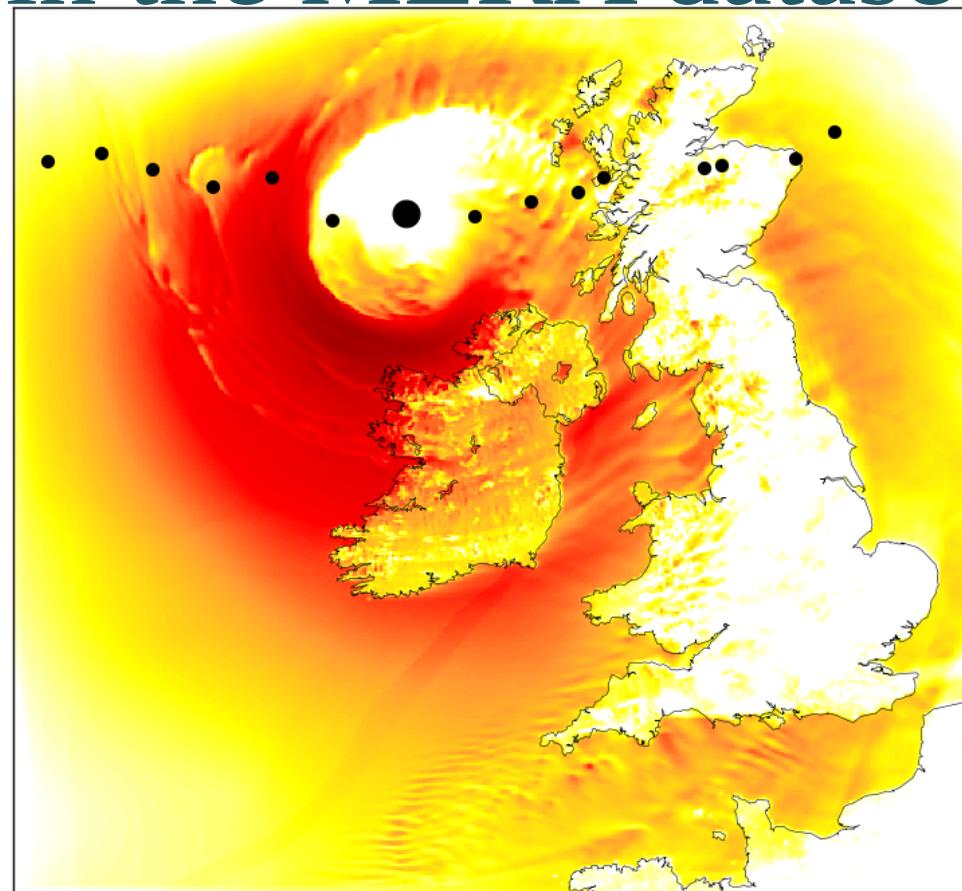


Verification of extreme windstorms in the MÉRA dataset



Laura Zubiate, Met Éireann

MÉRA Workshop, 2nd May 2019

WINDSURFER

WIND AND WAVES FOR REINSURANCE, FORESTRY AND OFFSHORE ENERGY



National Centre for
Atmospheric Science
NATIONAL ENVIRONMENT RESEARCH COUNCIL



University of
Reading



DEMOKRITOS
NATIONAL CENTER FOR SCIENTIFIC RESEARCH



Norwegian
Meteorological
Institute



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Meteorologisch Instituut
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FINNISH METEOROLOGICAL
INSTITUTE



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WIND AND WAVES FOR REINSURANCE, FORESTRY AND OFFSHORE ENERGY

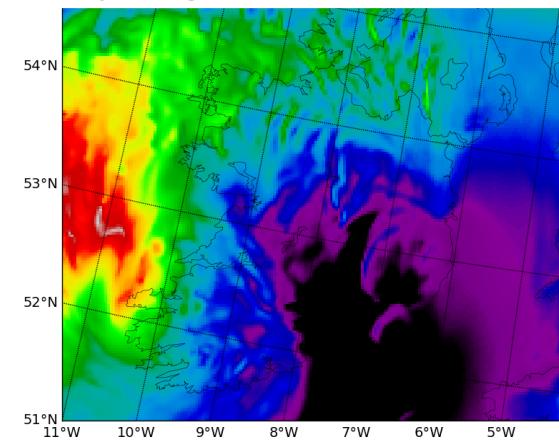
Assessing current and future risk of extreme wind and waves for the forestry, reinsurance and offshore energy sectors



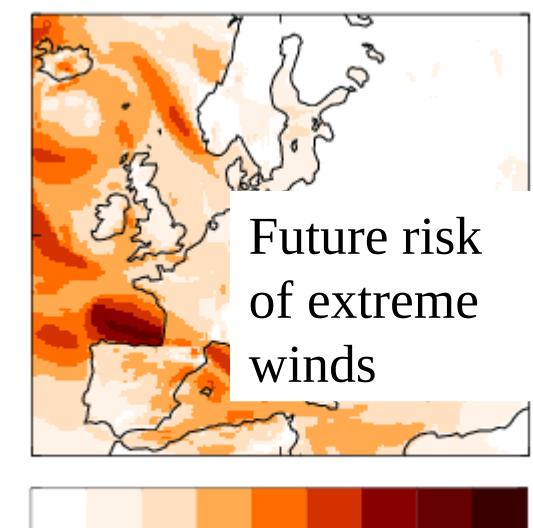
Modelling extreme winds in very high resolution models



Historical
Windstorm
Database



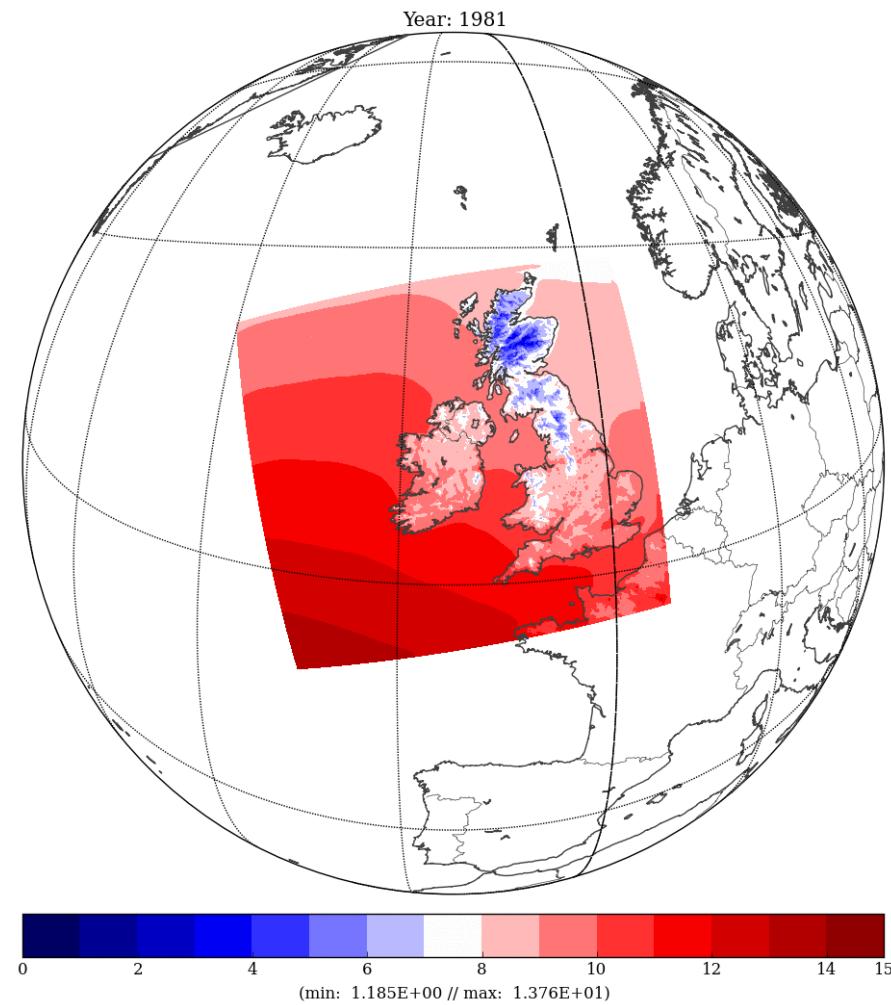
Storm Ophelia in the MERA dataset



From XWS Catalogue

The MÉRA dataset

- Met Éireann climate ReAnalysis
- Launched in May 2017
- Used HARMONIE-AROME Numerical Weather Prediction system (forecast model, data assimilation system, conventional observations)
- Products: analysis 3-hourly, 1-hourly forecast (initialised every 3 hours) and 33-hour forecast initialised at 00
- From 1981 – 2018: currently at September 2018 and will continue while ECMWF ERA-Interim boundaries are available

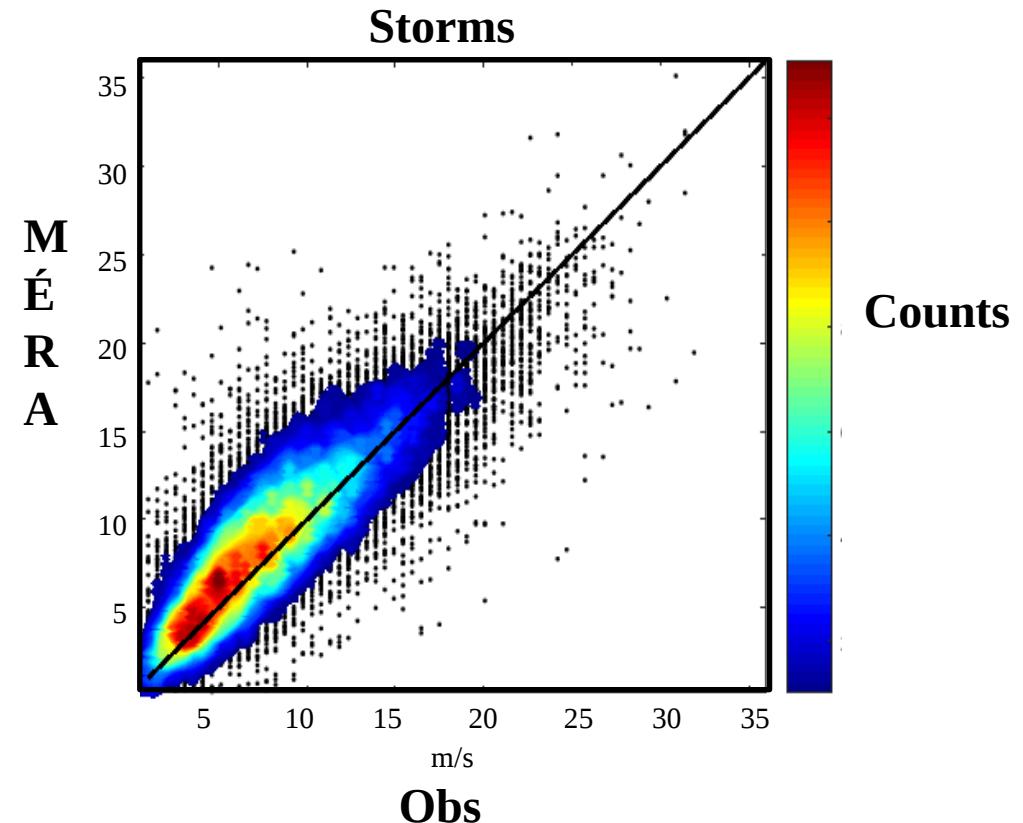
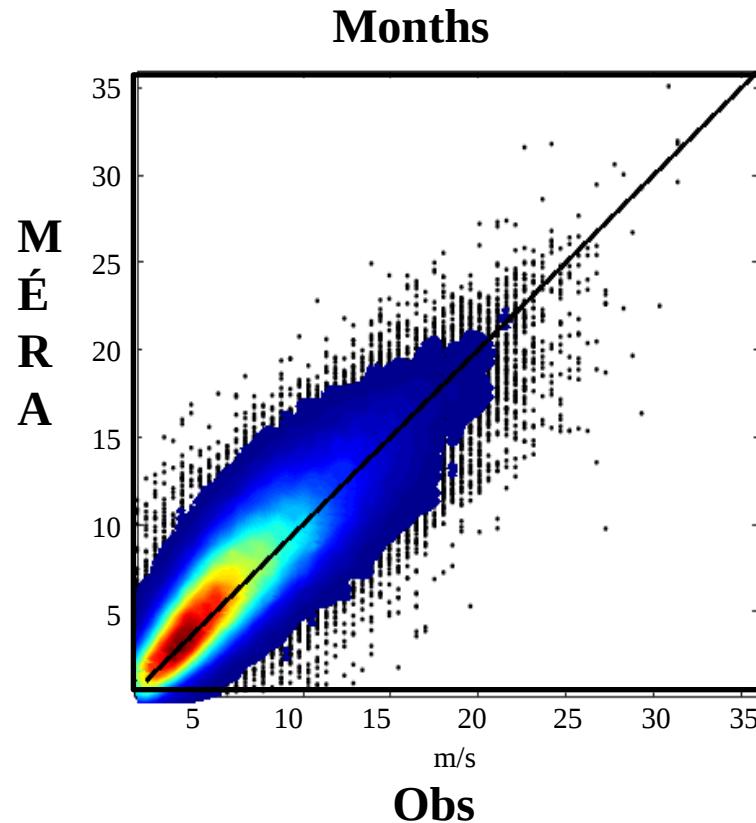


Reference: Gleeson et al., (2017): Met Éireann high resolution reanalysis for Ireland, ASR

Storm Verification

- 20 storms in 16 months. Criteria to select the storms
 - Met Éireann's **Major Weather Events**: Feb1988, Feb1990, Jan1991, Dec1997, Dec1998, Dec2013, Jan2014, Feb2014, Darwin, Ophelia
 - **XWS Catalogue**: Oct2002 (Jeanette), Jan2005 (Gudrun), Jan2007 (Kyrill)
 - Wind speeds exceeding 49 knots in more than one station: Jan2005, Jan2008, Mar2008
- 72 hour periods centered around the time of maximum wind speed (XWS Catalogue methodology)
- 23 stations from Met Éireann's synoptic network: 10m level wind speeds at hourly resolution (forecast product)

Verification

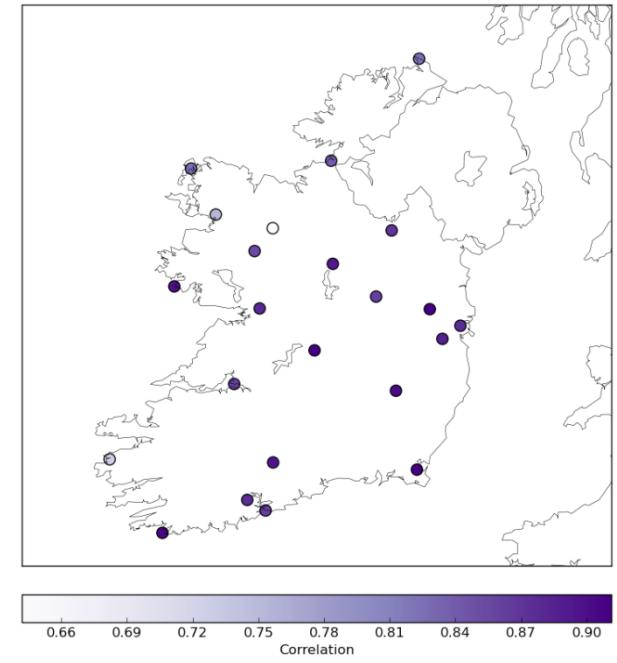
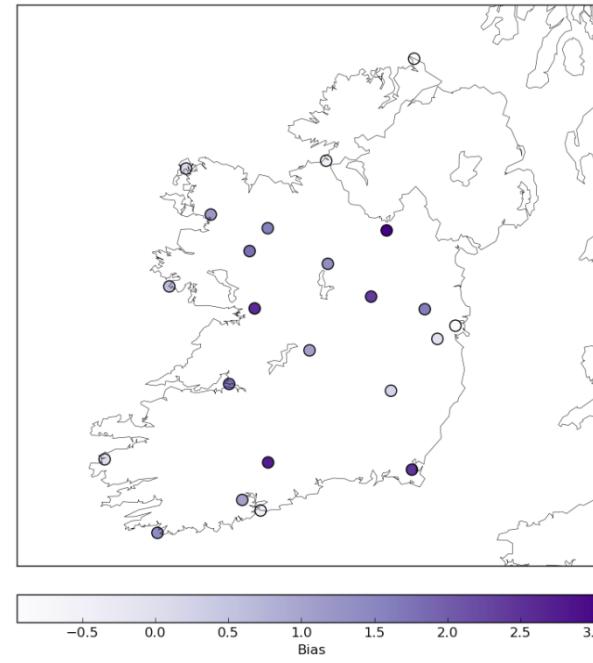
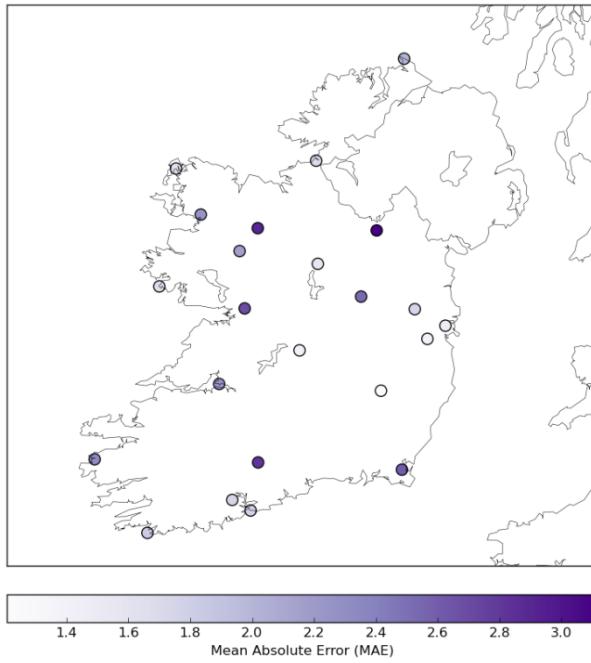


RMSE = 2.0743
Bias = 0.7858
MAE = 1.658
Correlation = 0.8937

RMSE = 2.5174
Bias = 1.0592
MAE = 2.0351
Correlation = 0.85516

Storm Verification

20 storms



Storm Darwin

- 12th February 2014
- Shannon Airport recorded gust of 159 km/h
- 215,000 homes lost power
- 7.5 million trees felled, 1% of national total

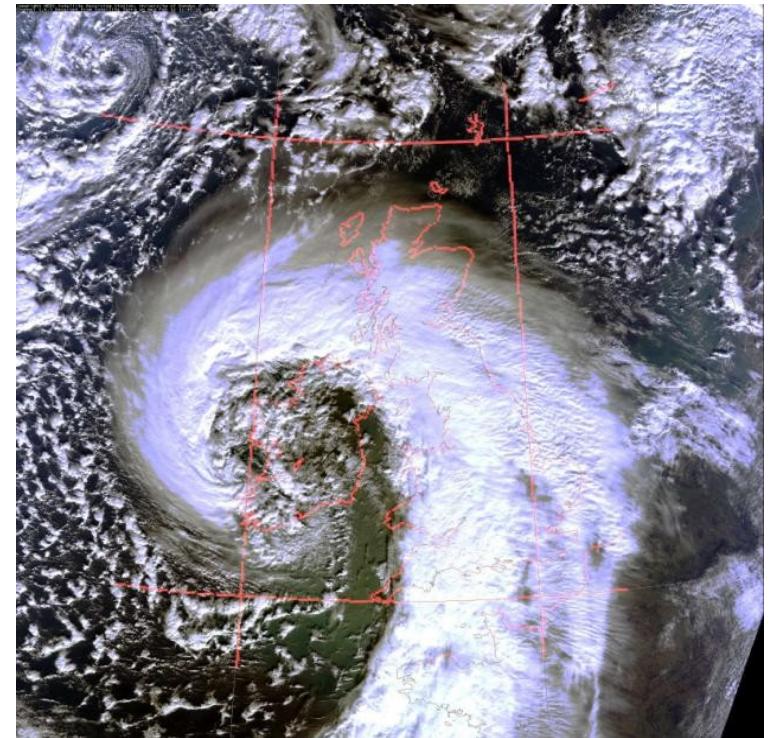
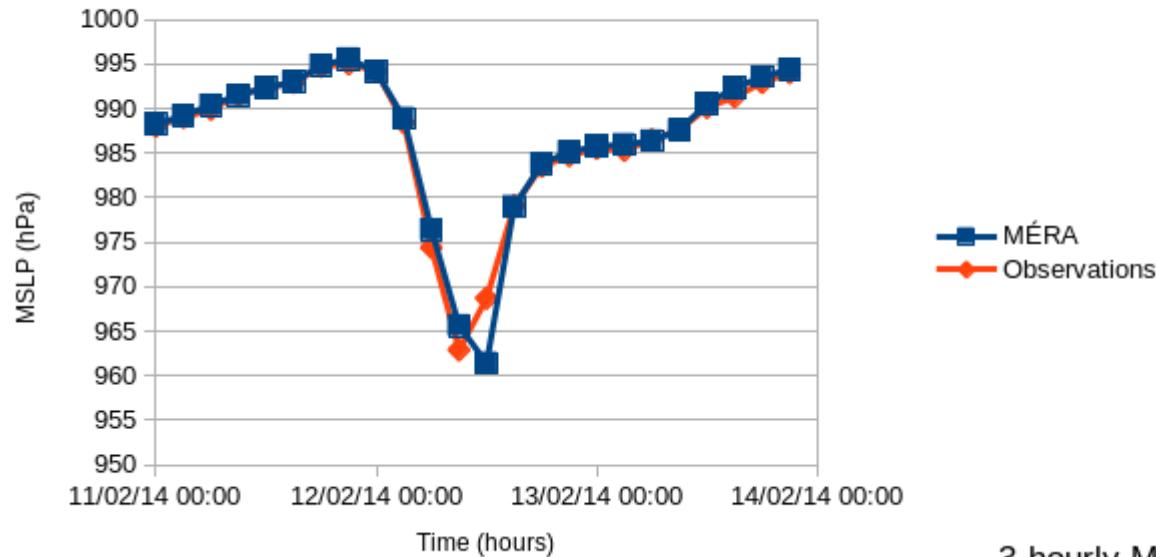


