HALO Guideline Overview

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Overview of Presentation

- **Introduction**

- **System Layout**

- **Data Categories**

- **Data Flow Overview**

- **Summary**

Introduction

ECMWF

HALO – GMES Specific Support Action (SSA)

- Harmonised coordination of Atmosphere, Land and Ocean integrated projects of the GMES backbone (1/2/2004 – 1/1/2007)

- geoland (1/1/2004 - 1/2/2007)
  - **Global and regional observatories & core services**
- MERSEA (1/4/2004 – 1/4/2008)
  - **Global to coastal scale models, EO and in-situ data assimilation and modelling**
- GEMS (1/3/2005 - 1/3/2009)
  - **Global greenhouse and reactive gases, global aerosol and regional air pollution, EO-data assimilation and modelling**

- HALO aims at formulating agreed recommendations to GAC and IPs
- Scientific thematic analysis of links:
  - **Direct product exchange**
  - **Unaccomplished data demands**
  - **Common data**
- Coordinated solutions to infra-structure in operational mode
  - **Candidate solutions by Alcatel and Astrium**

HALO-Objectives

- "Optimising the efficiency of interaction the Atmosphere, Ocean and Land segments by formulating agreed recommendations to A - L - O IPs and GMES steering groups in areas of"
    - Scientific thematic analysis and coordination
    - Coordinated solutions to shared problems
    - Recommendations to the transition to operational status
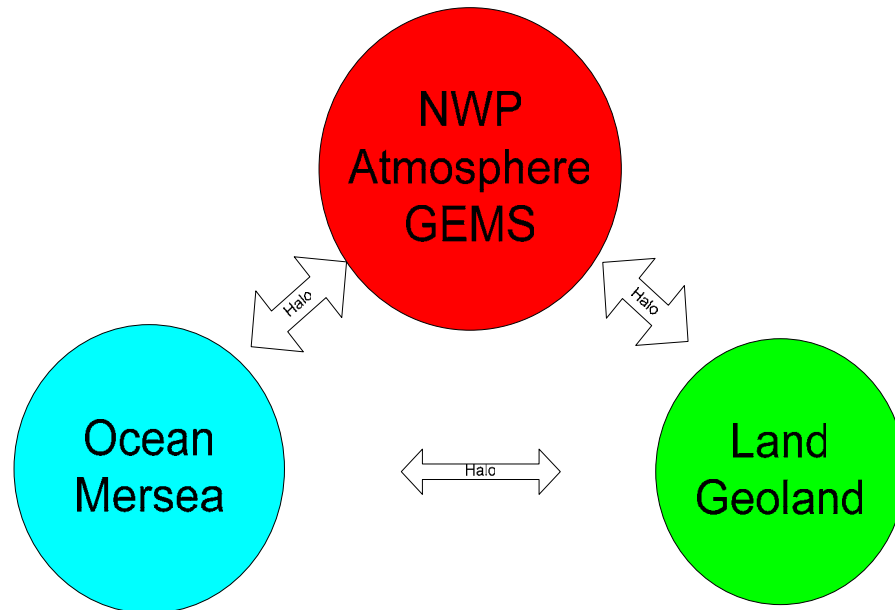
HALO Data Reports Flow

1. "ECMWF's data and products for GMES"
2. "geoland data and products for GMES"
3. "MERSEA data and products for GMES"
4. "GEMS data and products for GMES"

5. "Interacting parts of GEMS, MERSEA and geoland: Data, products and infrastructure"

6. "HALO Guideline"

7. "Infrastructure candidate solutions overview"

