EUMETCast

EUMETSAT's Broadcast System

for Environmental Data

Gordon Bridge

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EUMETCAST

Presentation Overview

- **EUMETCast concept and overview**

- **C-band reception issues**

- **EUMETCast delivered services**

- **Future plans for EUMETCast**

- **EUMETCast summary**

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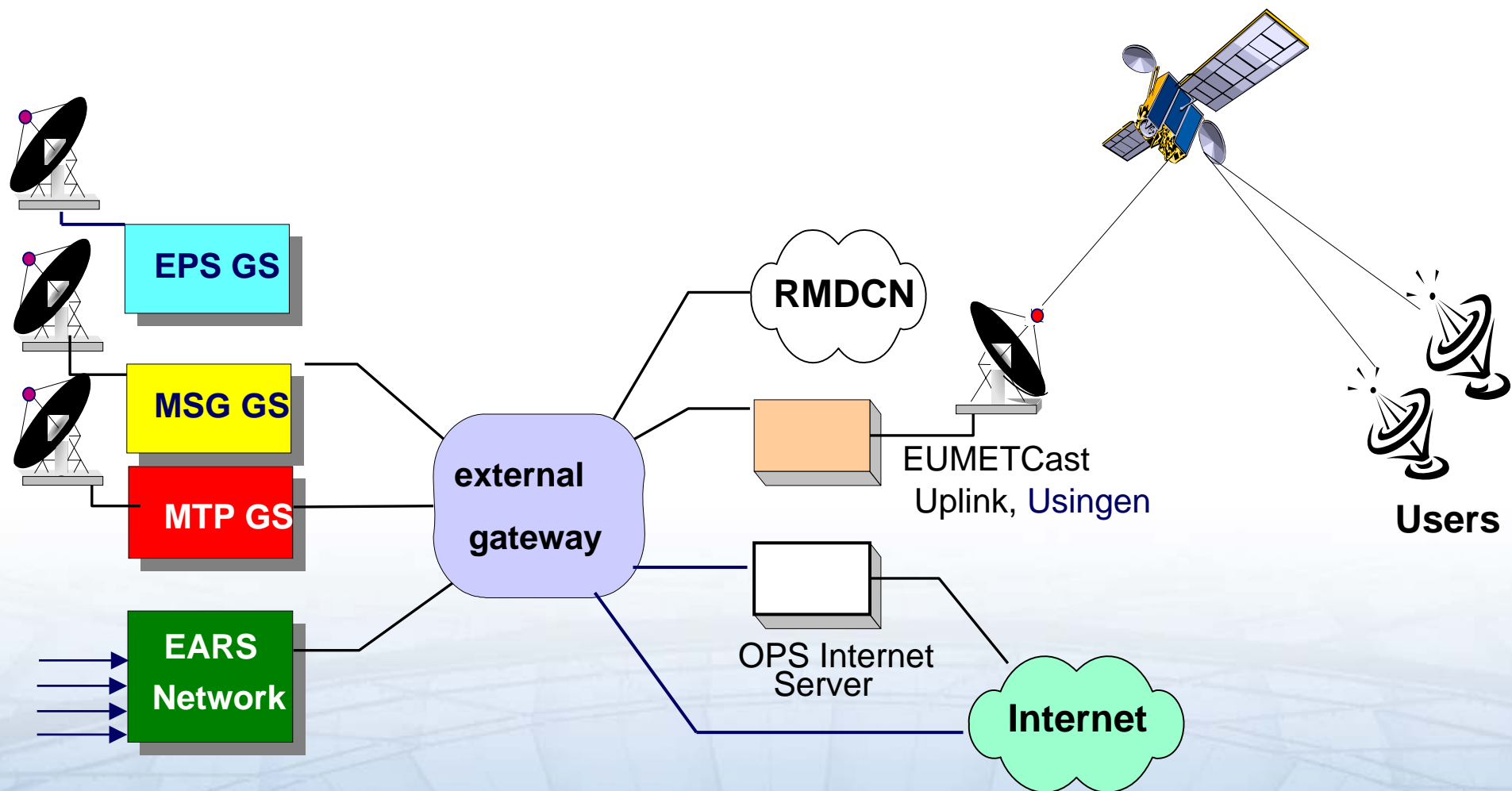
EUMETCast Concept and Overview (1)

- **EUMETCast is a multi-service dissemination system based on the standard Digital Video Broadcast (DVB), multi-cast technology**

- **Data are relayed via commercial telecommunication satellites**

- **Off-the shelf, commercial, inexpensive equipment can be used, resulting in relatively low cost reception stations**

- **Service priority handling for the most urgently required information**

- **Highly configurable encryption facility - using EUMETCast Key Unit (EKU) and EUMETCast Client Software**

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EUMETCast Concept and Overview (2)

History of its use:

April 2003 - start of dissemination of Meteosat-8 services following the failure of the Solid State Power Amplifier on Meteosat-8 (MSG-1)

- December 2003 – EUMETSAT Council declared EUMETCast as the baseline dissemination for Meteosat-8 *and* future MSG and Metop satellites

