

NWP know-how AT INM

BACKGROUND



✓ **INM** is a member of **HIRLAM** since 1995.

✓ **INM** has participated in **HIRLAM-3**, **HIRLAM-4**,
HIRLAM-5 and **HIRLAM-6** Scientific Plans
(mainly data assimilation and physics)

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INM PARTICIPATION IN EU PROJECTS

- ✓ **EUROCS** (European Cloud Systems) : **2000-2003**
- ✓ **ELDAS** (European Land Data Assimilation System): **2002-2004**
- ✓ **HONEYMOON** (High resolution Numerical wind Energy Model for On-and Off-shore forecasting using ensemble predictions): **2002-2004**
- ✓ **TOUGH** (Targeting Optimal Use of GPS Humidity Measurements in Meteorology): **2003-2006**

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RESEARCH ACTIVITIES IN FORMER HIRLAM PROJECTS

✓ DATA ASSIMILATION :

- INM has been responsible for the development of the existing **HIRLAM surface analysis package**.
- INM has participated in the development of the **HIRLAM 3DVar** (screening and QC).

✓ MODEL PHYSICS :

- INM contributed with **CBR**(Cuxart et al.) turbulence scheme.
- INM has been responsible for the development of new **surface parameterisation**.
- INM has actively participated in parameterisation of **moist processes**.

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CONTRIBUTION TO **HIRLAM-6** SCIENTIFIC PLAN (2003-2005)

✓ DATA ASSIMILATION

(B.Navascués, A.Cansado, C.Martín, J.Parodi, E.Rodríguez)

- 3DVAR, 4DVAR tests, Surface analysis

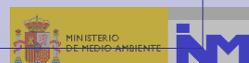
✓ OBSERVATION USAGE

(B.Navascués, J.Sánchez, A.Cansado, C.Salvador, C.Geijo)

- Improved use of conventional data
- Assimilation of remote sensing data
- Tuning and optimisation of observation usage

✓ MODEL PHYSICS (E.Rodríguez, J.Calvo)

- Surface parameterisation
- Physiography
- Clouds and condensation



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HIRLAM-6 SCIENTIFIC PLAN

DATA ASSIMILATION

•3DVAR

- ✓Developing and implementing background error statistics

•4DVAR

- ✓Extensive data assimilation experiments with 4DVar.

•SURFACE ANALYSIS

- ✓Improvement of snow analysis
- ✓Error statistics for analysis of T2m and RH2m
- ✓Improvement of Soil Moisture analysis (related to ELDAS tasks)

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HIRLAM-6 SCIENTIFIC PLAN:

OBSERVATION USAGE

•IMPROVED USE OF CONVENTIONAL DATA

- ✓Investigating and increasing use of RH2m and 10m wind observations.