HALO Data Reports Flow

1. "ECMWF's data and products for GMES"
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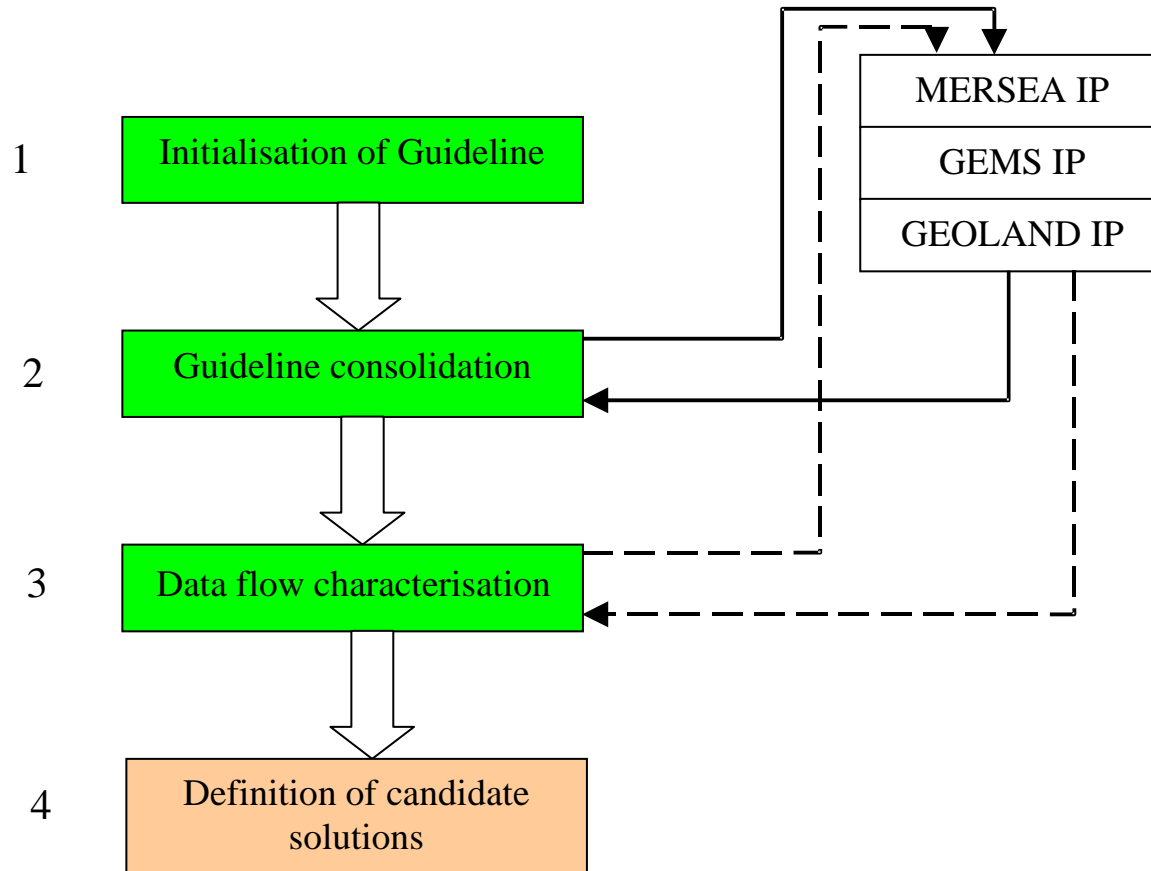4. "GEMS data and products for GMES"

5. "Interacting parts of GEMS, MERSEA and geoland: Data, products and infrastructure"

6. "HALO Guideline"
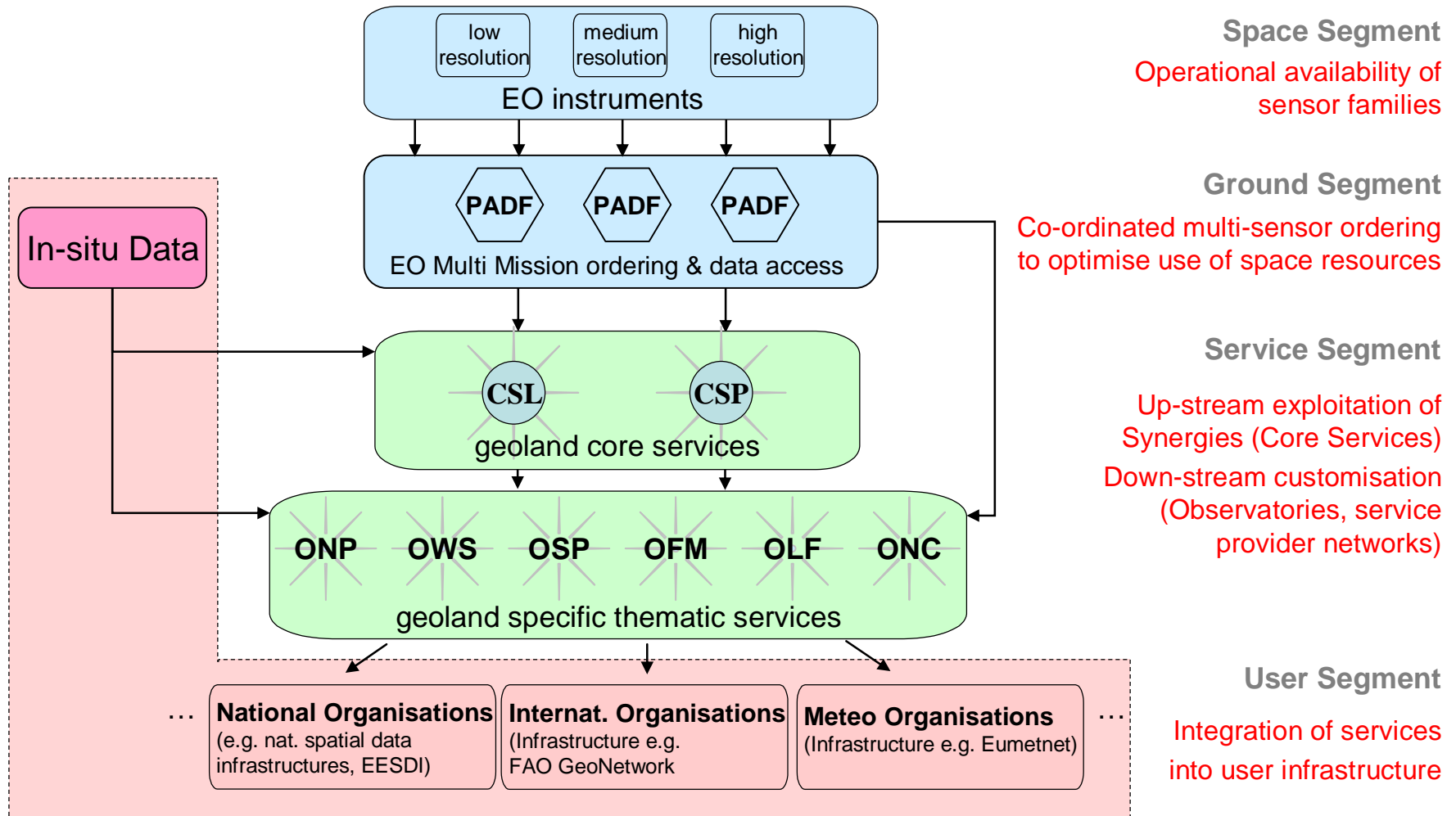
   this presentation: What data flows are expected?