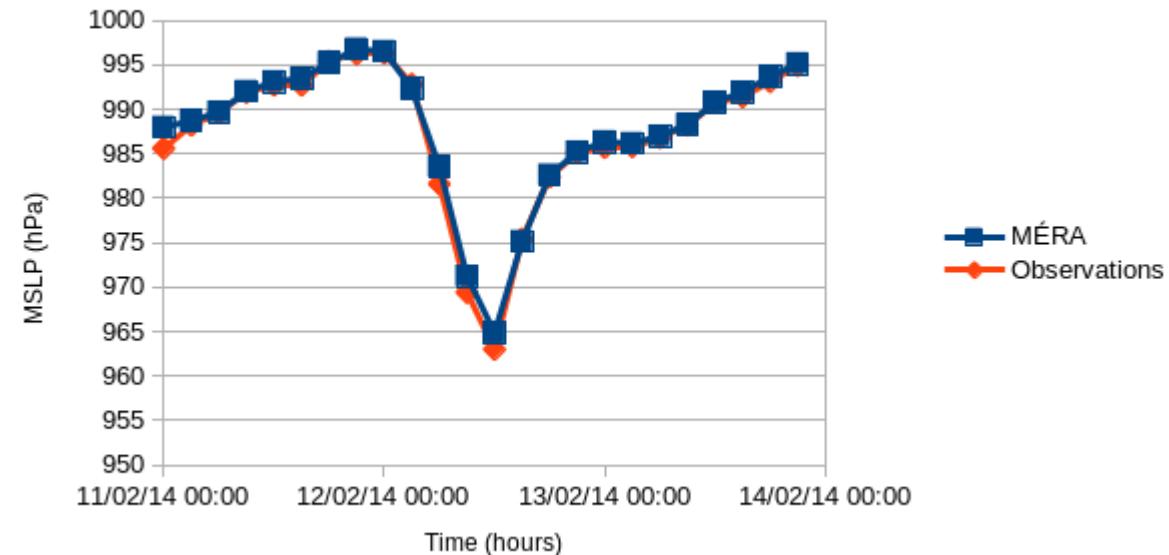
Image: MODIS

Storm Verification

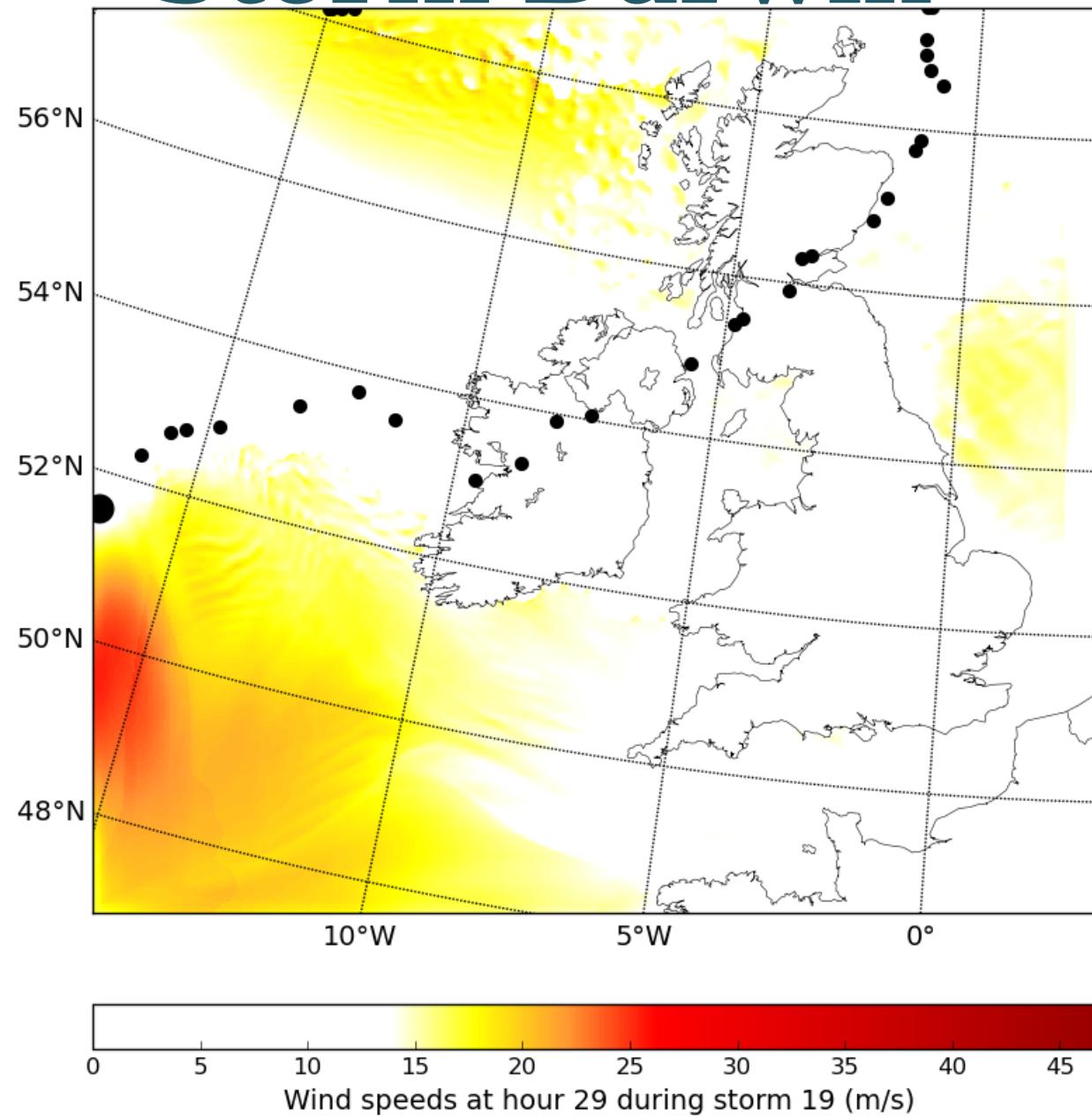
3-hourly MSLP in Valentia during Darwin



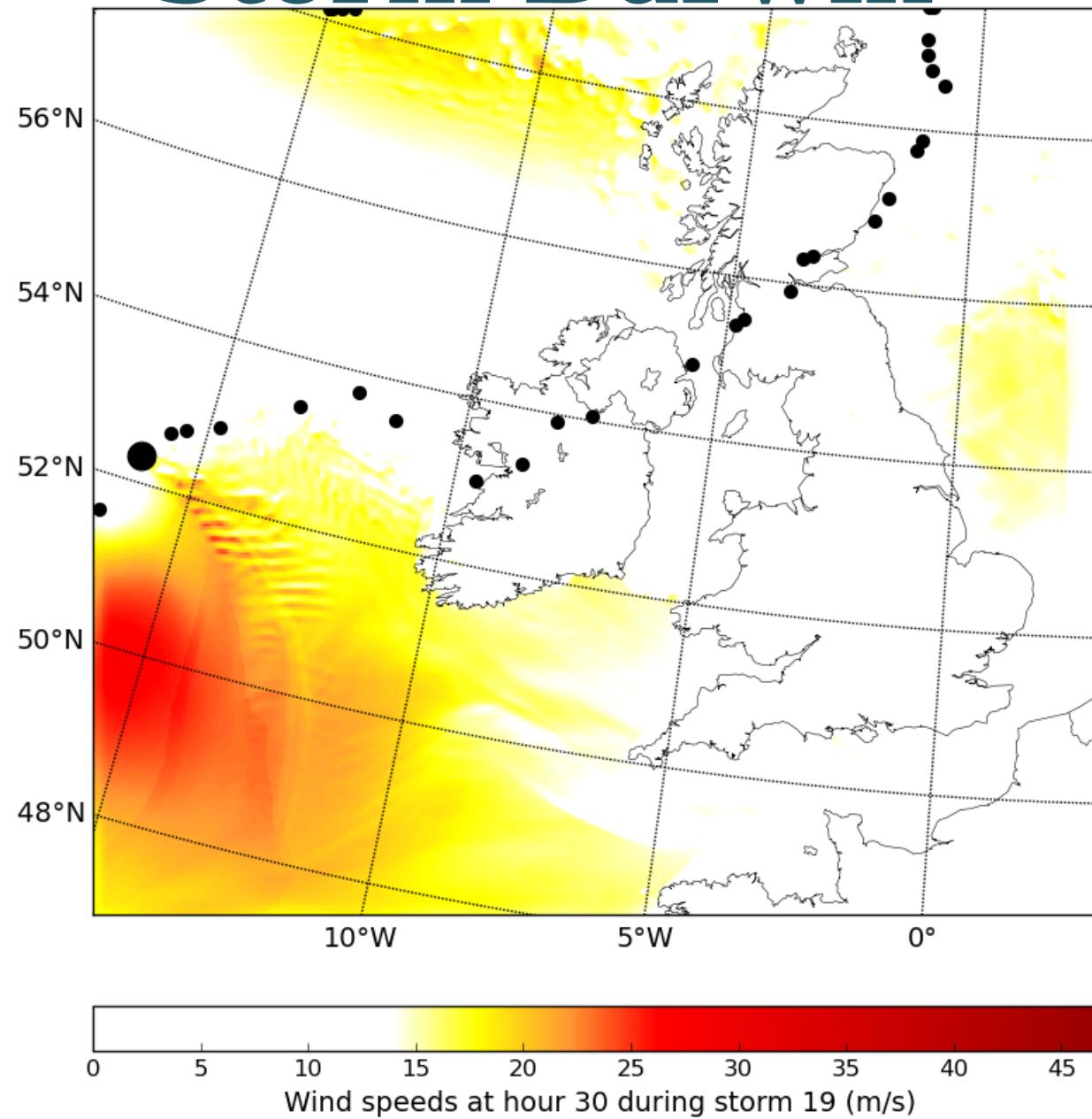
3-hourly MSLP in Roches Point during Darwin



