

Impact of Extreme Weather on Operating the Transmission System

nationalgrid



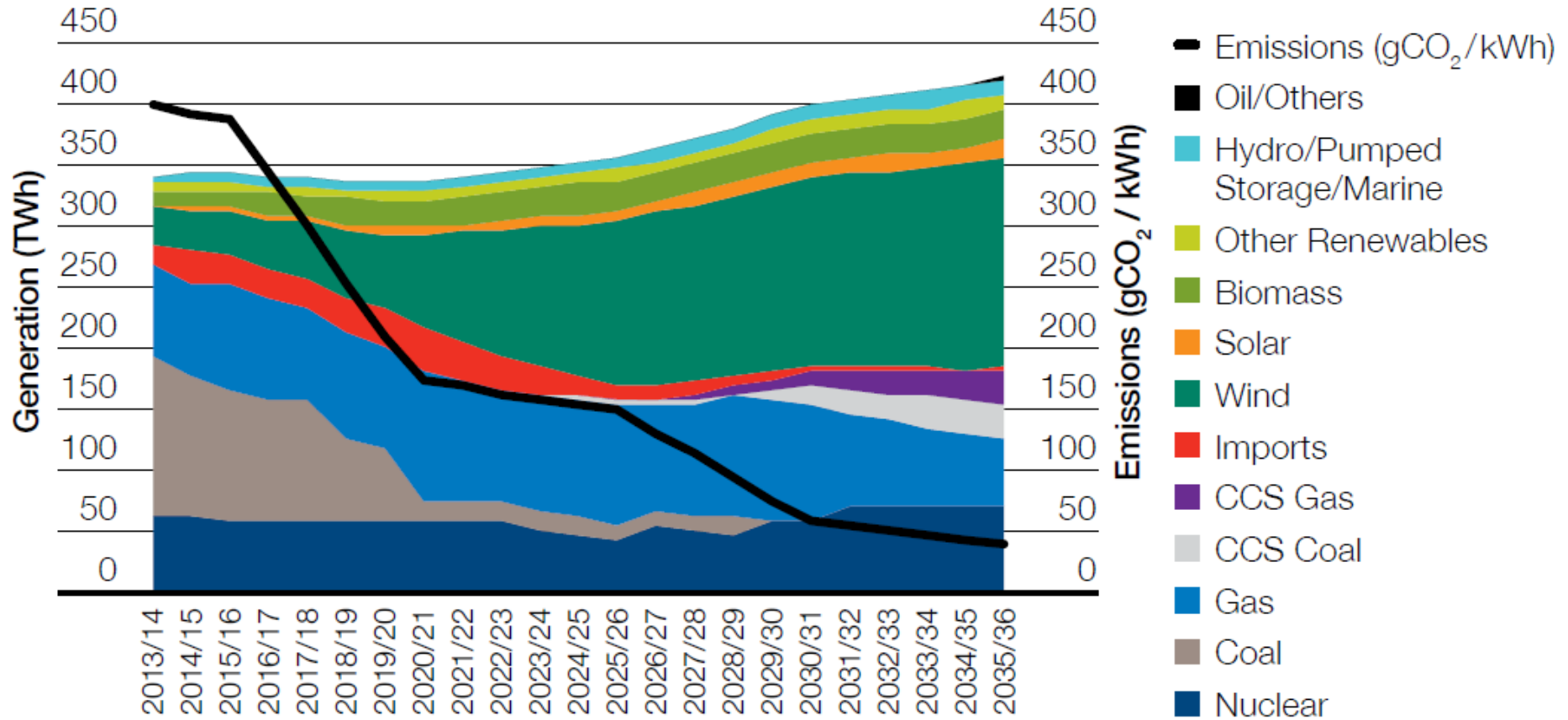
David Lenaghan

21st October 2014

Introduction

- National Grid have been collaborating with Reading University since 2011 on weather related projects.
- Four projects funded from NIA
 - **NIA_NGET0016 UK-wide Wind Power: Extreme and Variability**
08/2012 - 05/2014
 - **NIA_NGET0028 Impact of Extreme Events on Power Production at the Scale of a Single Wind-farm** 01/2013 - 07/2014
 - **NIA_NGET0085 UK Regional Wind: Extreme Behaviour and Predictability** 08/2013 - 08/2015
 - **NIA_NGET0128 Clustering Effects of Major Offshore Wind Developments** 04/2014 - 04/2016

Why is National Grid doing this?