7. "Infrastructure candidate solutions overview" next presentation:

   Which infrastructure can transport the data?

Guideline Work Flow

System Layout

geoland System Layout

Space Segment
Operational availability of sensor families

Ground Segment
Co-ordinated multi-sensor ordering to optimise use of space resources

Service Segment
Up-stream exploitation of Synergies (Core Services)
Down-stream customisation (Observatories, service provider networks)

User Segment
Integration of services into user infrastructure

MERSEA System Layout
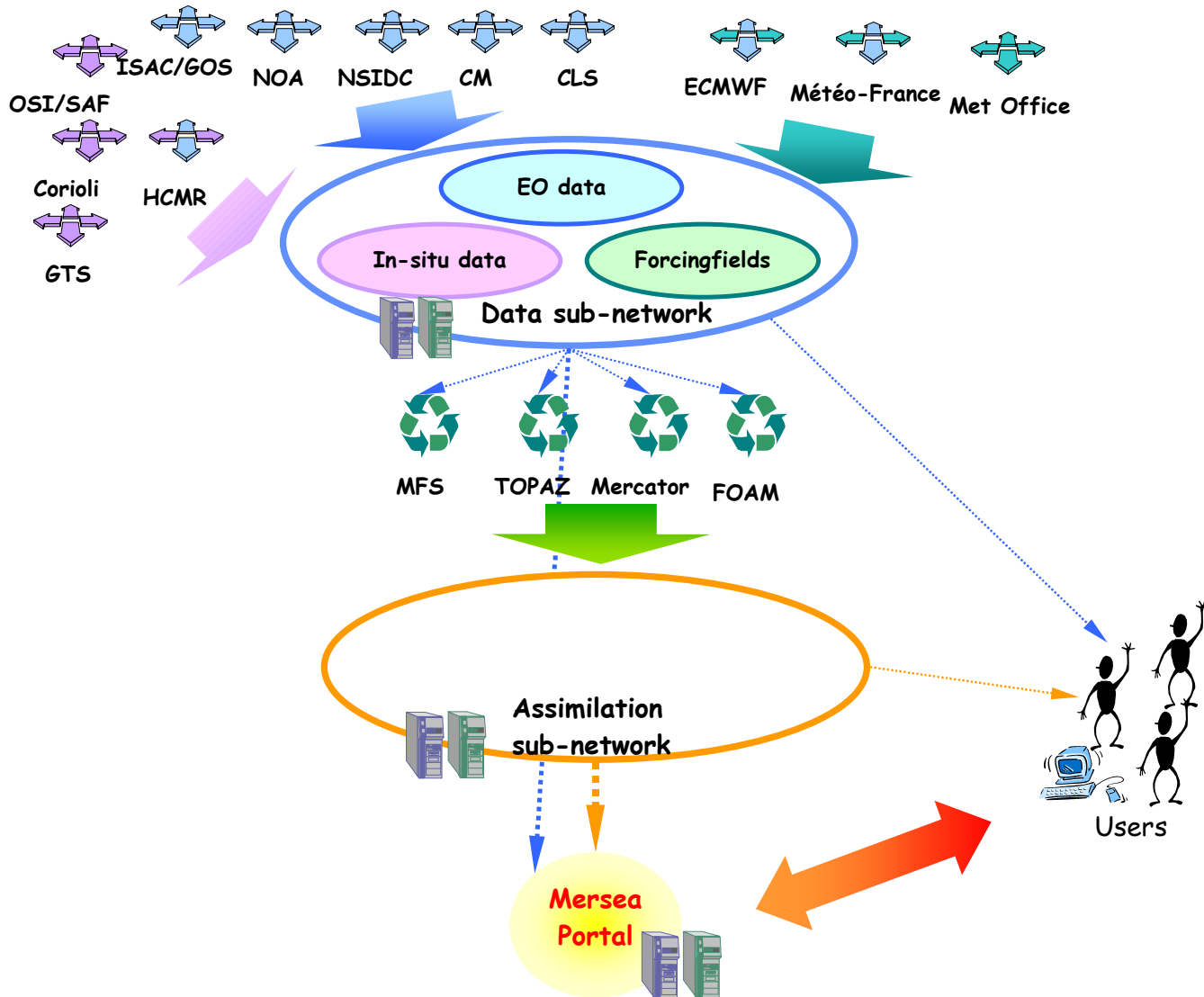
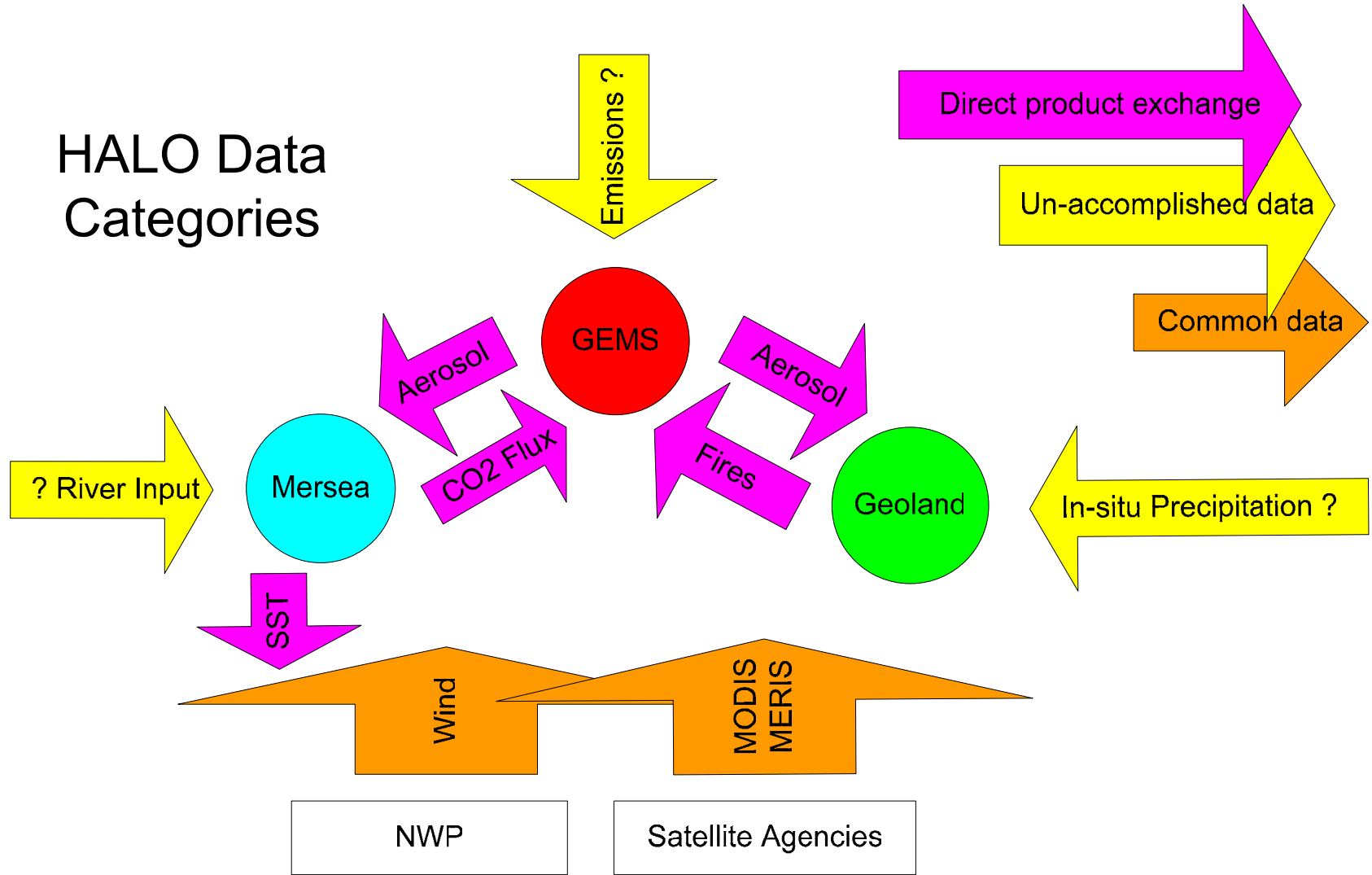# GEMS System Layout
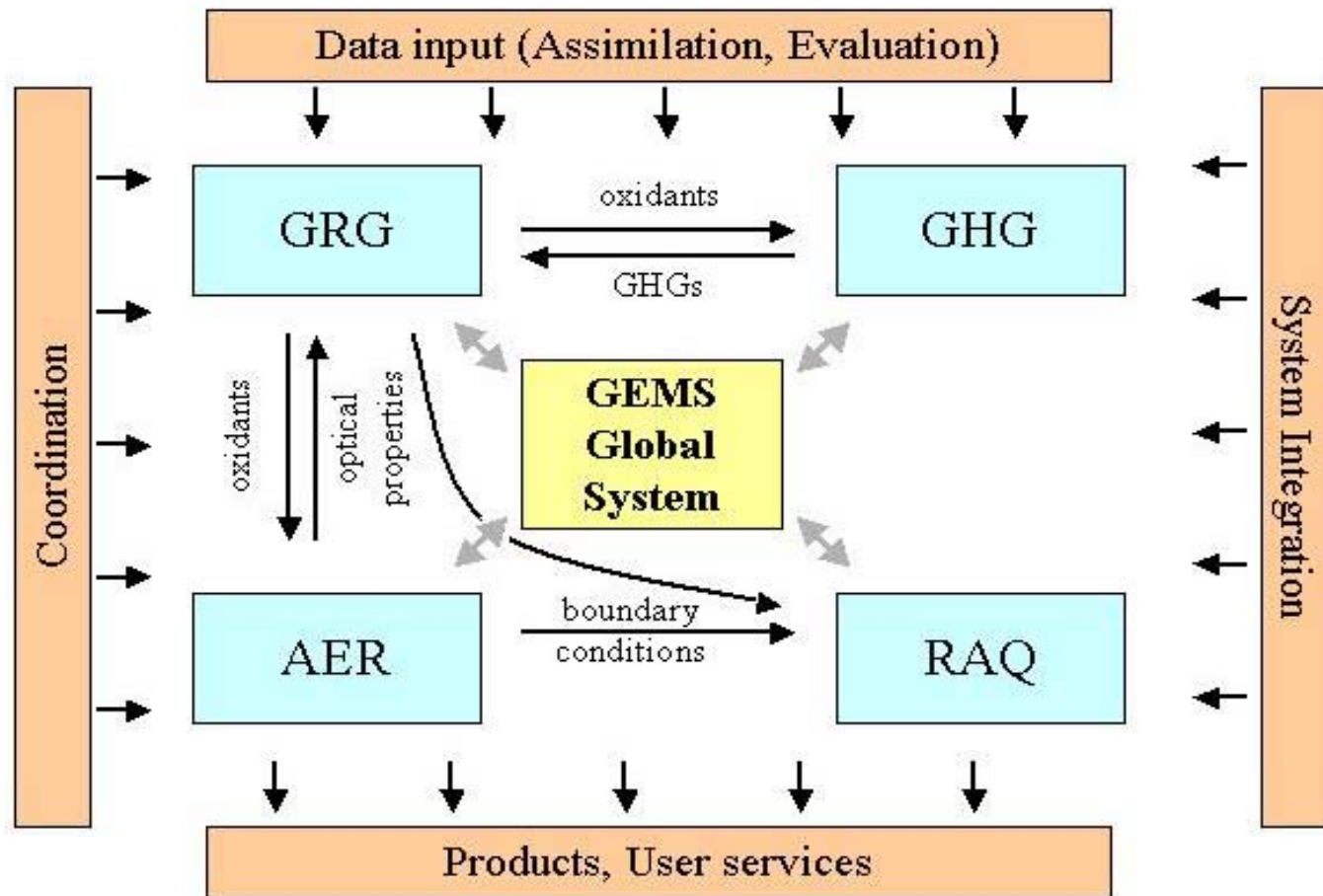
Overall System Layout