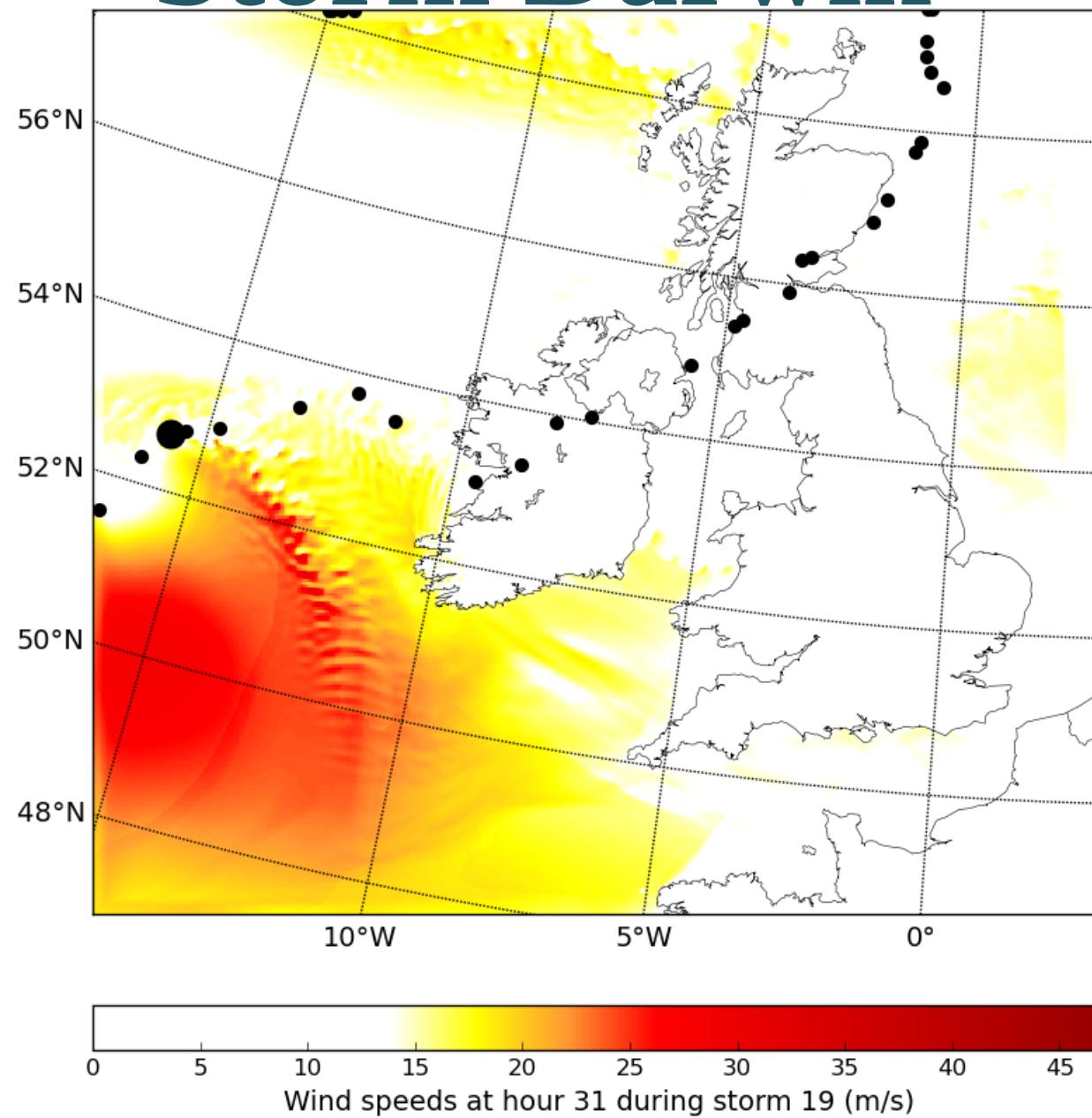
Storm Darwin



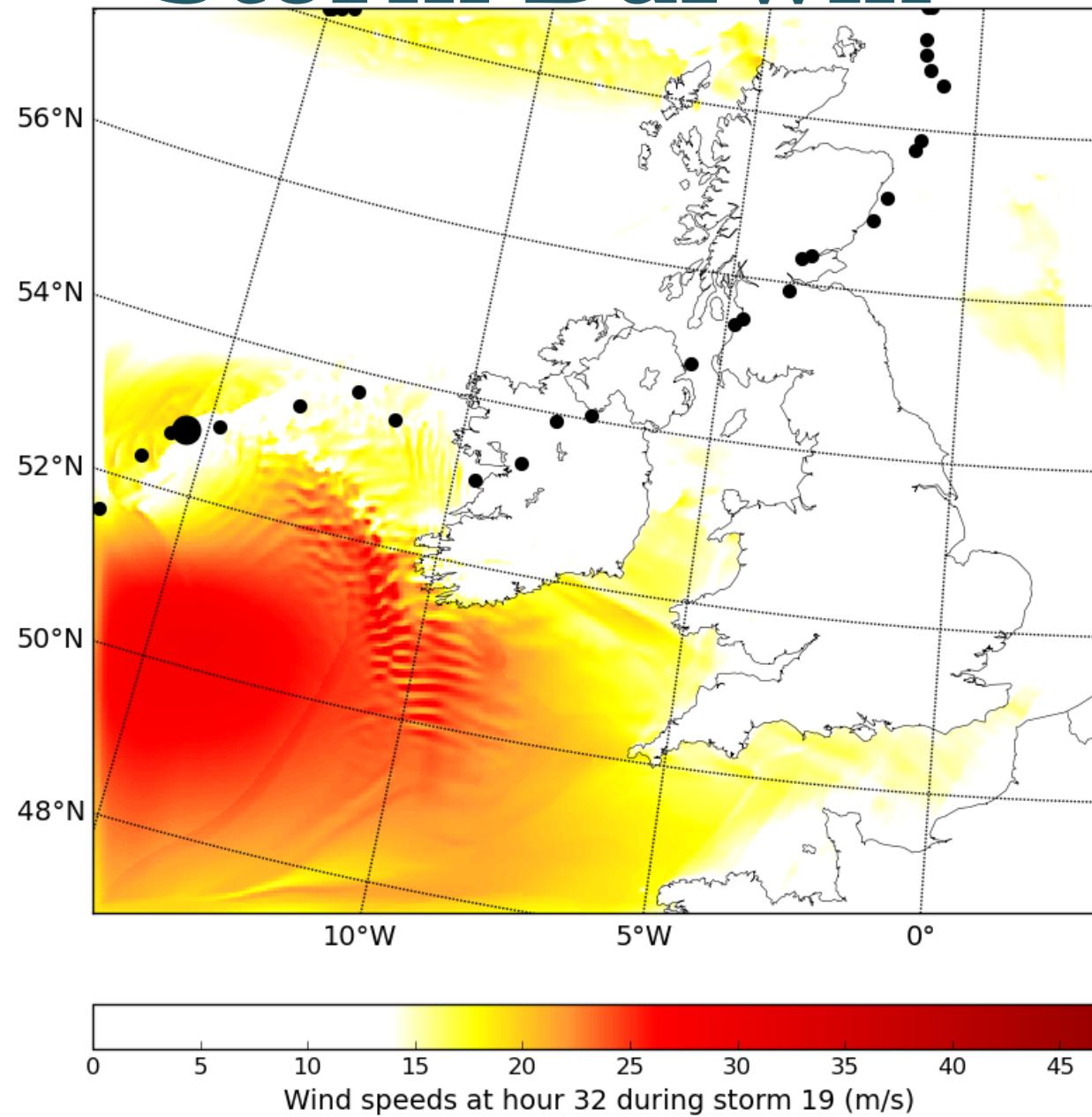
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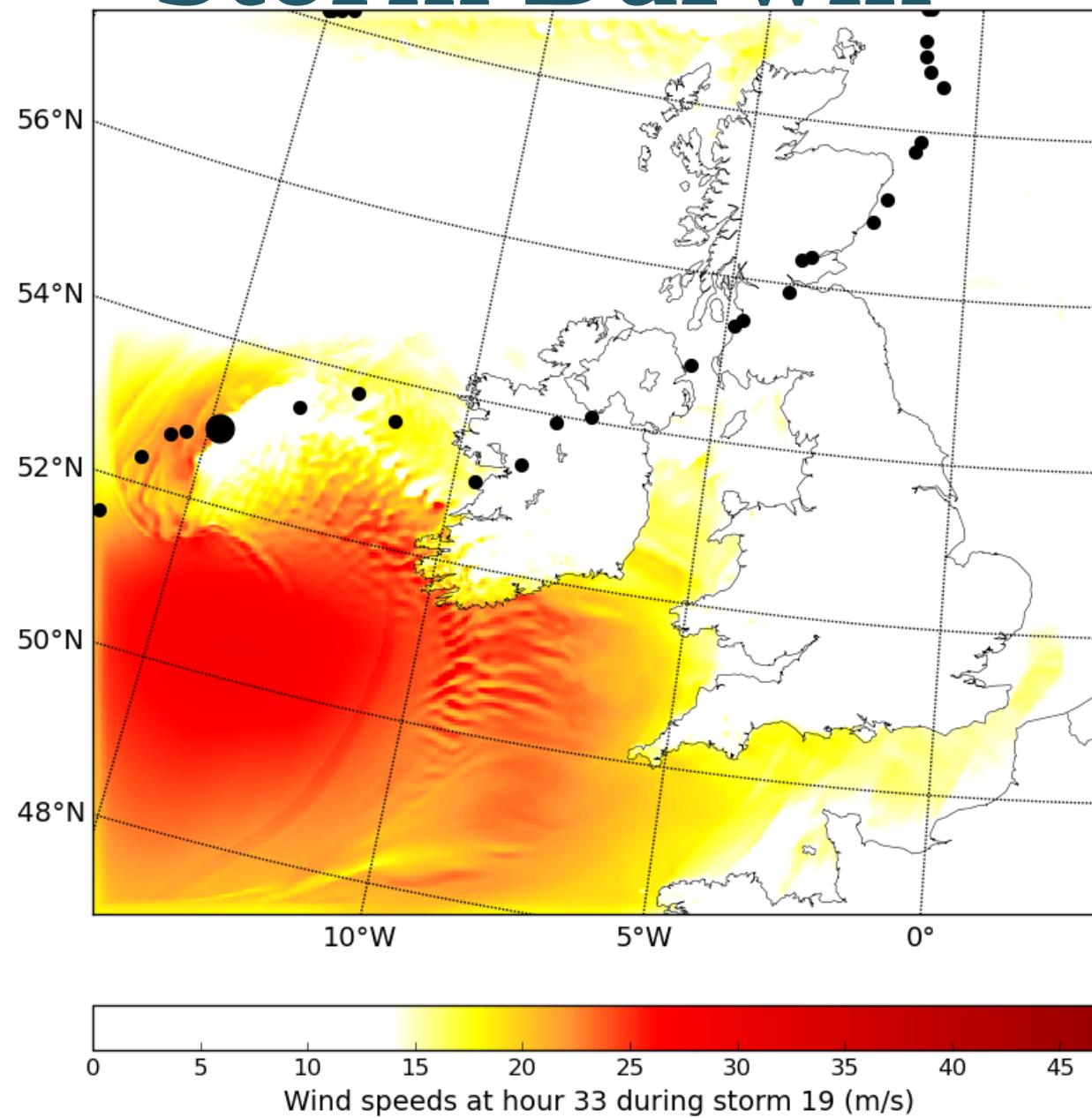
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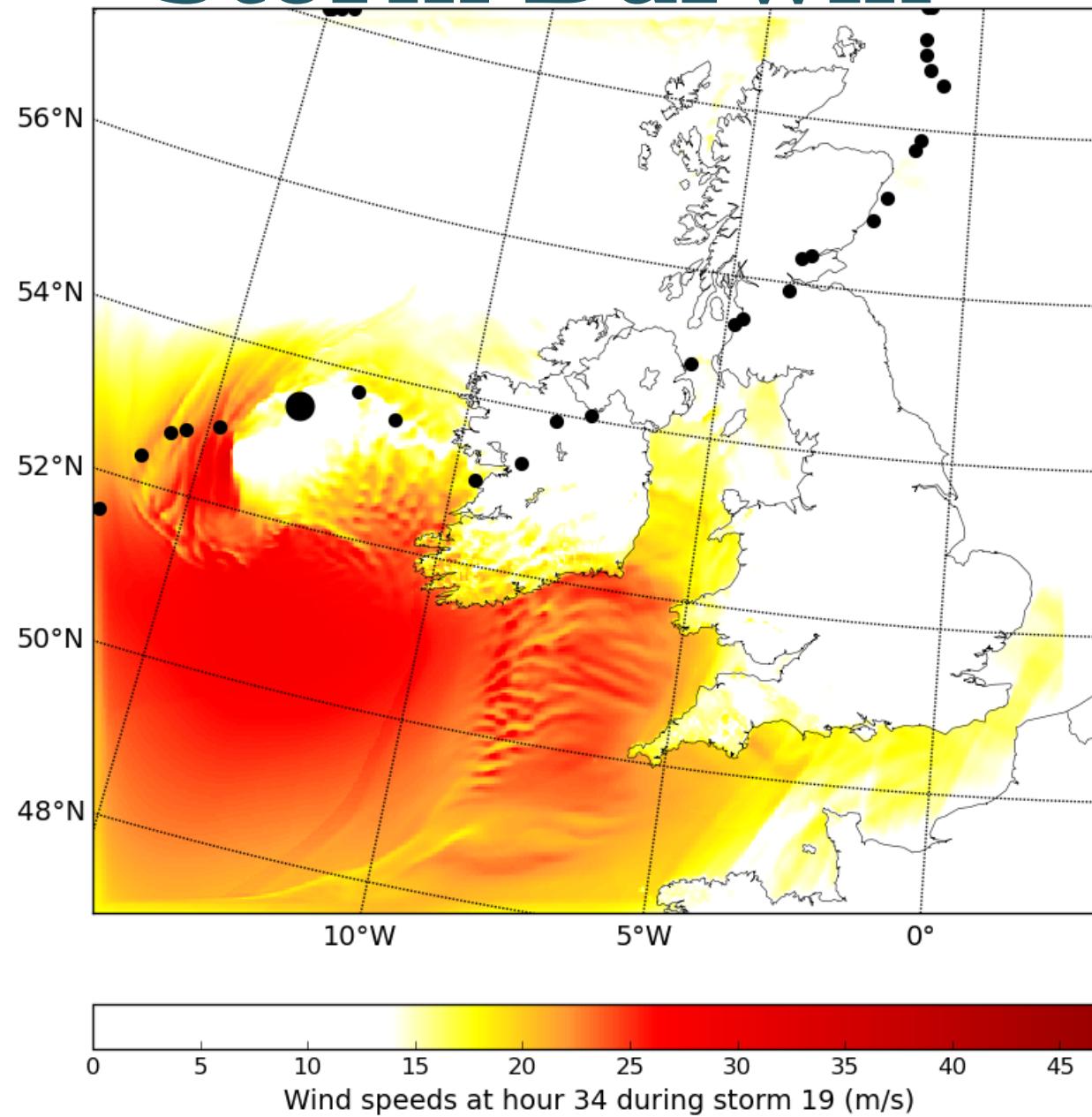
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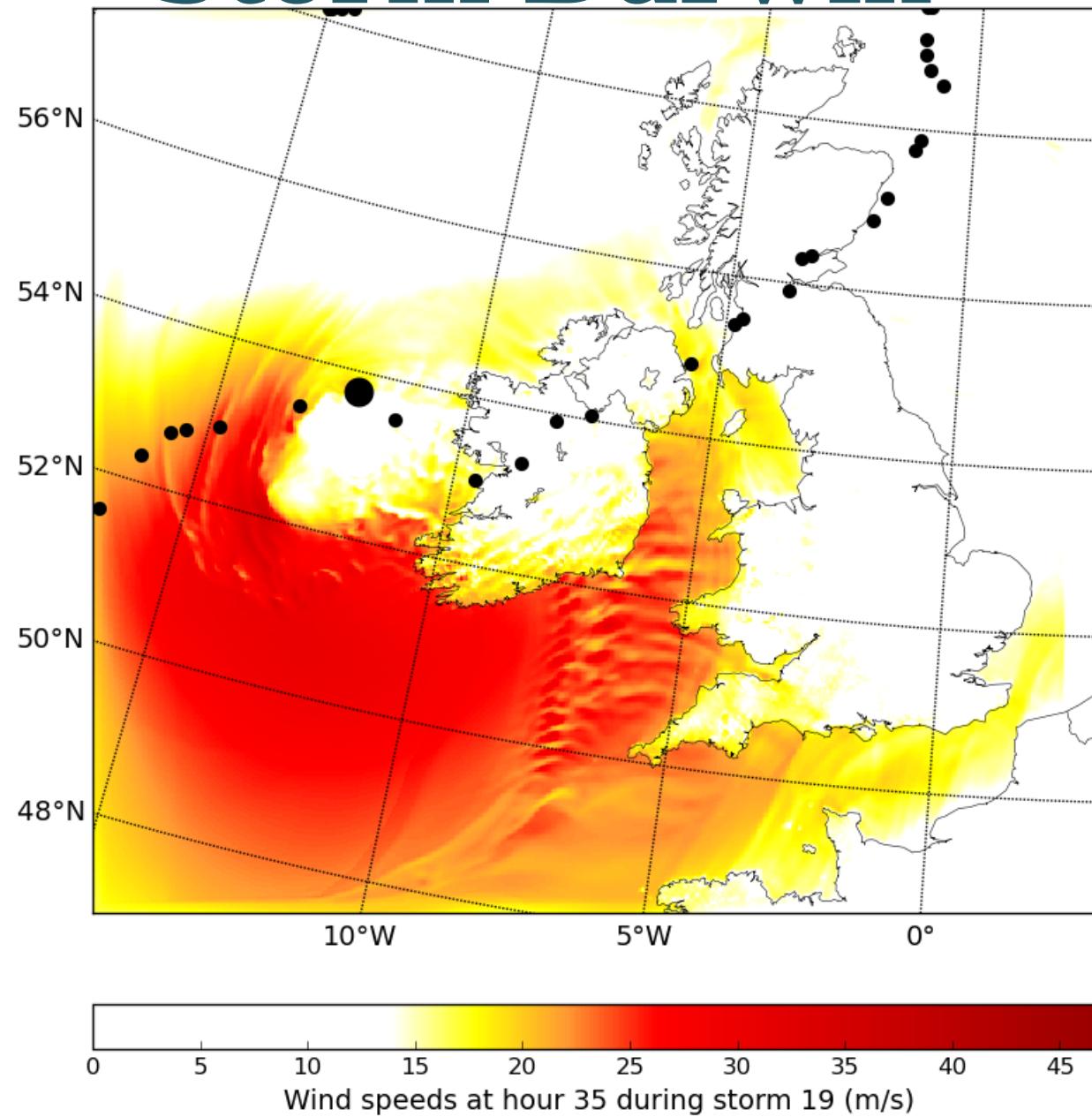
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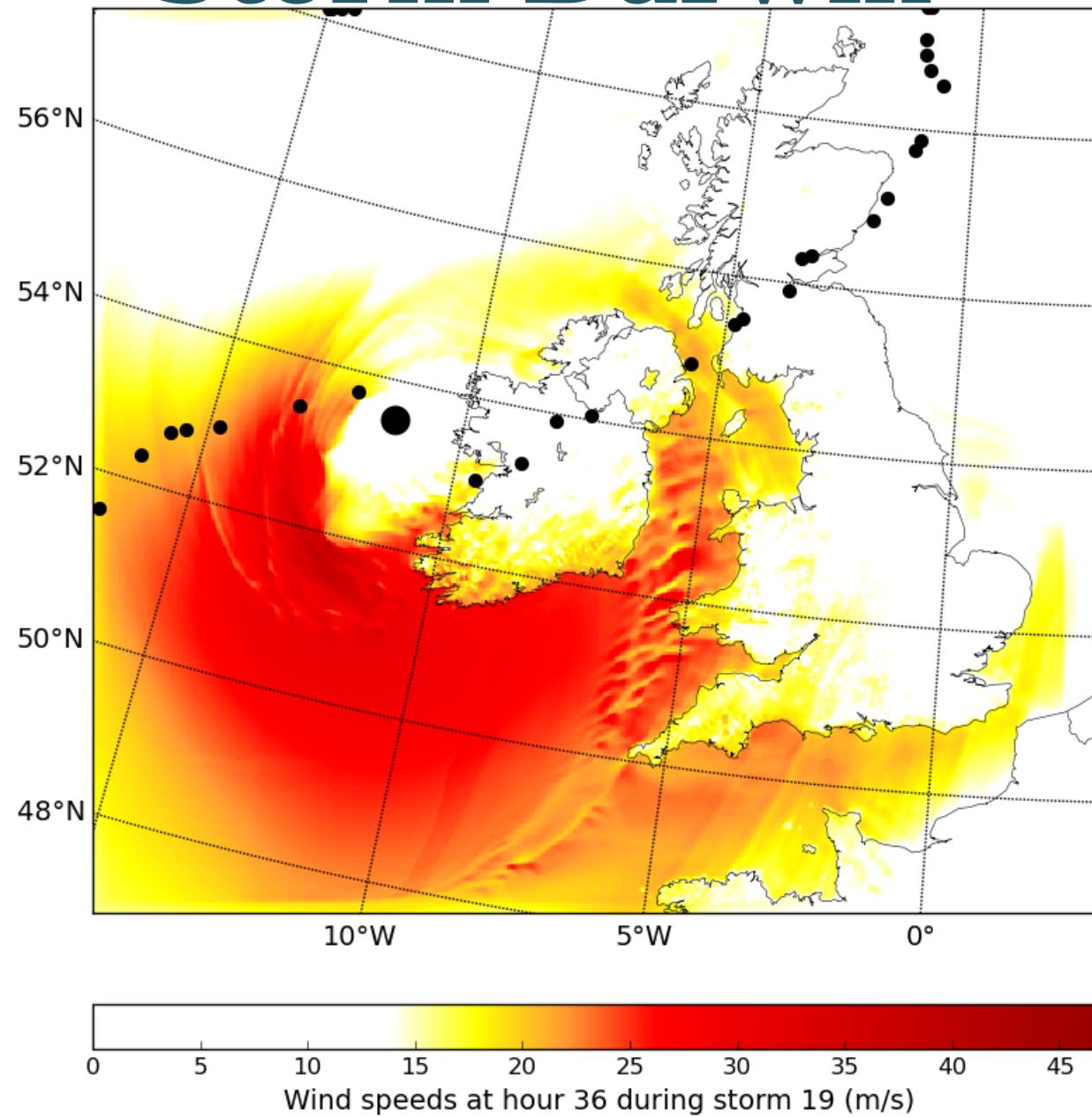
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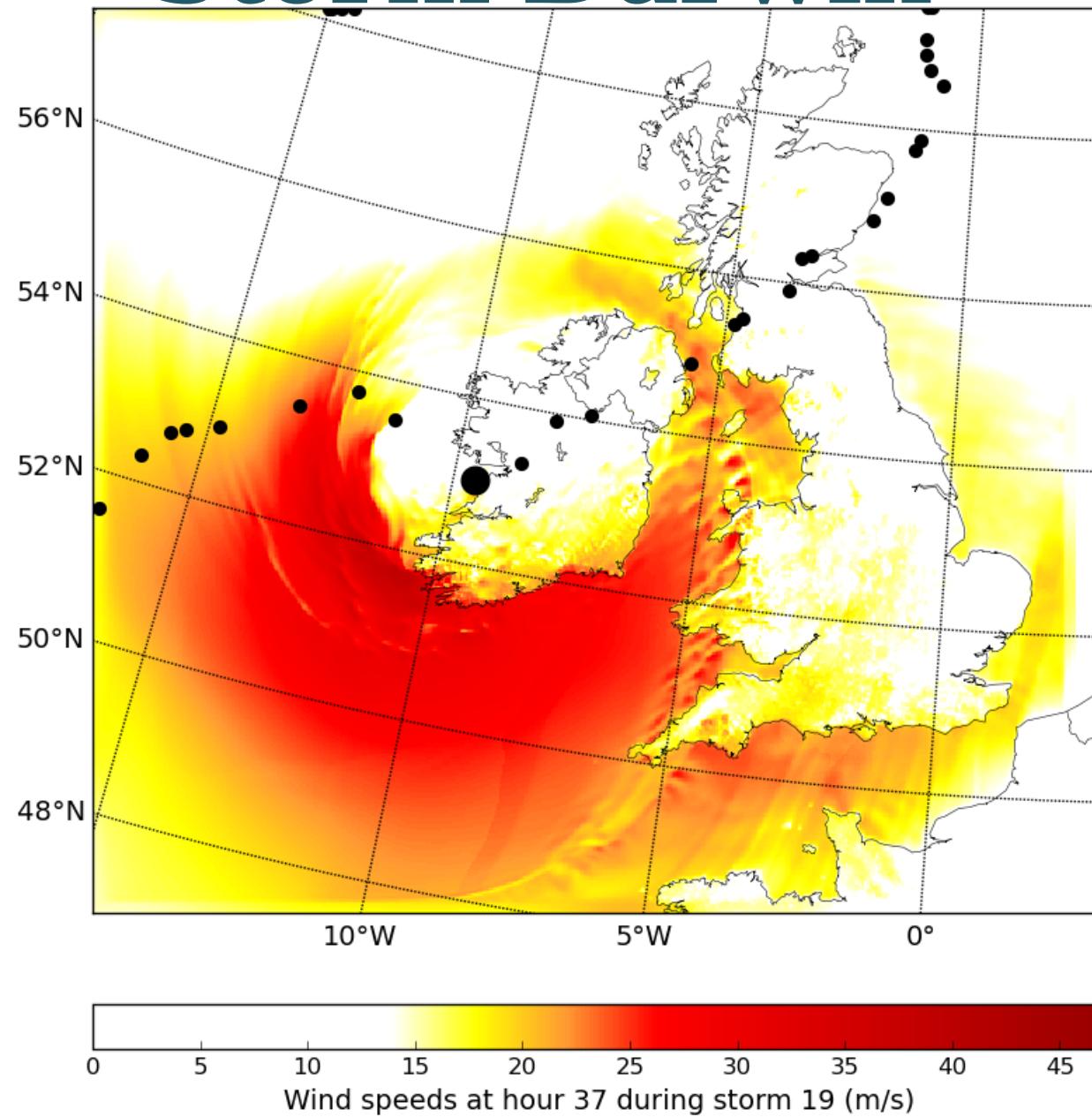
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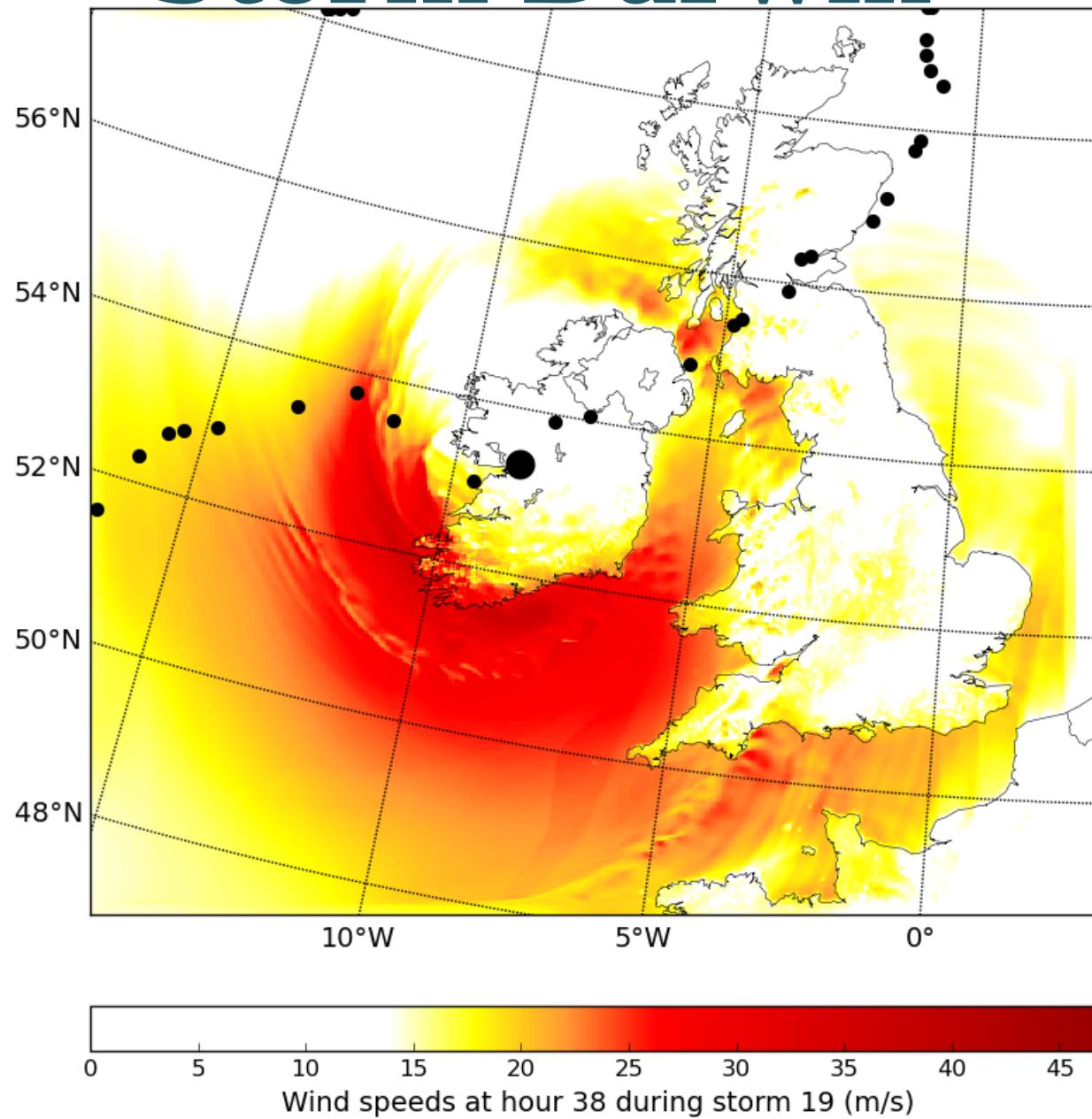
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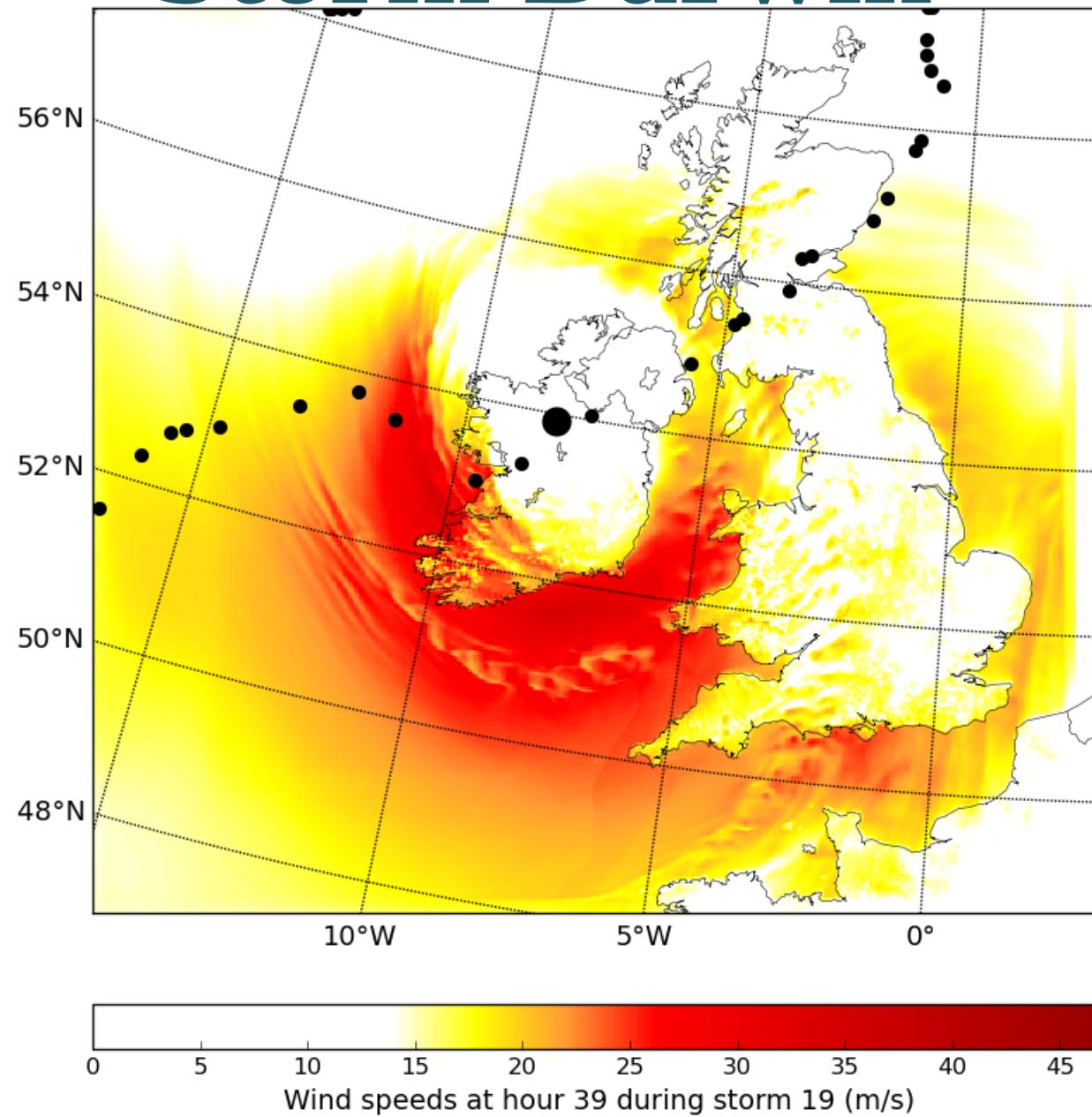
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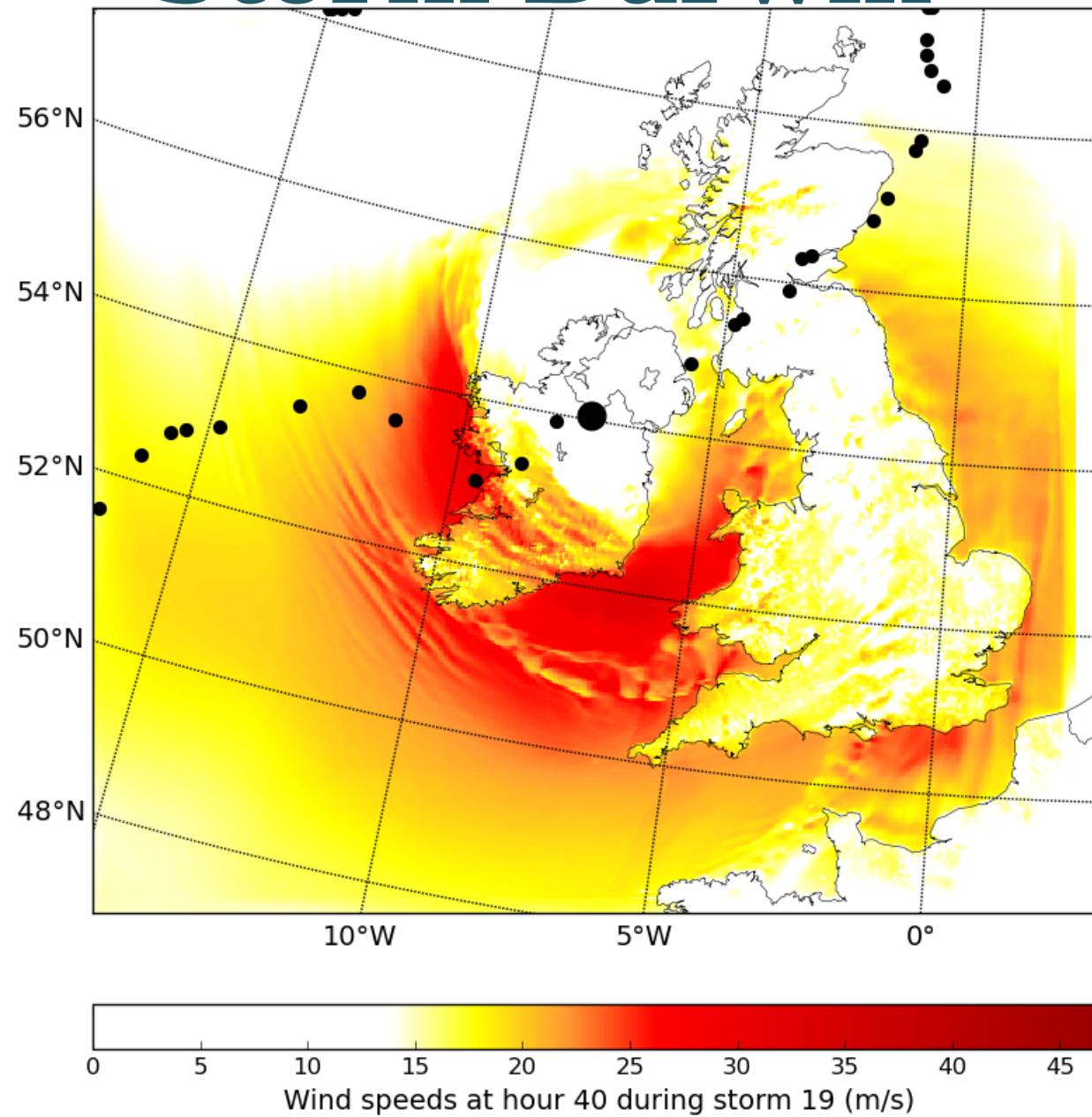
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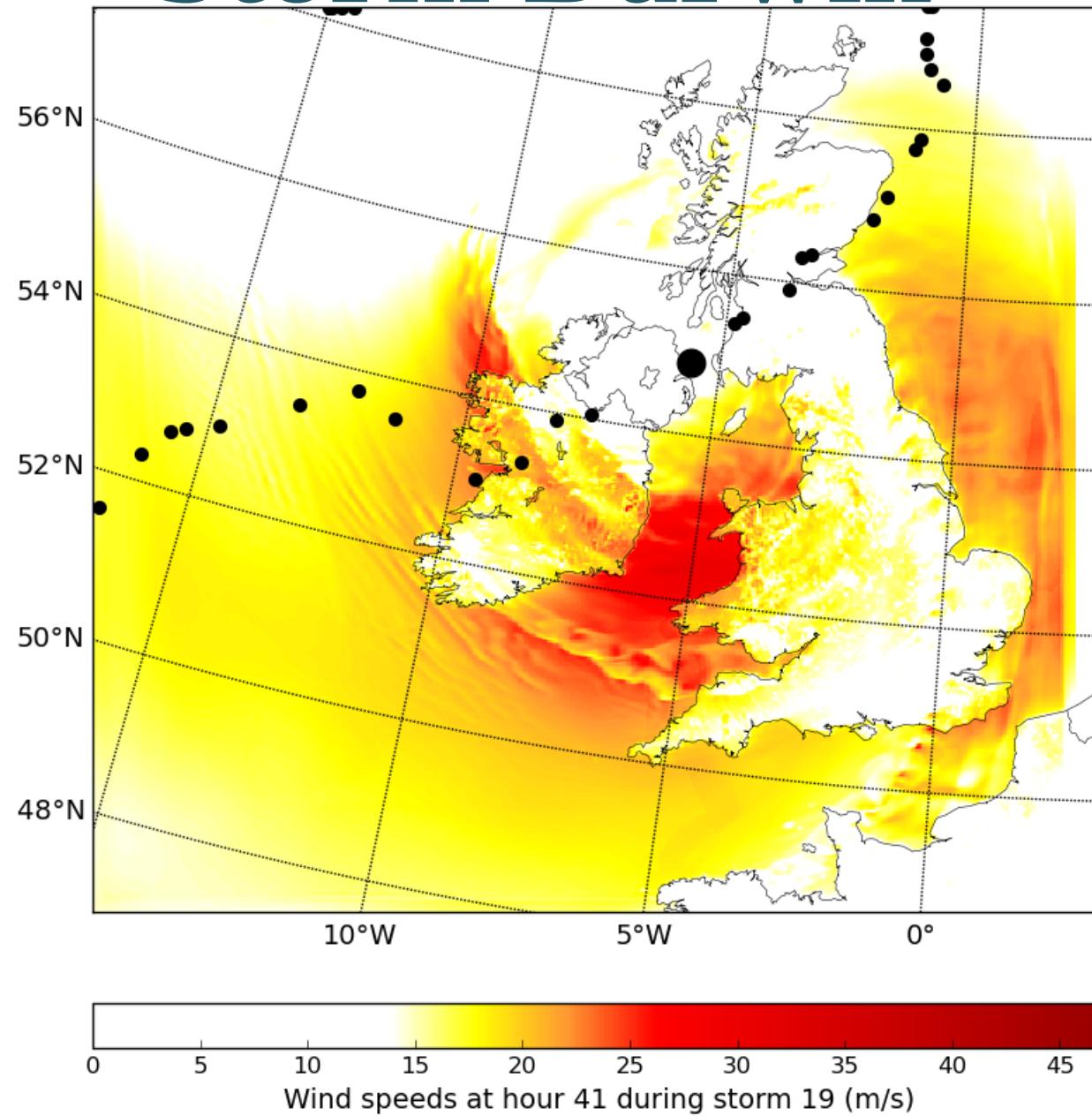
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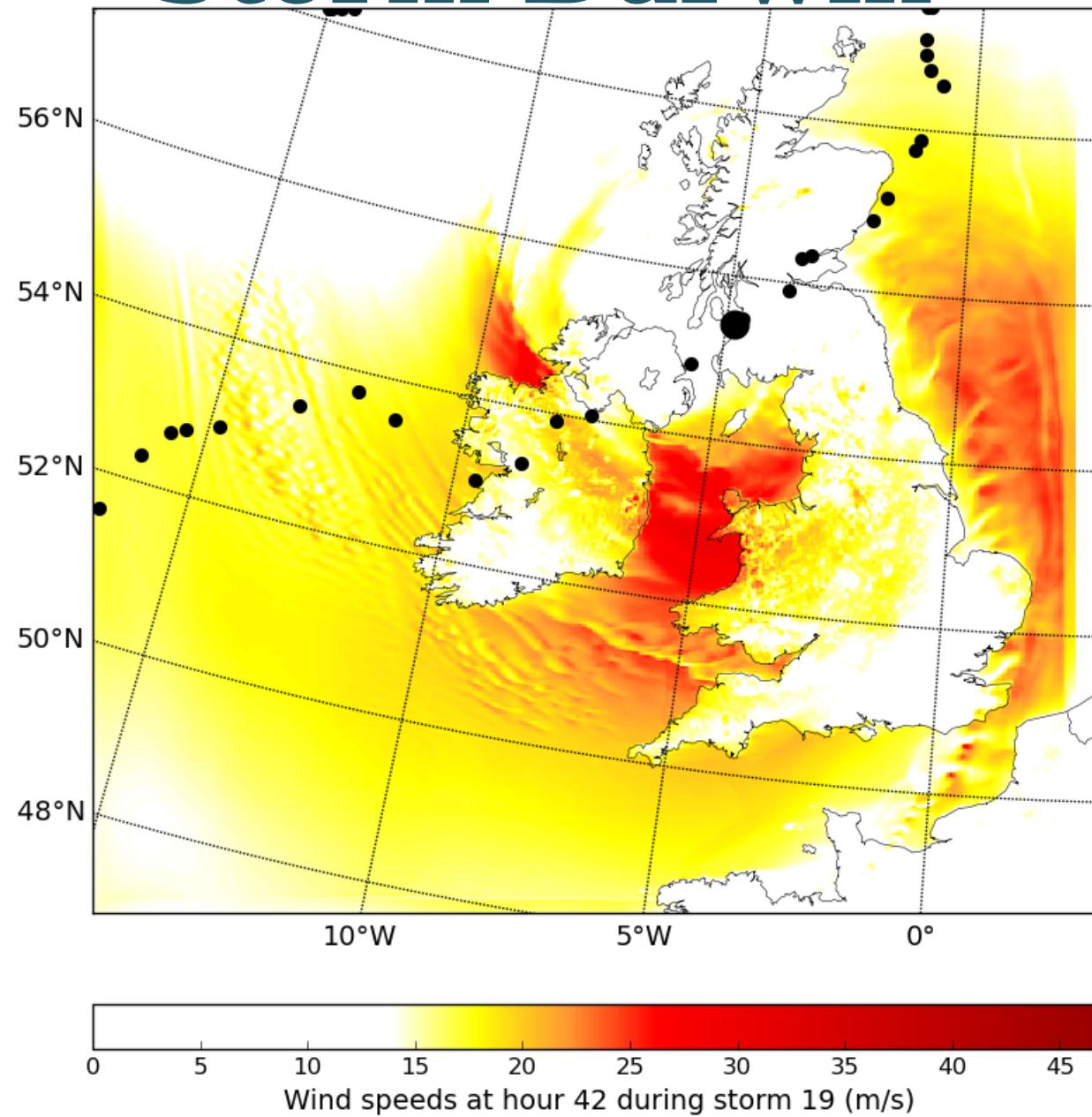
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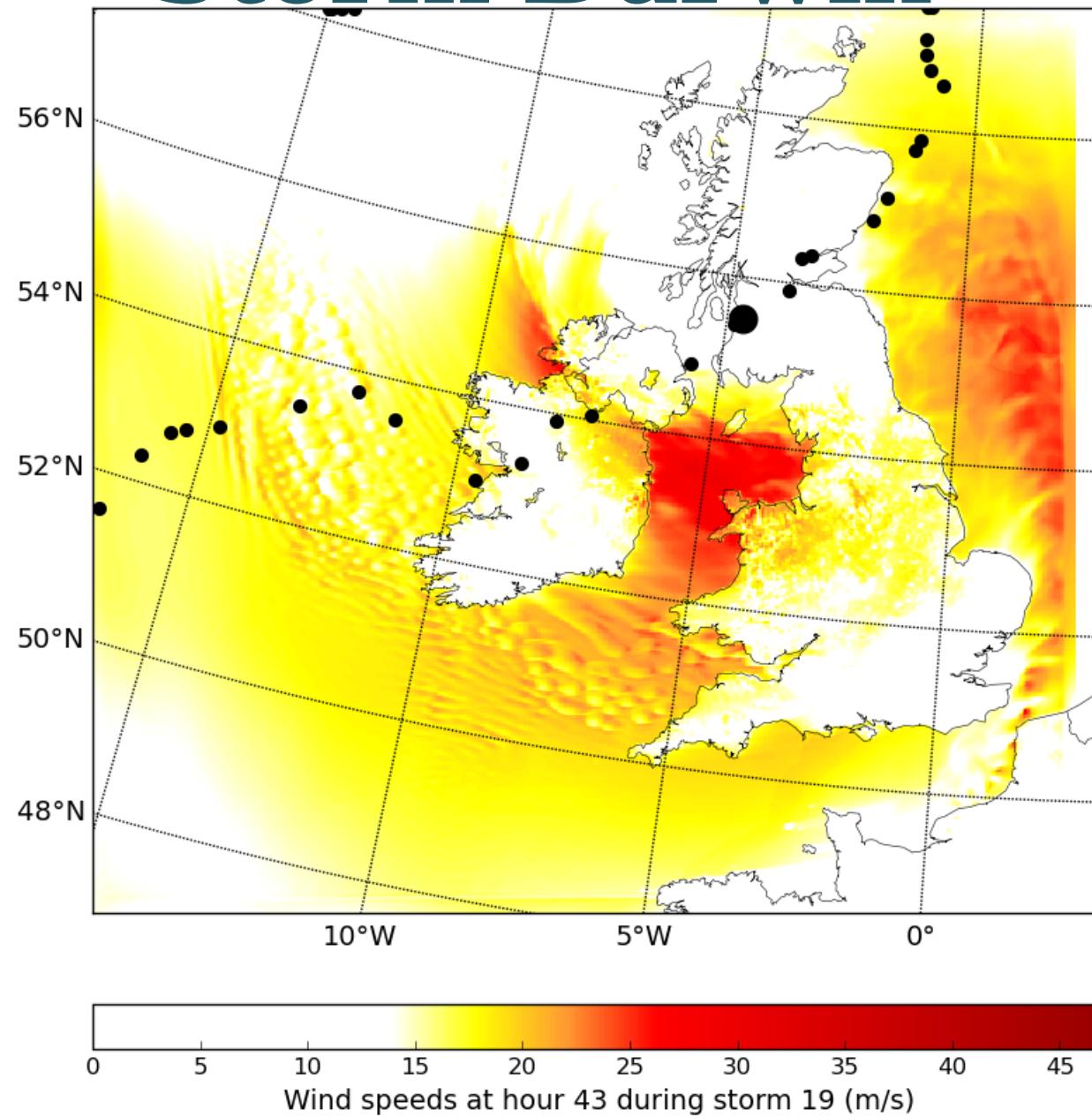