•ASSIMILATION OF REMOTE SENSING DATA

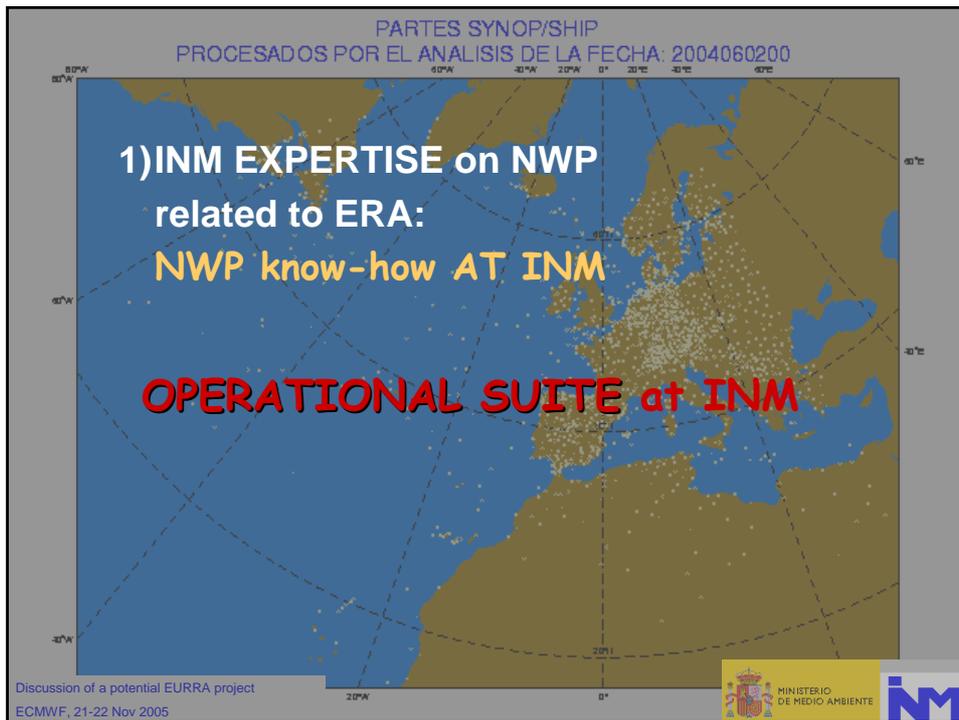
- ✓Research and usage of GPS ZTD observations (related to TOUGH tasks)
- ✓Implementing and improving the use of Doppler radar wind data (VAD profiles).
- ✓Assimilation of MSG AMV's.

•TUNING AND OPTIMISATION OF OBSERVATION USAGE

- ✓Monitoring of error statistics and tuning QC checks.

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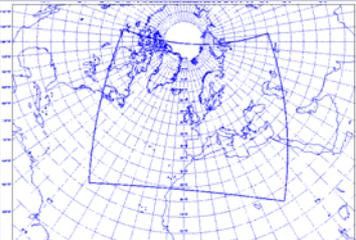




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OPERATIONAL SUITE at INM

- ✓ **INM Operational Suite** running on **CRAY X1 E** supercomputer
- ✓ **Rotated Area**, coverage: Europe, North Africa and the Atlantic Ocean.
- ✓ **Resolution**: 17 km horizontal and 40 vertical levels.
- ✓ **Nested model**: 5km, 40 vertical levels (experimental)
- ✓ **6 h Assimilation cycle** with HIRLAM 3DVar for upper air analysis.
- ✓ **Surface analysis** for:
 - Sea Surface T (SST)
 - Ice fraction (diagnosis)
 - Snow Depth
 - 2m T
 - 2m RH
 - Soil Moisture
 - Soil T



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HIRLAM 3DVAR:

✓ **Assimilation of Conventional and Satellite Observations:**

SYNOP, SHIP, DRIBU, BUOY, TEMP, PILOT, AIREP and AMSU-A radiances (EUMETCAST).

✓ **Passive assimilation of:**

- Meteosat AMV (winds)
- GPS ZTD observations (framework of EU-TOUGH project)
- SYNOP RH2m
- VAD wind profiles from INM Doppler radar network.

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HIRLAM 3DVAR:

✓ **Statistical Background constraint (Berre 2000):**

- Latitudinal variation of background errors: transformation geopotential-rotational wind decreases towards the Equator.
- Link mass-convergence
- Multivariate humidity analysis

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HIRLAM 3DVAR:

✓ **Assimilation of Conventional and Satellite observations:**

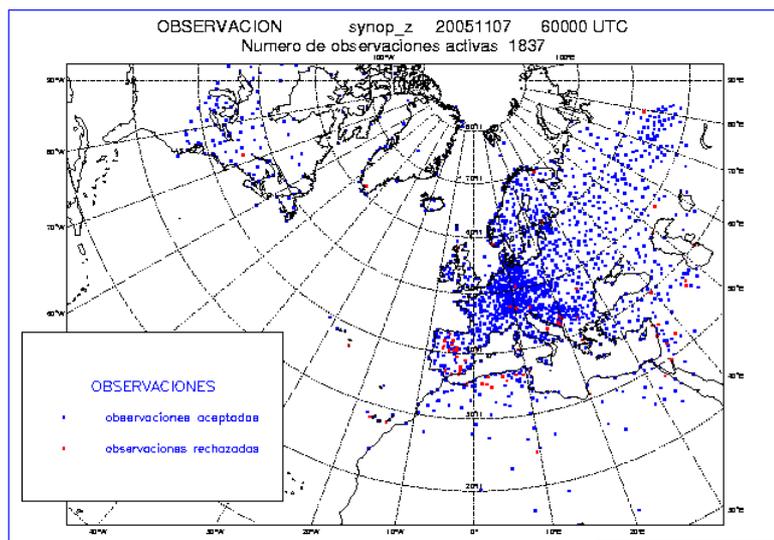
SYNOP, SHIP, DRIBU, BUOY, TEMP, PILOT, AIREP and AMSU-A radiances (EUMETCAST).

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SYNOP- z

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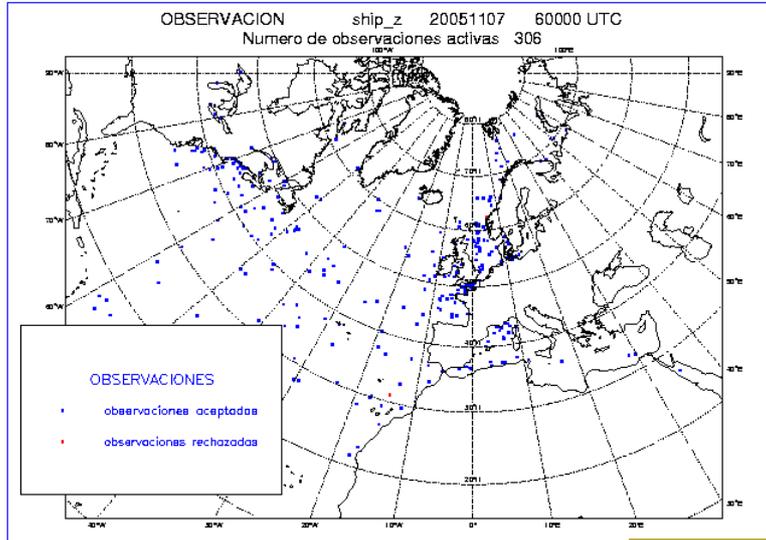


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SHIP- z

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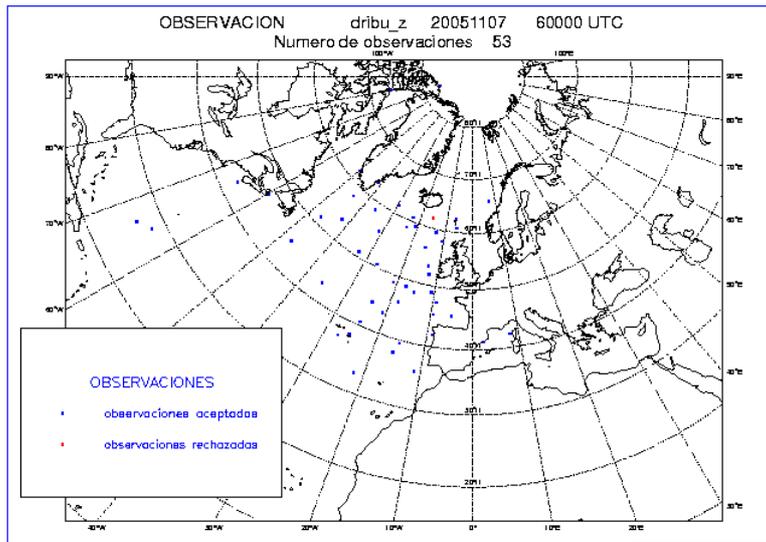