Offshore Wind Development: Round 3

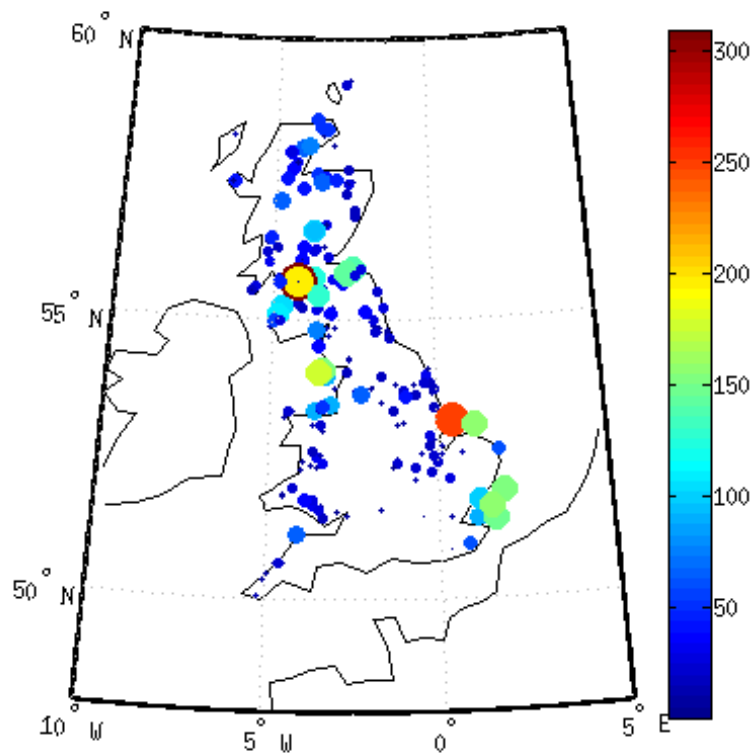
Awarded in January 2010

- 9 Zones
- Up to ~~32~~ GW of capacity
29 GW

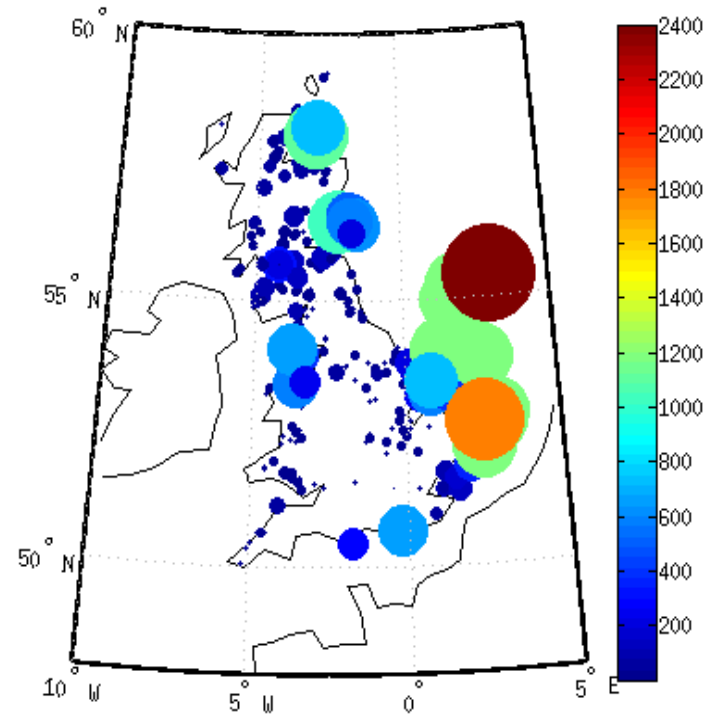
Zone	GW
Moray Firth	1.5 1.3
Firth of Forth	3.5
Dogger Bank	9 7.2
Hornsea	4
East Anglia	7.2
Rampion	0.6
Navitus Bay	1.2 0.9
Bristol Channel	1.5
Celtic Array	4.2



