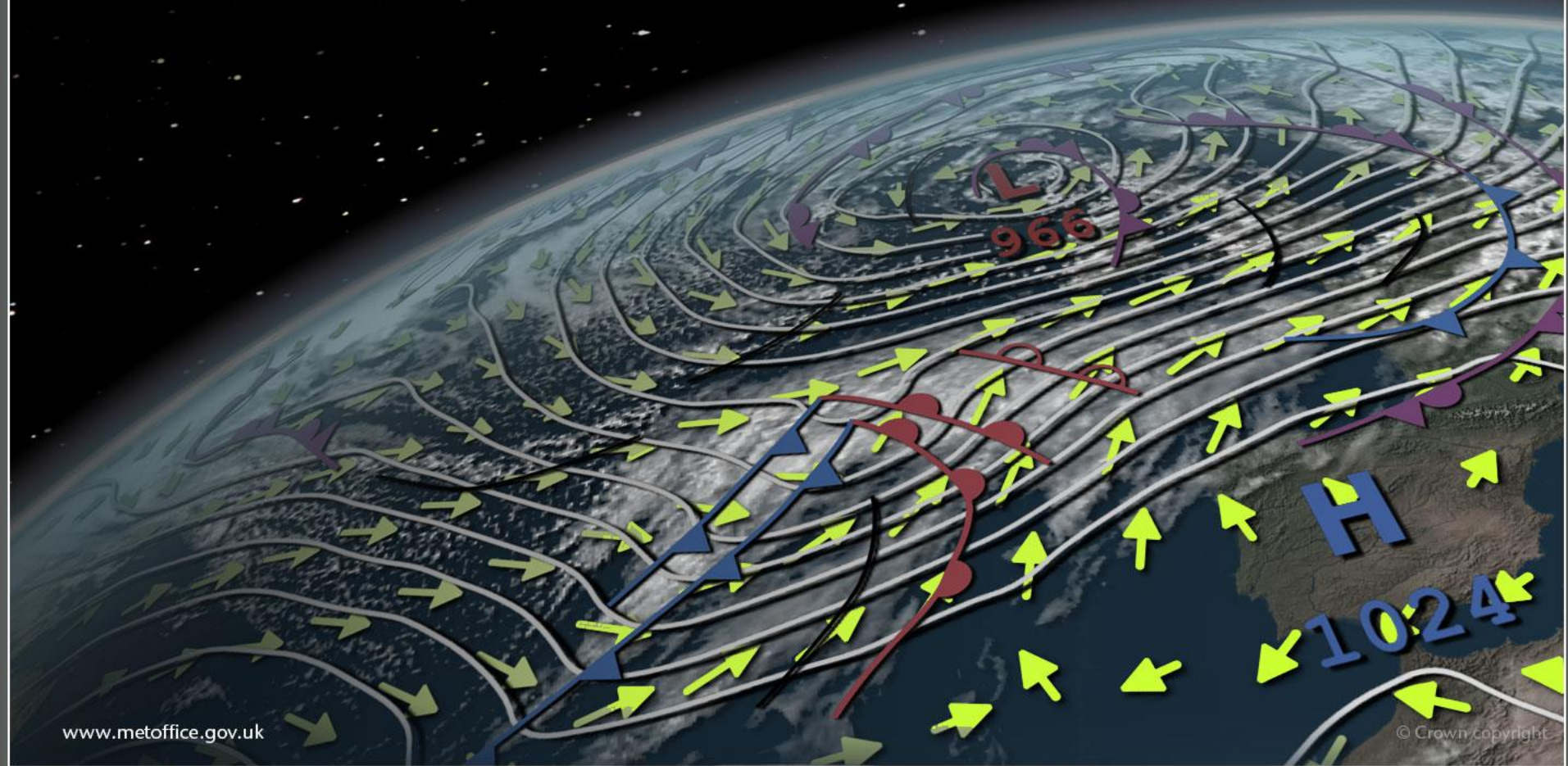




Ground-based GNSS data processing at the UK Met Office

E-GVAP Annual Meeting

KNMI, Netherlands, 28-29th November 2017



Processing at UKMO

Global

17km model

4D-VAR

Old NAE model -
retired

EURO4

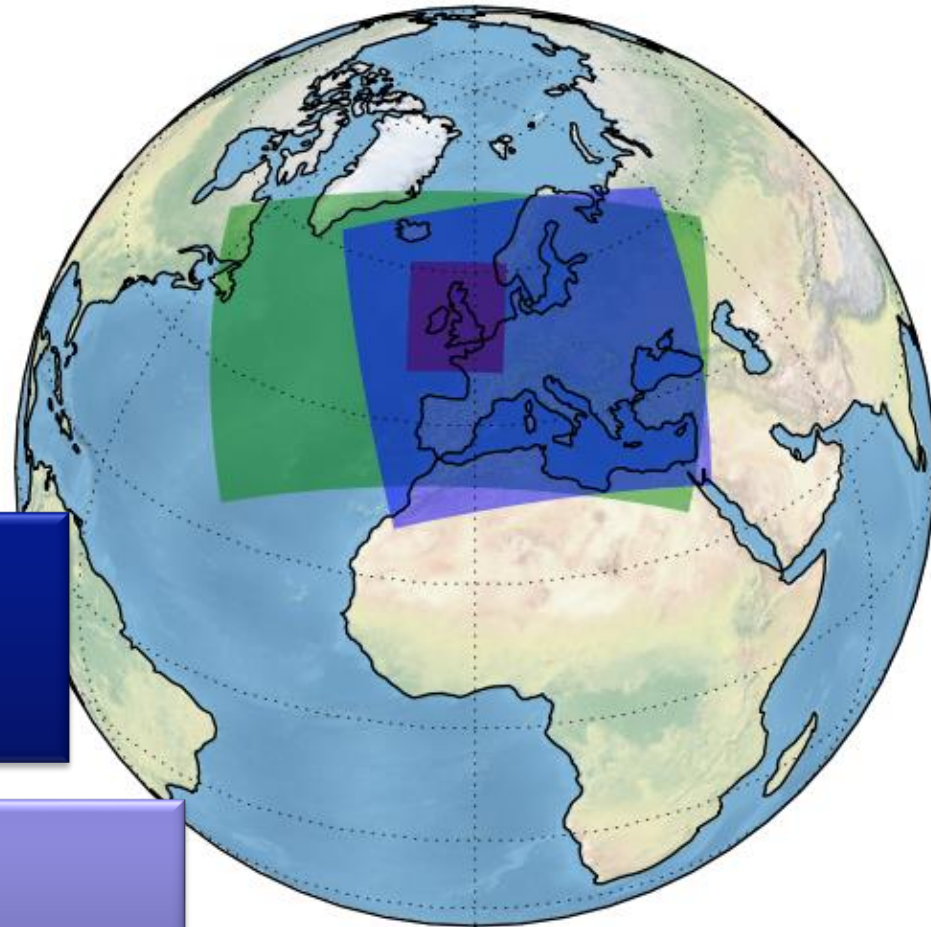
4km

No DA

UKV

1.5km

3D-VAR



Processing at UKMO

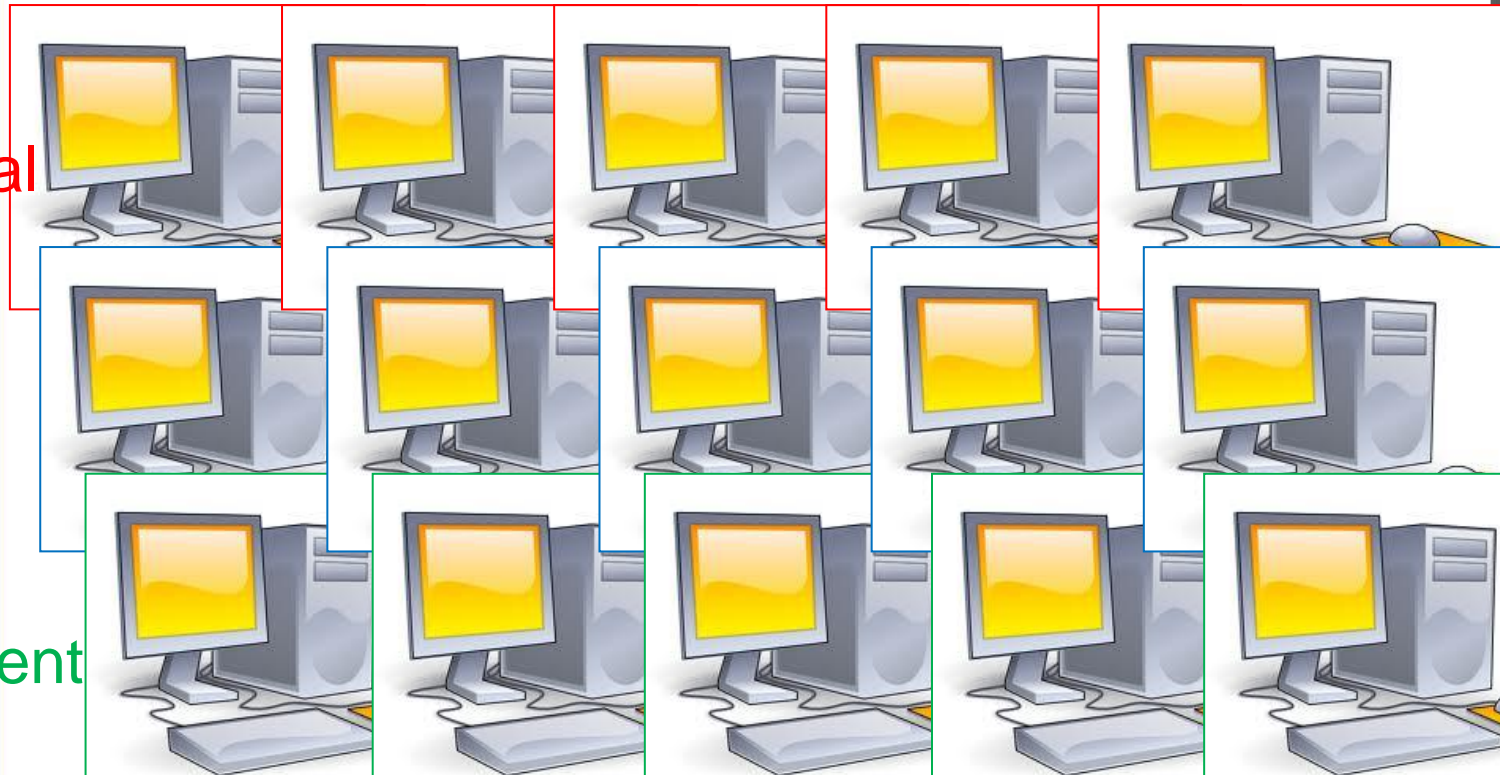
- 5 GNSS processing services running 24/7:
 - METO: Euro, hourly, 41min latency, operational since 2007
 - METG: Global, hourly, 51min latency, operational since 2014
 - METR: UK focused, 15min, <10min latency, still in R&D env.
 - METI01 and 02 delivering Total Electron Content estimates for space weather applications
- All systems (still!) based around BSW50 in DD mode
- Formal agreements guaranteeing raw data access in place on national and international scales
- Formal agreement in place with system developers