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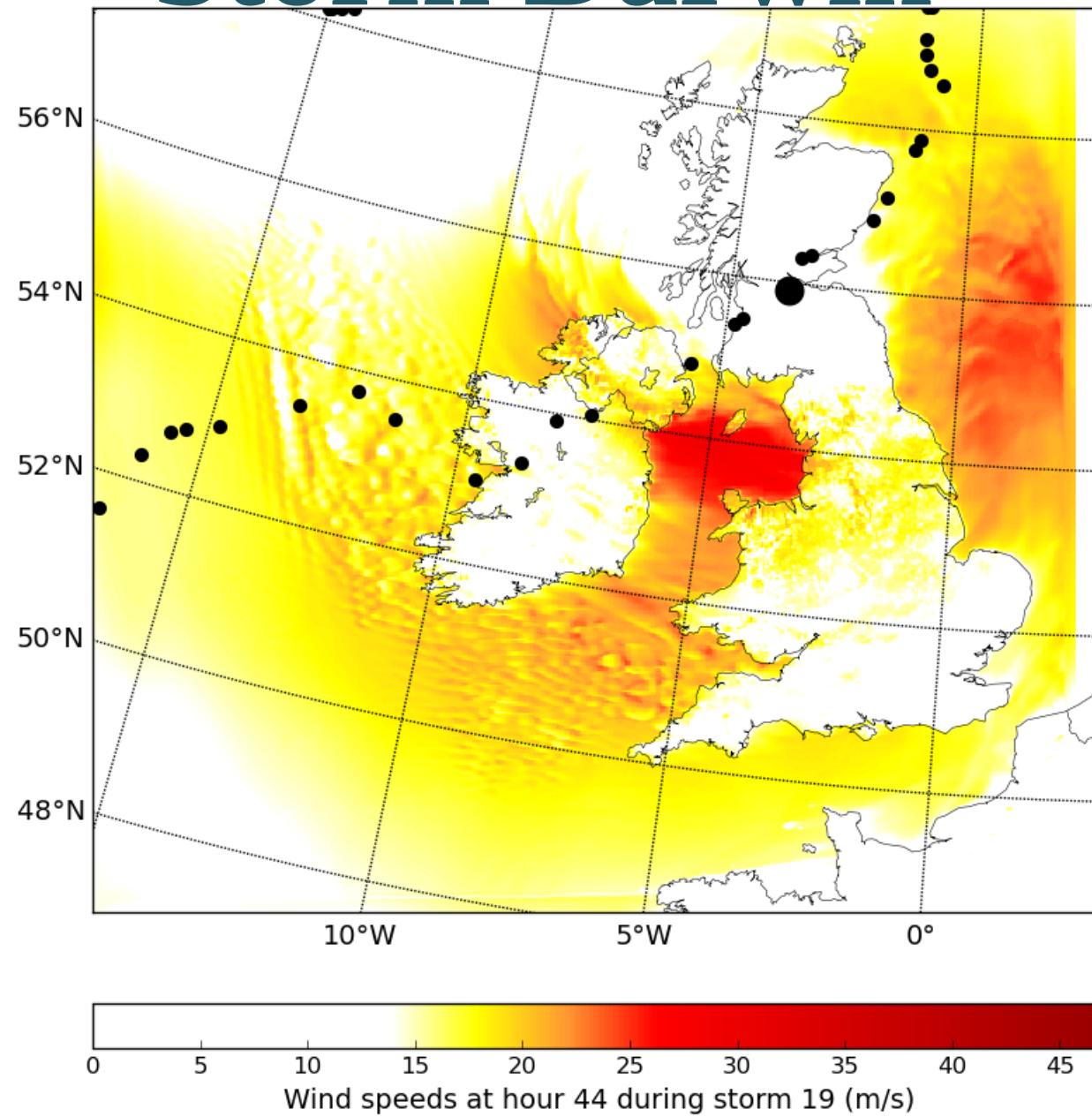
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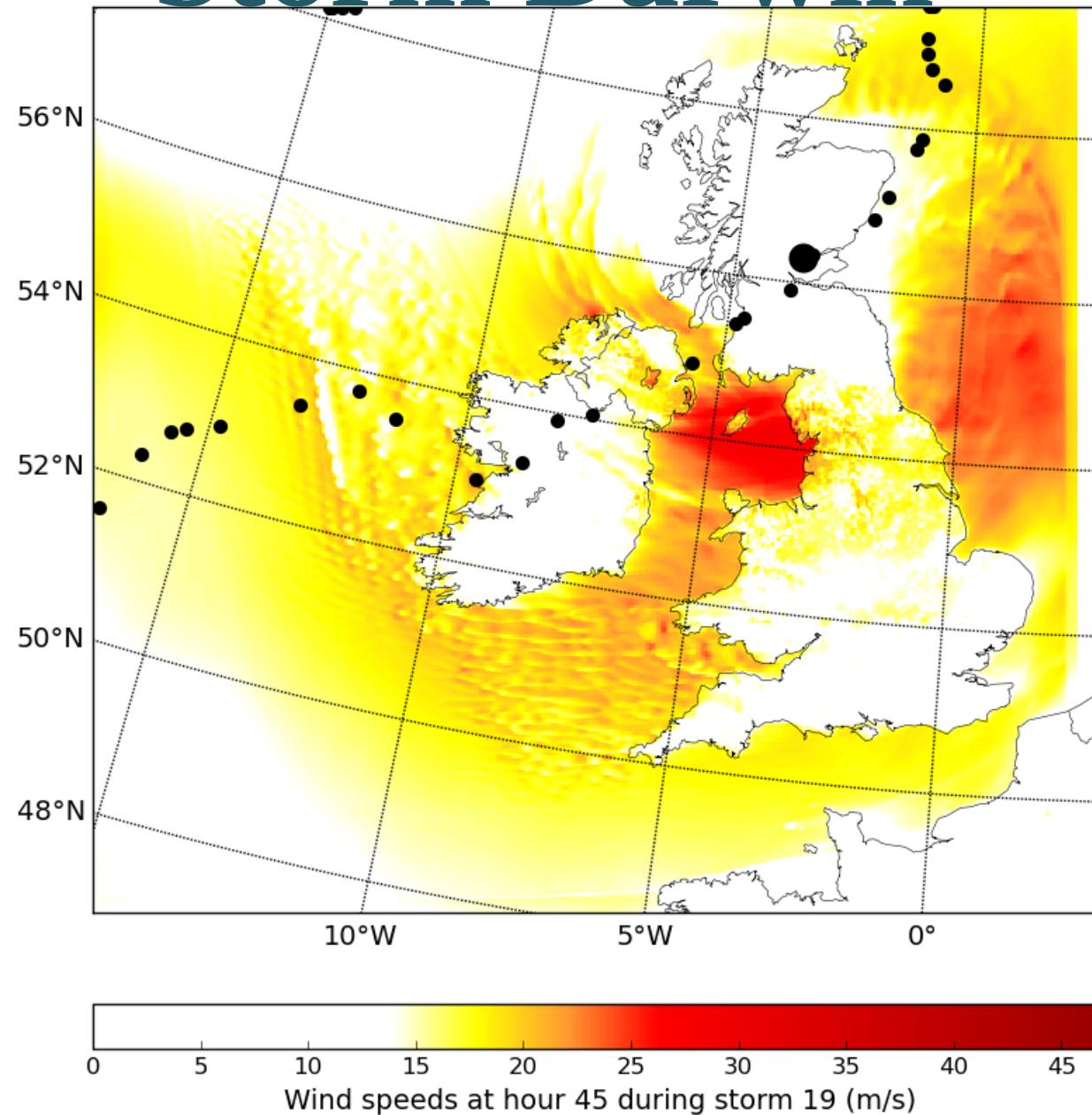
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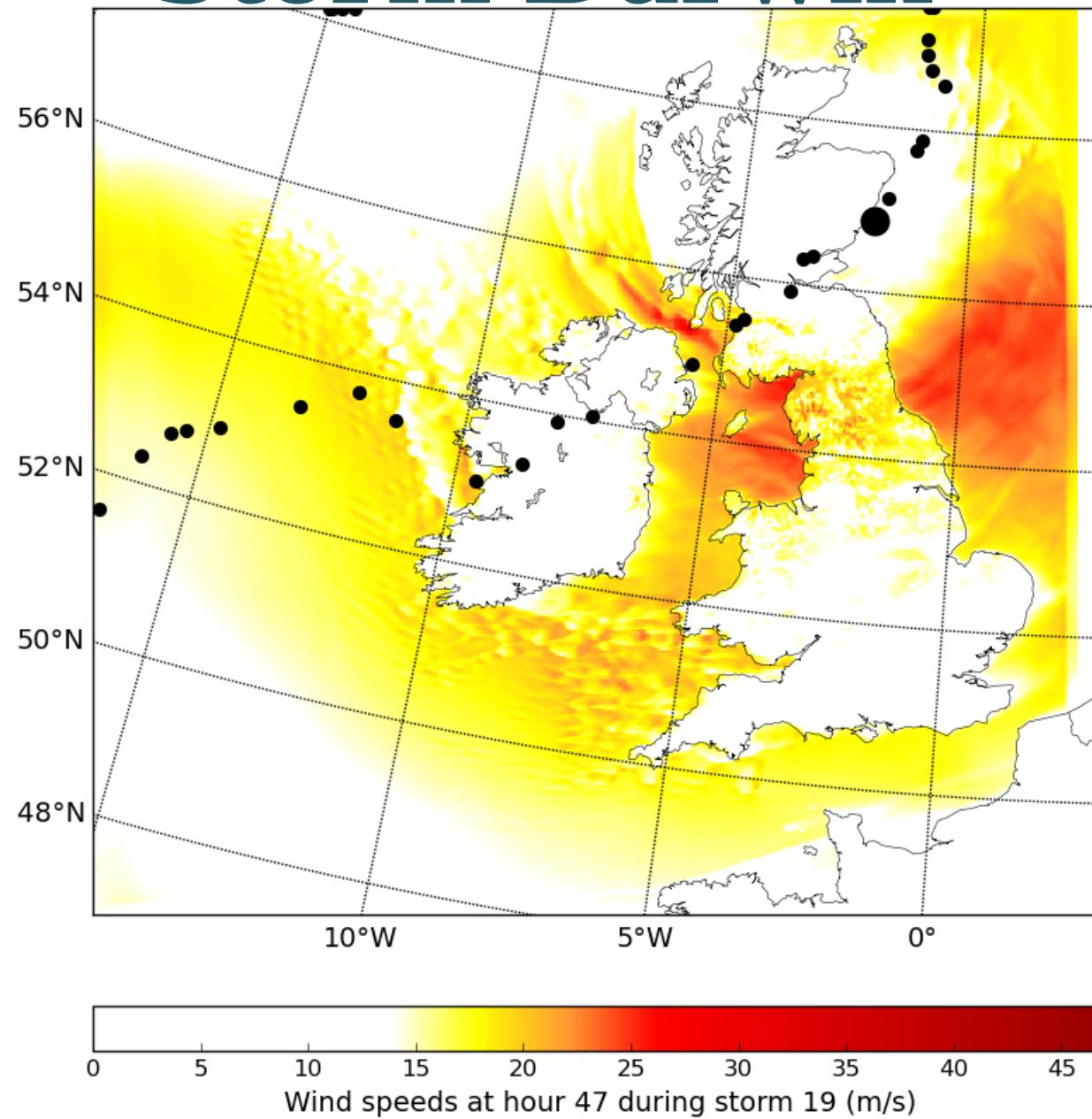
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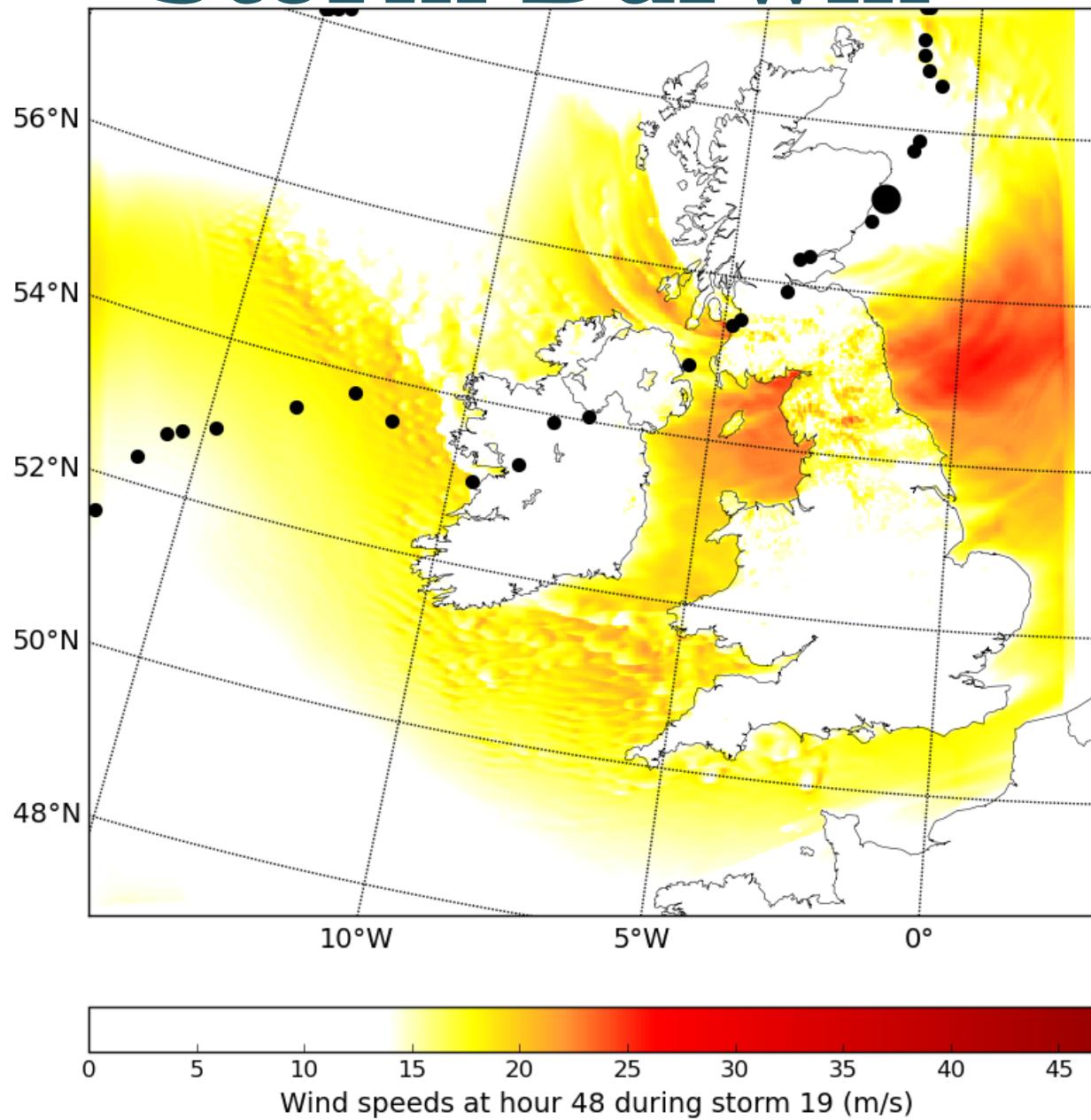
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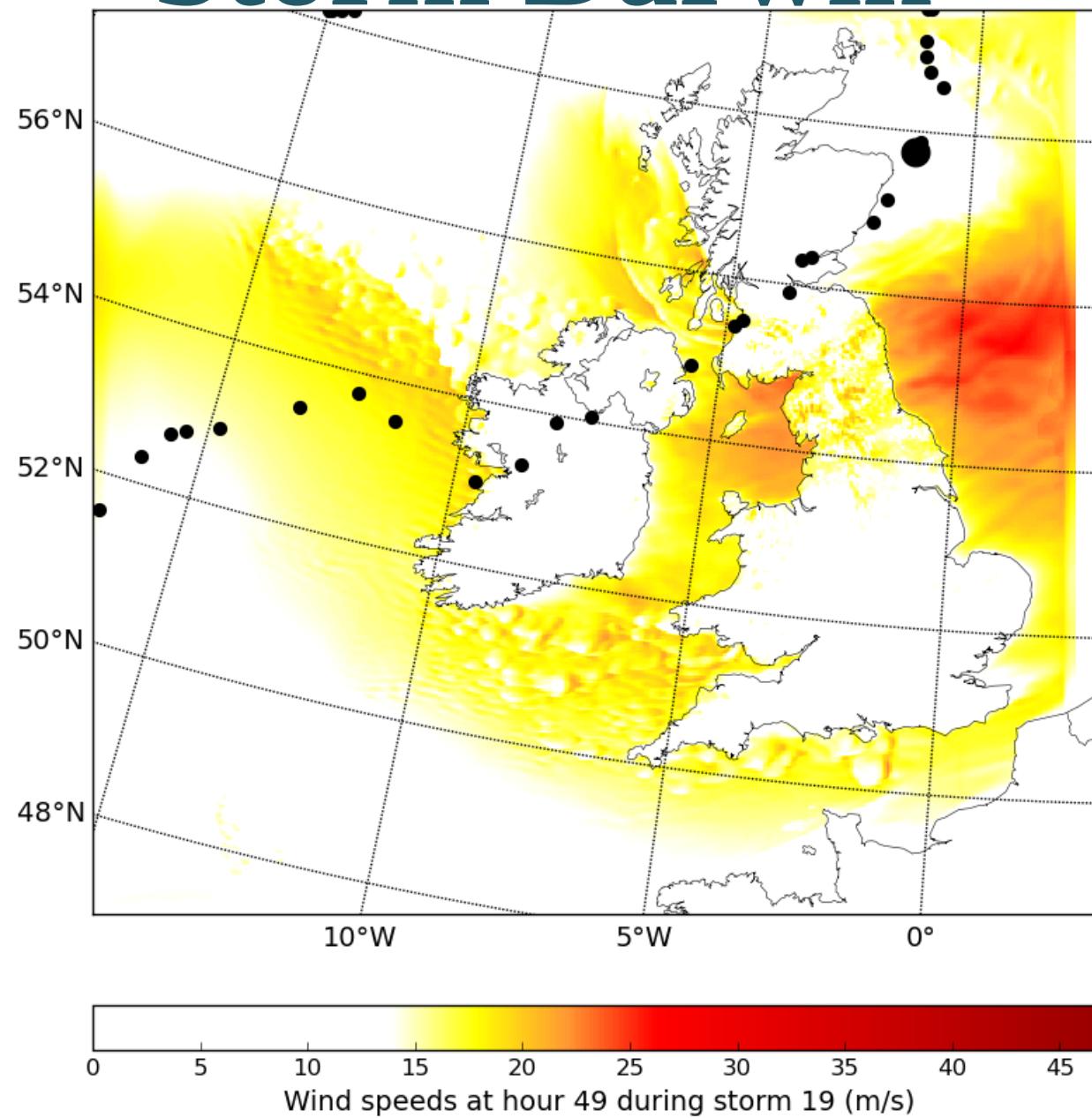
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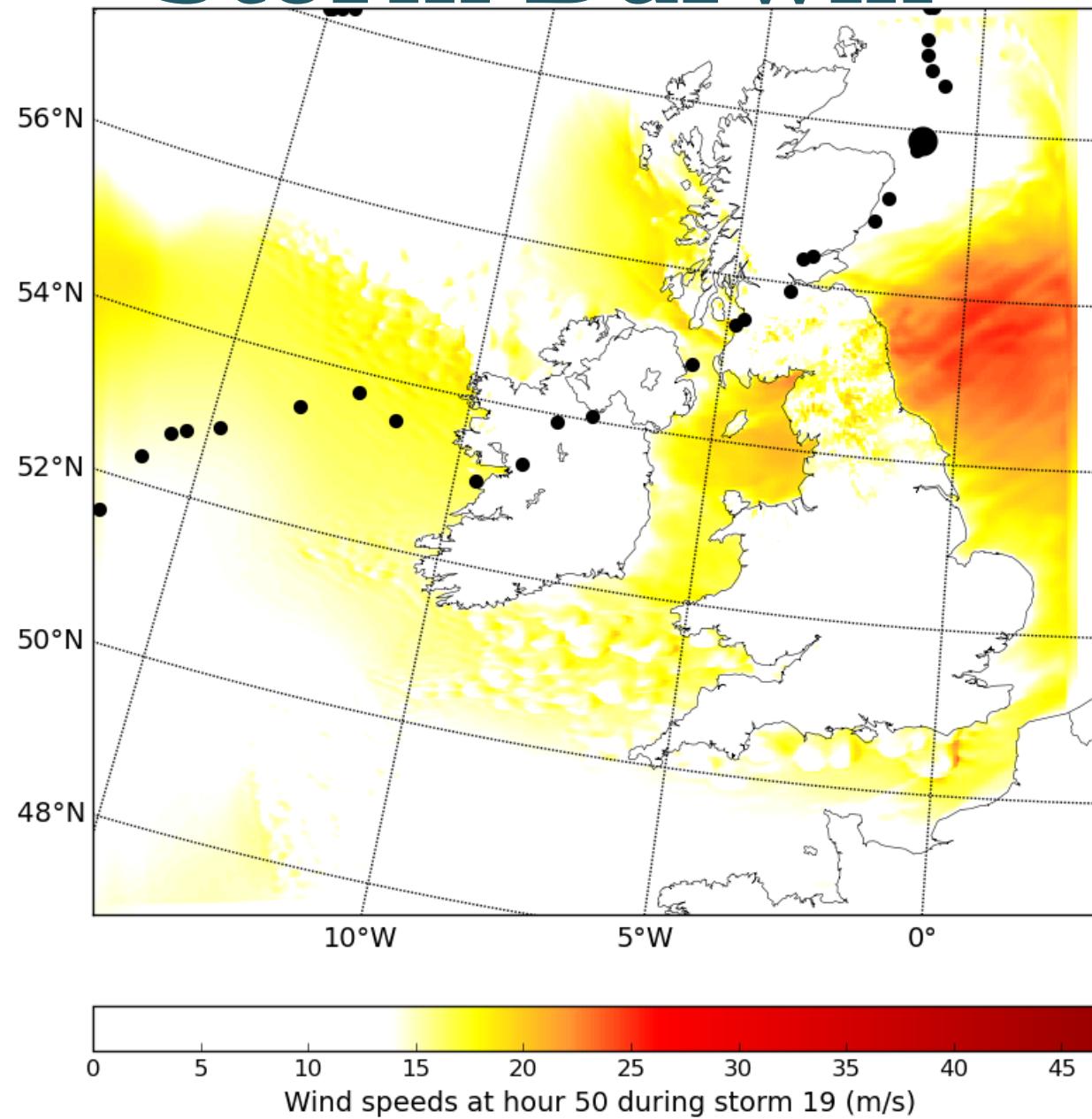
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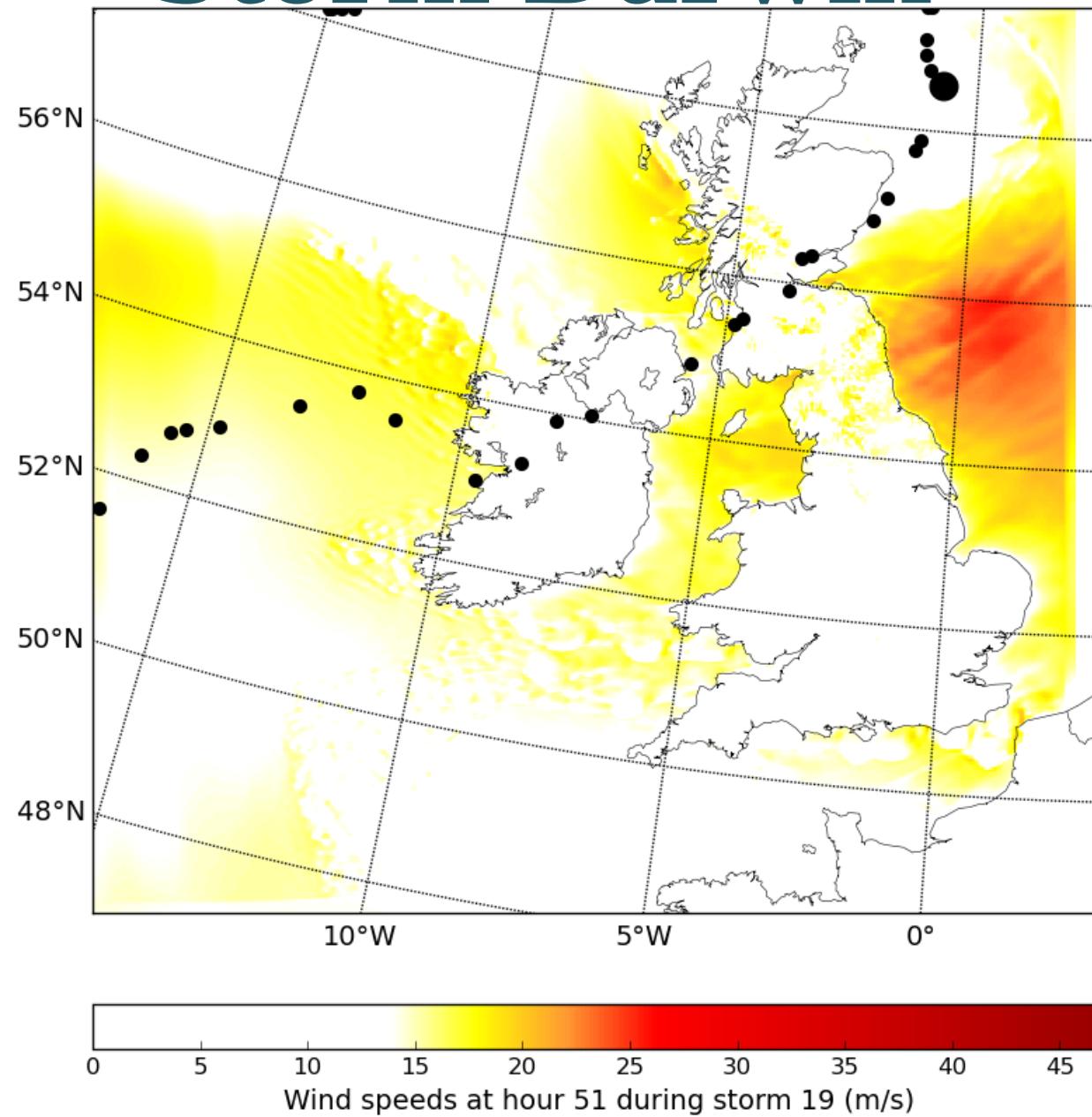
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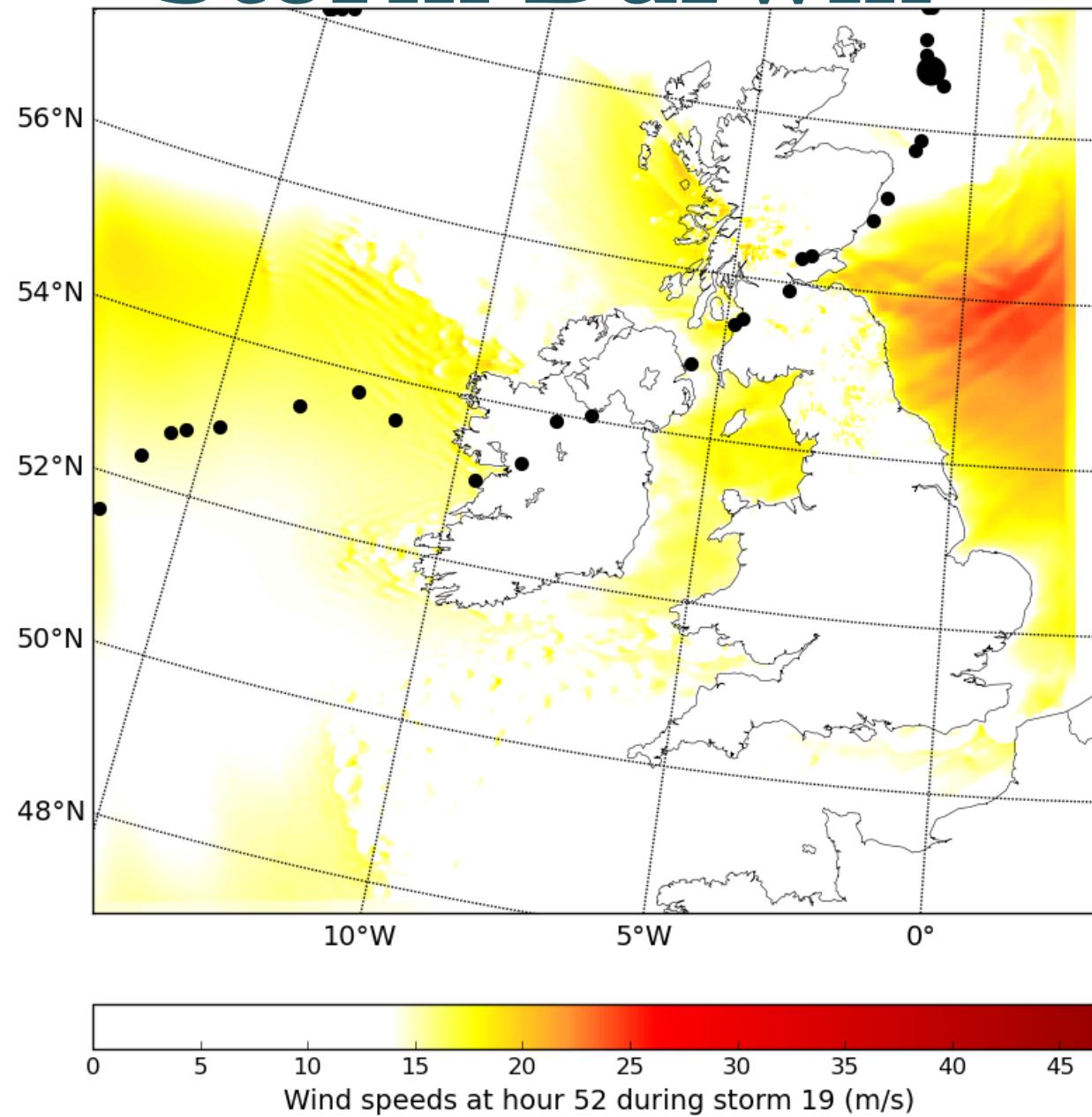
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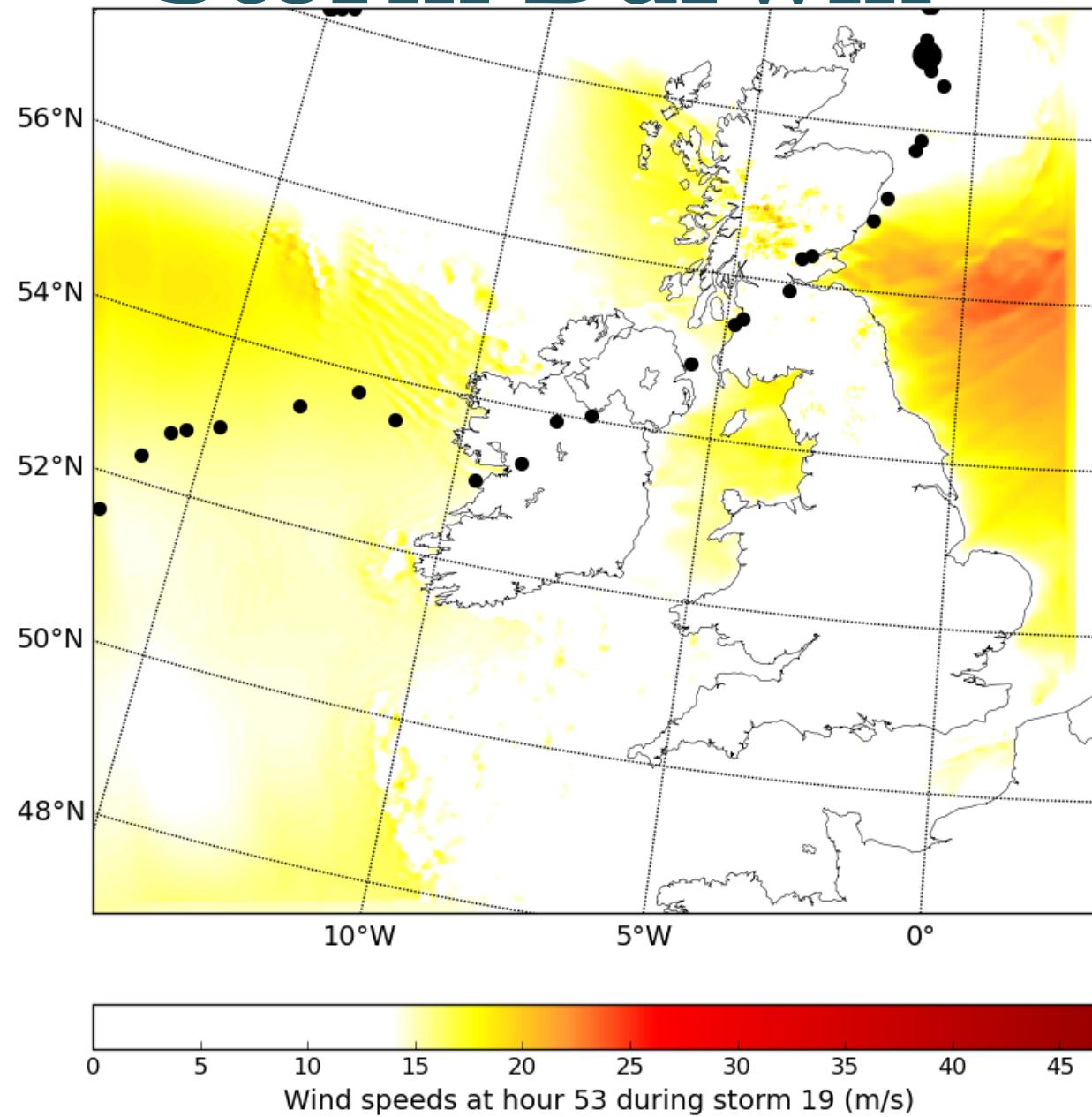
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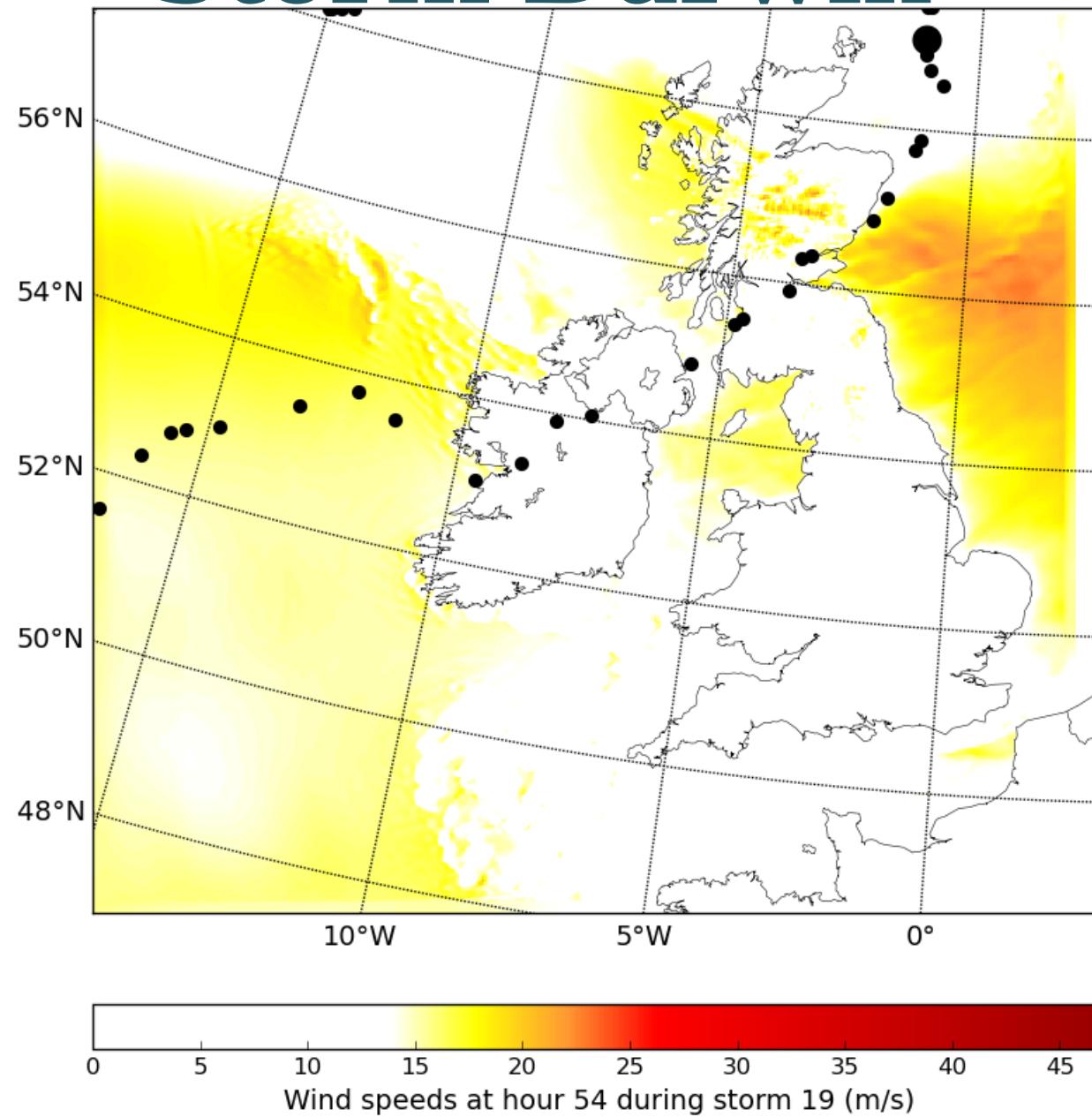
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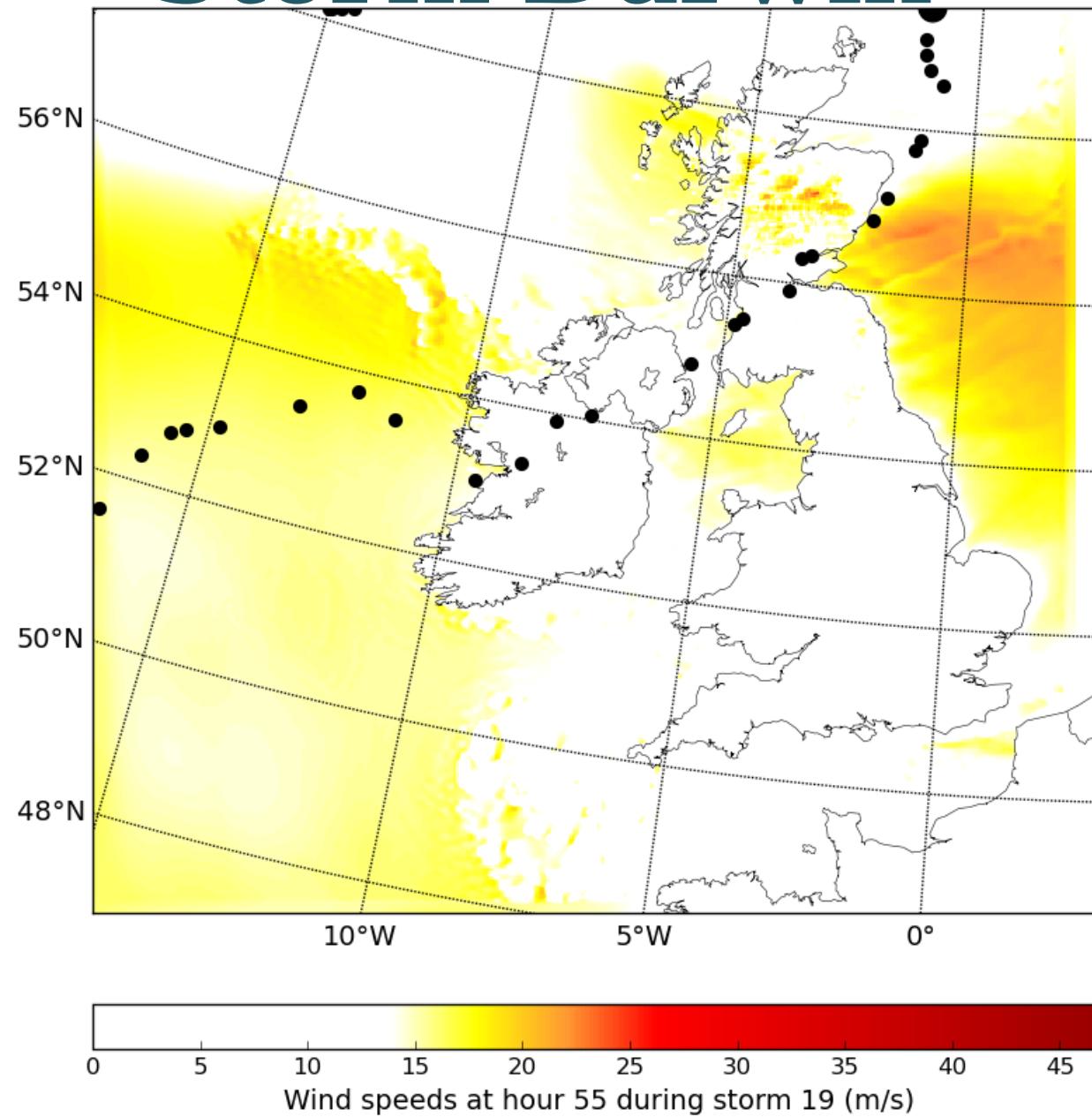
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Storm Darwin