- November 2003 - Start of operational dissemination in C-band for Africa

- Additional services have been progressively added
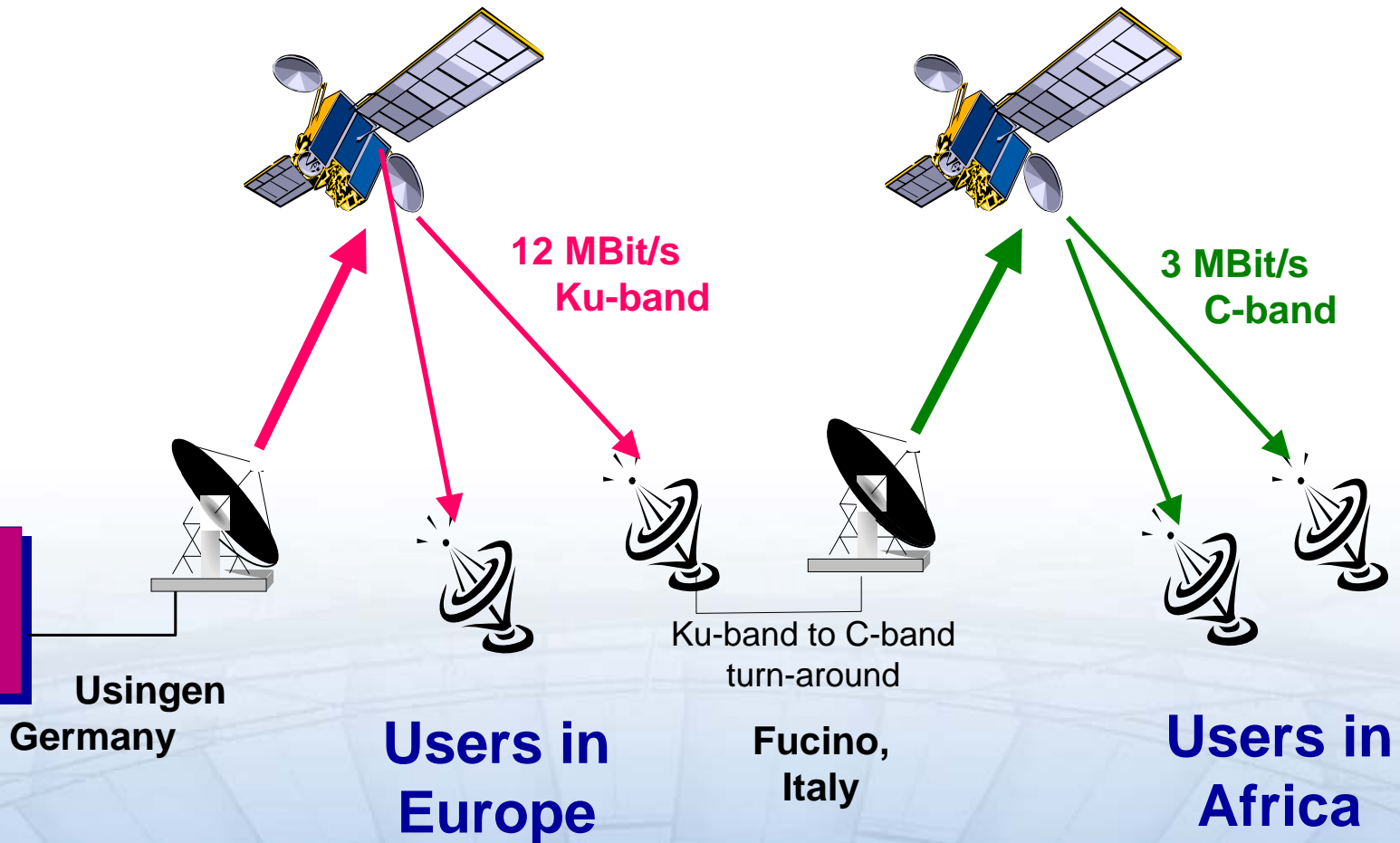
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EUMETCast Concept and Overview (3)

EPS GS

MSG GS

MTP GS

EARS Network

external gateway

RMDCN

EUMETCast Uplink, Usingen

OPS Internet Server

Internet

Users

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EUMETCast Concept and Overview (4)

HotBird-6

AtlanticBird-3

12 MBit/s
Ku-band

3 MBit/s
C-band

EUMETCast Uplink

Usingen Germany

Ku-band to C-band turn-around

Fucino, Italy

Users in Europe

Users in Africa

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EUMETCast Concept and Overview (5)

HOT BIRD™ 6 Ku-band predicted downlink coverage

EUMETCast Concept and Overview (6)