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DRIBU- z

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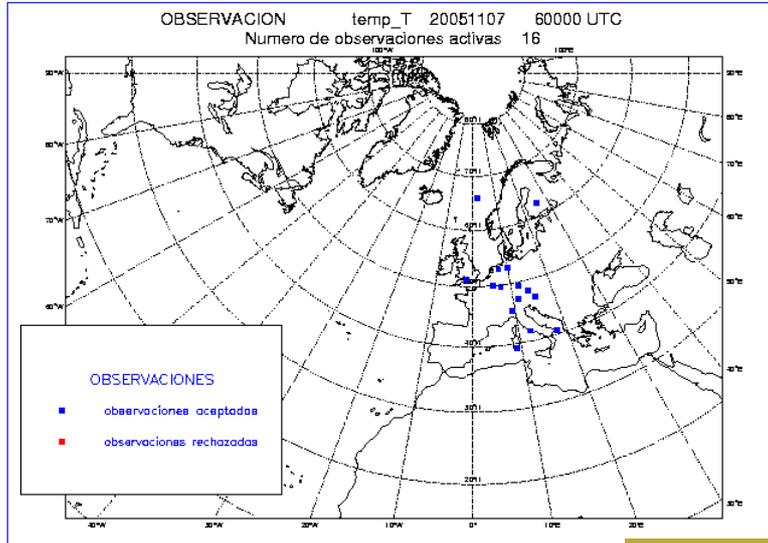


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TEMP- T

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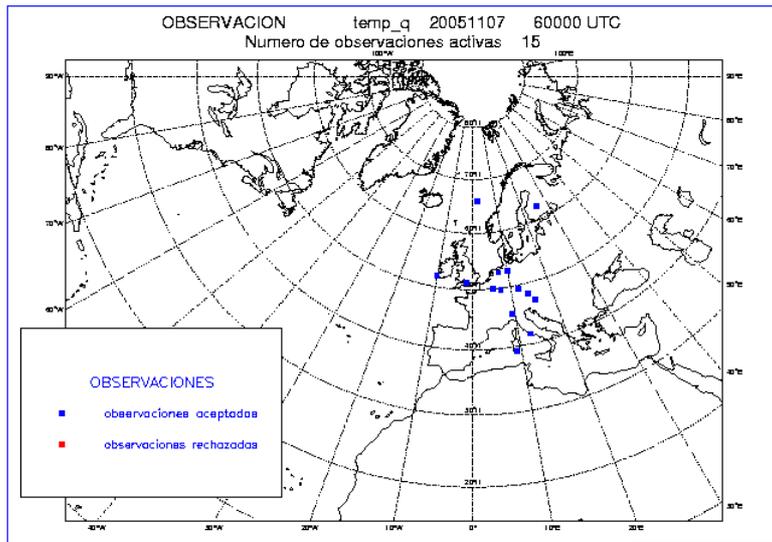


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TEMP- q

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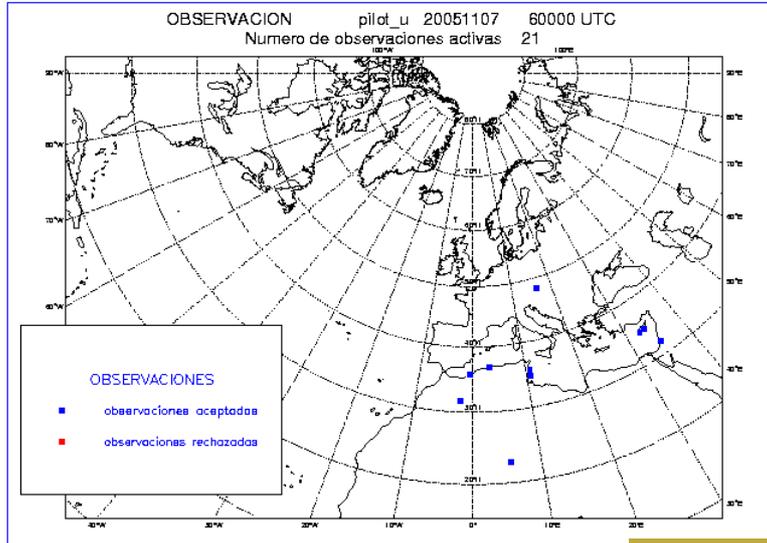