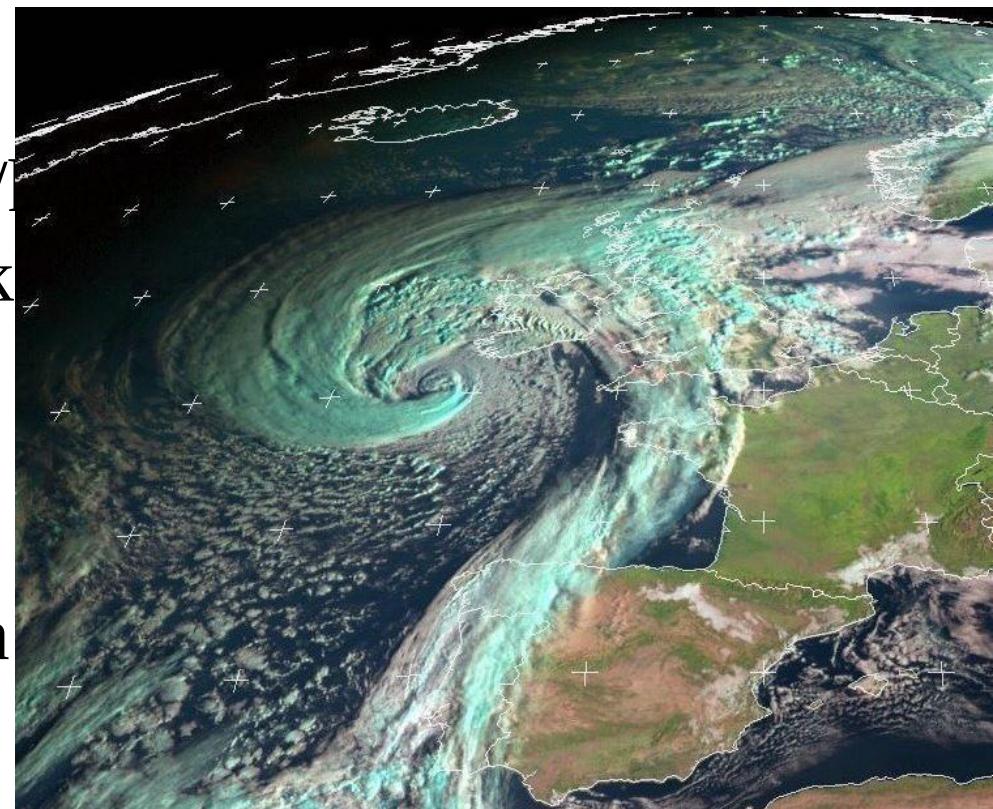


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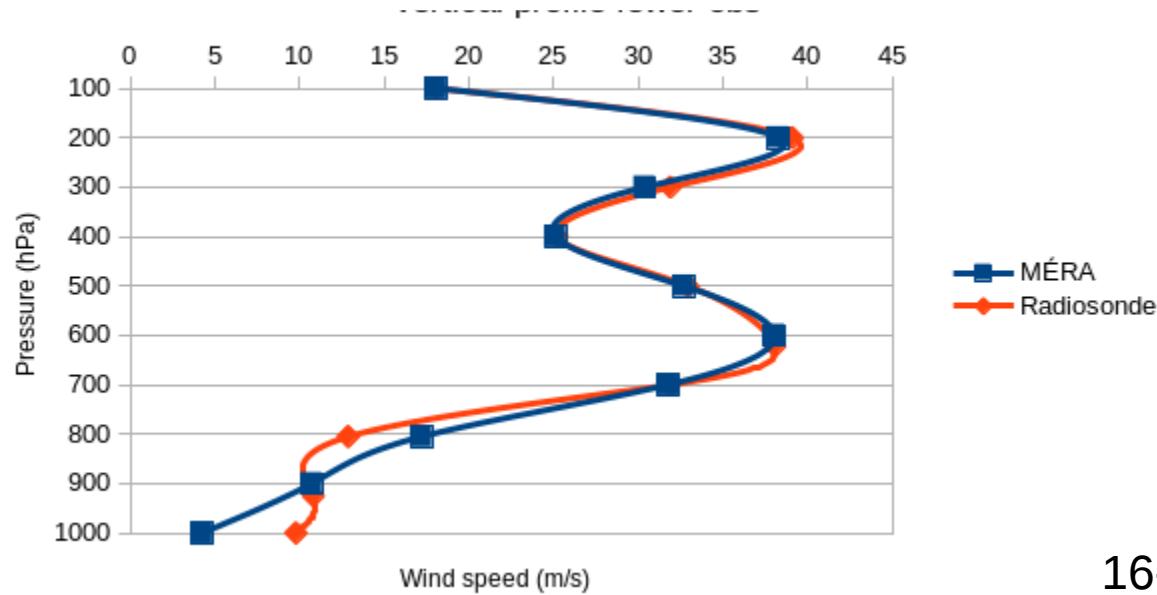
Storm Ophelia

- 16th October 2017
- Maximum gust of 155.6 km/h in Roches Point, county Cork
- 370,000 homes lost power
- Estimated losses €1.5 billion
- 3 fatalities