Overall System: More Details
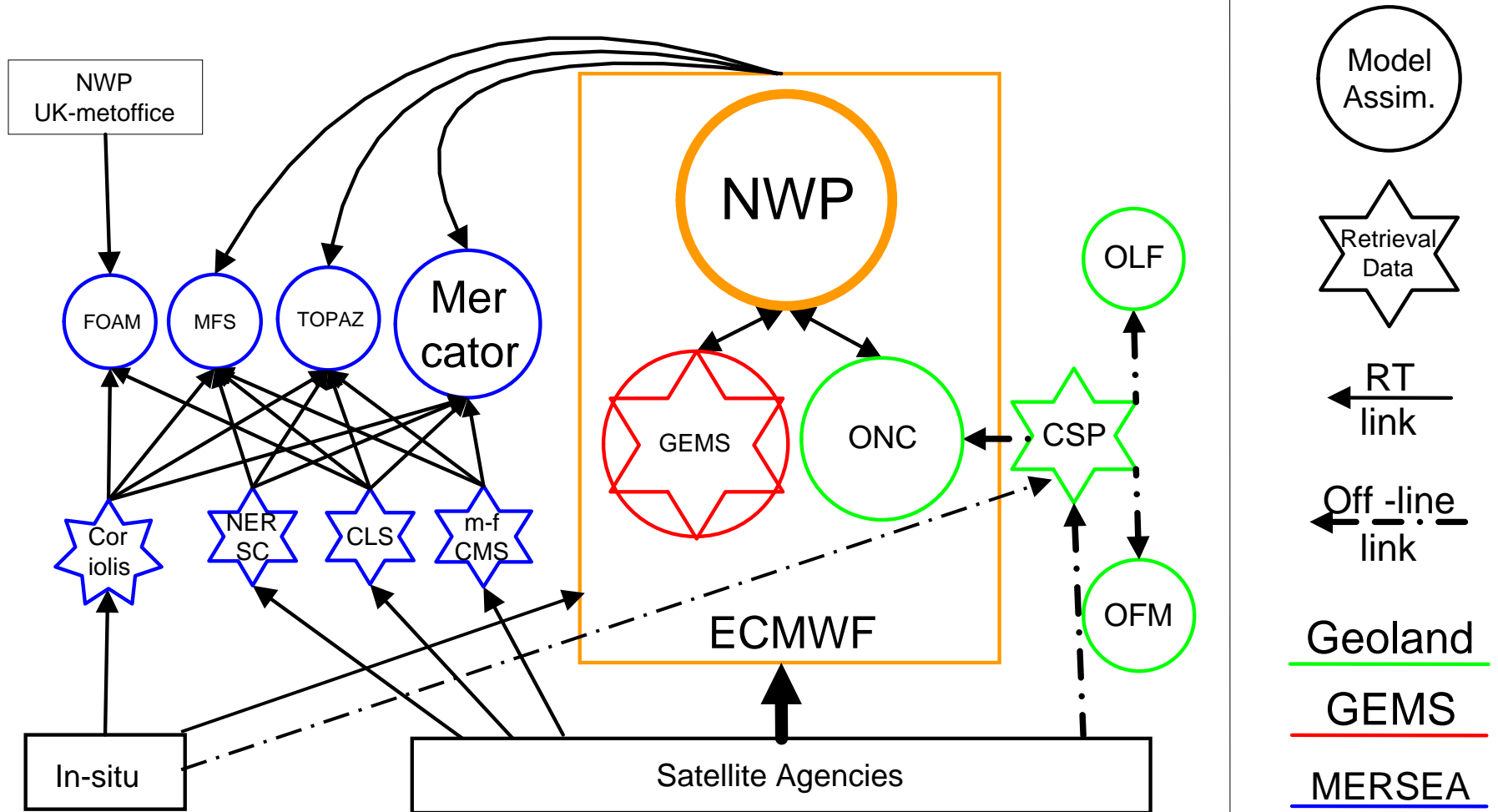
Common Categories