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PILOT- u

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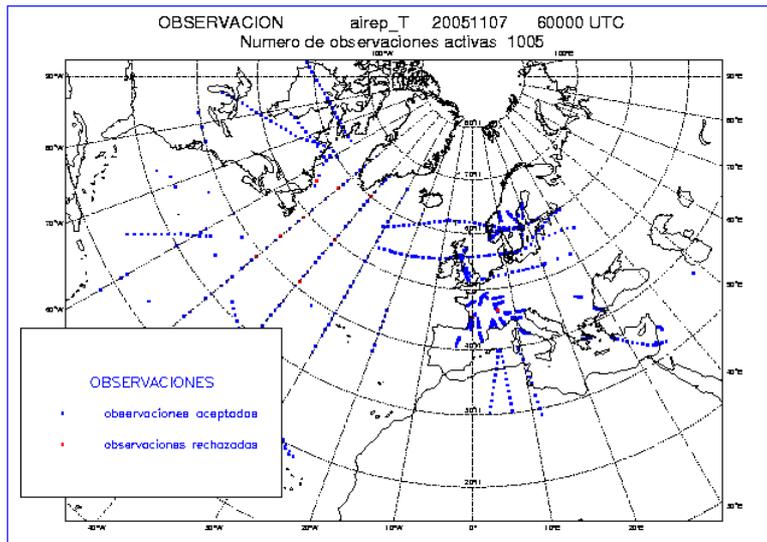


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AIREP- T

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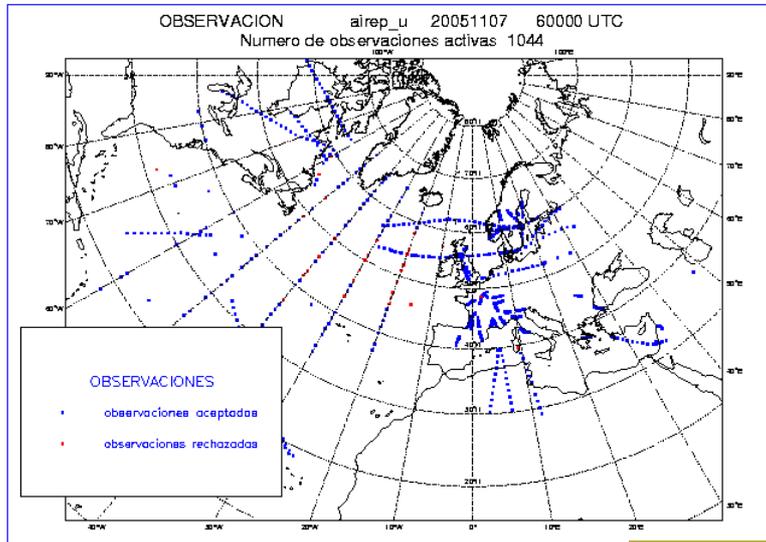


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AIREP- u

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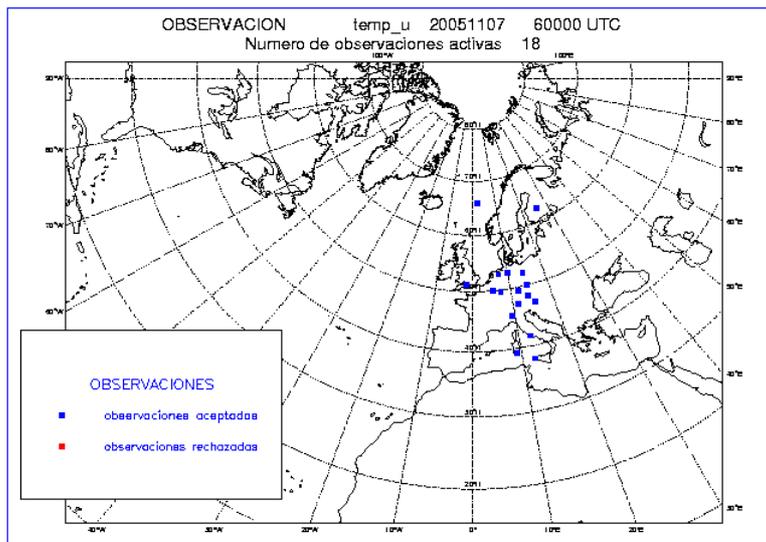