GPS Processing at UKMO

Tropospheric

Ionospheric

- Operational
- Test
- Development



METO

METG

METR

METI01

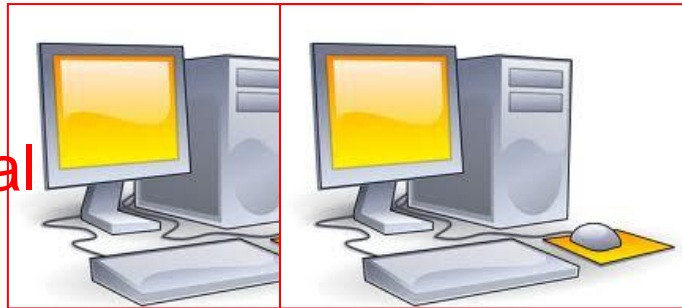
METI02

GPS Processing at UKMO

Tropospheric

Ionospheric

- Operational



- Test

- Development



METO

METG

METR

METI01

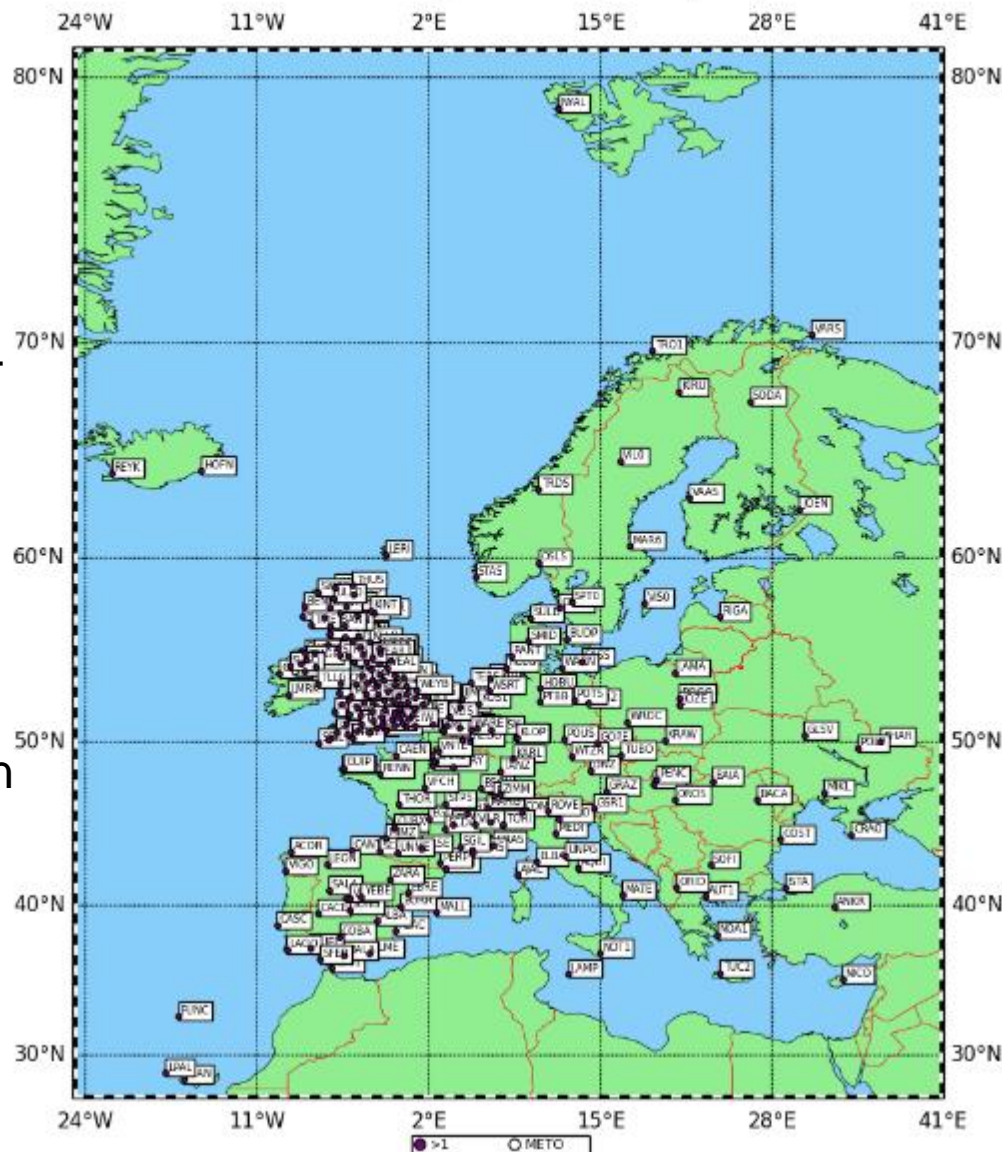
METI02

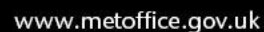
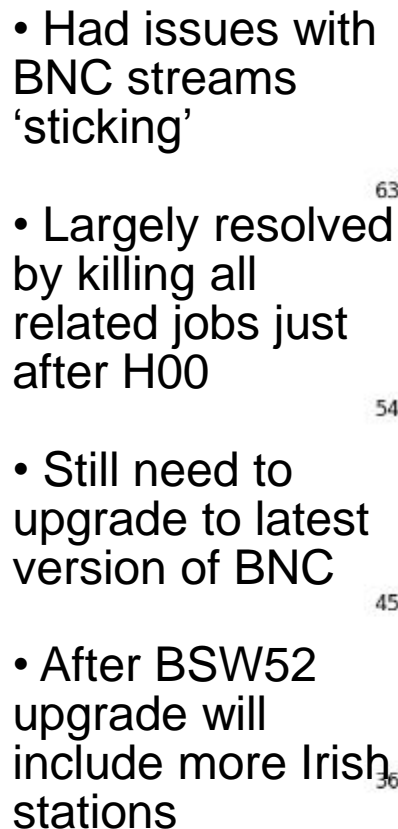
Processing at UKMO: METO



- In process of upgrading to BSW52 – already up and running on DEV server (METT soln.)
- Once BSW52 upgraded on all machines, will update to IGS14
- Will run BSW52 in parallel for x-months, DA will assess data and authorise switch to operational data flow

GNSS stations processed by METO (277)







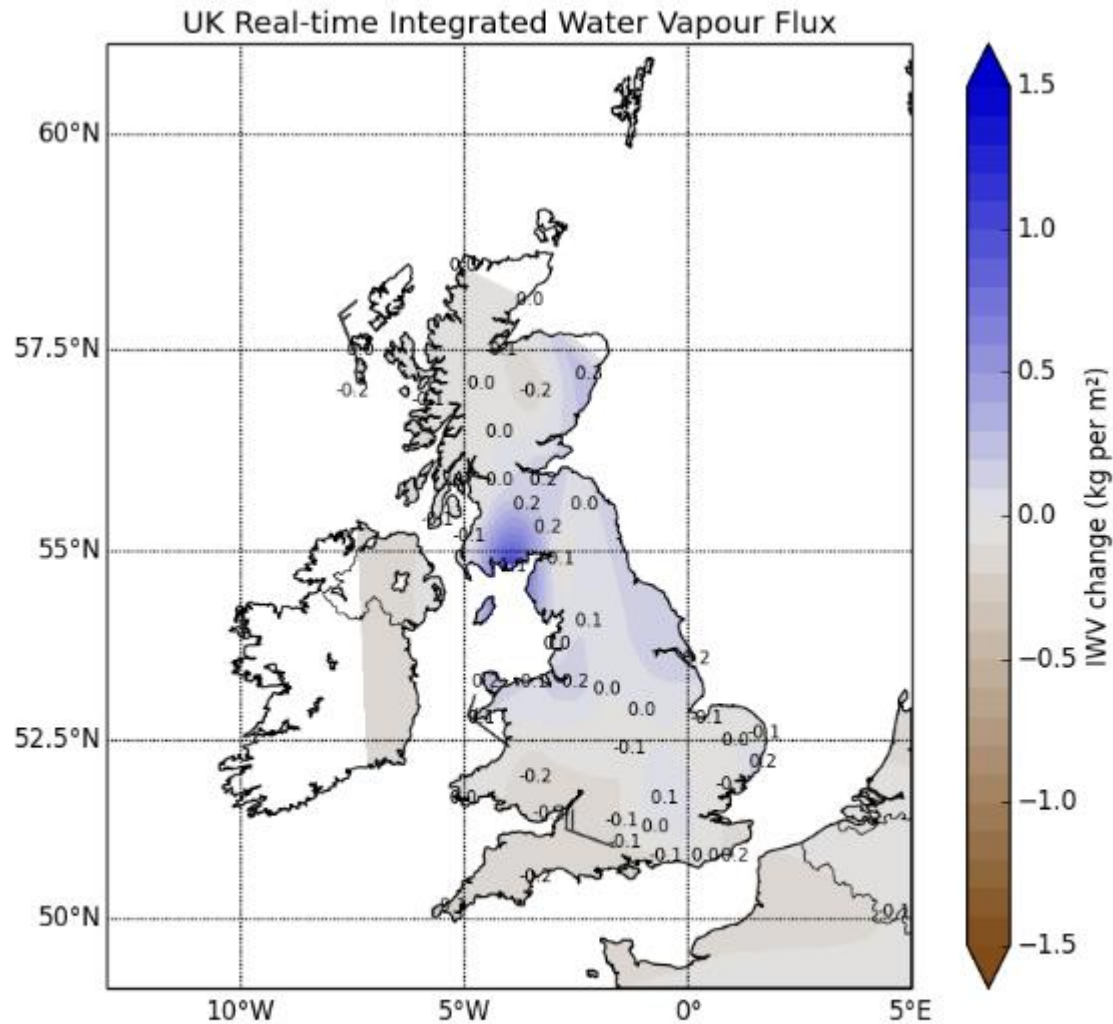
- Once BSW52 updated will add many more stations globally
- Will ensure common stations are processed for global QC (Env. Canada, Geo Aus, NCAR etc)



Forecaster Assessment