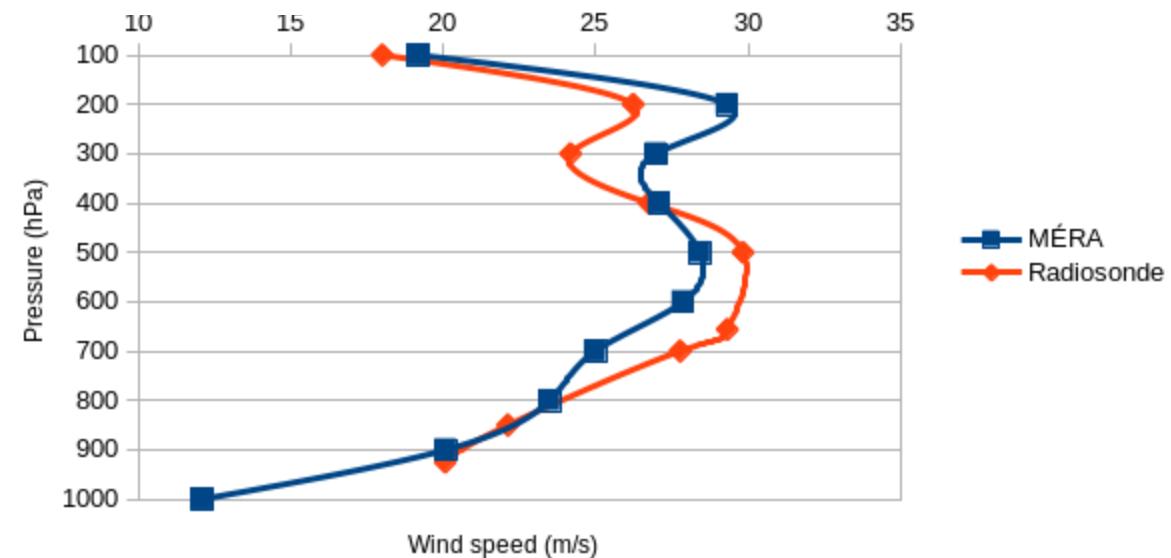
Storm Verification

16-10-2017 00z

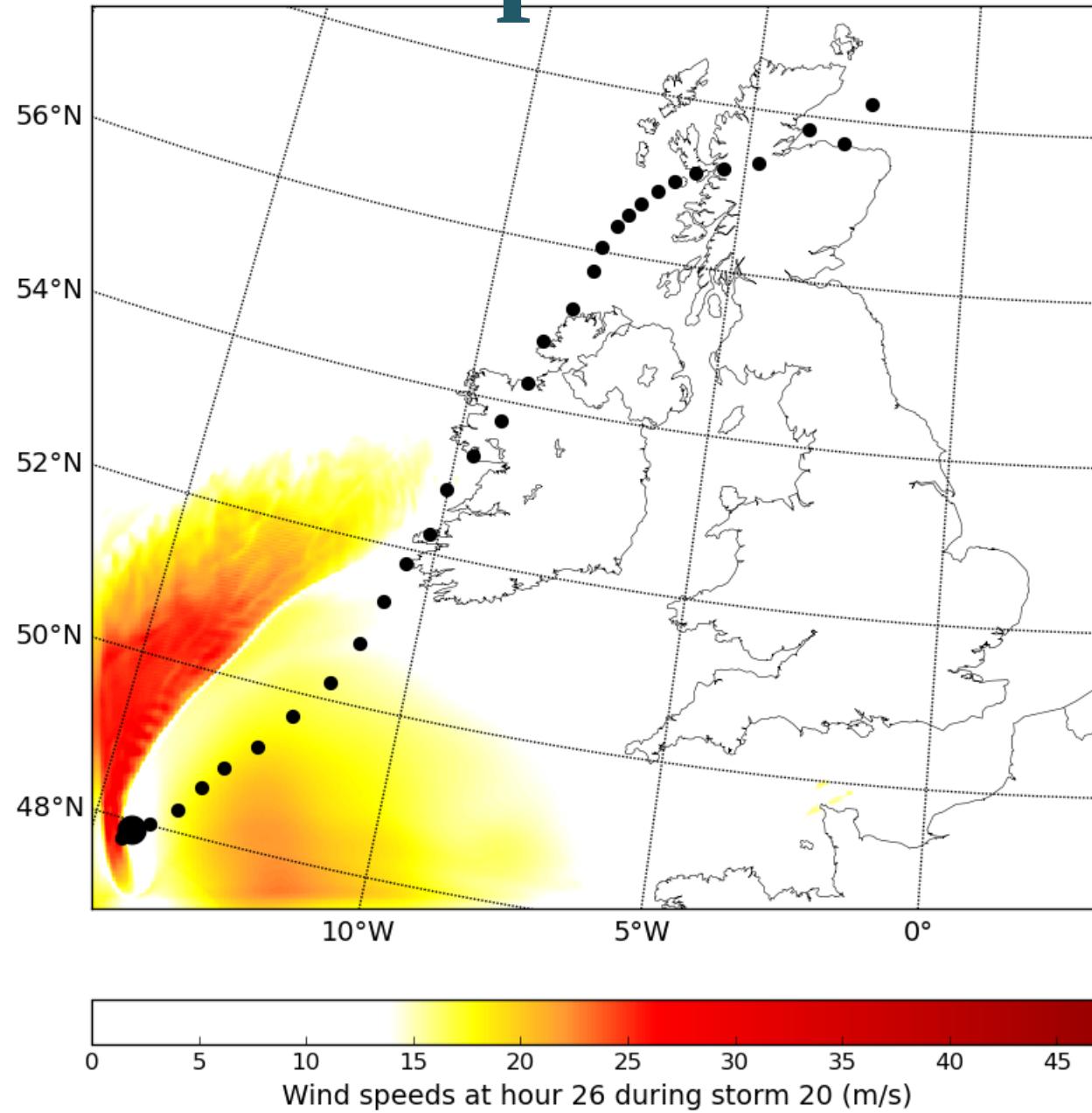


Valentia Radiononde
observations

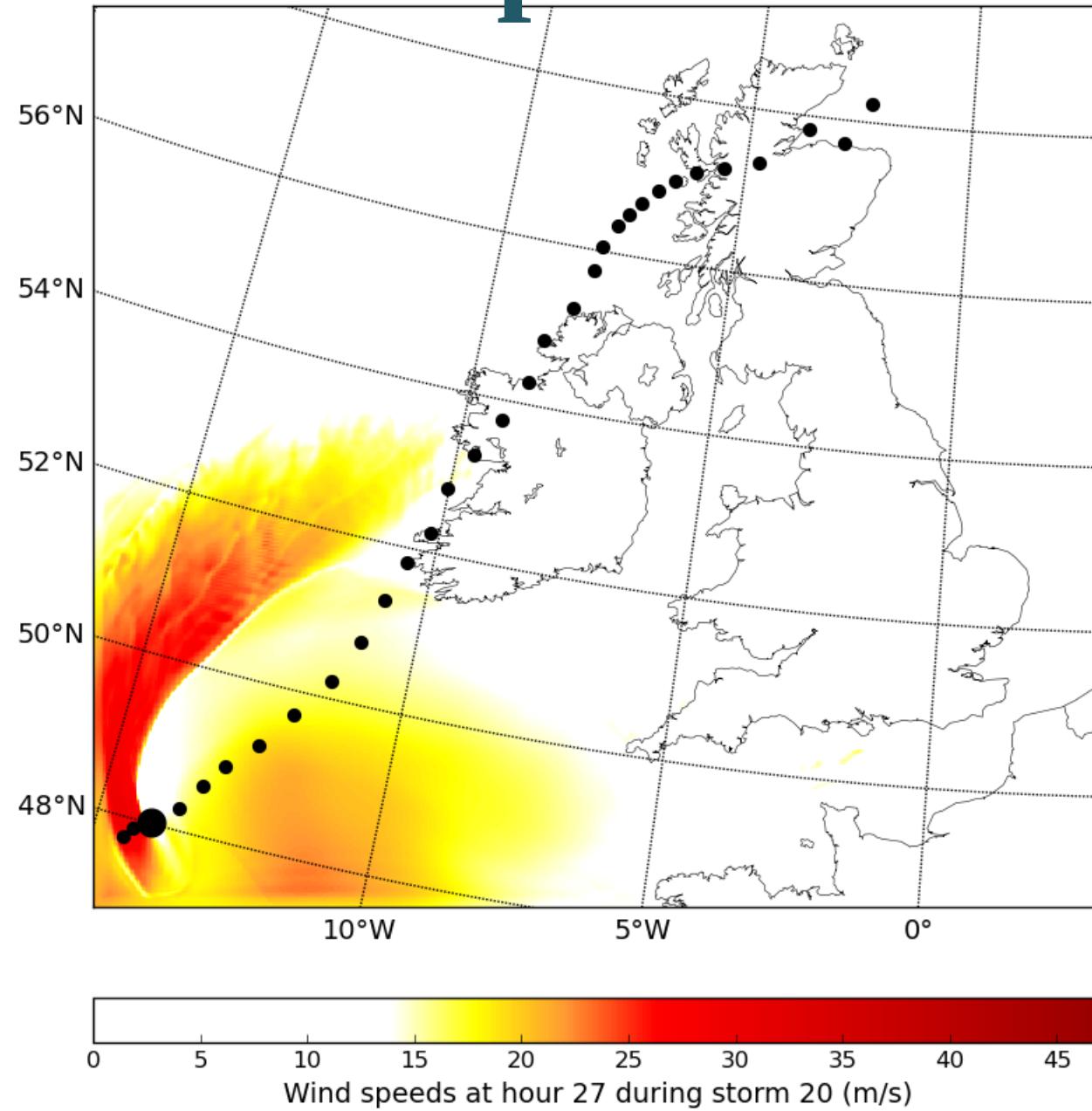
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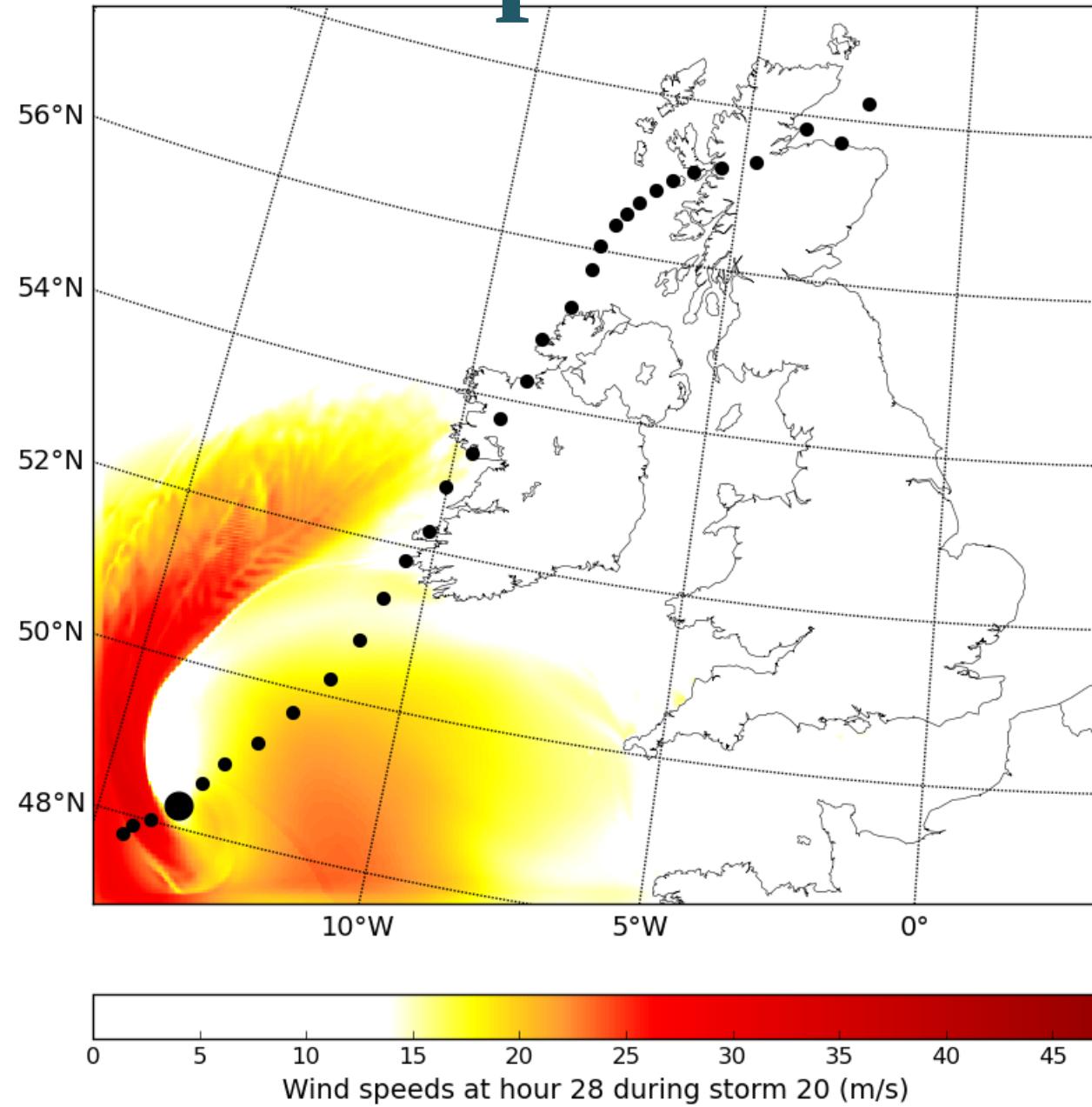
Ophelia