Change in wind farm distribution



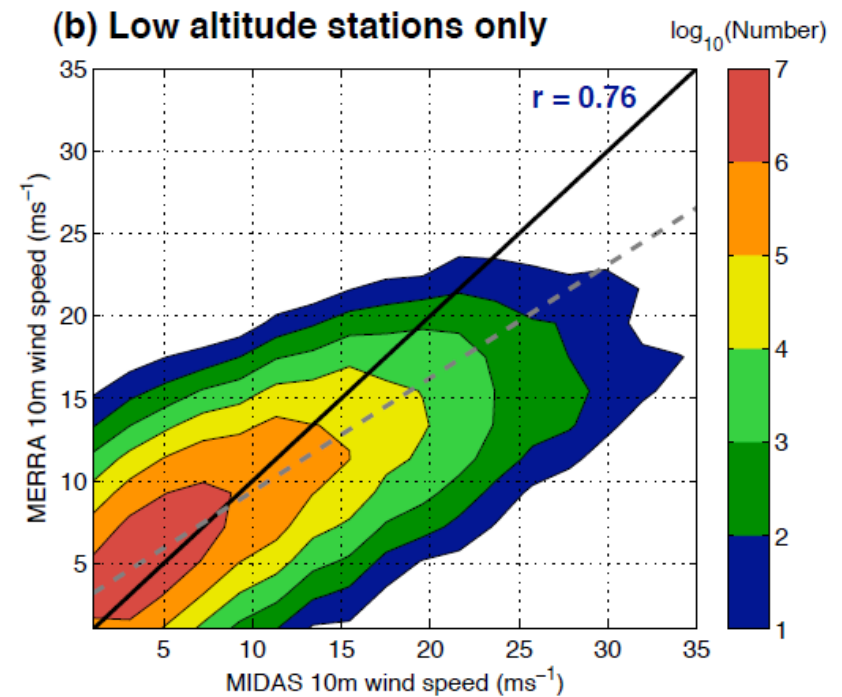
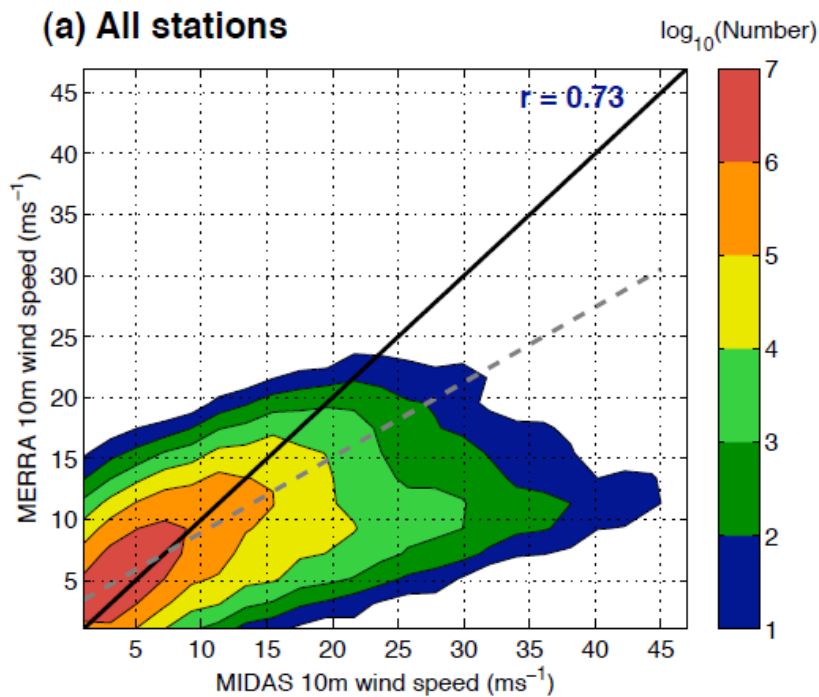
2012