C-band downlink coverage
ATLANTIC BIRD™ 3 at 5° West
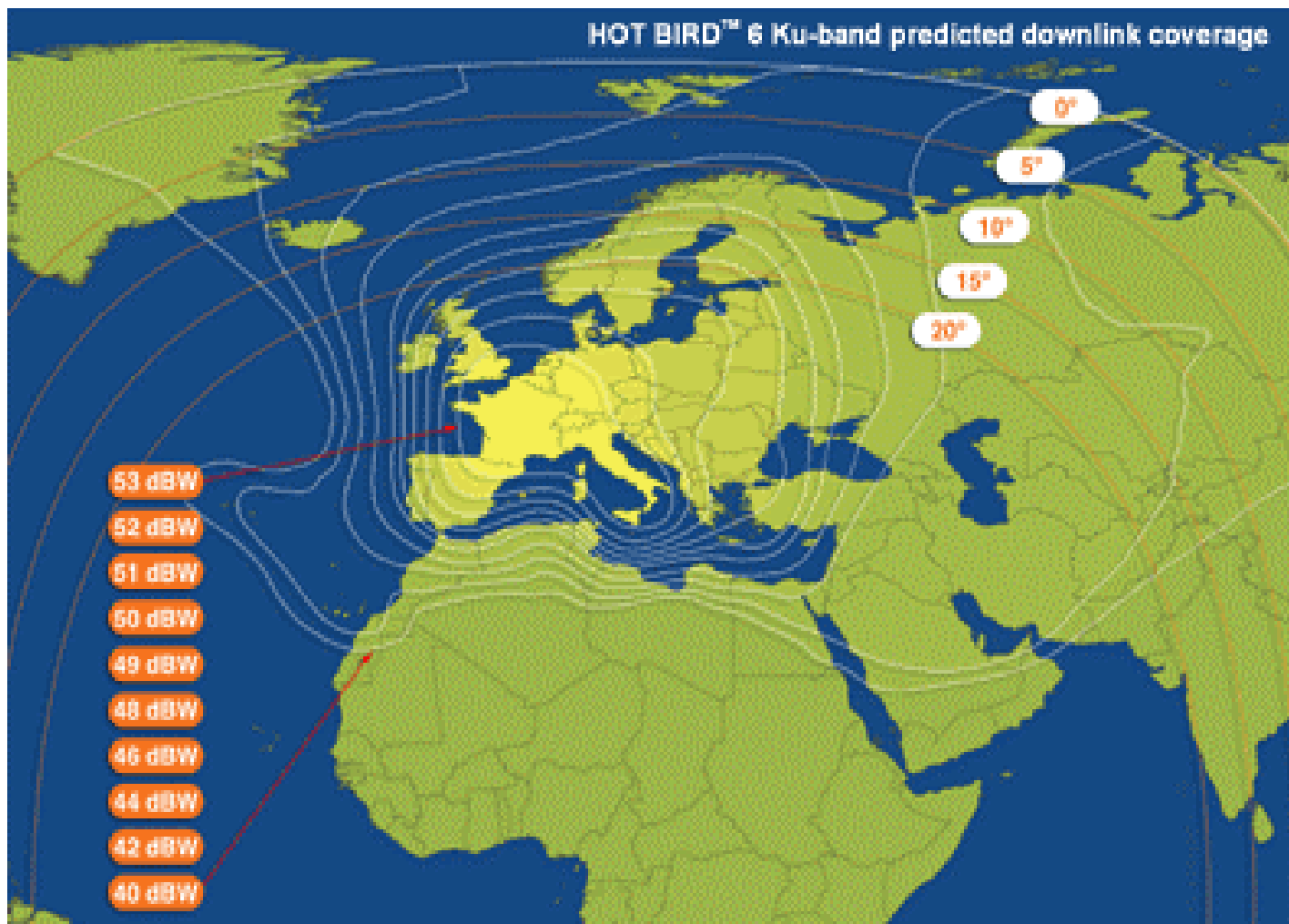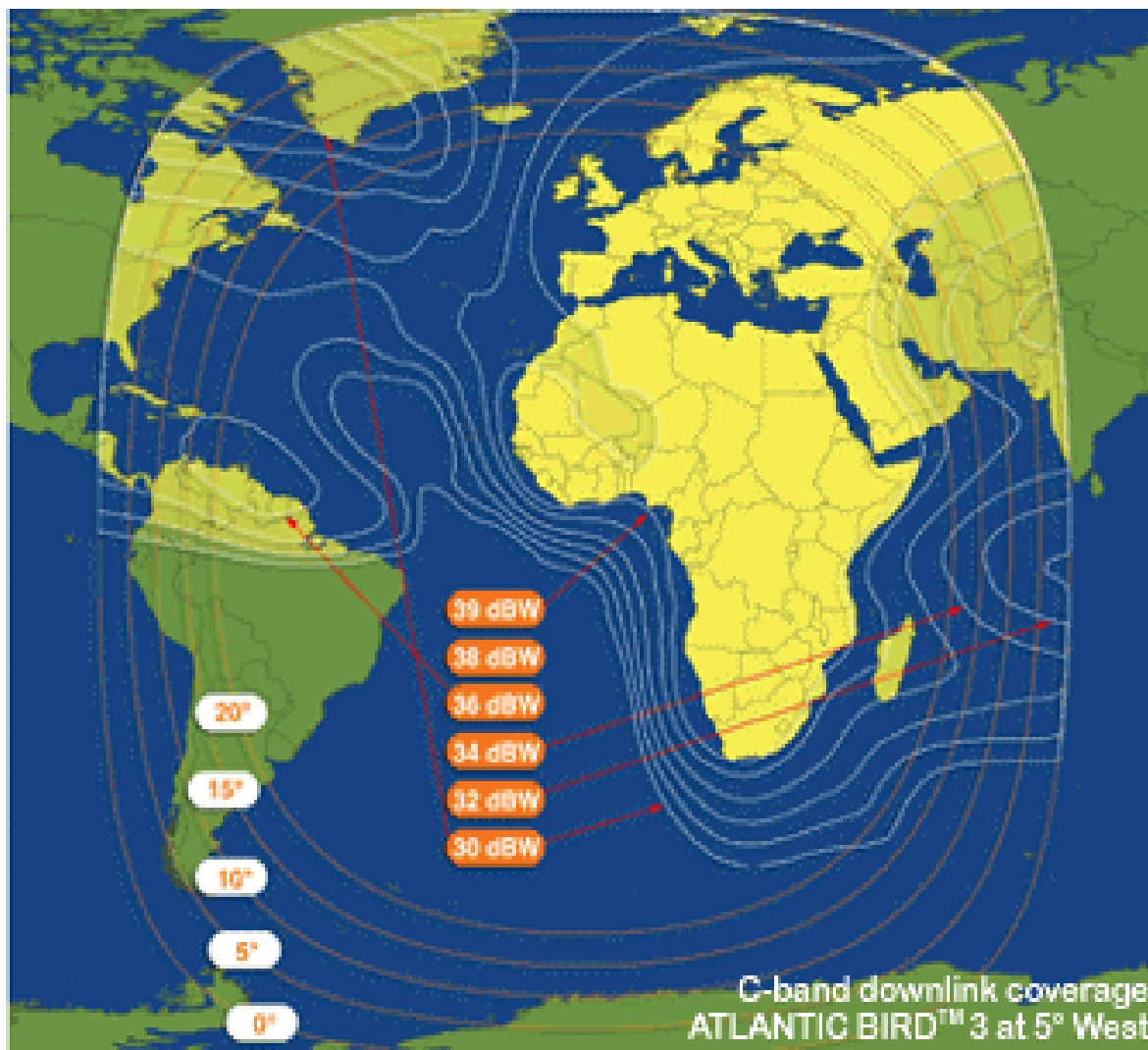
EUMETCast Concept and Overview (8)