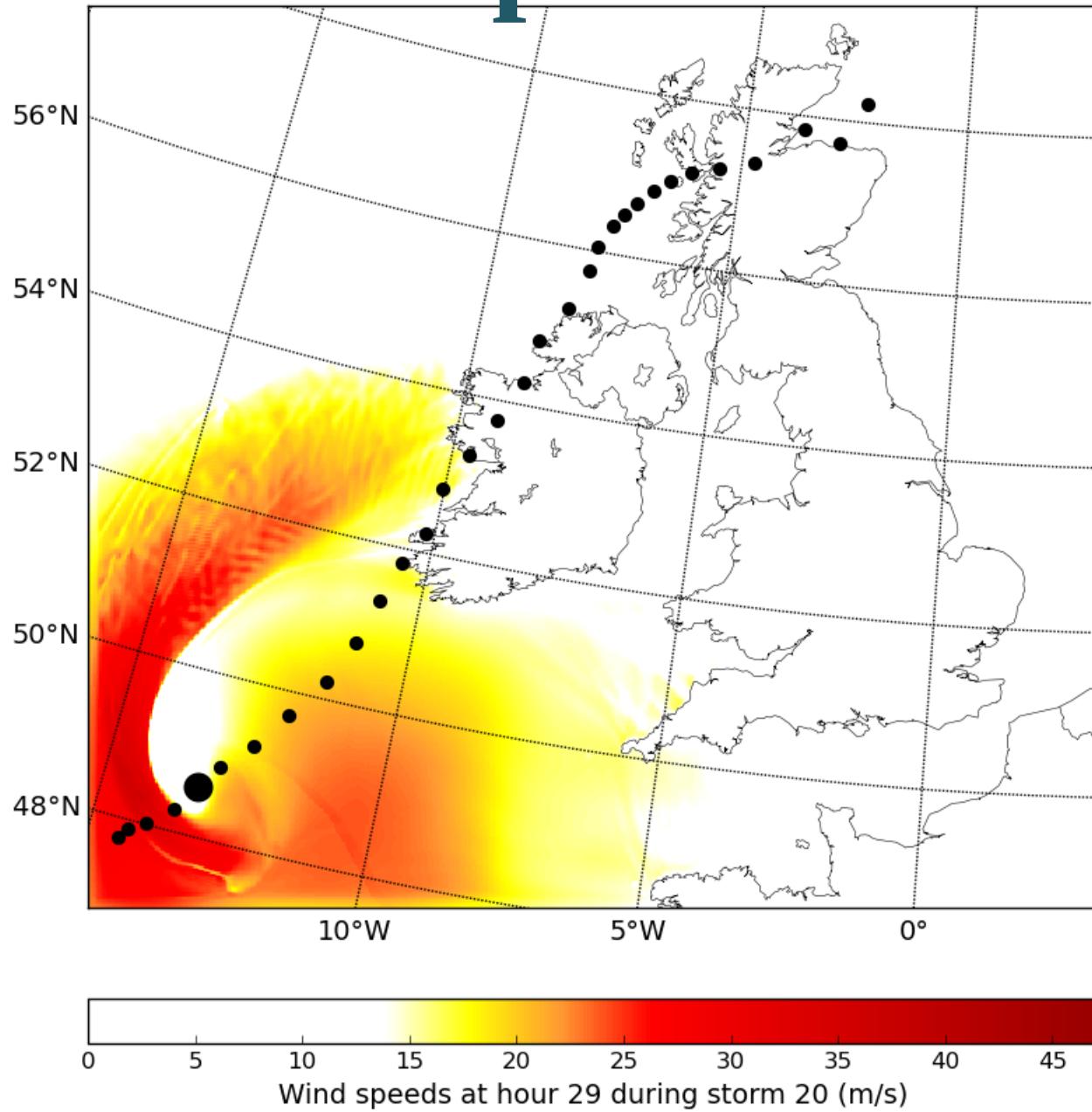
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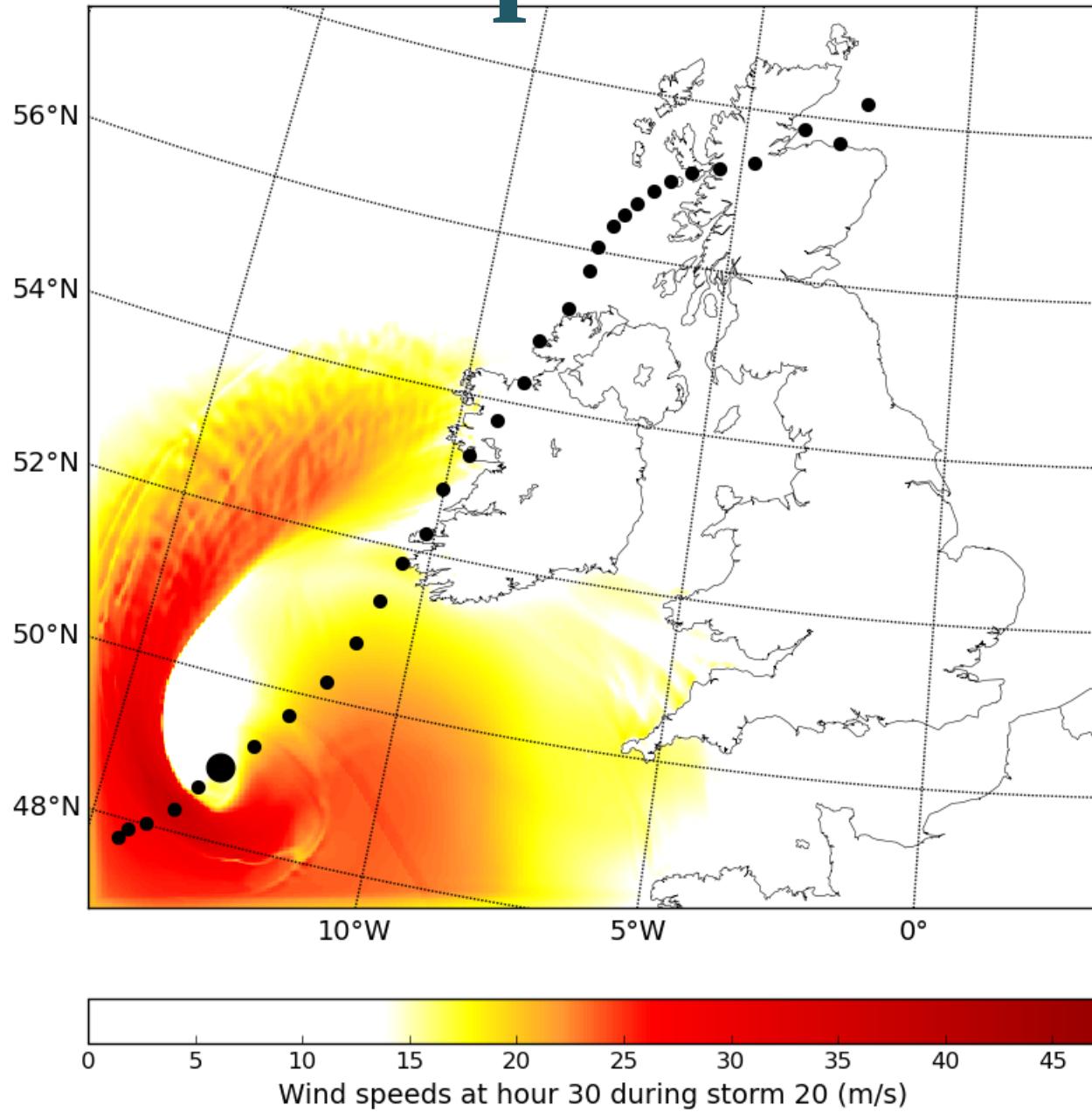
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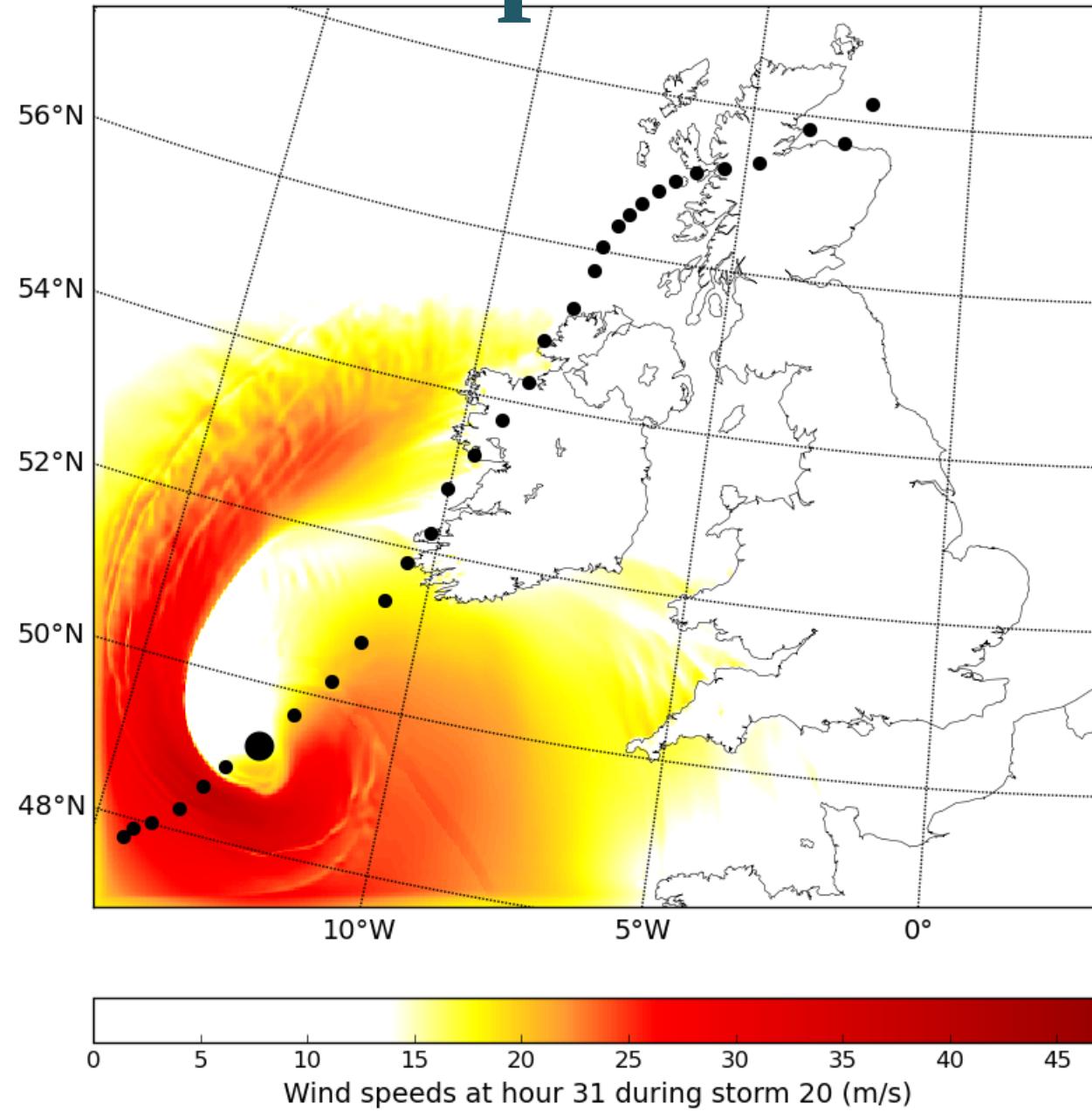
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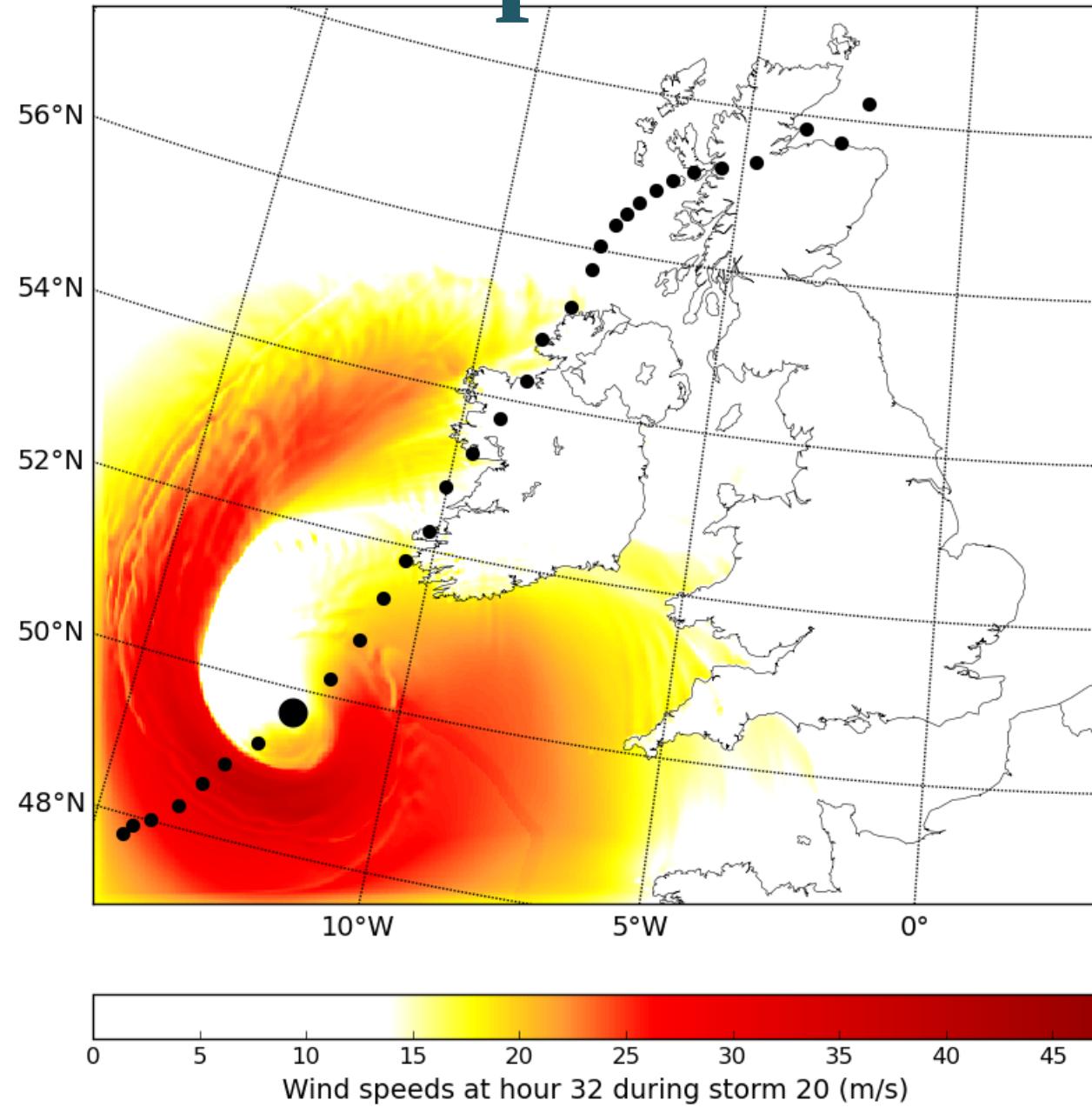
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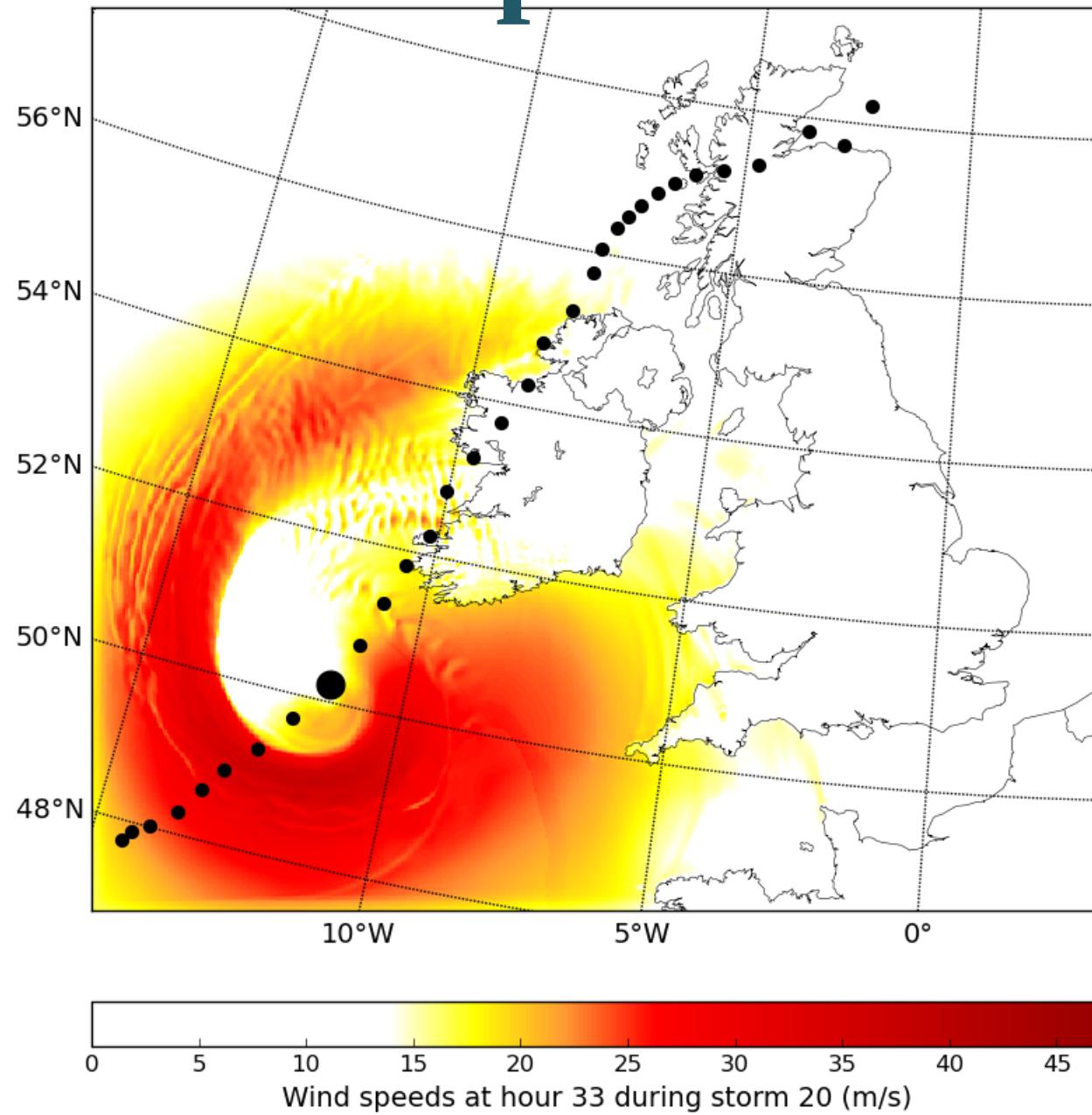
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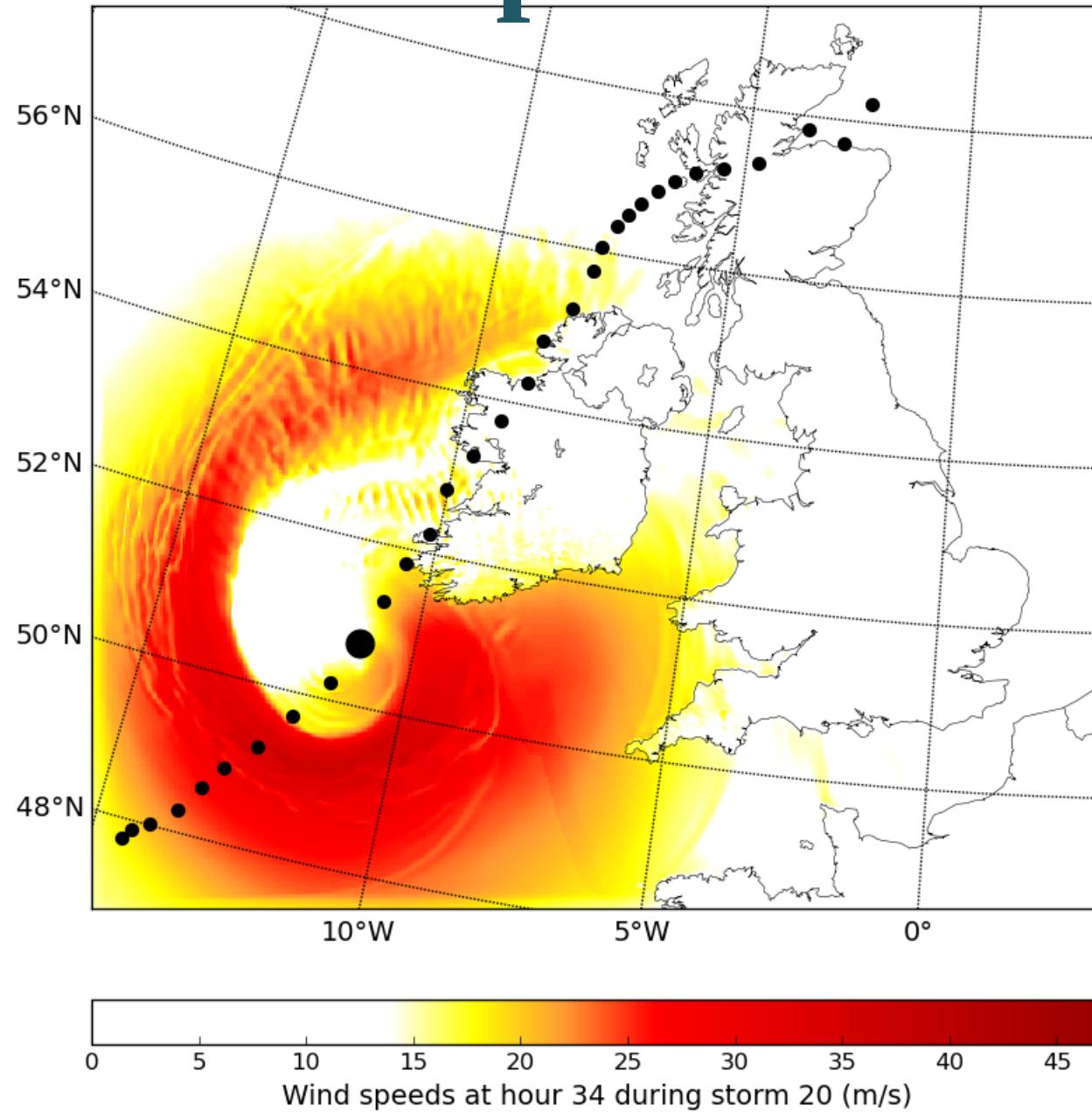
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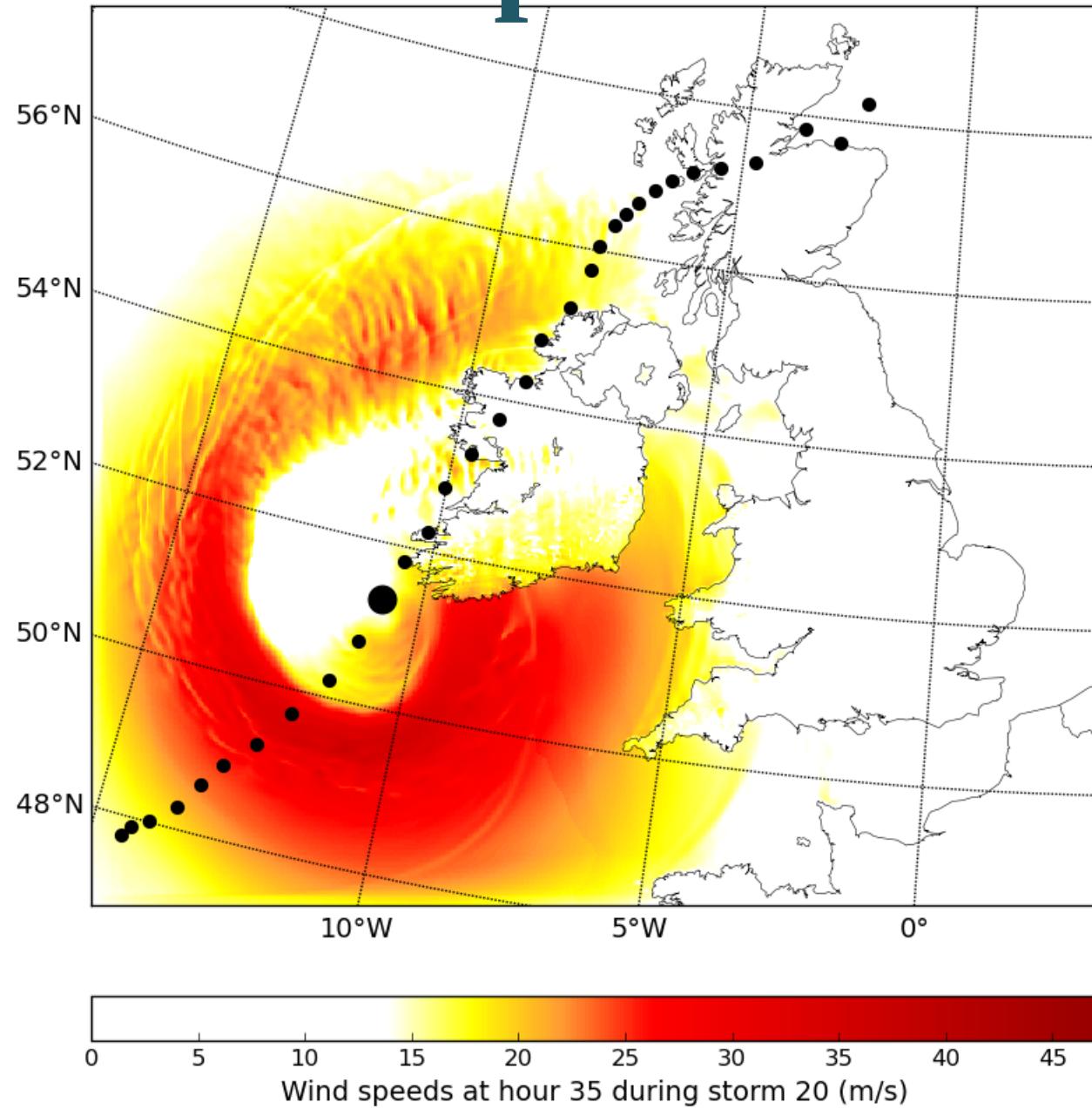
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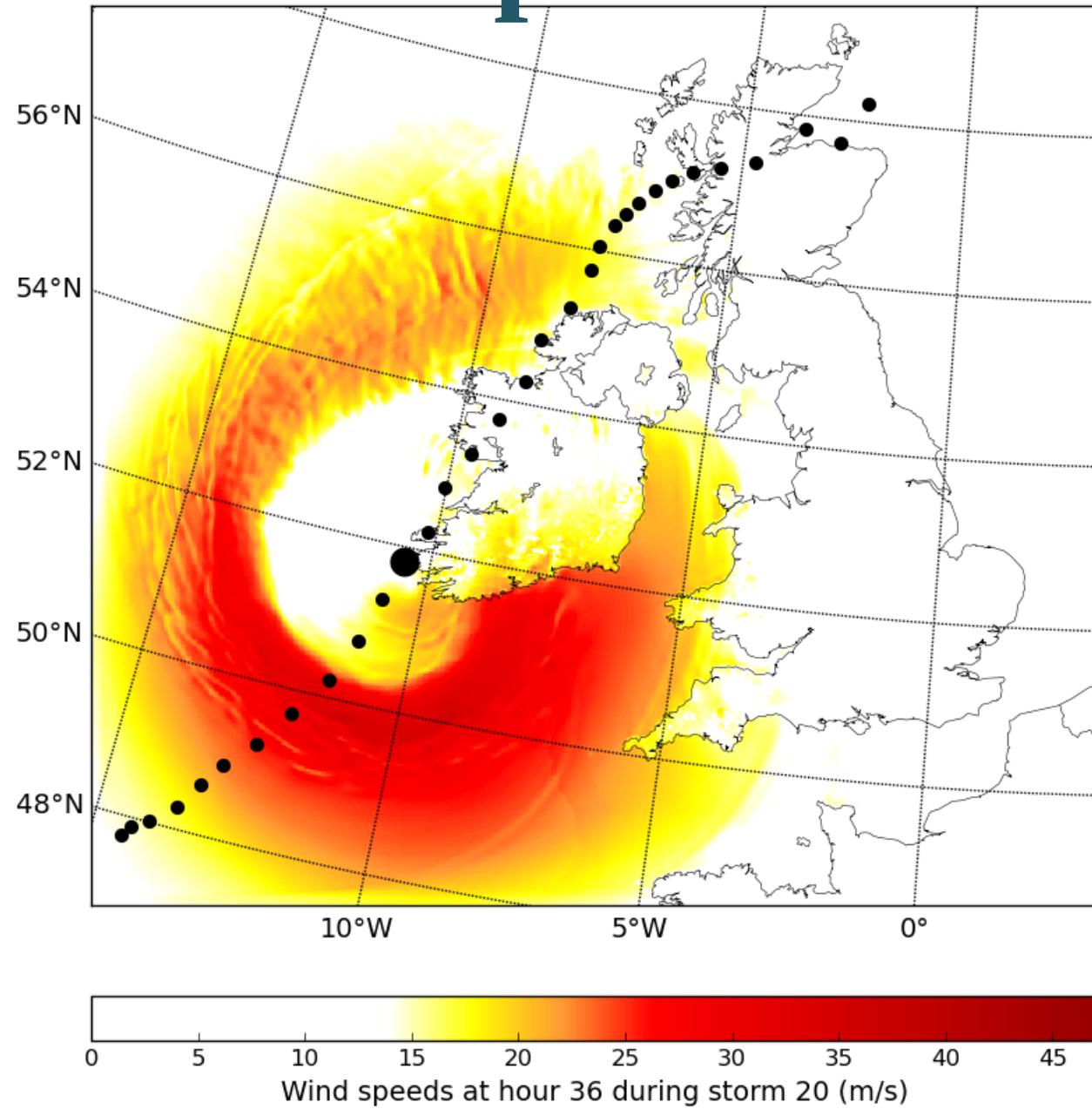
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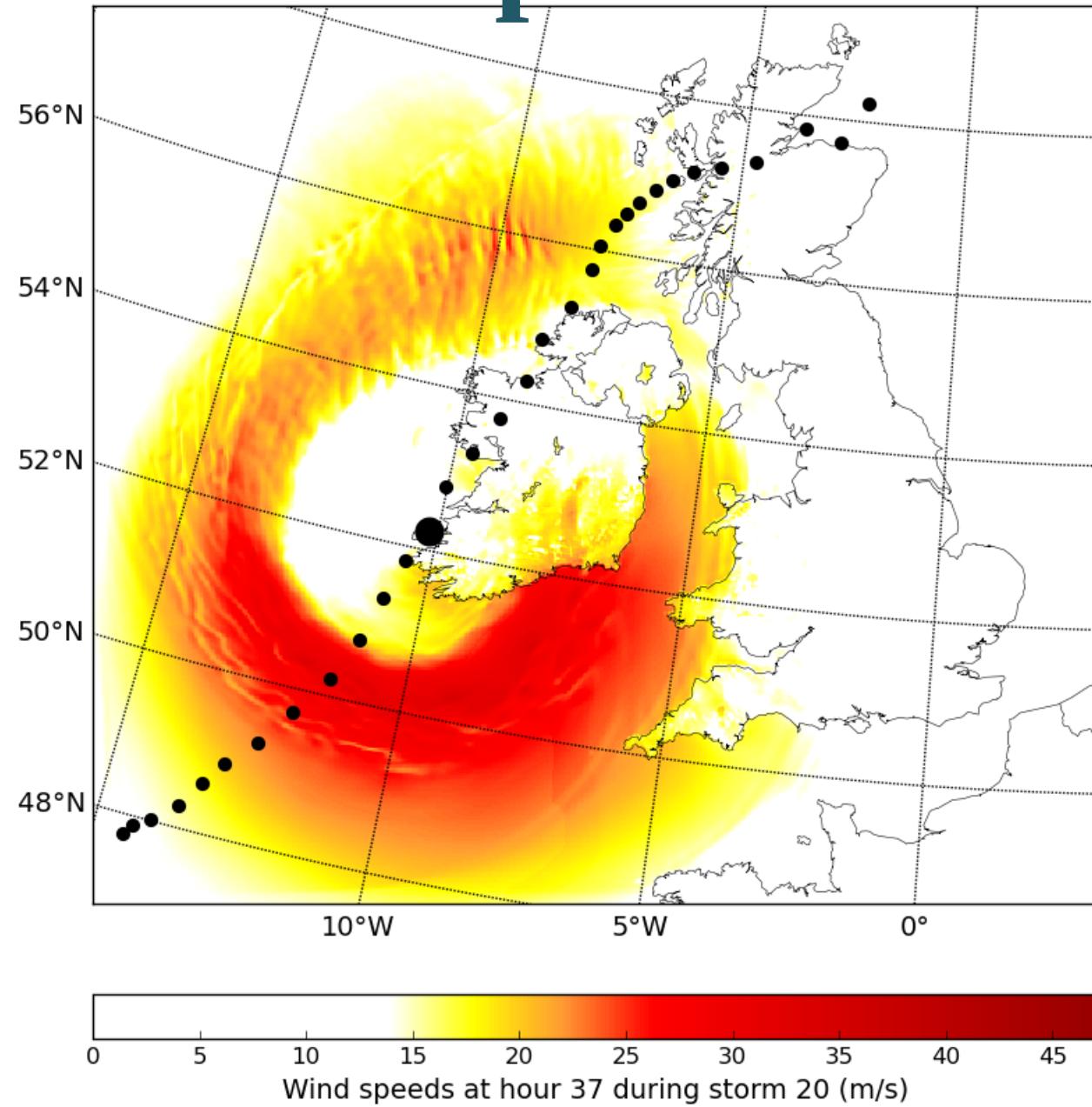
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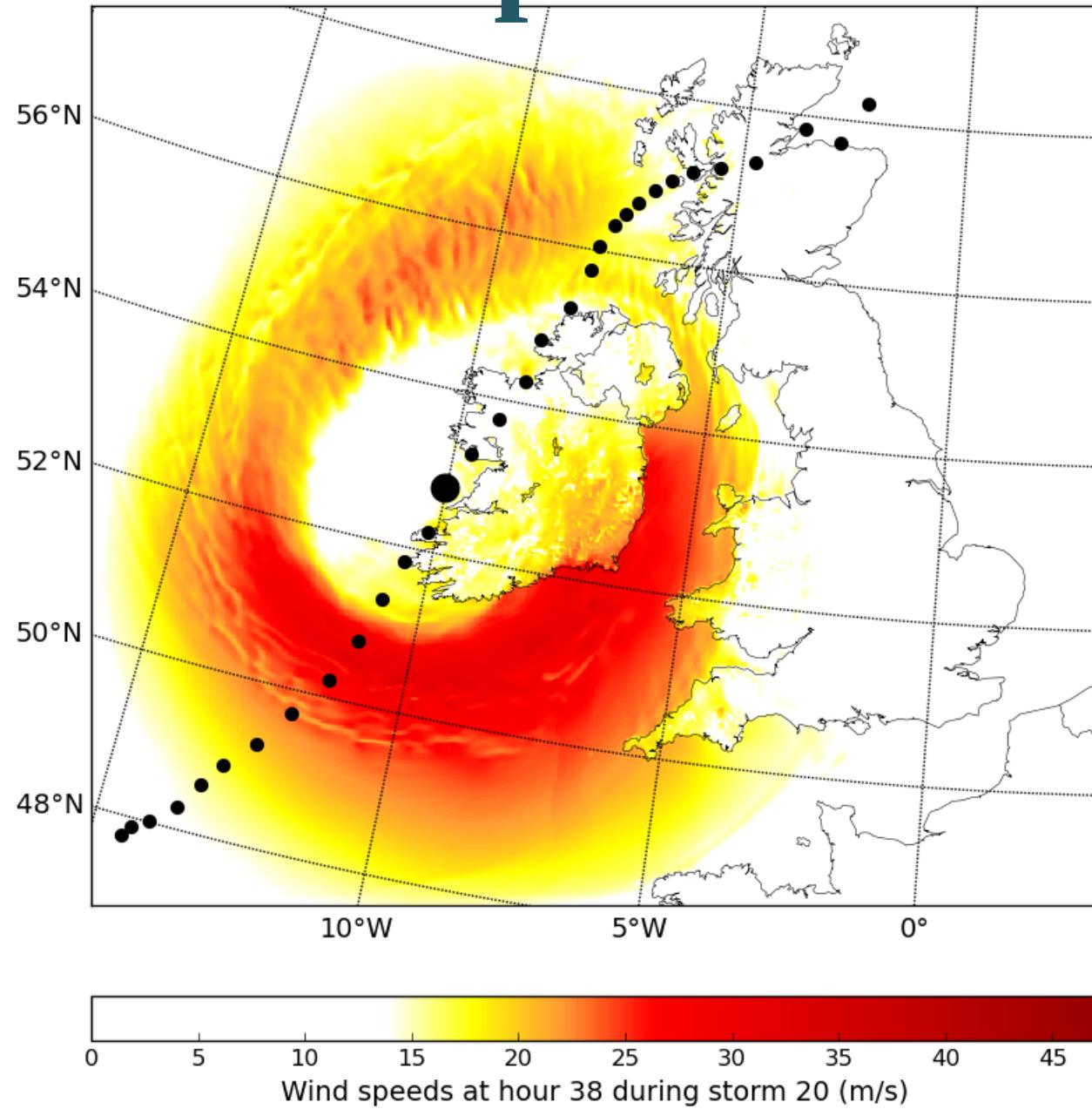
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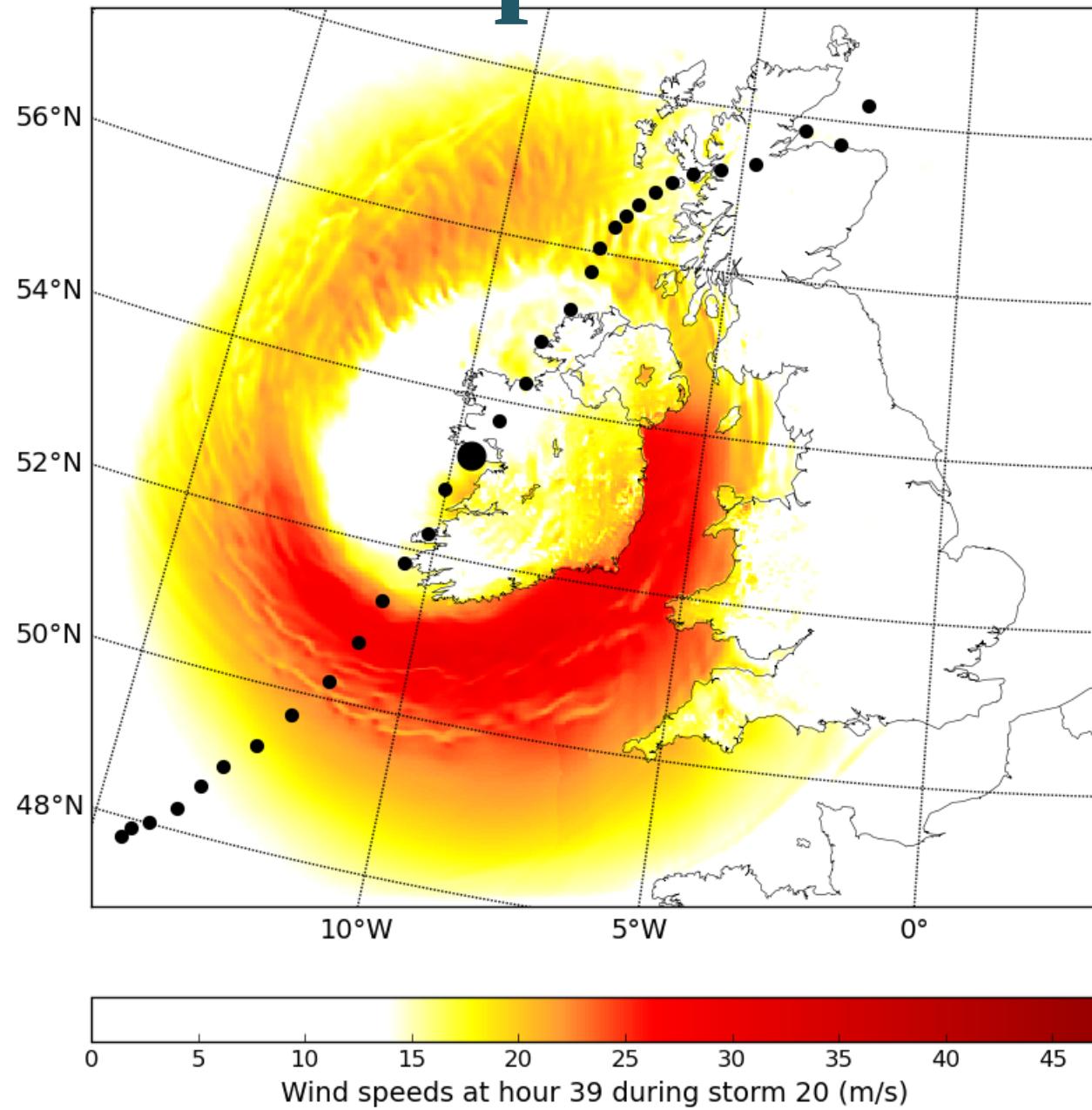
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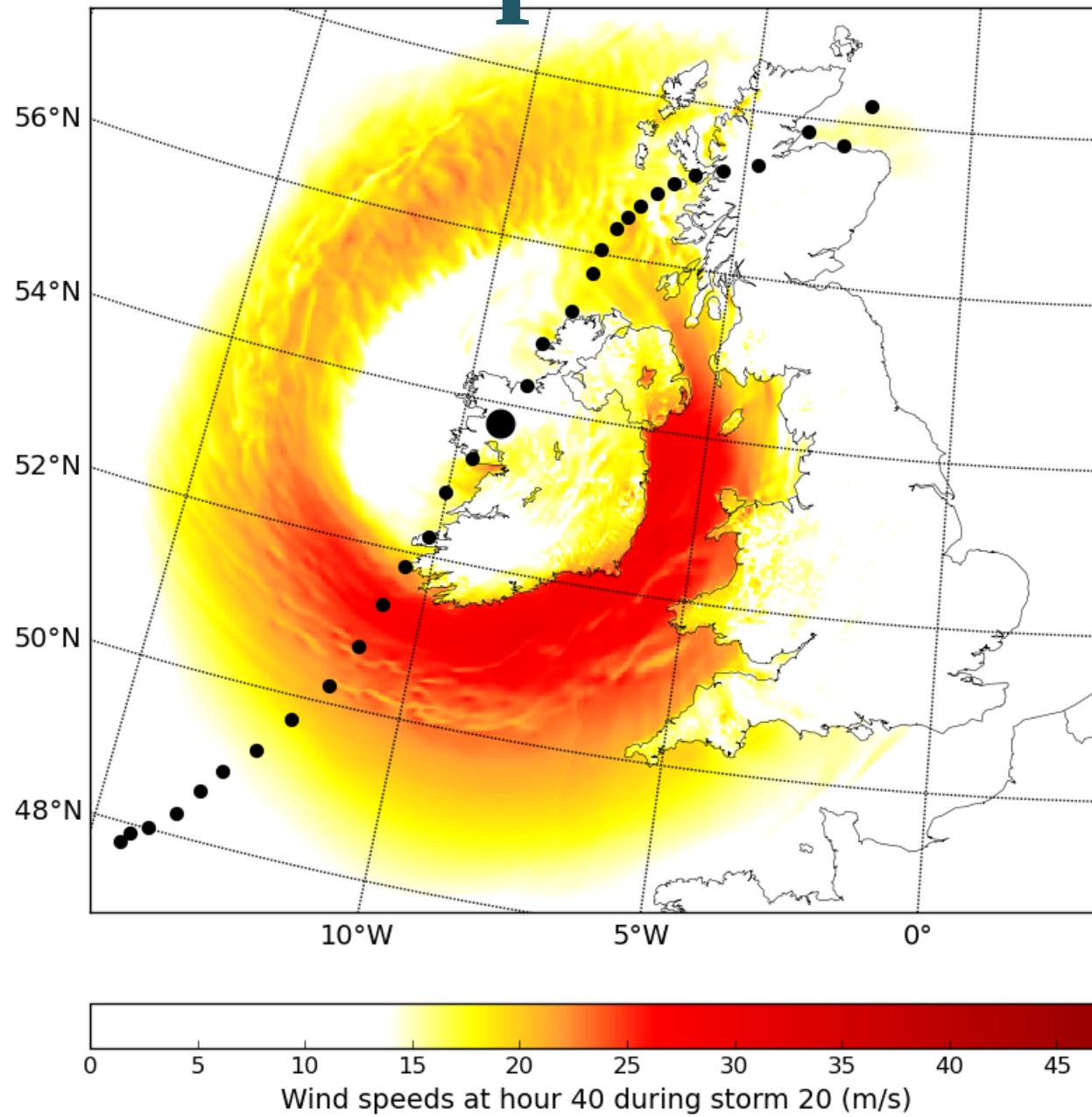
