

REPORT ON THE LRD DEVELOPMENT

The USA discussed the development of Low Rate Data (LRD) service from the National Polar-orbiting Operational Environmental Satellite System (NPOESS). NPOESS will simultaneously broadcast real-time HRD (X-band) and LRD (L-band) data streams to suitably equipped field terminal systems. The NPOESS prime contractor has begun development of the software for the Interface Data Processing Segment (IDPS) that will run at U.S Centrals and on HRD/LRD field terminals. The LRD data content consists of eight (8) primary EDRs and fifteen (15) additional EDRs required to support the DOD/NOAA missions

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1. Introduction

The NPOESS Low Rate Data (LRD) broadcast will be a subset of the full NPOESS sensor data set and is intended for U.S. and worldwide users of field terminals (land and ship-based, fixed and mobile environmental data receivers operated by DoD users and surface receivers operated by other U.S. government agencies, worldwide weather services, and other international users). Some data compression (Lossy or Lossless) may be employed for the LRD link. The LRD L-band broadcast will provide data at a rate of about 4.0 Mbps (nominally 3.88 Mbps) at 1702.5/1706.5 MHz with full CCSDS convolutional coding, Viterbi decoding, and Reed Solomon encoding/decoding into a tracking receive antenna aperture not to exceed 1.0 meter diameter. The LRD broadcast will be available on two selectable channels to accommodate multiple NPOESS spacecraft in the same orbit during life-cycle replacement. The NPOESS LRD broadcast parameters (frequency, bandwidth, data rate, and data content) have been selected to satisfy U.S. requirements for low-rate, real-time direct broadcast, as well as be closely compatible with the broadcast parameters for the Advanced High Resolution Picture Transmission (AHRPT) format that has been accepted and approved by the Coordinating Group on Meteorological Satellites (CGMS) and will be used on the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) Metop spacecraft.

2. LRD Data Content

The NPOESS LRD service will include data required to satisfy the U.S. user-specified highest priority EDRs for real-time broadcast. These EDRs are listed in priority order in the following table:

NPOESS LRD DATA PRODUCTS

High Priority EDRs, In Priority Order from Highest to Lowest	
1	<p>Imagery</p> <p>Threshold Attributes:</p> <ul style="list-style-type: none"> ▪ 0.8 km horizontal spatial resolution (HSR) worst case across scan for at least one visible and one IR band. ▪ Day/night band at night with 2.7 km HSR ▪ Provide Day and Night capability for the Field Terminal User** to: <ul style="list-style-type: none"> - Interpret High, Mid, and Low Cloud Types - Detect all Fog Types (Valley, Coast, etc.) - Distinguish Between Snow & Clouds - Detect Coastal Water Mass Features (coastal fronts, eddies, river plumes, etc.) - Detect Dust/Aerosol/Haze/Smoke <p>** The users intend to primarily exploit the LRD Imagery by manual methods (Interpretation, Detection, and Distinction) of inspection of processed images.</p>
2	<p>Atmospheric Vertical Temperature Profile (Surface to 100 mb only)</p> <p>Measurement Accuracy Threshold Attributes:</p> <ul style="list-style-type: none"> ▪ Surface to 700 mb: 2.5K/1 km ▪ 700 mb to 300 mb: 1.5 K/1 km ▪ 300 mb to 100 mb: 1.5K/3km. <p>Measurement Accuracy attribute applies to clear and cloudy conditions.</p>
3	Atmospheric Vertical Moisture Profile (Surface to 100 mb only)
4	Global Sea Surface Winds (Speed and Direction)
5	Cloud Base Height
6	Cloud Cover/Layers

7	Pressure (Surface/Profile)
8	Sea Surface Temperature (SST)

These high priority EDRs will be derived principally from data collected by four primary imaging/sounding instruments flying on the NPOESS spacecraft: the Visible/Infrared Imager Radiometer Suite (VIIRS); the Cross-track Infrared Sounder (CrIS) paired with the Advanced Technology Microwave Sounder (ATMS); and the Conical-scanning Microwave Imager/Sounder (CMIS). The VIIRS and CMIS instruments will be carried as payloads in all three NPOESS orbits. Data from the CrIS/ATMS instruments will be available only from the 1330 and 2130 orbits. NOAA plans on using data from the Infrared Atmospheric Sounding Interferometer (IASI), Advanced Scatterometer (ASCAT), and the Space Environment Monitor (SEM) aboard the EUMETSAT Metop satellite.

Fifteen additional lower priority EDRs will also be included in the LRD broadcast. While the eight high priority EDRs will be produced at the LRD “objective” level of performance, including data latency of two minutes for imagery EDR processing and 15 minutes or less for the other EDRs, these lower priority EDRs will be produced between threshold and objective levels with less stringent latency requirements.

Lower Priority EDRs (no particular order)	
	Aerosol Optical Thickness
	Albedo
	Cloud Effective Particle Size
	Cloud Liquid Water
	Cloud Optical Thickness
	Cloud Top Height
	Cloud Top Temperature
	Land Surface Temperature
	Ocean Wave Characteristics – Significant Wave Height
	Precipitation Type/Rate
	Precipitable Water
	Snow Cover/Depth
	Soil Moisture (Surface)
	Suspended Matter
	Total Water Content