2020

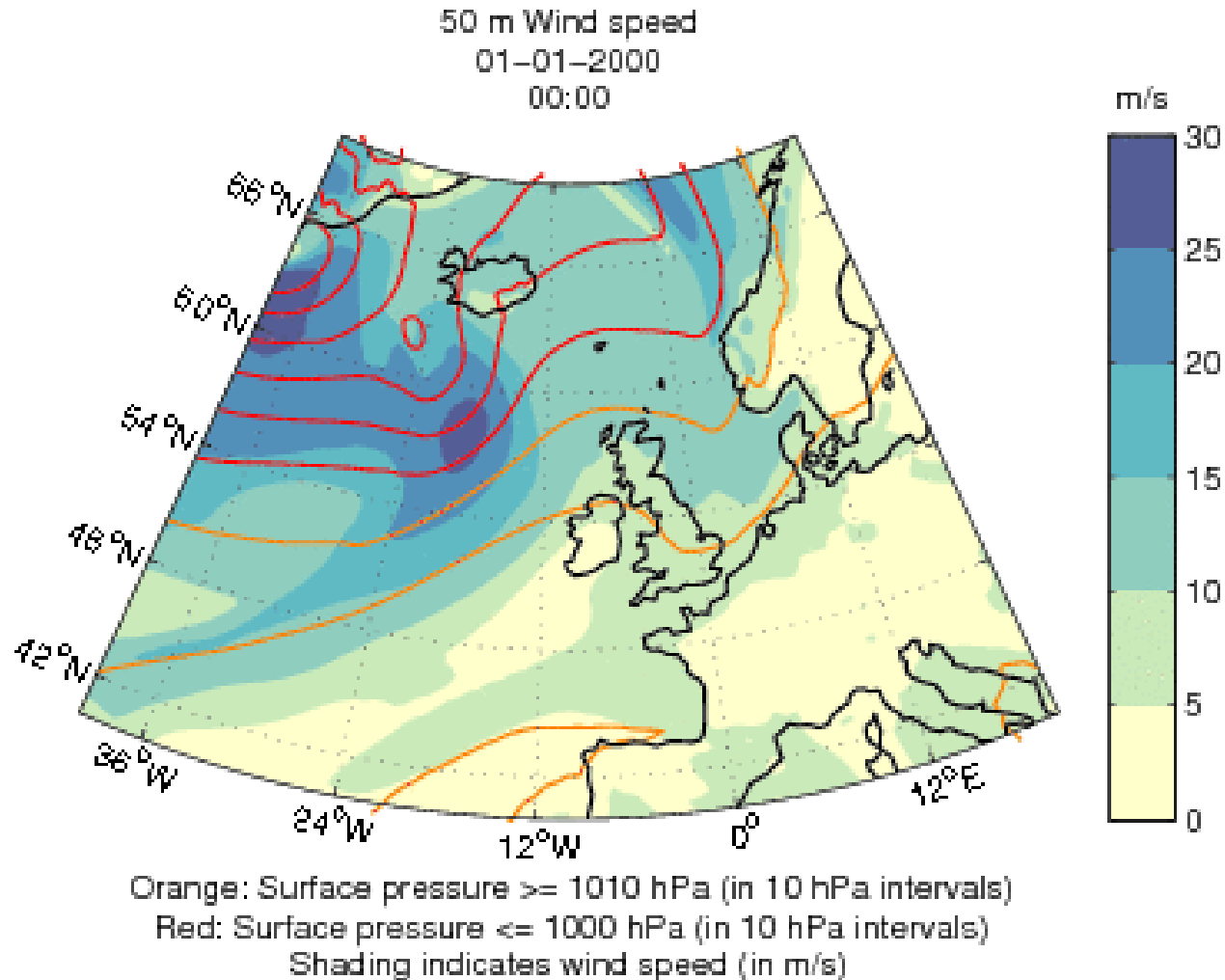
Results (so far)