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TEMP- u

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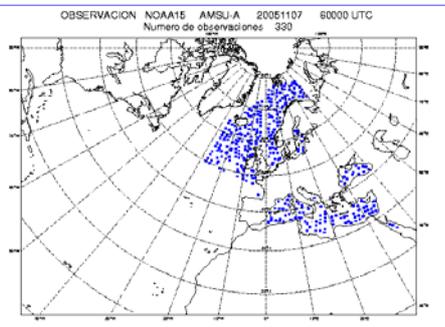


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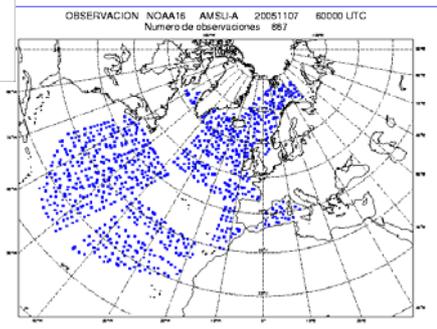


AMSU- A NOAA15

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AMSU- A NOAA16



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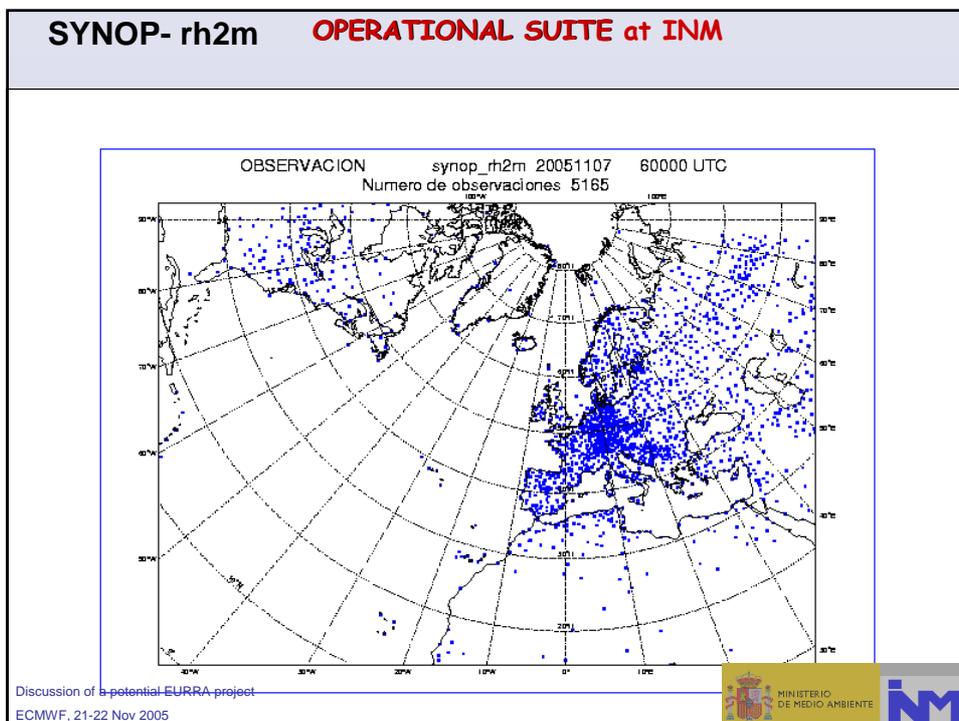
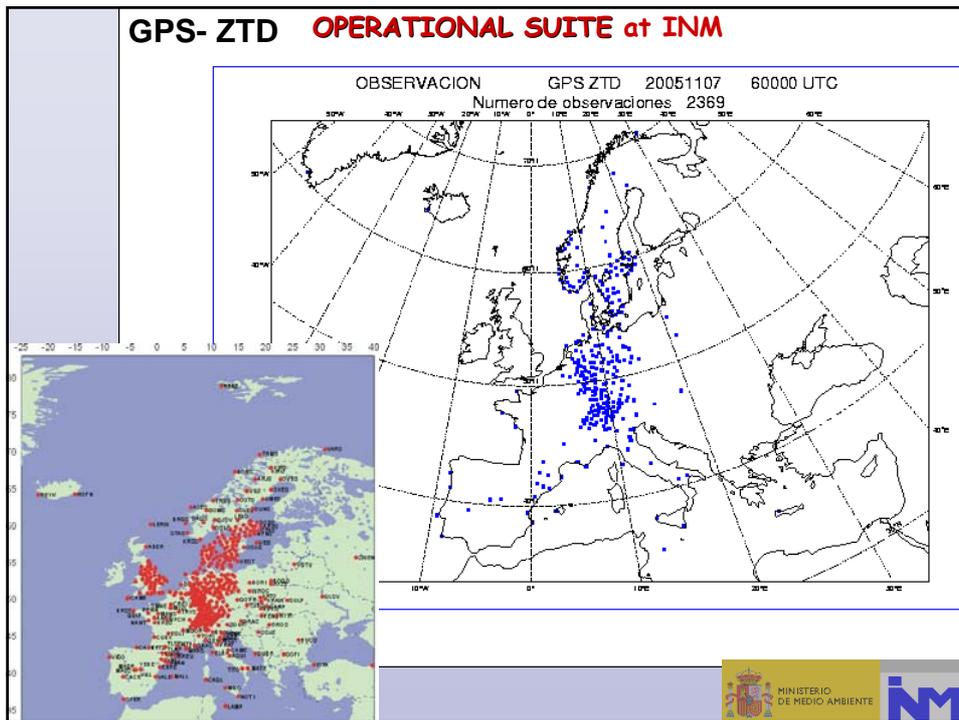
HIRLAM 3DVAR:

