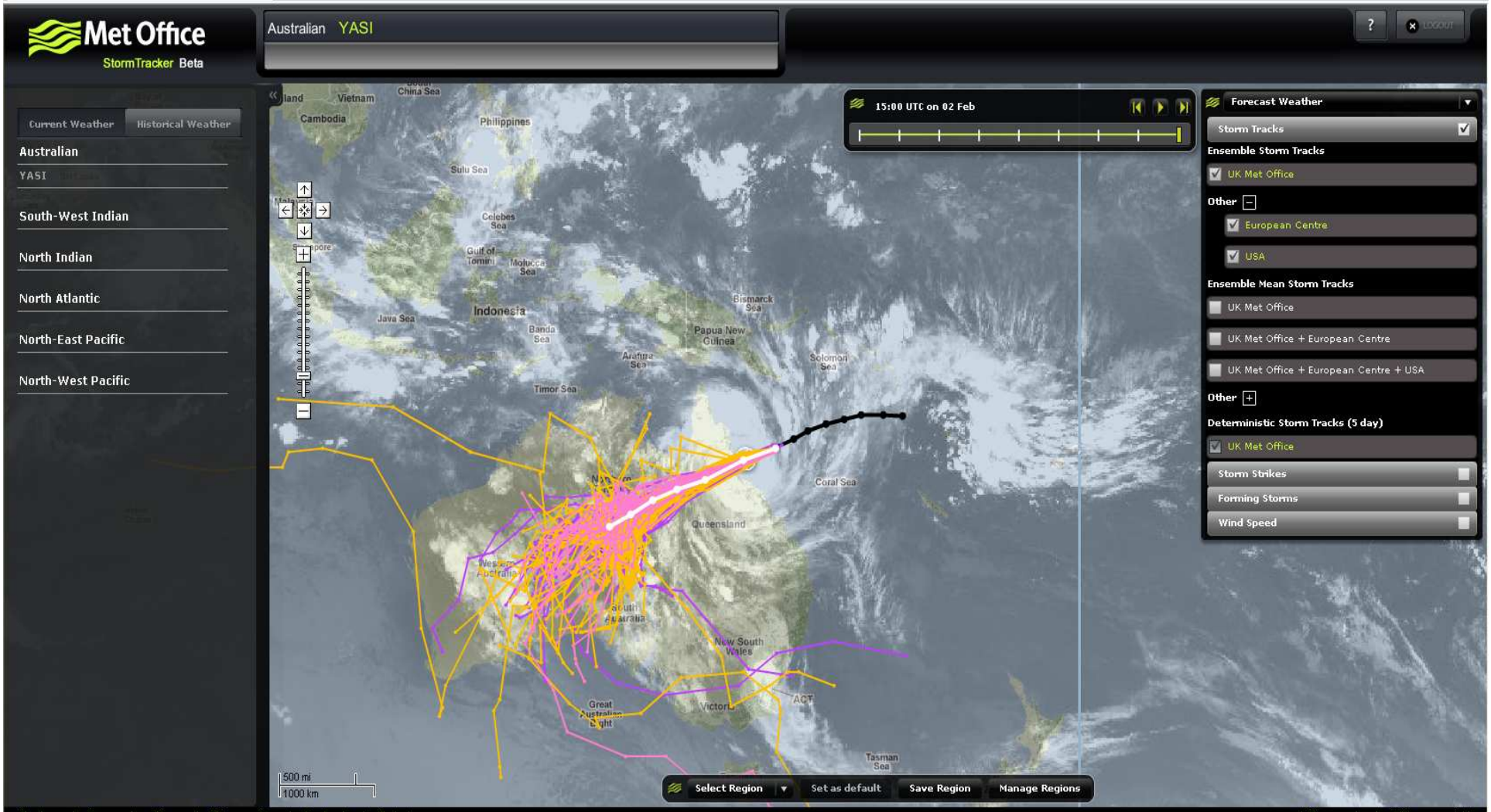
Global Climate Services – Adaptation for the Finance Sector

Dr Matt Huddleston, Met Office, for NAB / UNEP FI

3rd February 2011


Met Office
StormTracker Beta
Australian YASI
Current Weather
Historical Weather
Australian
YASI
South-West Indian
North Indian
North Atlantic
North-East Pacific
North-West Pacific
15:00 UTC on 02 Feb
Forecast Weather
Storm Tracks
Ensemble Storm Tracks
UK Met Office
Other
European Centre
USA
Ensemble Mean Storm Tracks
UK Met Office
UK Met Office + European Centre
UK Met Office + European Centre + USA
Other
Deterministic Storm Tracks (5 day)
UK Met Office
Storm Strikes
Forming Storms
Wind Speed
Select Region
Set as default
Save Region
Manage Regions
500 mi
1000 km
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Tropical cyclone products from the experimental MOGREPS 15-day ensemble