- Comparison of Re-Analysis data set to real measurements



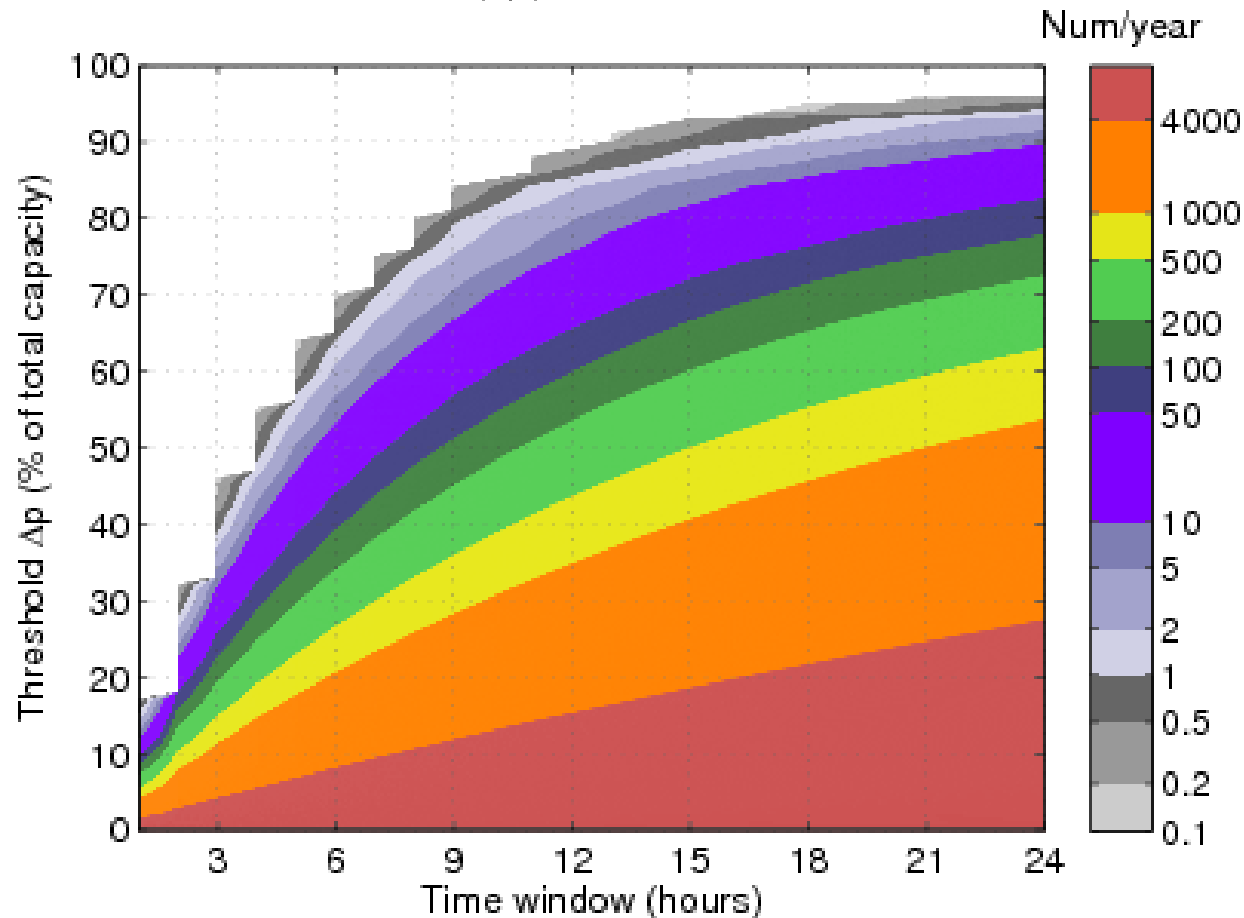
Results (so far)