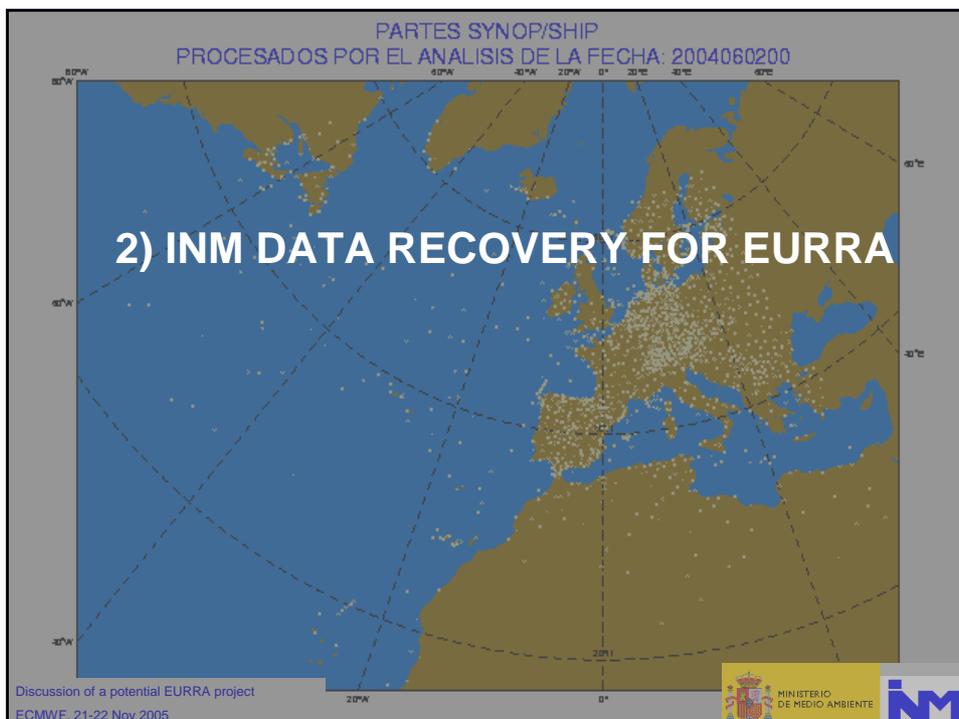
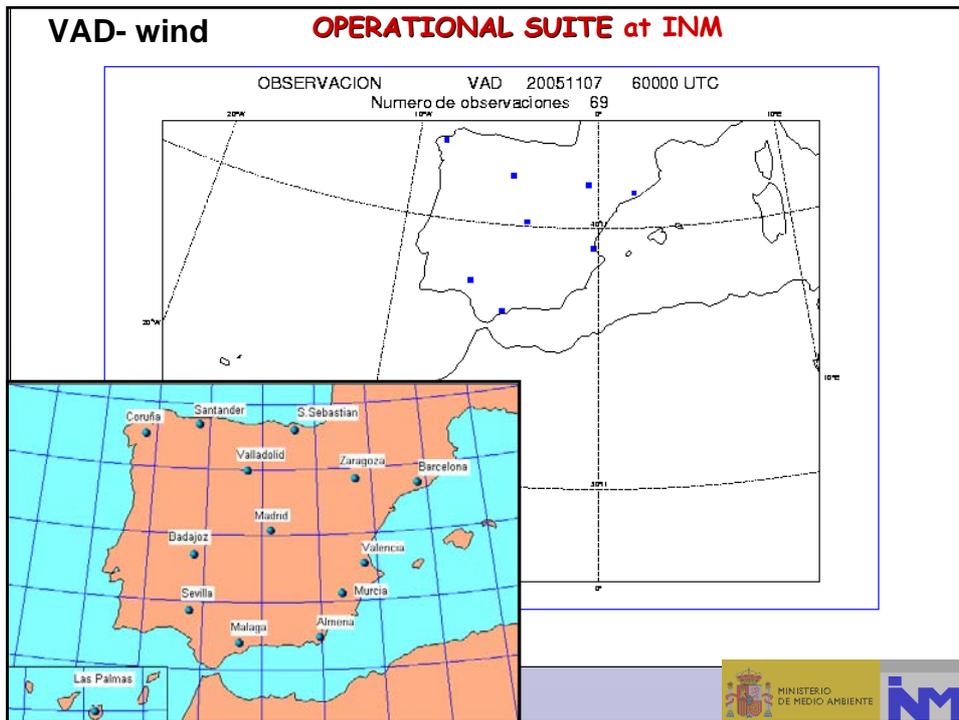
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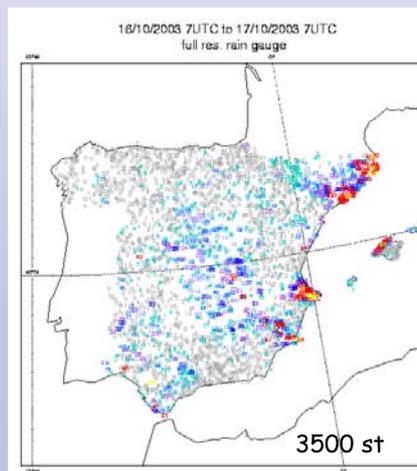


INM DATA RECOVERY FOR EURRA

SUGGESTED:

- 1) Investigate observations used for previous ERA over Spain.
- 2) Provide more data for ERA (assimilate/validate).
(surface:synop, rain gauge from INM climate stations network, RS, radar?)
- 3) Digitalisation, formatting if needed.

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POSITION OF INM WITH RESPECT TO European Re-Analysis (EURRA)

THANK YOU

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