- Recently met with two operational forecasters (Dan Suri (Chief Operational Meteorologist) and Martin Young)
- Have developed a rough guide of IWV as indicator for max rainfall
- Mildly interested in IWV imagery
- Very interested in more intuitive information IWV fields/plots can tell them:
 - IWV flux as indicator of convective initiation
 - IWV as indicator for fog formation
 - O-B plots as indicator for where model is over or underestimating humidity (knock-on for cloud cover and surface temp)
- Agreed to develop (and write up) case studies over next 18 months to explore as yet untapped potential of GNSS IWV, to act as forecaster guidance and give justification of integrating GNSS IWV in operational forecaster displays

METR IWV Flux Plots



Dots = GPS sites Crosses = ATDnet fixes Barbs = Wind profiler (large barbs) and AMDAR (small barbs) data (between 1-2km)

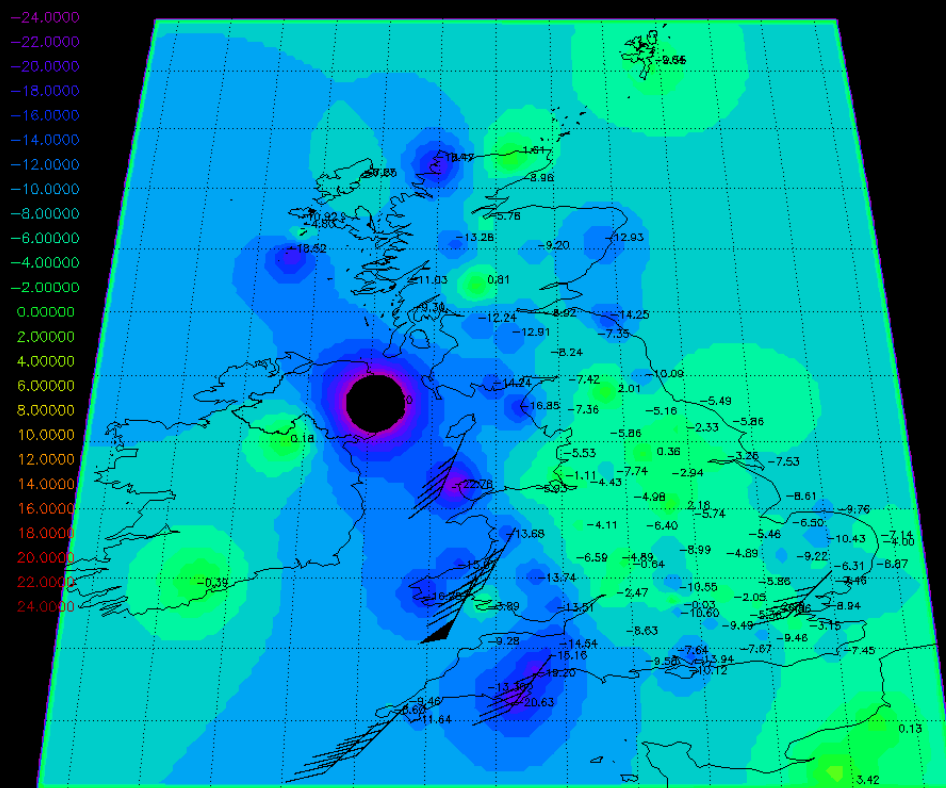
IWV change between 1945UTC and 1959UTC, 27/11/2017