Organisational Categories

- **Organisation vs. Project**
  - **ECMWF hosts NWP, GEMS, and geoland-ONC**

- **Project vs. GMES operational system**
  Geoland, MERSEA, and GEMS are
  - **EU Integrated Projects**
  - **future parts of the GMES system backbone**

- **different data flows for 2007 vs. 2009**
  - **geoland system operational in 2007**
  - **GEMS system operational in 2009**

Data Categories

- **source and destination**
    - **internal:**   **within one IP**
    - **interacting:**   **between two IPs**
    - **external:**   **between an IP and a third party**

- **external observations**
    - **in-situ**
    - **satellite-based**

- **delivery mode**
    - **real-time / near-real time**
    - **regular**
    - **on-demand / offline**

ECMWF

DATA FLOW

MERSEA data flow: Interacting, External, Internal

Data flow	Source	Destination	Delivery Mode	Theme/Product
Meteorological forcing fields	ECMWF	Ocean Model Centre	Regular distribution, real-time analysis and forecasts, Regional High resolution models	Meteorological forecast/NWP Bulletin
GEMS global aerosol products	ECMWF	Mersea retrieval centres	to be checked, initially research mode only	Atmospheric Aerosol data for atmospheric corrections in retrieval
Satellite data	ESA, EUMETSAT, NASA, NOAA	MERSEA Satellite TEP	Regular	Along track, validated
Satellite products	SAT -TEP, GHRSST, SSALTO, OSI/SAF	Ocean Model Centre	Regular	Merged, gridded, validated products
In-situ observations	GDAC, RDAC, ARGO, GTSPP, DBCP,	In-situ Data Centre	Regular + On-demand	High quality controlled, merged gridded products, climatology
In-situ observations in real time	ARGO	In Situ - TEP	Real Time flow	ARGO data in real -or near real -time, with QC flags
In-situ observations in real time	In Situ - TEP (from ARGO)	Ocean Model Centre	Real Time flow	ARGO data in real -or near real -time, with QC flags
In-situ observations in real time	In Situ - TEP	?	Real Time flow	GSUD / VOS, Ocen time series / BBCP

