reduced / compressed processed Level 1b data
- Primary Distribution: NCCF
- Data Passed to Commercial Provider, Uplinked to Commercial Communications Satellite
  - Broadcast TBD Band, ~50 Mbps (subset)
- Comparable Architectures: EUMETCast, GEONETCast-Americas (GNC-A)



Typical GRB Receiving Antennas



1.8m Ku EUMETCast



C-Band GNC-A (El Salvador)

# Auxiliary GOES-R User Facing Comm Services

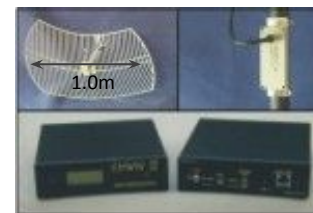
GRB	HRIT	EMWIN	DCS
Processed GOES-R data: ABI L1b, GLM, and SpWx	Processed images with reduced cadence (some w/ reduced resolution)	Processed weather alerts and warnings (NWS text messages)	GOES-R collects messages from ~40,000 platforms (aggregated data stream)
Distribution to NWS Centers and other users	Distribution to widespread users	Distribution to emergency managers	Included in HRIT/EMWIN downlink for distribution
Minimum Latency Highest Availability	Modest Latency High Availability	Modest Latency High Availability	Modest latency High Availability
Data Rate: 31 Mbps	Data Rate: 348 kbps	Data Rate: 32 kbps	Data Rate: 20 kbps



GRB Receiver System



HRIT/EMWIN  
Receiver System



HRIT/EMWIN  
Receiver System



DCS Sensor on Buoy