- MERRA Re-analysis data visualised



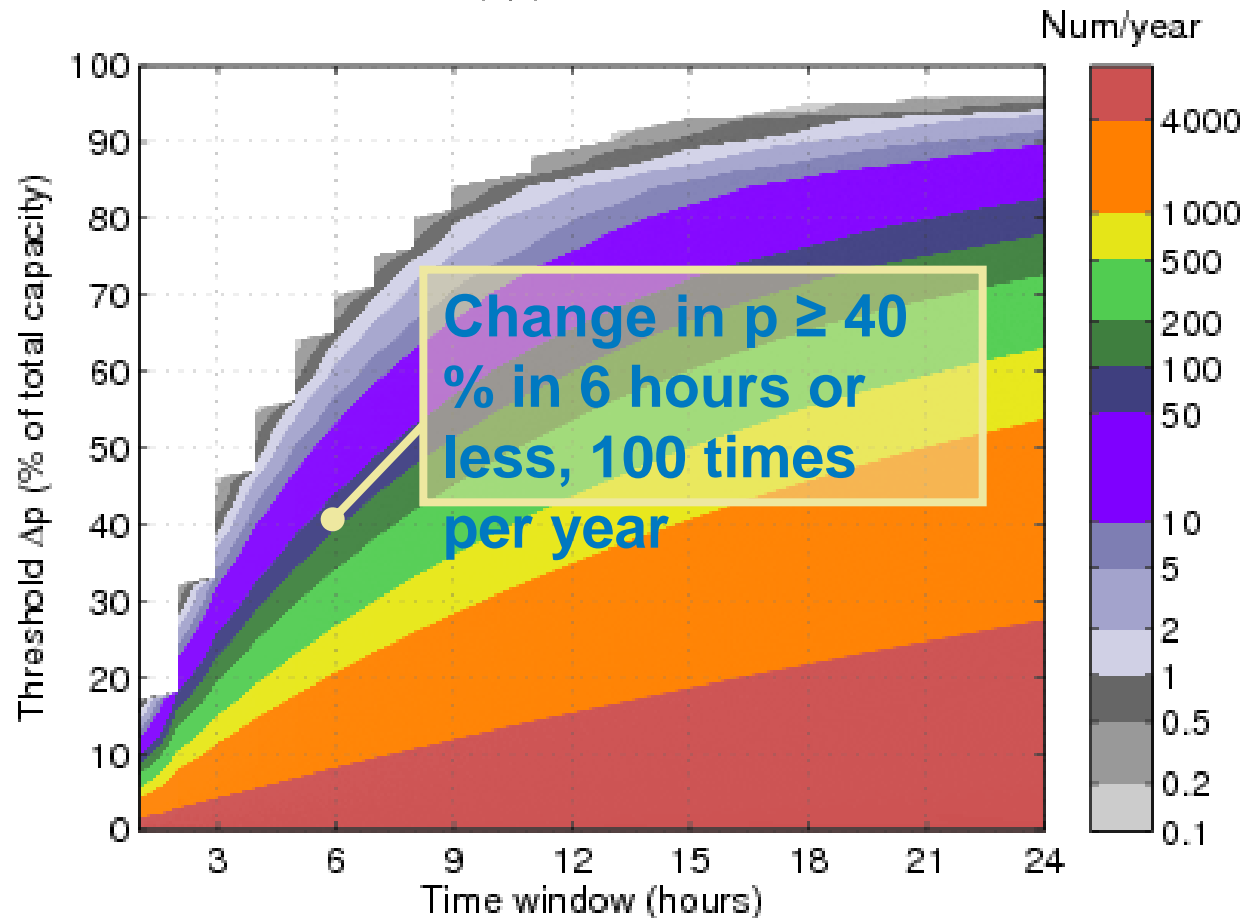
Ramping / cut-out events

Number of different ramping events in MERRA
for which $\text{Max } |\Delta p| \geq Y \text{ MW}$ within X hours