A typical reception station comprises:

- **Standard PC equipment - recommend two PCs, one for reception one for data processing**

- **DVB PCI card**

- **Satellite off-set antenna fitted with a digital universal V/H LNB - C-band for Africa**

- **EUMETCast Client Software**

- **EUMETCast Key Unit (EKU) - USB device**

- **Processing/visualisation software**

- **List of known manufacturers see: http://www.eumetsat.de/en/dps/helpdesk/msg_suppliers.html**

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Typical EUMETCast Receiving Station

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C-band Reception Issues

- **2.4 m antenna recommended for Africa & Europe (3.0 to 3.7 m for some African/Indian Ocean islands)**

- **1.8 m dish in many cases sufficient depending on the quality of the LNB**

- **C-band significantly less susceptible than Ku-band to rain attenuation, but suffering frequently from electromagnetic interference (mainly radar)**

    ⇒ **Implementation of a band-pass filter and/or use of a tuned/narrow-band LNB have shown good results elimination of (nearly) all interference**

- **Further information in EUMETCast Technical Description -EUM TD 15 (available online) at www.eumetsat.int**

EUMETCast Delivered Services (1)

- **High Rate Image Data - data from Meteosat-8 (every 15-min)**
- **Low Rate Image Data - data from Meteosat-8 (every 30-min)**
- **High Resolution Image - data from Meteosat-7 (30-min)**
- **Indian Ocean Coverage image data from Meteosat-5 (30-min)**
- **Data Collection and Retransmission, also used for Tsunami warning system**
- **"General" Meteorological Data Dissemination**
- **Meteorological Products (including some from EUMETSAT Satellite Application Facilities)**
- **Foreign Satellite Data (US, Japanese, later Chinese)**
- **Satellite Sounding data for Numerical Models**

EUMETCast Delivered Services (2)

- **Announcement Channel -** *Ku & C-band*

- **Channel 1   EARS & RSS -** *Ku-band*

- **Channel 2   High Rate Channel -** *Ku & C-band*
  - ⇒**All 12 High Rate SEVIRI spectral channels**

- **Channel 3   Multi-service Channel -** *Ku & C-band*
  - ⇒**5 Low Rate SEVIRI spectral channels**
  - ⇒**HRI 0° & IODC (Meteosat-7 & Meteosat-5)**
  - ⇒**Meteorological Products (incl. SAF products)**
  - ⇒**DCP**
  - ⇒**MDD**
  - ⇒**FSD**