geoland Data Flow: Interacting, Internal

Data flow	Source	Destination	Delivery Mode	Theme/Product
Meteorological forcing fields for land surface models	ECMWF	Geoland-ONC	Regular	Air temperature/humidity, wind speed, precipitation, incoming radiation (short and longwave)
Geoland Global products	Geoland-CSP	GEMS	Regular + On-demand	Generic Land Cover (300 m – 1 km resolution
Geoland CSP-OFM vegetation CO2	GEOLAND-OFM	GEMS @ ECMWF	to be checked, initially research mode only	Land use change and forest fires
geoland ONC vegetation CO2	GEOLAND-ONC @ ECMWF	GEMS @ ECMWF	to be checked, initially research mode only	Vegetation data as input for emission models (biogenic and fires): CO2 fluxes, above-ground biomass, stomatal conductance
GEMS global aerosol products	ECMWF	geoland retrieval centres	to be checked, initially research mode only	Atmospheric Aerosol data for atmospheric corrections in retrieval
Geoland Global Gobal products	Geoland-ONC @ECMWF	GEMS @ ECMWF	Regular + On-demandTo be checked, initially research mode only (TBC)	Biogeophysical Parameters (Rainfall for water cycle, burned area, active fire and LAI for trace gas emission)Vegetation data as input for emission models (biogenic and fires) (TBC)
Satellite forcing fields for land surface models	Geoland-CSP	Geoland-ONC	Regular	Improved precipitation fields and incoming radiation (short and longwave)

ECMWF

geoland Data Flow: External

| Data flow	Source	Destination	Delivery Mode	Theme/Product
Satellite data	ESA EUMETSAT NOAA / NASA	Geoland-CSP	Regular + On-demand	Satellite observation to infer information about the land surface, in three areas : vegetation, radiation, water
in-situ data	Meteo	Geoland-CSP	Regular + On demand	Rainfall
In-situ data	Research labs	Geoland-CSP	On demand	Validation data for Vegetation, radiation, soil moisture products
Satellite data	SPOT Image, NASA	Geoland-CSP	On demand	Validation data for Vegetation & Land cover products
Satellite data to be assimilated	ESA EUMETSAT NOAA/NASA CNES	Geoland-ONC	Regular + On-demand	Satellite observation to infer information about the land surface and the vegetation status.
In-situ data for validation	Fluxnet	Geoland-ONC	On-demand	CO_2 and water fluxes
In-situ data for validation	GAW	Geoland	On-demand	radiative surface fluxes

ECMWF

GEMS Data Flow: Interacting

Data flow	Source	Destination	Delivery Mode	Theme/Product
Geoland CSP-OFM vegetation CO2	GEOLAND-OFM	GEMS @ ECMWF	to be checked, initially research mode only	Land use change and forest fires
geoland ONC vegetation CO2	GEOLAND-ONC @ ECMWF	GEMS @ ECMWF	to be checked, initially research mode only	Vegetation data as input for emission models (biogenic and fires): CO2 fluxes, above-ground biomass, stomatal conductance
GEMS global aerosol products	ECMWF	Mersea retrieval centres	to be checked, initially research mode only	Atmospheric Aerosol data for atmospheric corrections in retrieval
GEMS global aerosol products	ECMWF	geoland retrieval centres	to be checked, initially research mode only	Atmospheric Aerosol data for atmospheric corrections in retrieval
Meteorological forcing fields	ECMWF	Ocean Model Centre	Regular distribution, real-time analysis and forecasts, Regional High resolution models	Meteorological forecast/NWP Bulletin
Meteorological forcing fields for land surface models	ECMWF	Geoland/ONC	Regular	Air temperature/humidity, wind speed, precipitation, incoming radiation (short and longwave)
Geoland Global products	Geoland-CSP	GEMS	Regular + On-demand	Generic Land Cover (300 m – 1 km resolution

GEMS Data Flow: External, Internal

Data flow	Source	Destination	Delivery Mode	Theme/Product
Satellite data	ESA, EUMETSAT, NOAA / NASA (UNI-BREMEN, UMW)	ECMWF	operational	Raw radiances and satellites products on atmospheric species concentration and fire count/ burnt area
in-situ data	Scattered provider (NILU, EEA, national and regional authorities)	ECMWF MPI KNMI RAQ Centres	regular	In situ observation for validation
CO2 concentration	www.cmdl.noaa.gov, gaw.kishou.go.jp	GEMS @ ECMWF	on demand	validation data for CO2 assimilation. open access on the internet.
GEMS global products	ECMWF	GEMS RAQ Centres (6)	operational	Boundary conditions for reginal air pollution models