V1.2 Crown Copyright 2017.. Source: Met Office

© Crown copyright

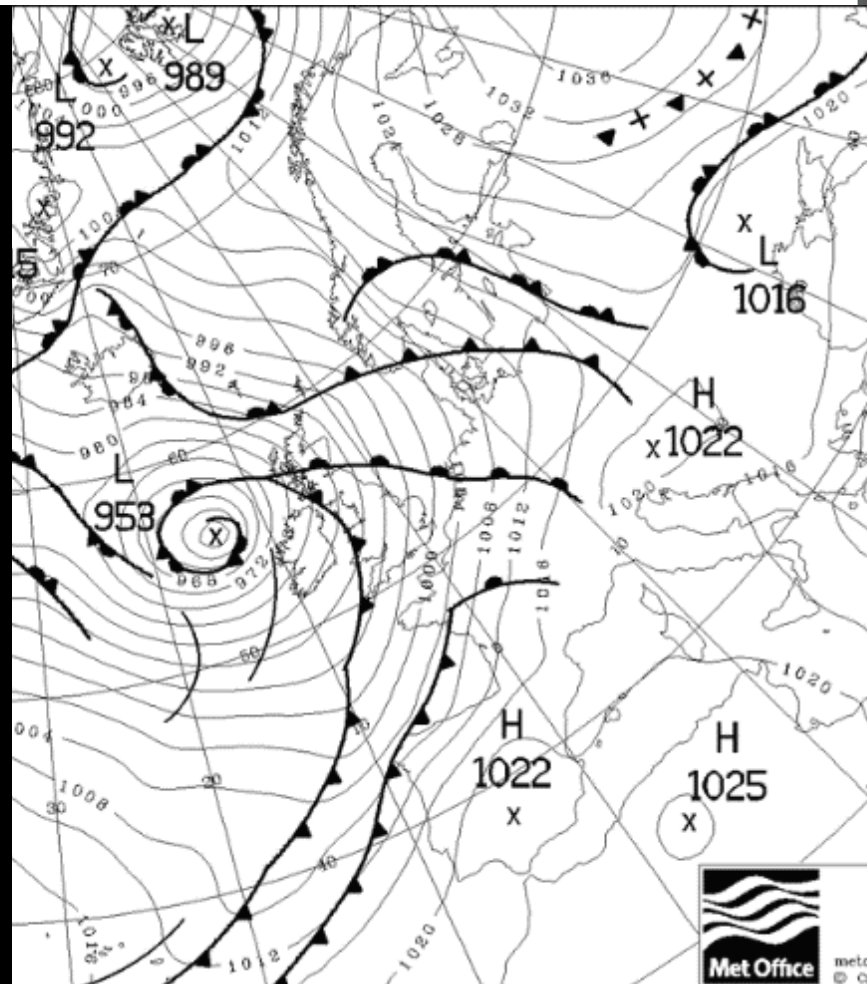
O-B Feature 6/12/09

UK Region O-B ZTD Plot 2009 12 06 00 UTC (Units=mm of ZTD)



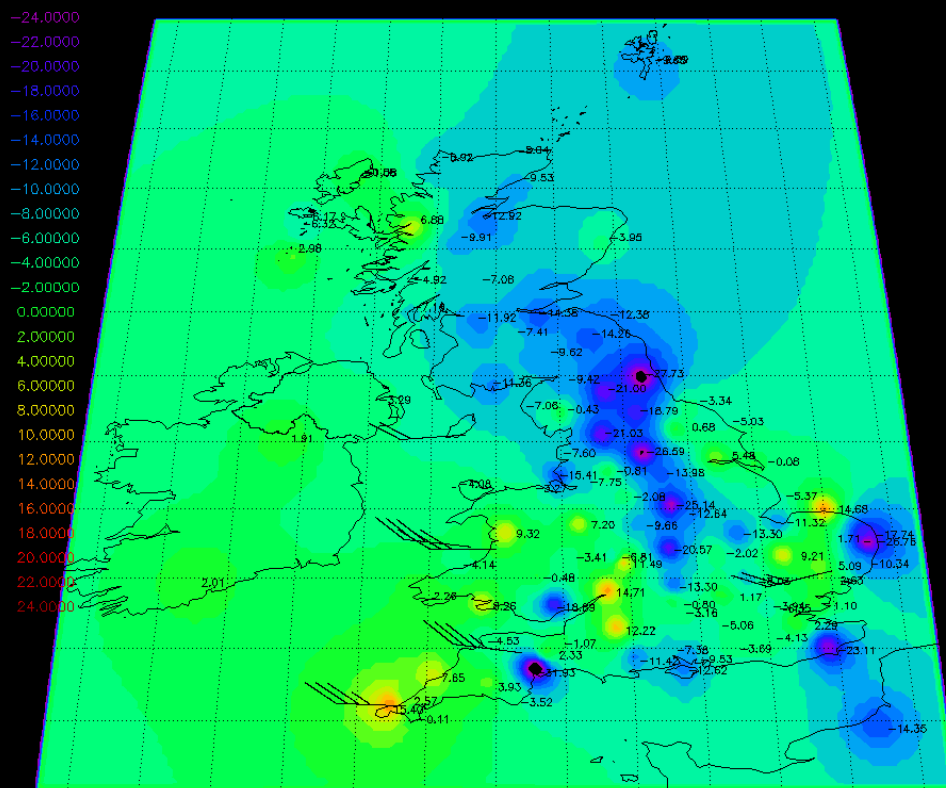
Wind barbs at 2000m. Lightning Data (White Xs) provided by the UK Met Office ATD Sferics system