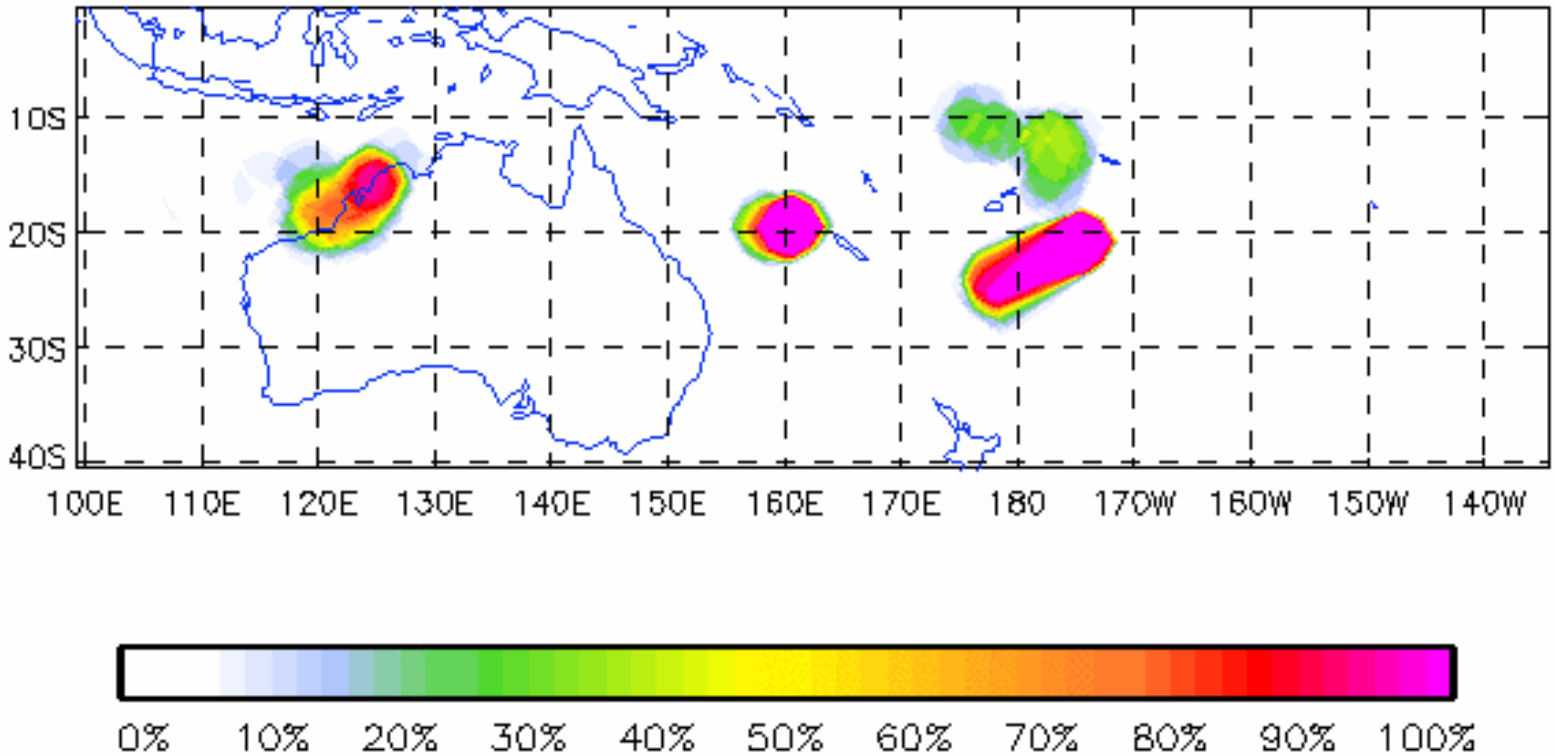
Met Office

Forecast from Tuesday 25th January

Data time 2011012500

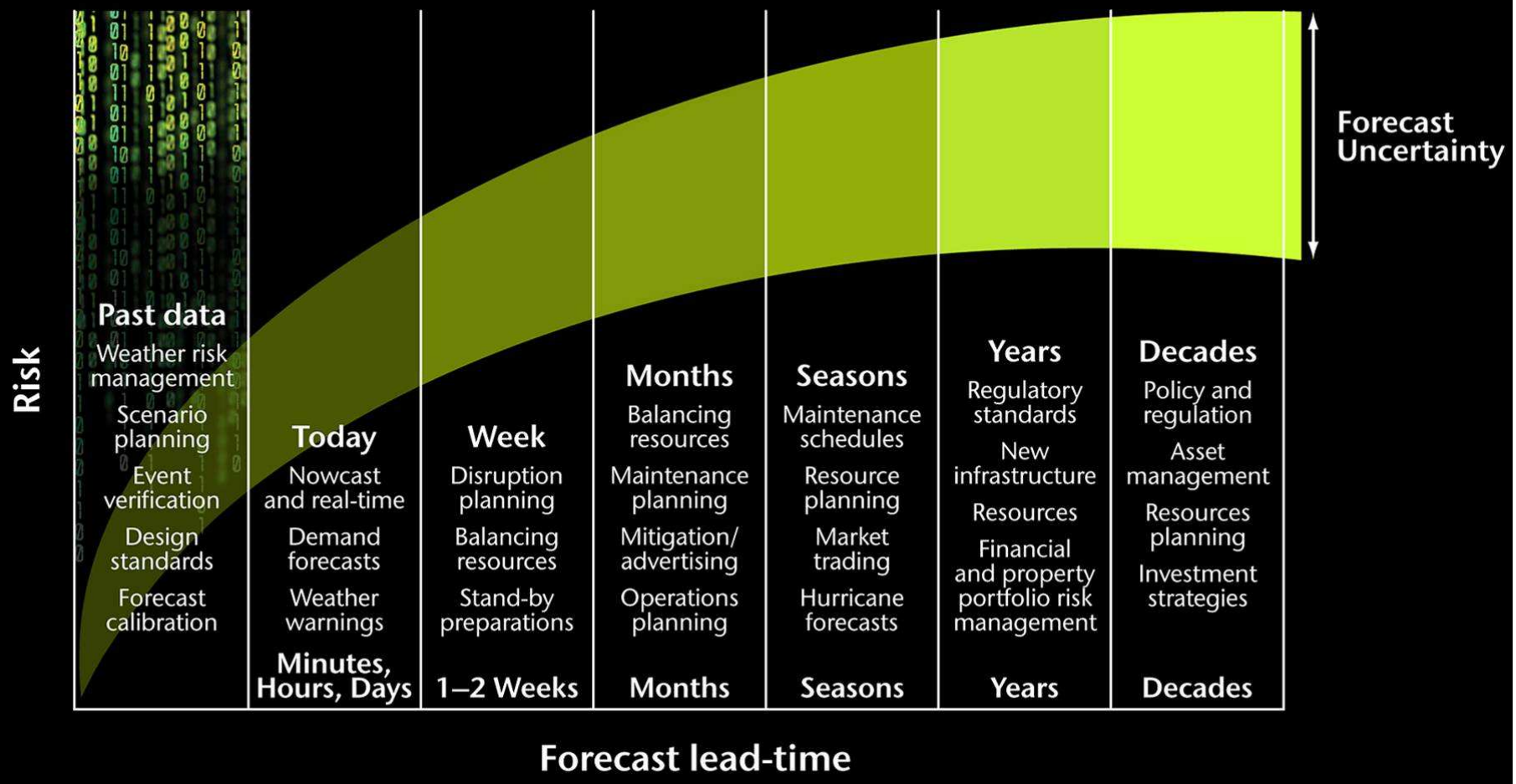
Tropical cyclone strike probability for 24hrs centred on T+012

(shows probability of a tropical cyclone passing within c.300km)



Adaptation in the Financial Markets:

Insurance, catastrophe bonds, commodity and equity derivatives, asset & credit risk management



Renewable energy & Finance -

Climate application case study:

£7bn Thames Water buy-out

Tailored seasonal forecast of UK drought risk 2006/07 following major drought

- Seasonal climate forecast systems and historical data tailored for a private equity fund.
- Specific risk assessment of exceedance of critical thresholds were assessed
- Risk assessment informed in multi-billion pound decision, potentially saving company huge losses.

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Barclays Bank: Managing Climate Risks in Africa, 2009

Key report looking at adaptation opportunities and both **natural and man-made climate changes**:

- Current climate risk in South Africa, Kenya, Ghana
- Regional economic impacts of climate
- Country focus on Water, Energy, Health & Agriculture
- Case studies provide risk & resilience perspectives and opportunities for developing markets

"El Nino is key"

The energy industry is leading the world on natural & human climate change

EP2: The Impact of Climate Change on the UK Energy Industry

Understanding impacts: What's normal in a changing climate?