- **Channel 4   DWDSAT -** *Ku-band*

Essential Services

	3 - hourly 00:00, 03:00, 06:00, …	6 – hourly 23:45, 05:45, 11:45, 17:45	6 – hourly 00:00, 06:00, 12:00, 18:00	All formats
High Rate SEVIRI		x		
Low Rate SEVIRI		x		
HRI from Met-5 & Met-7			x	
Foreign Satellite Data	x			
DCP Messages				x
Meteorological (incl. SAFs) Products				x
EARS				x

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Current Allocation of Services on Channels

	Services	Bandwidth
Channel 1 (PID 500)	**EARS & Rapid Scan Service**	**0.300 Mbps**
Channel 2 (PID 300)	**High Rate SEVIRI (all 12 spectral channels)**	**1.420 Mbps**

Channel 3 (PID 301)	**Low Rate SEVIRI:**
	      (IR_016, IR_039, IR_108, VIS006, WV_062)
	Meteosat-5 HRI (IODC)
	Meteosat-7 HRI
	Foreign Satellite Data:
	      (GOES-9, GOES-10, GOES-12)
	Meteorological Products (inlcuding SAF products, currently OSI SAF products from Norway & France)
	DCP
	MDD
	Vegetation Product S10NDVI
	Basic Meteorological Data for WMO RA VI
		0.338 Mbps

Channel 4 (PID 302)	**DWDSAT**	**1.536 Mbps**

- Channel 2 & 3 fed into the C-Band turn around service

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Number of Users of EUMETCast Delivered Services

EUMETCast Delivered Services Jan 2005 to Jan 2006

Legend:
- 15-min SEVIRI Users
- RSS Users
- DWDSAT Users
- DCP Users
- HRI 0 Users
- HRI IODC Users
- MDD Nominal Users
- BMD
- No.of EKUs Issued (EUMETCast Stations)

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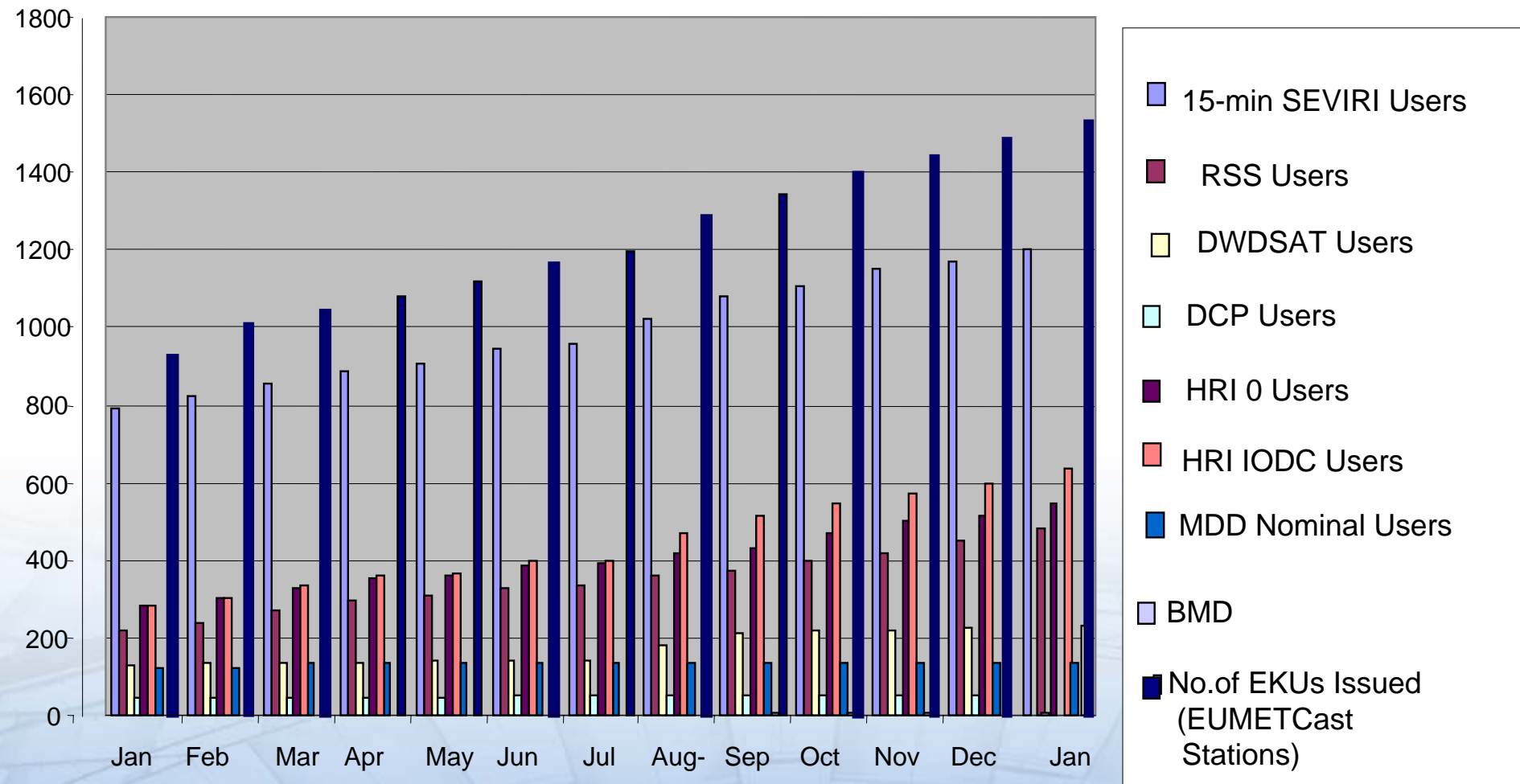
Future Plans for EUMETCast (2)