Orthometric Map Projection



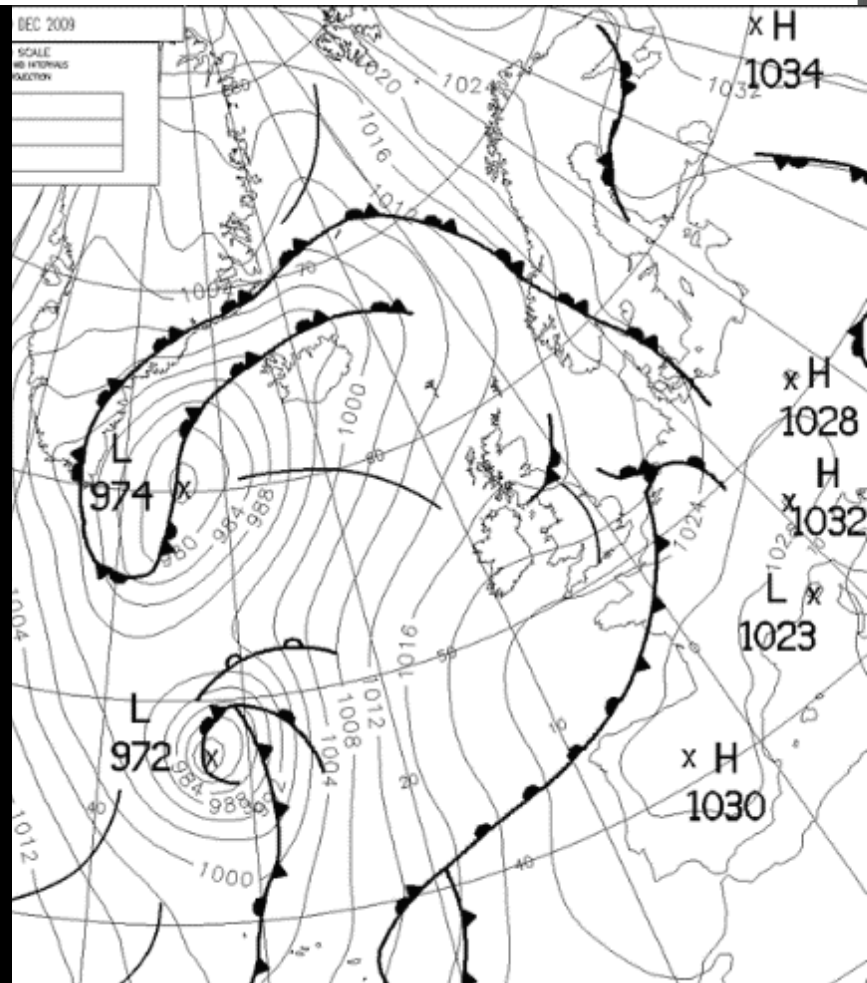
O-B Feature 10/12/09

UK Region O-B ZTD Plot 2009 12 10 00 UTC (Units=mm of ZTD)



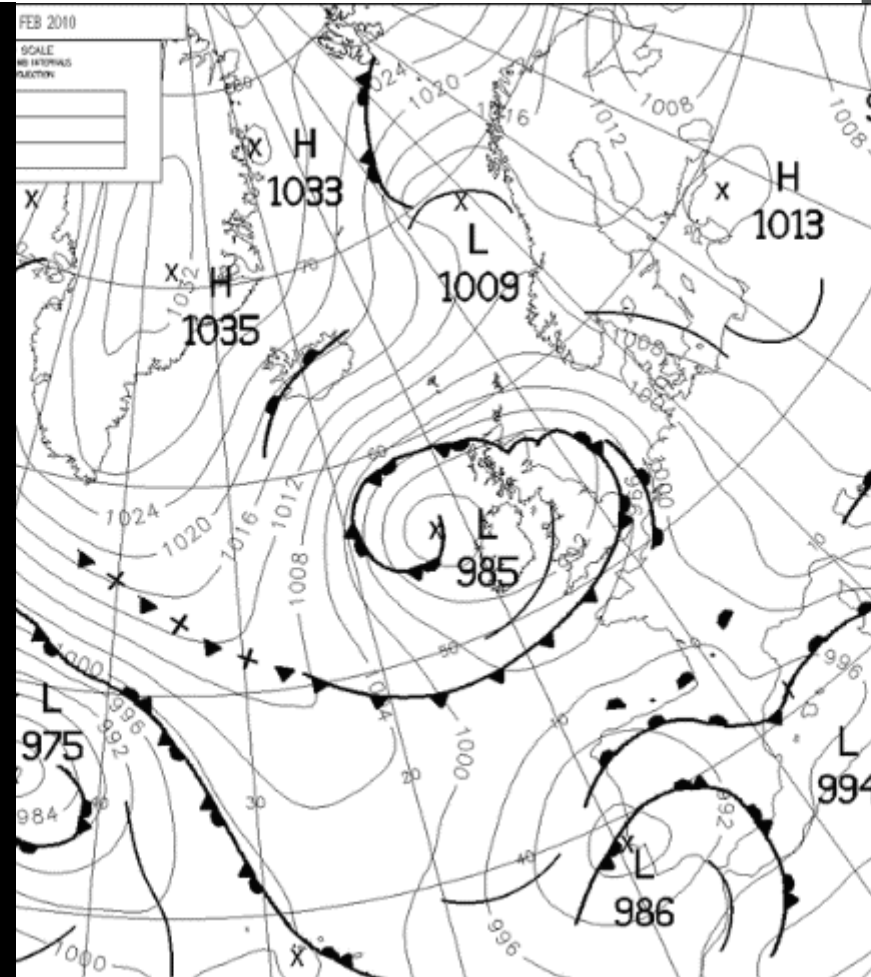
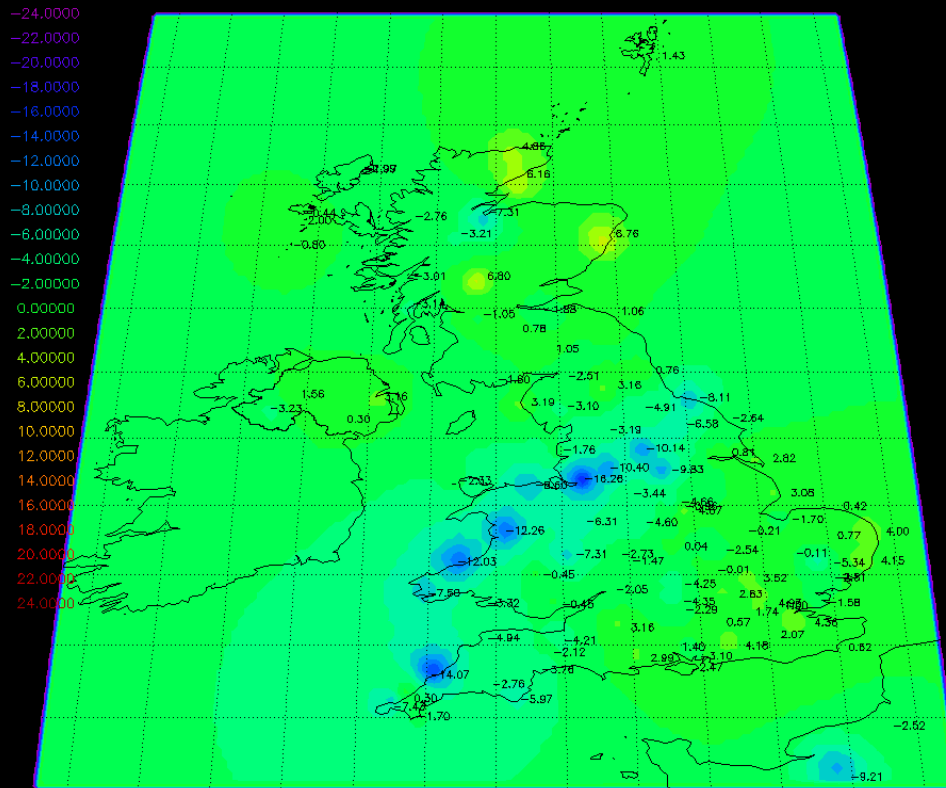
Wind barbs at 2000m. Lightning Data (White Xs) provided by the UK Met Office ATD Sferics system