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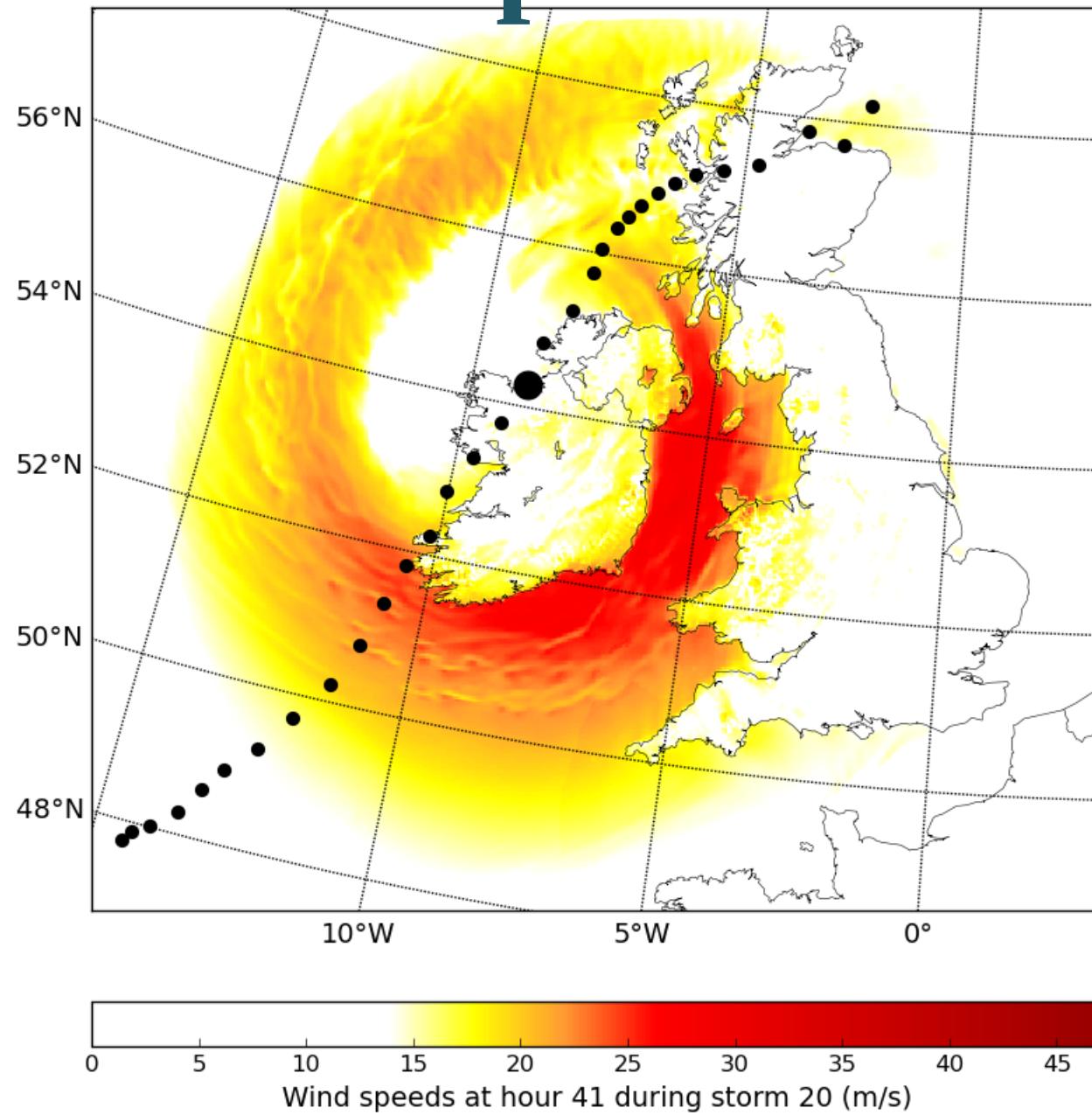
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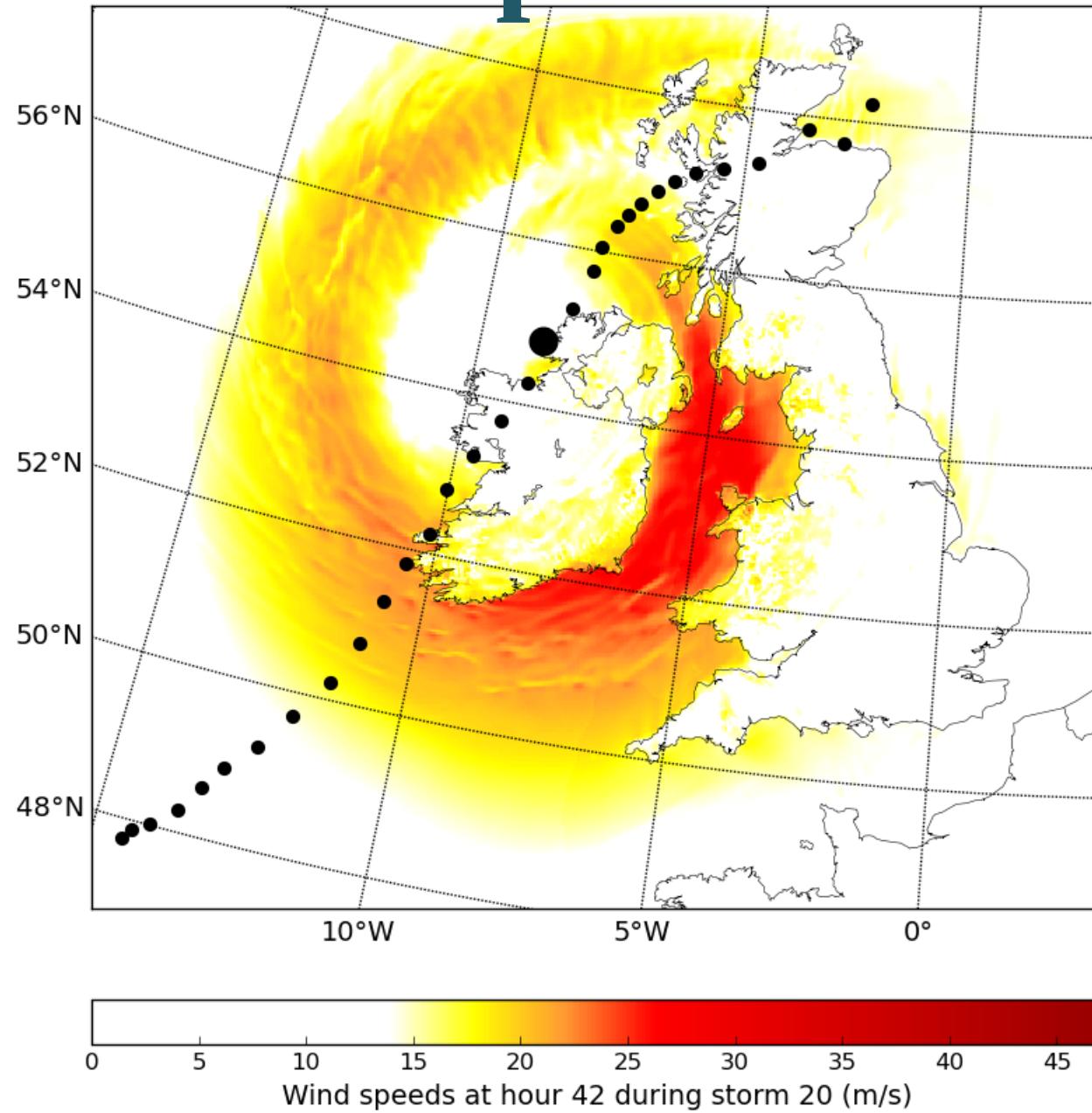
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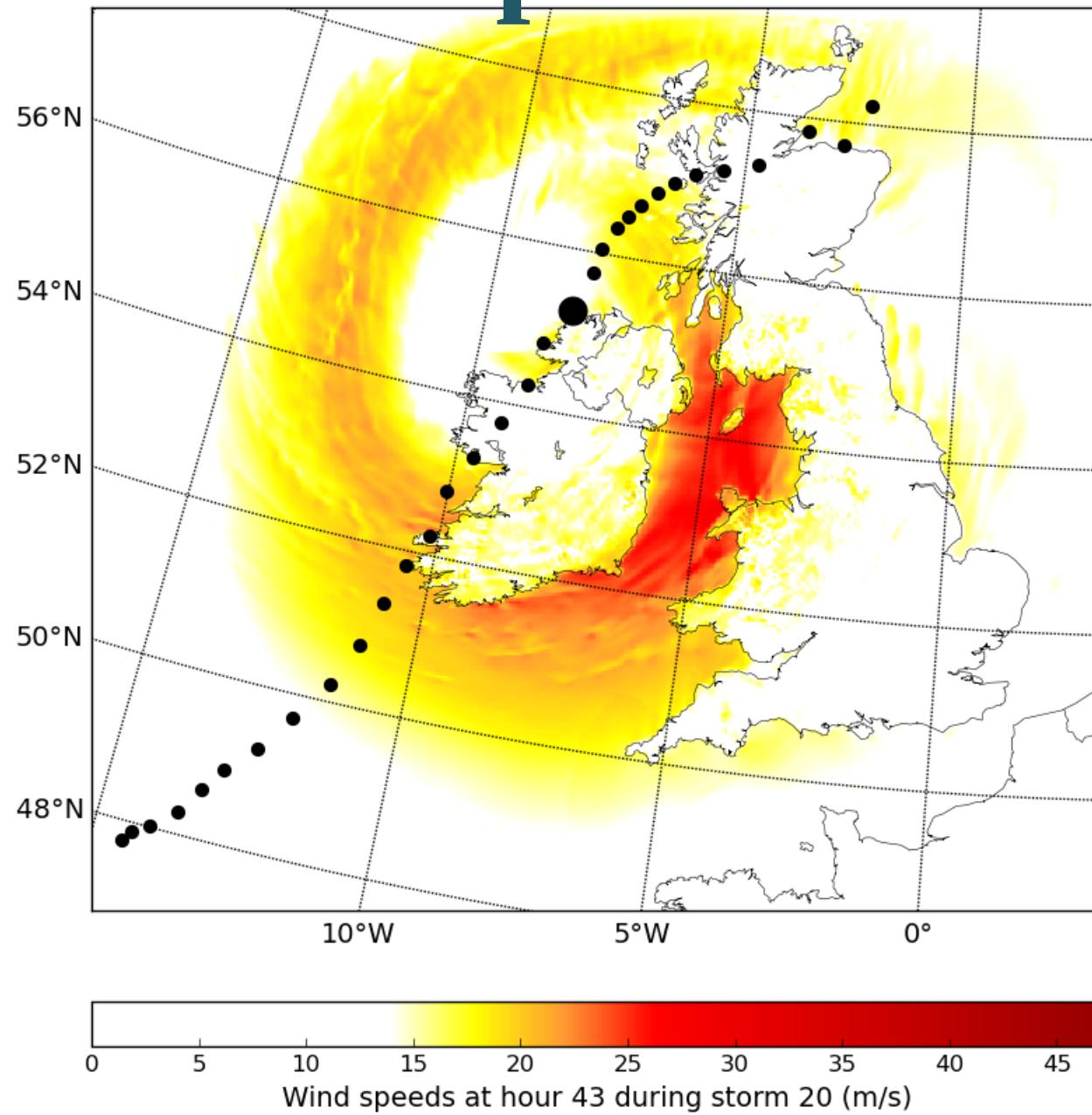
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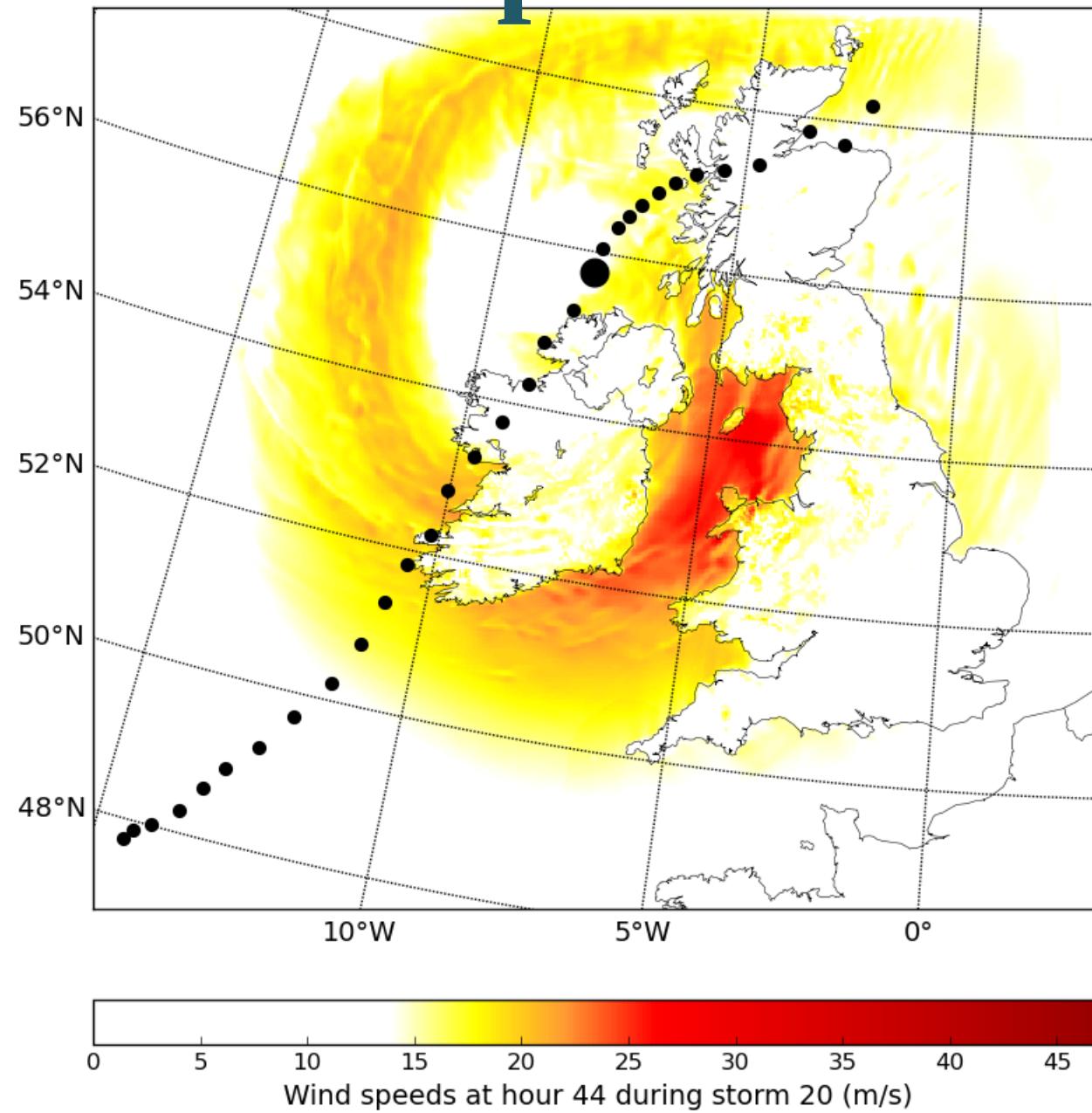
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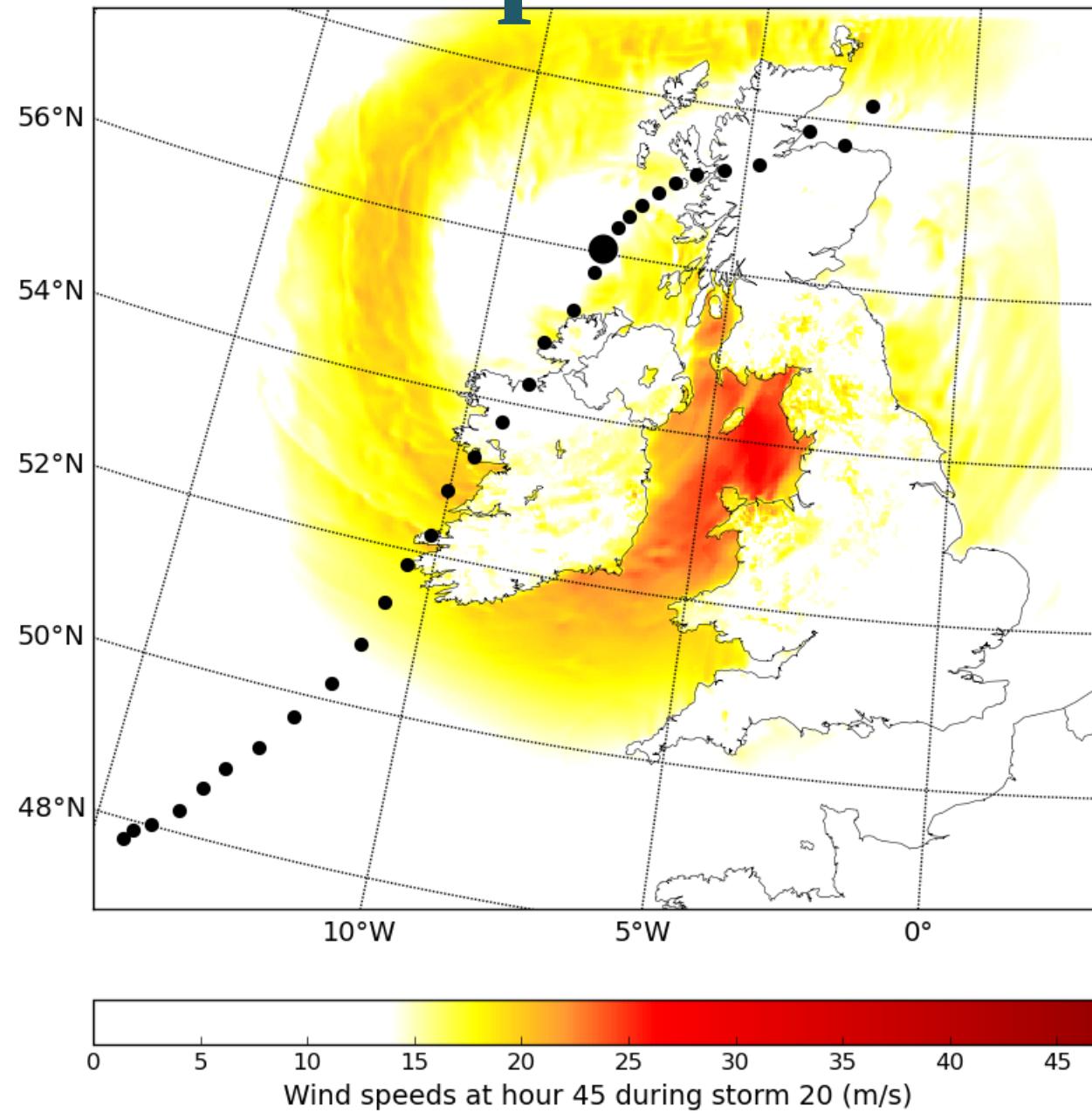
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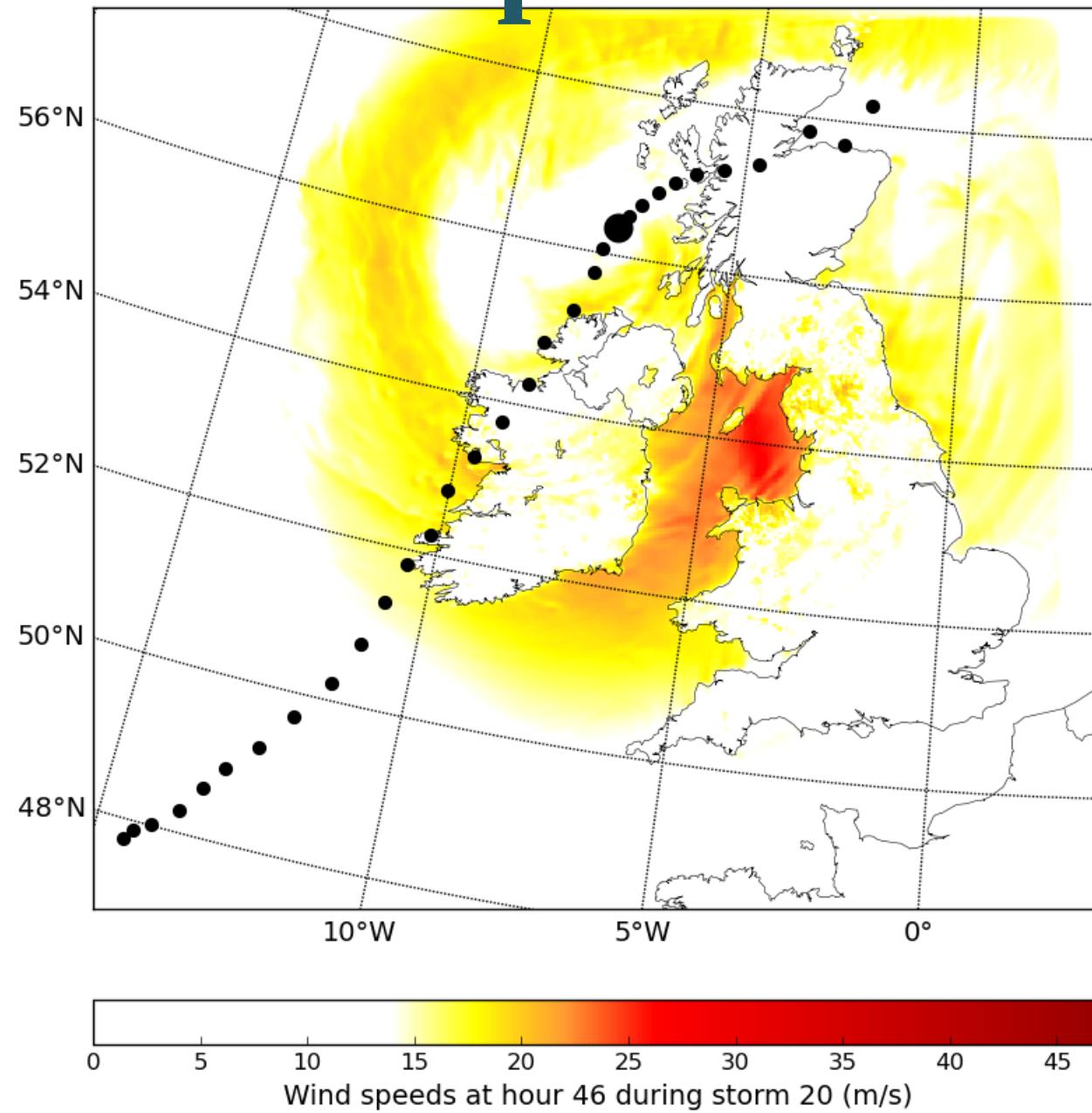
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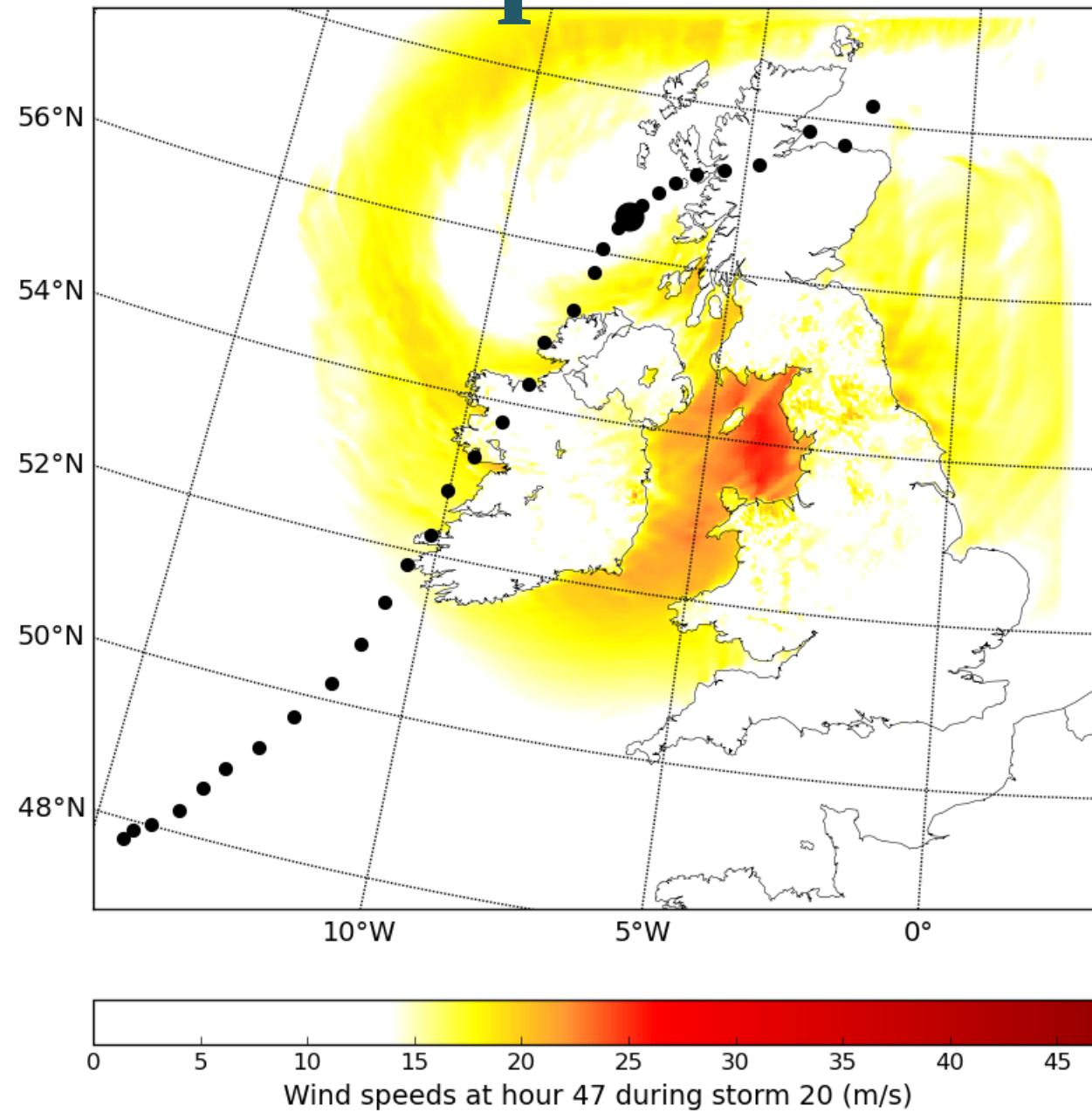
Ophelia



Ophelia



Ophelia



Conclusions & Future work

- MÉRAs characterisation of normal and extreme wind speeds, MSLP and vertical profiles is good
- Further analysis of gusts and mesoscale structures will show more strengths/weaknesses of the 2.5 Km resolution dataset
- In the future:
 - Dynamical downscaling of CMIP6 RCP 4.5 and RCP 8.5 outputs (CORDEX)
 - Windstorm risk models: user sectors and previous projects (WISC and SECTEUR)



Thank you for listening!

Verification

Months with storms