Service Expansion:

- **Continued availability of Meteosat data (MSG-2,-3,-4)**

- **Evolution of Meteosat meteorological products**
    - ⇒ **New products**
    - ⇒ **Updates of existing products based on operational experience**

- **Metop (future satellite) data**

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Future Plans for EUMETCast (3)

Third Party data:

- **Indian satellite data (INSAT, KALPANA)**
  - ⇒ **Potential backup to Meteosat-5 data**
  - ⇒ **To be provided via NOAA and Météo-France**
  - ⇒ **Quality/operational readiness of data is being assessed by Météo-France**

- **Vegetation derived products for Africa - climate product (VITO in Belgium)**

- **Proposal to disseminate data from ESA's ENVISAT satellite via EUMETCast, for Africa**

- **Basic meteorological data from WMO regional Association VI - Europe and Middle East**
  - ⇒ **Use of EUMETCast for basic provision of observations and weather forecasts**

Extension of EUMETCast
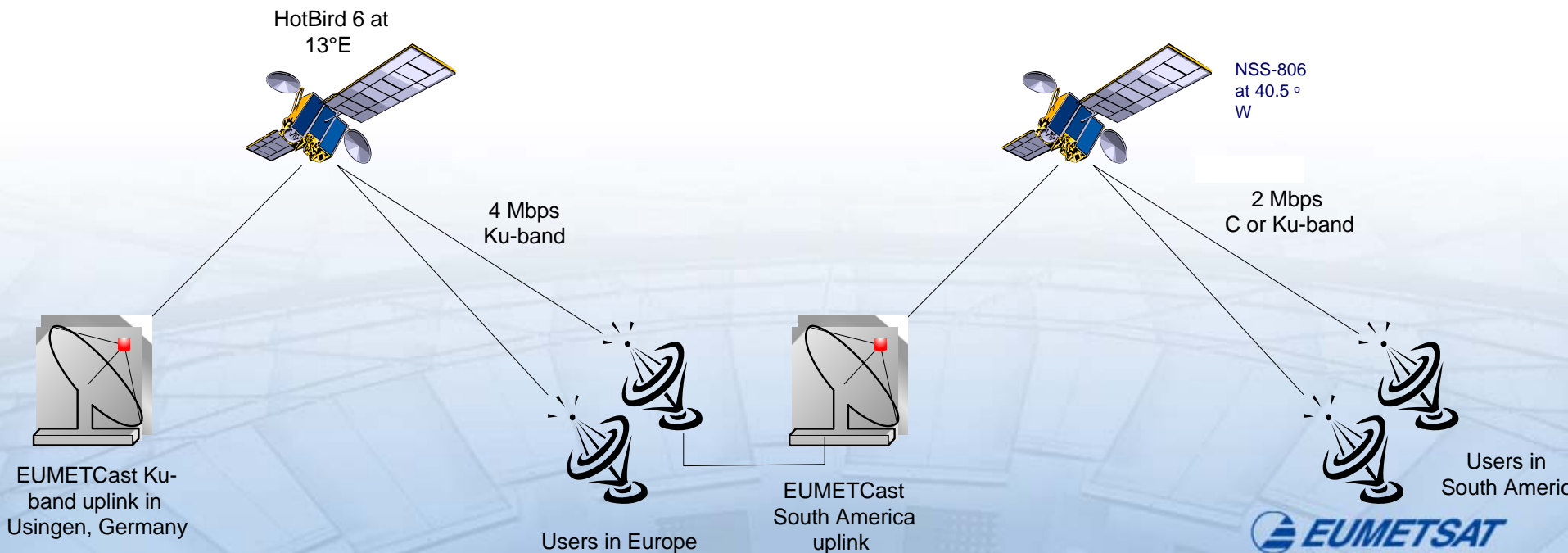
Coverage to South America