Orthometric Map Projection

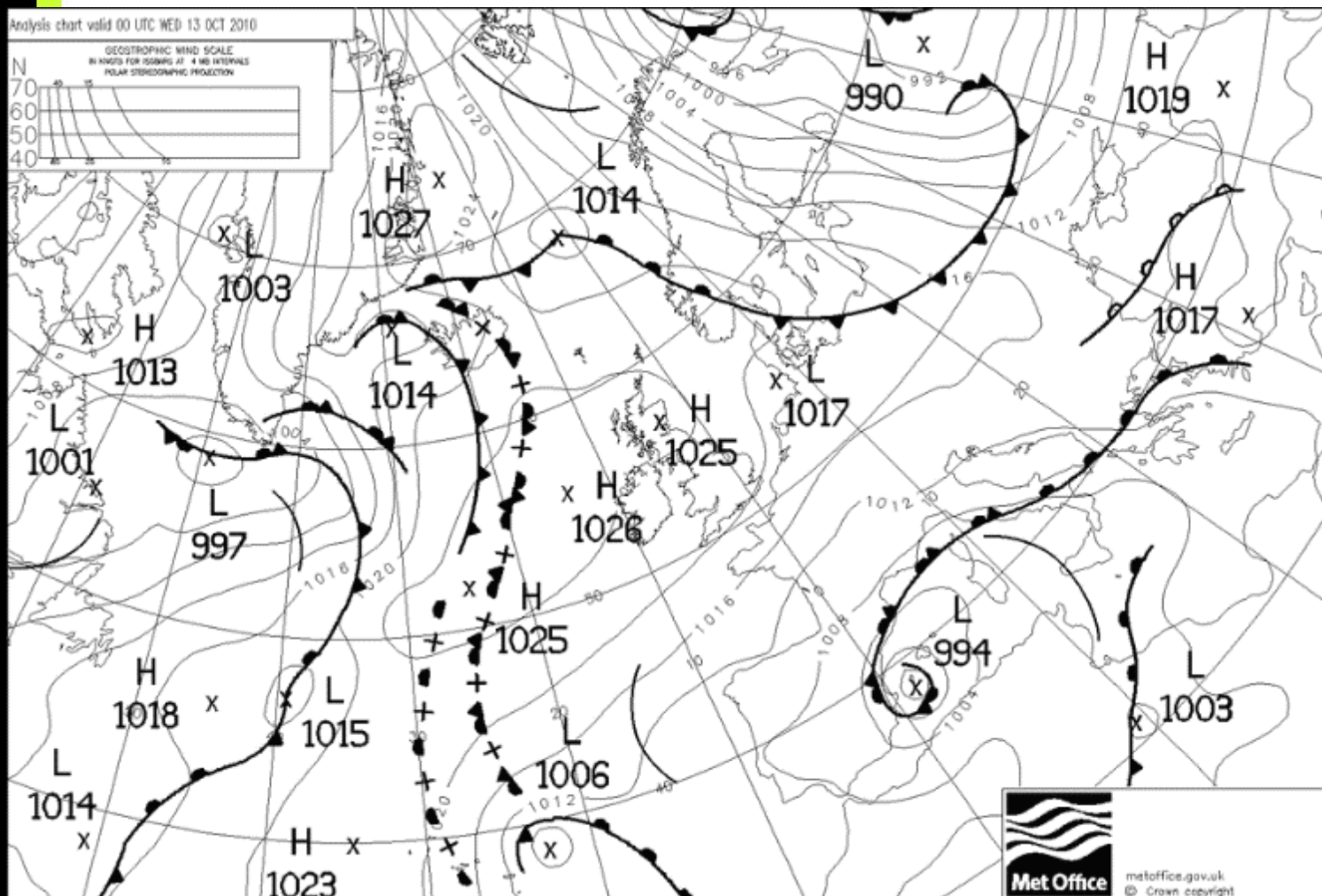


O-B Feature 16/02/10

UK Region O-B ZTD Plot 2010 02 16 12 UTC (Units=mm of ZTD)