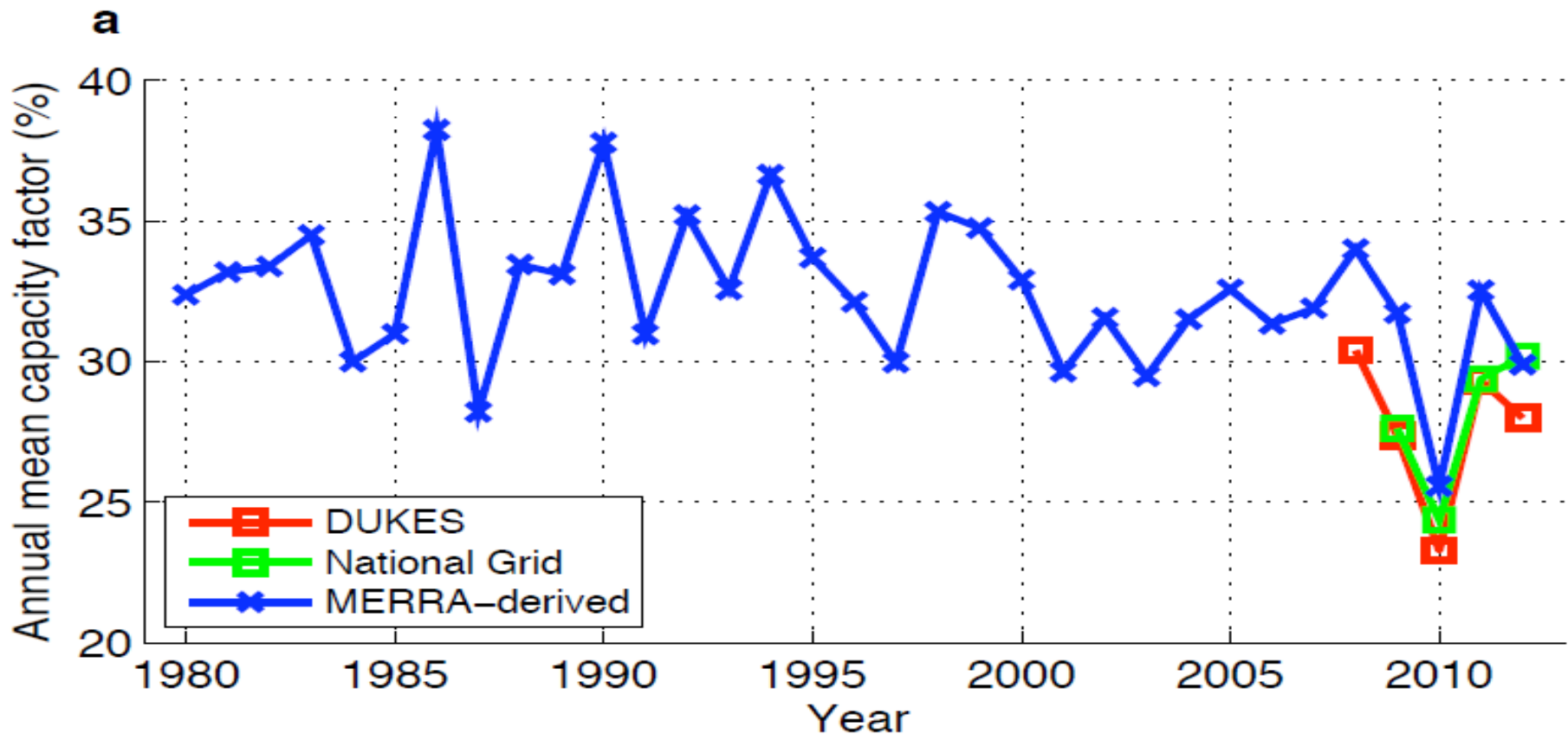
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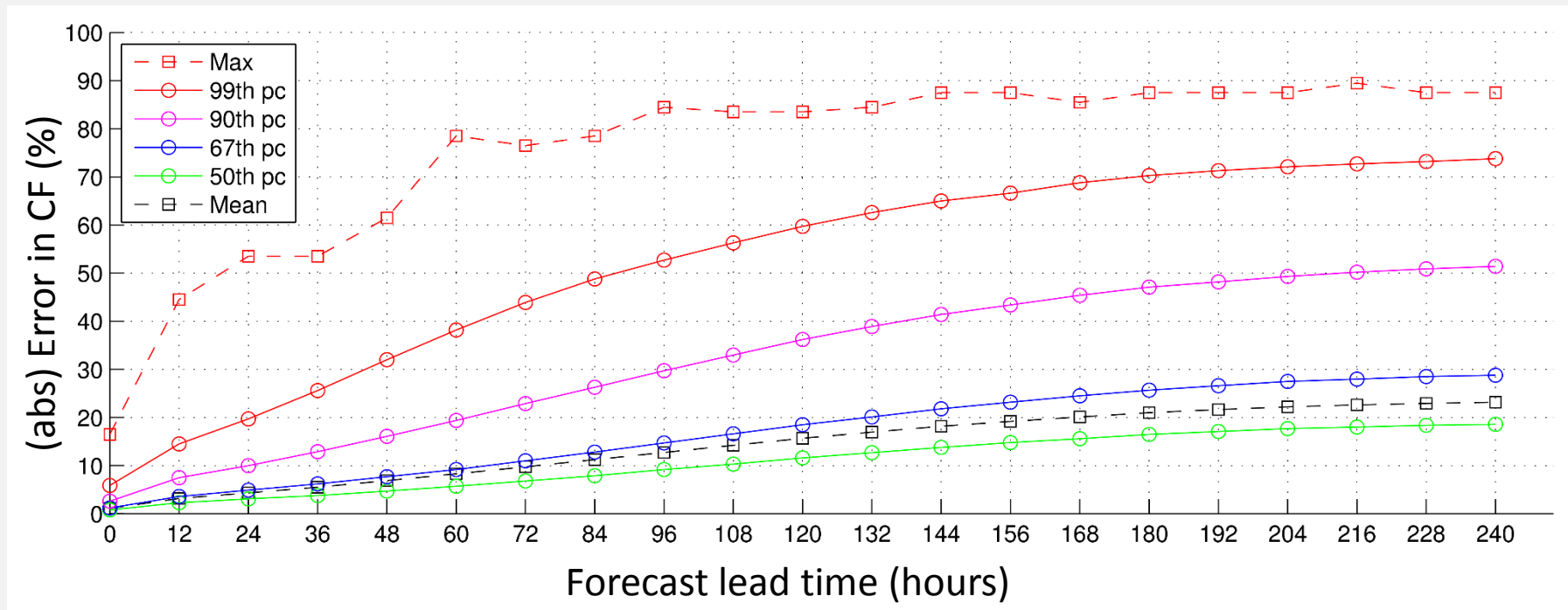
Results (so far)

- Long term time series allows us to take a longer view



Results (so far)

- Distribution of “forecast errors” in ECMWF (EU) model:



Next Steps

- Wind farm parameterization:
- Characterisation of the offshore cluster extreme events:
- Enhance the predictability of extreme events:

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Thank You