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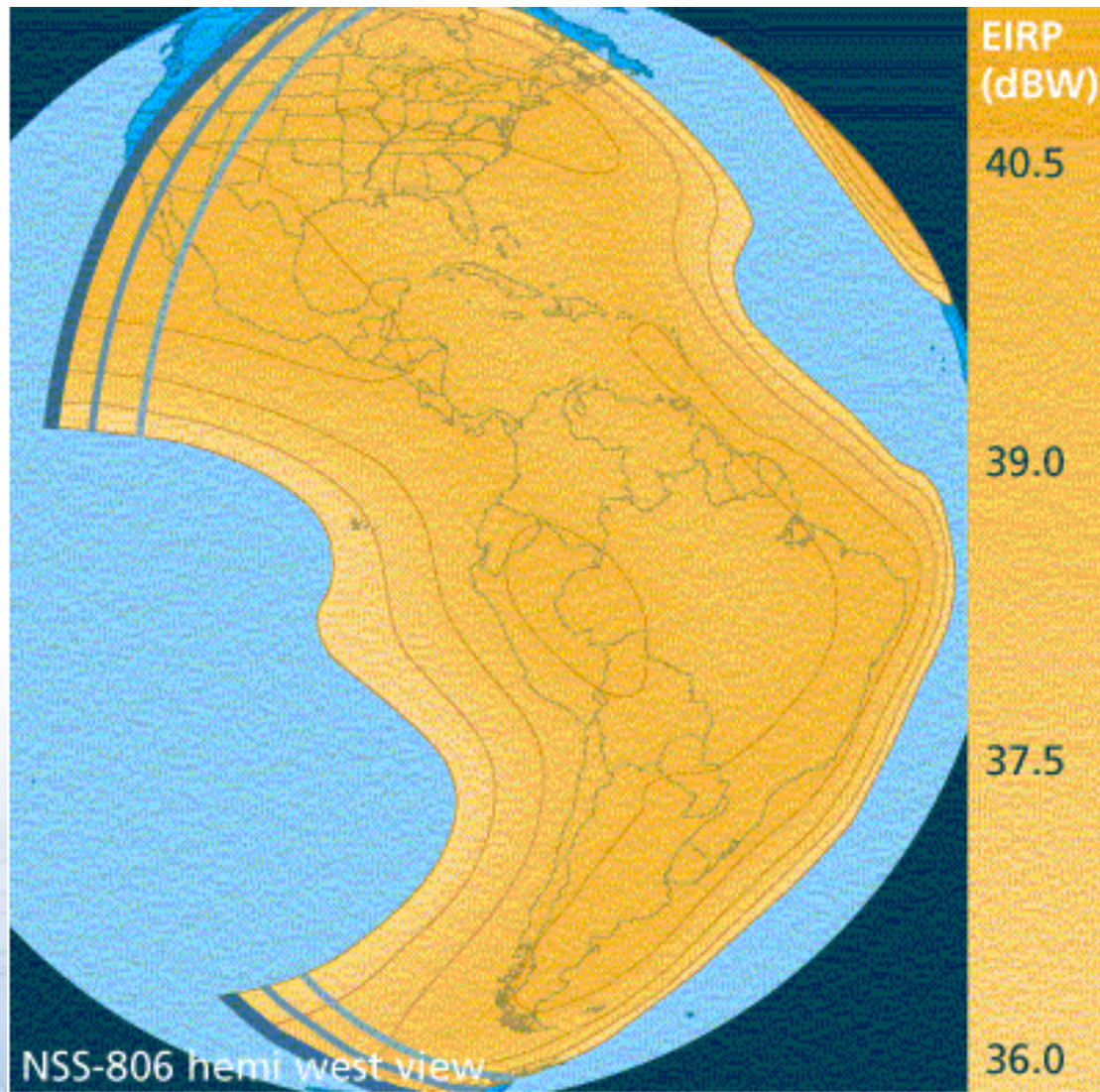EUMETSAT

The problem was……

- Coverage of South America had to be resolved, after the start of routine operations of Meteosat-8 and coverage of Europe and Africa by EUMETCast

- South America remained the most significant area imaged to which Meteosat-8 data was not disseminated - particularly Brazil, which has similar viewing angles as Spain and Portugal