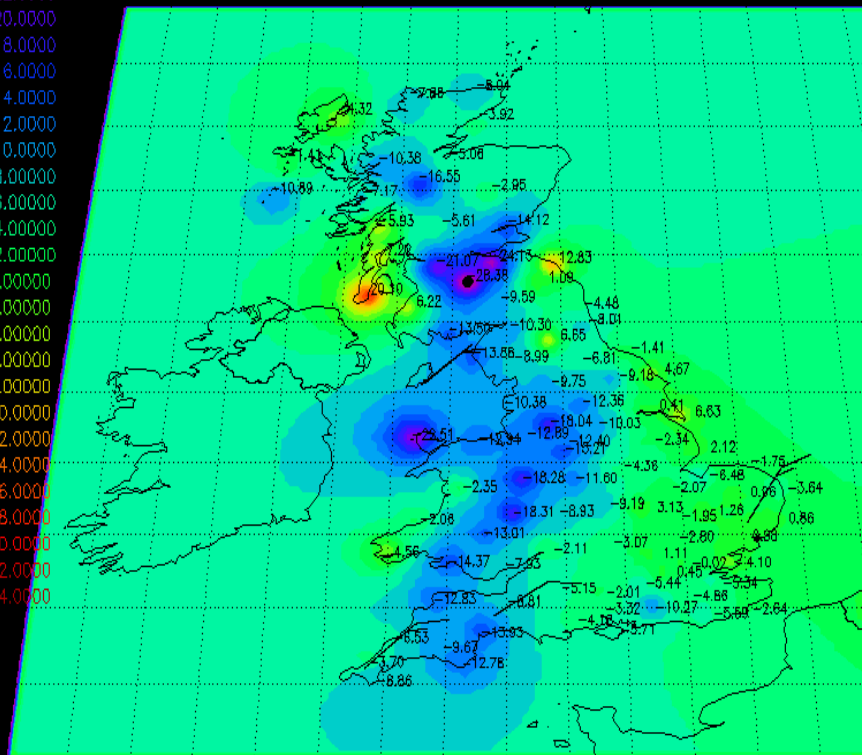
ZTD O-B Case Study 13/10/10



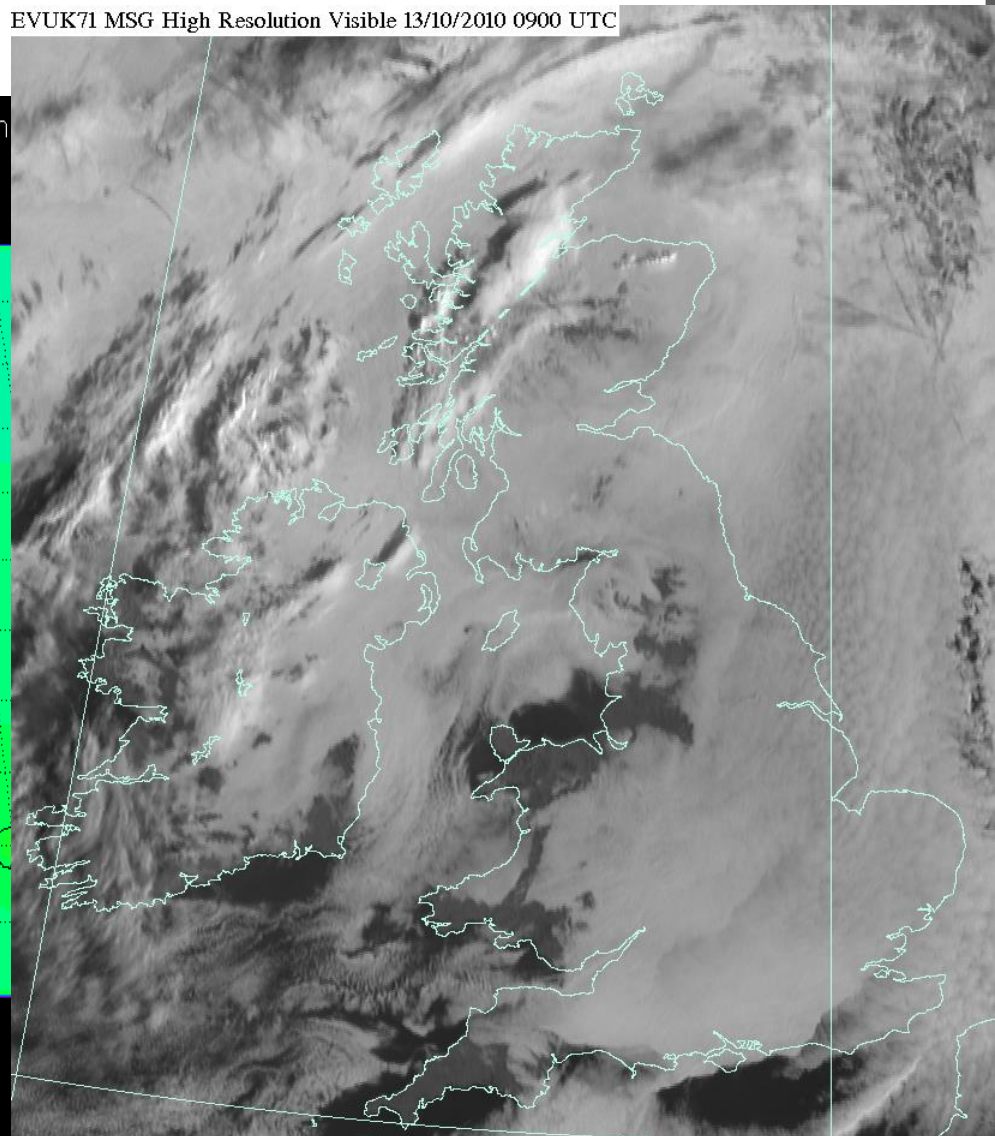
ZTD O-B Case Study 13/10/10

UK Region NAE O-B ZTD Plot 2010 10 13 00 UTC (Units=mm)

-24.0000
-22.0000
-20.0000
-18.0000
-16.0000
-14.0000
-12.0000
-10.0000
-8.0000
-6.0000
-4.0000
-2.0000
0.0000
2.0000
4.0000
6.0000
8.0000
10.0000
12.0000
14.0000
16.0000
18.0000
20.0000
22.0000
24.0000



EVUK71 MSG High Resolution Visible 13/10/2010 0900 UTC

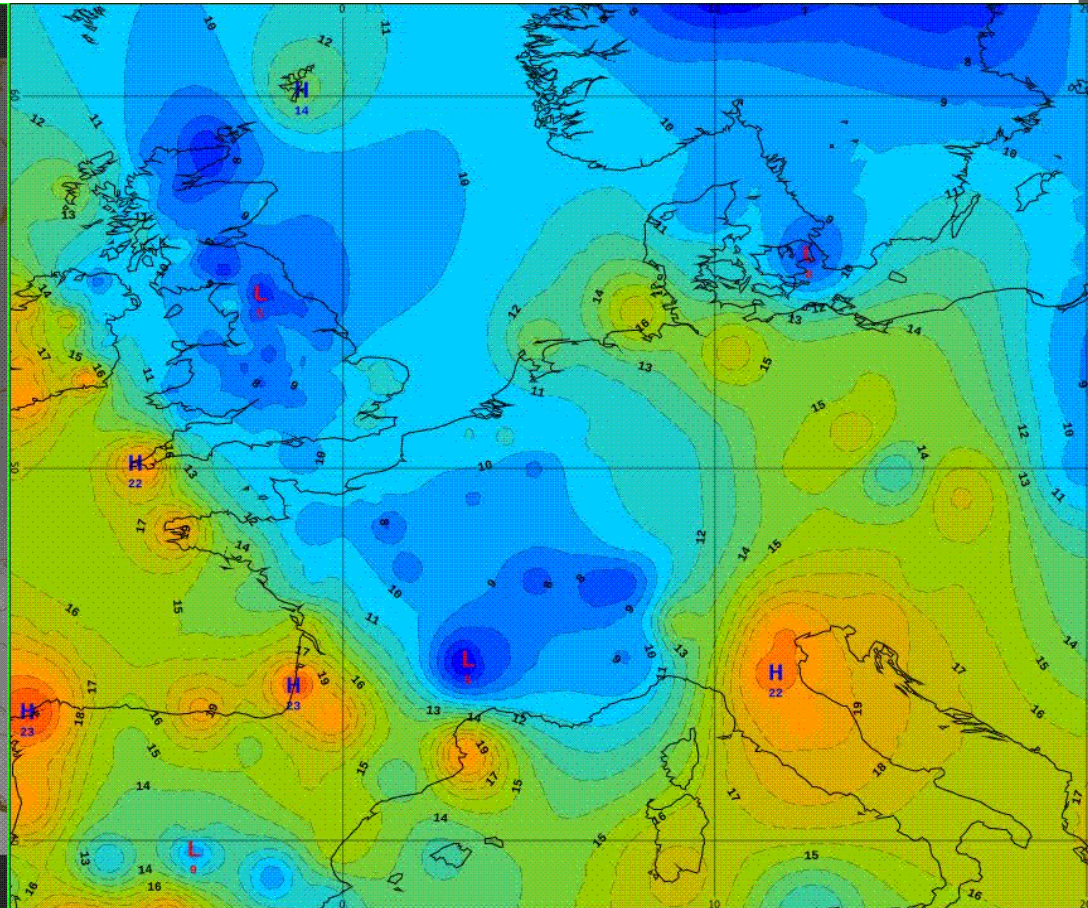
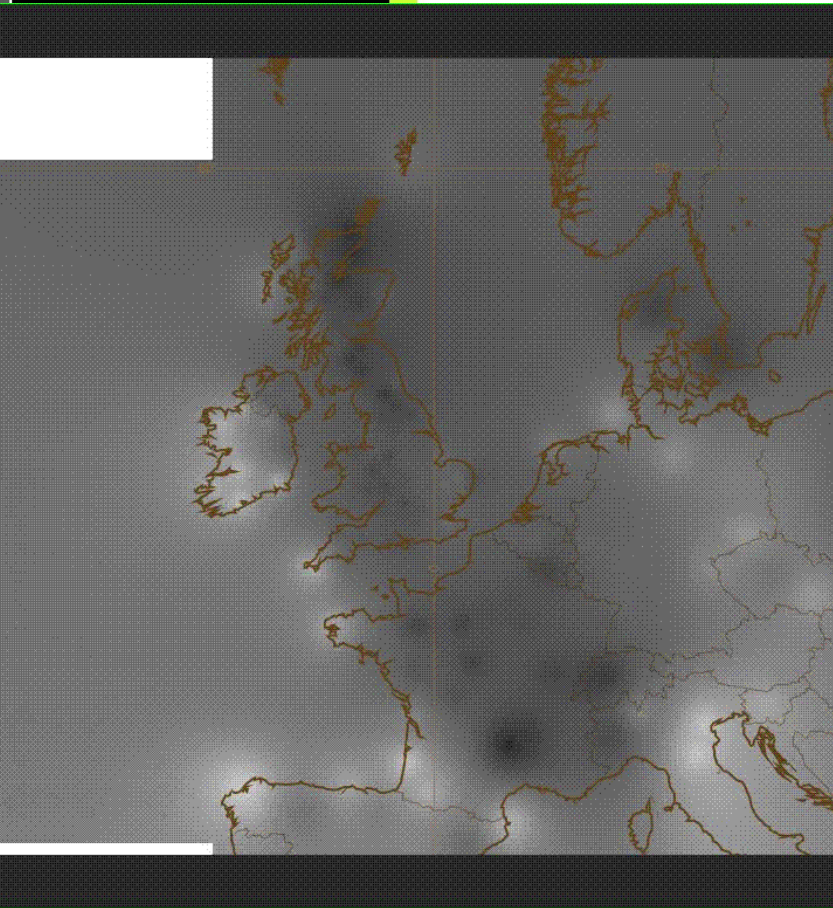


Wind barbs at 1km. Lightning Data (White Xs) provided by the UK Met Office ATD Sferics system