ECMWF

Estimated Satellite Data Volume for GEMS

Daily Transfer MB/Day Satellite Products
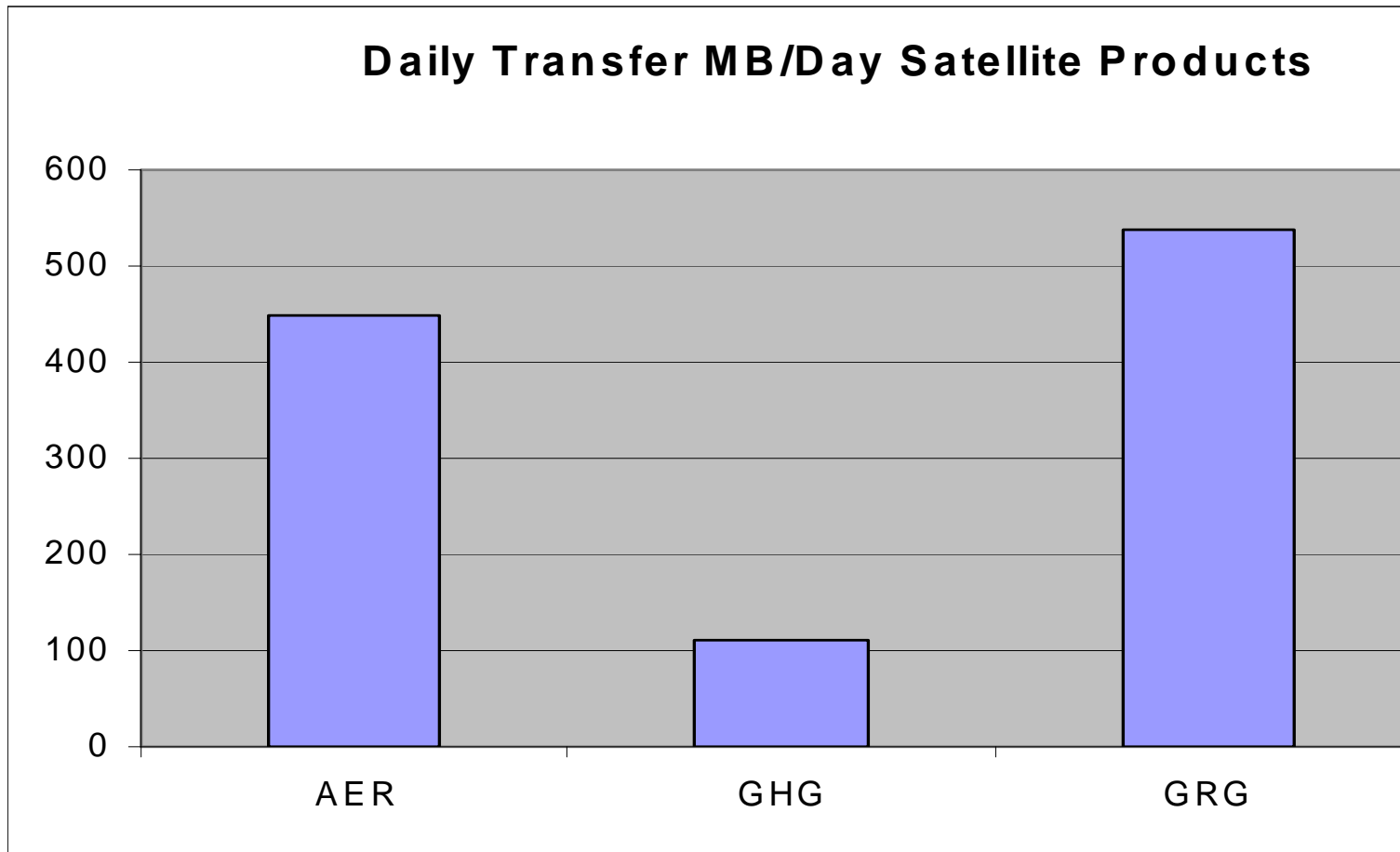
In-Situ Providers for GEMS

- CarboEurope, NOAA-CMDL, FLUXNET, ALE-GAGE-AGAGE, WDCGG data centre, WMO/GAW, WOUDC, DWD, SHADOZ, MOZAIC, DLR, IPSL, NILU, NDSC, EMEP, NILU, IMPROVE, AERONET, PHOTONS, WDCA, Brewer network, NUIG, ARM, SIRTA, NJKDSC, BSRN, SURFRAD, NASA, HELCOM, OSPAR, CREATE, DAEDALUS, GMES-GATO, Met-Monieur, AIRBASE, …

- Very diverse, heterogeneous data flow!

Summary

Summary

- **List of Data Flows collected and characterised**

- **Some key issues:**
  - **many external in-situ providers**
  - **Satellite data volume > 1 GB/day**
  - **Evolving GMES system**

- **How can the data flow be realised?**

ECMWF