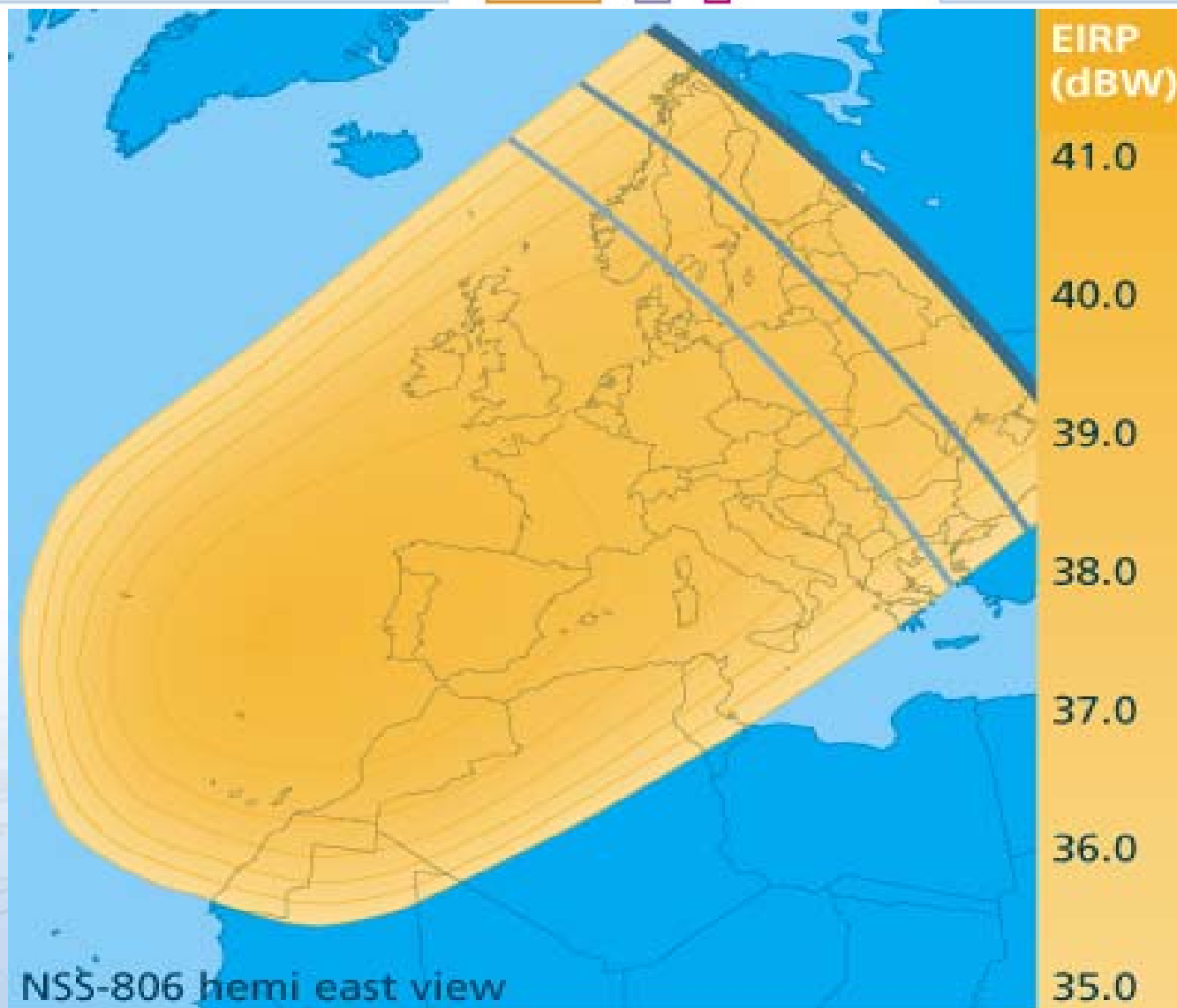EUMETSAT

EUMETCast - South America Service

- Service Provider: GlobeCast, Spain
- Communication S/C: NSS-806, 40.5 ^{o} West, from NewSkies
- C-Band, 2.1 Mbps Bandwidth
- Turn around service (like the C-Band Africa Service)
- Turn around of (only) the High Rate Meteosat images
- Turn around reception in Madrid, up-link station near Paris

HotBird 6 at
13°E

NSS-806
at 40.5 ^{o}
W

4 Mbps
Ku-band

2 Mbps
C or Ku-band

EUMETCast Ku-
band uplink in
Usingen, Germany

Users in Europe

EUMETCast
South America
uplink

Users in
South America

EUMETCAST

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EUMETCast America Service Coverage

NSS-806 hemi west view

EIRP (dBW)

40.5

39.0

37.5

36.0

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EUMETCast Services Overview: C-Band Turn Around

C-Band Africa Service		
Ku-Band Multicast Channel	**Service**	**Bandwidth**
Channel 2	High Rate SEVIRI (all 12 spectral channels)	2.7 Mbps
Channel 3	Multi Service Channel	

C-Band America Service		
Ku-Band Multicast Channel	**Service**	**Bandwidth**
Channel 2	High Rate SEVIRI (all 12 spectral channels)	2.048 Mbps

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Summary

- **EUMETCast is a highly configurable system**
- **EUMETCast is the baseline dissemination mechanism for all Meteosat satellite data**
- **EUMETCast can be expanded**
  - ⇒ **geographical coverage**
  - ⇒ **additional services**
- **EUMETCast can be used to deliver third party, non-meteorological and/or non-satellite data**
- **EUMETCast future expansion lies with the user**
  - ⇒ **Sharing experience/knowledge of new data and new technologies**

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And, finally………. TSUNAMI DATA RELAY

Coverage provided
By Mateosat-5 / -7.

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TSUNAMI DATA RELAY

EUMETCast System

Meteosat-5 / -7

(Indian Ocean Coverage)

(back-up, available for eventual use by "local" warning service(s))

End User Warning System(s)

University of Hawaii

WMO/GTS

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EUMETSAT Ground Segment

Tsunami DCP

Tsunami DCP

Tsunami DCP

Currently, 16 registered

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