Orthometric Map Projection

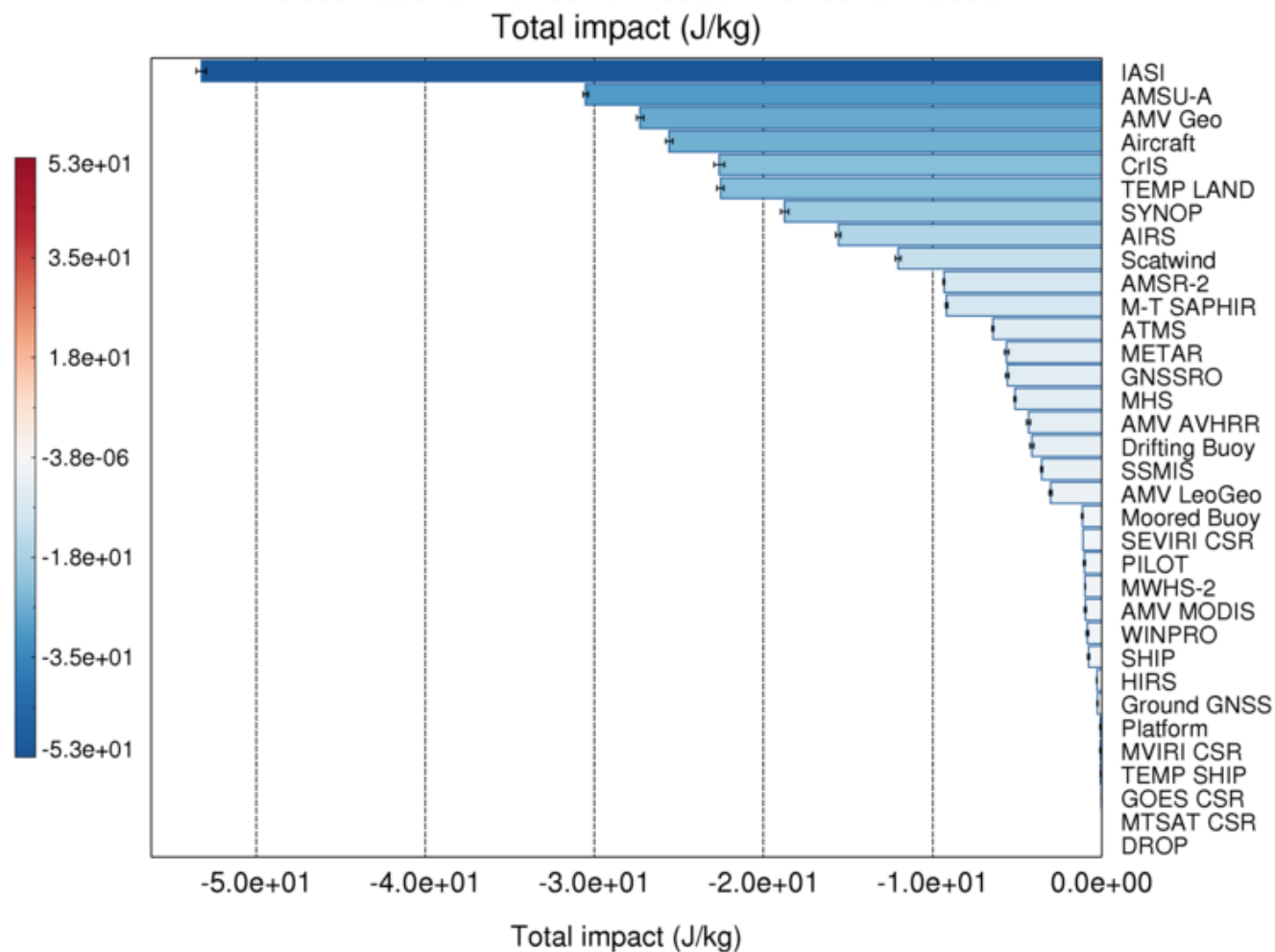
© Crown Copyright 1988-2000

Operational IWV Plots (VW/Swift)



ZTD Impact

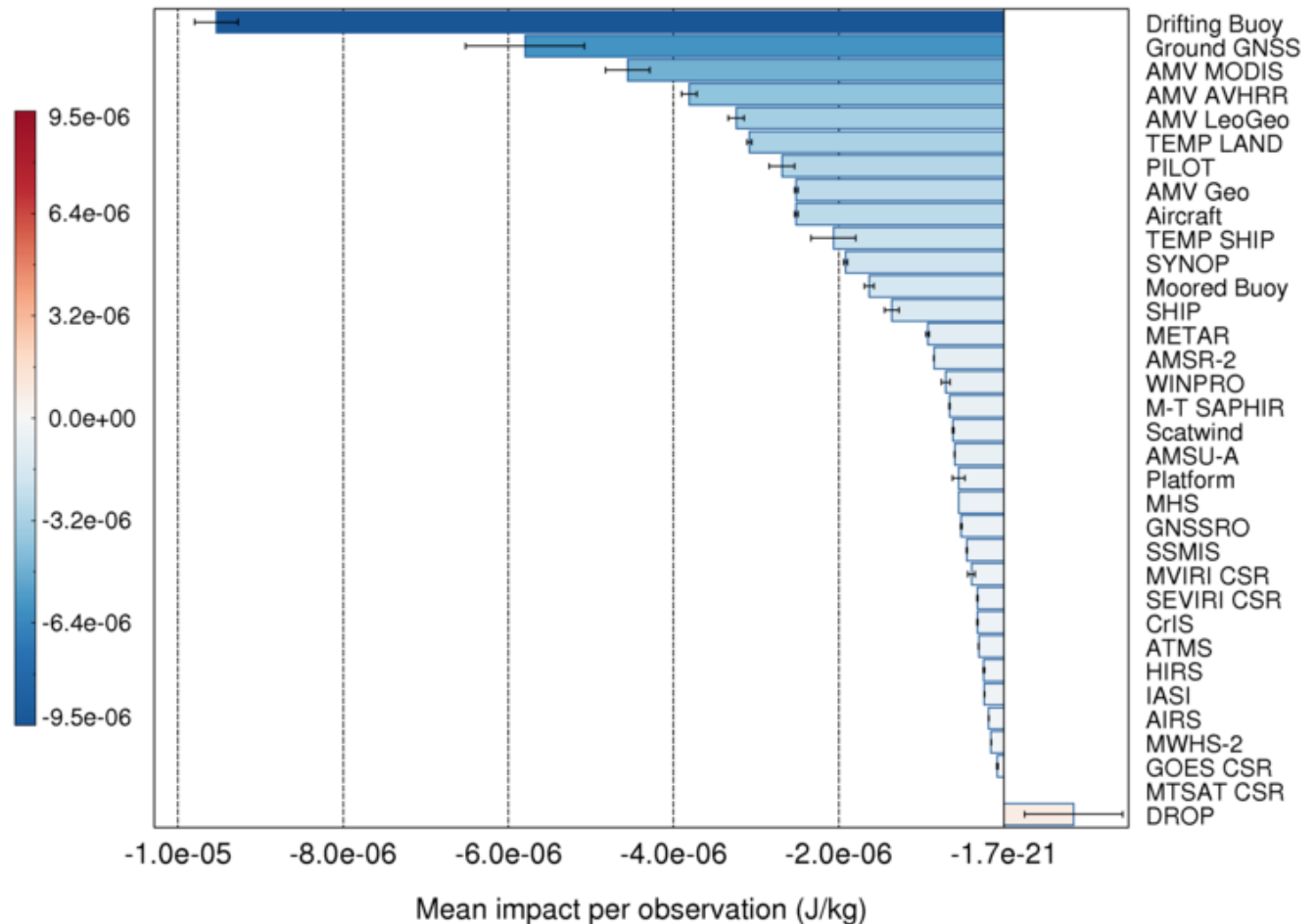
All observations / 20160701T0000Z-20160731T0600Z



ZTD Impact

All observations / 20160701T0000Z-20160731T0600Z

Mean impact per observation (J/kg)



Questions

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