- Predicting the expected normal climate for each year 2007-2011 hour by hour

  (EDF Energy, 2007)

With ever warmer seasons in the UK – historical records and return periods become are misguiding.

EDF knew they needed a better estimate of what to expect for the coming years to make operational and strategic business critical decisions.

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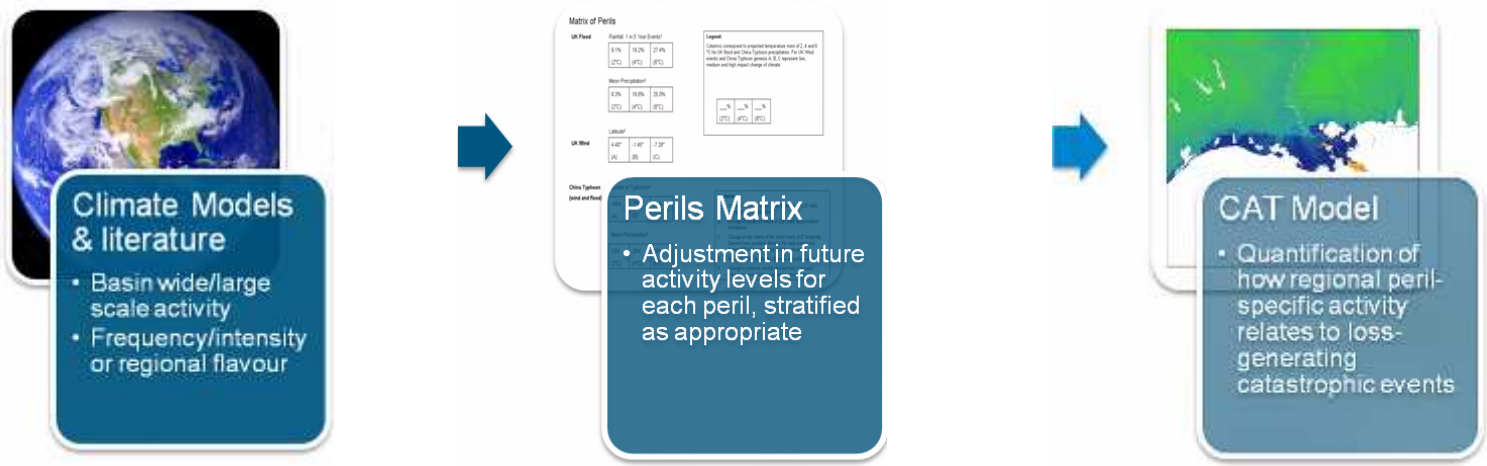
A collaboration for the ABI research programme

The Financial Risks of Climate Change - Nov 2009



Objective scenarios of impacts on UK storms & rainfall, and Chinese typhoons, including post-IPCC AR4 science update:

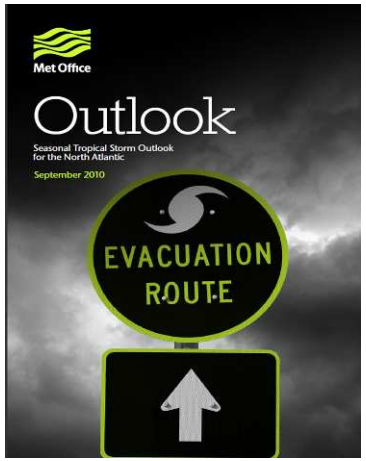
- 1-in-200 year **typhoon** loss in **China** could reach £1.1 billion for a global temperature rise of 4℃ (2008 exposure levels and £)
- Average annual insured **wind** losses for the **UK** could rise by 25% to £827 million for slight southward shift in storm track; which could arise from current **natural climate** variations.
- **Insured flood losses** occurring on average once every 100 years in the UK could rise by 30% to £5.4 billion for a global temperature rise of 4℃

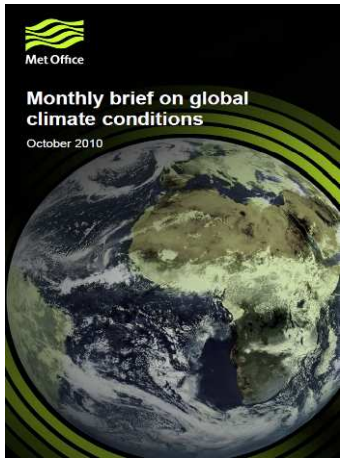
(link)

The Climate Service for Reinsurance

Reports, whitepapers, regular forecasts, podcasts and teleconferences in four key areas:

- Tropical storms on seasonal timetable
- Seamless global risk forecasts
- Science communication
- Research

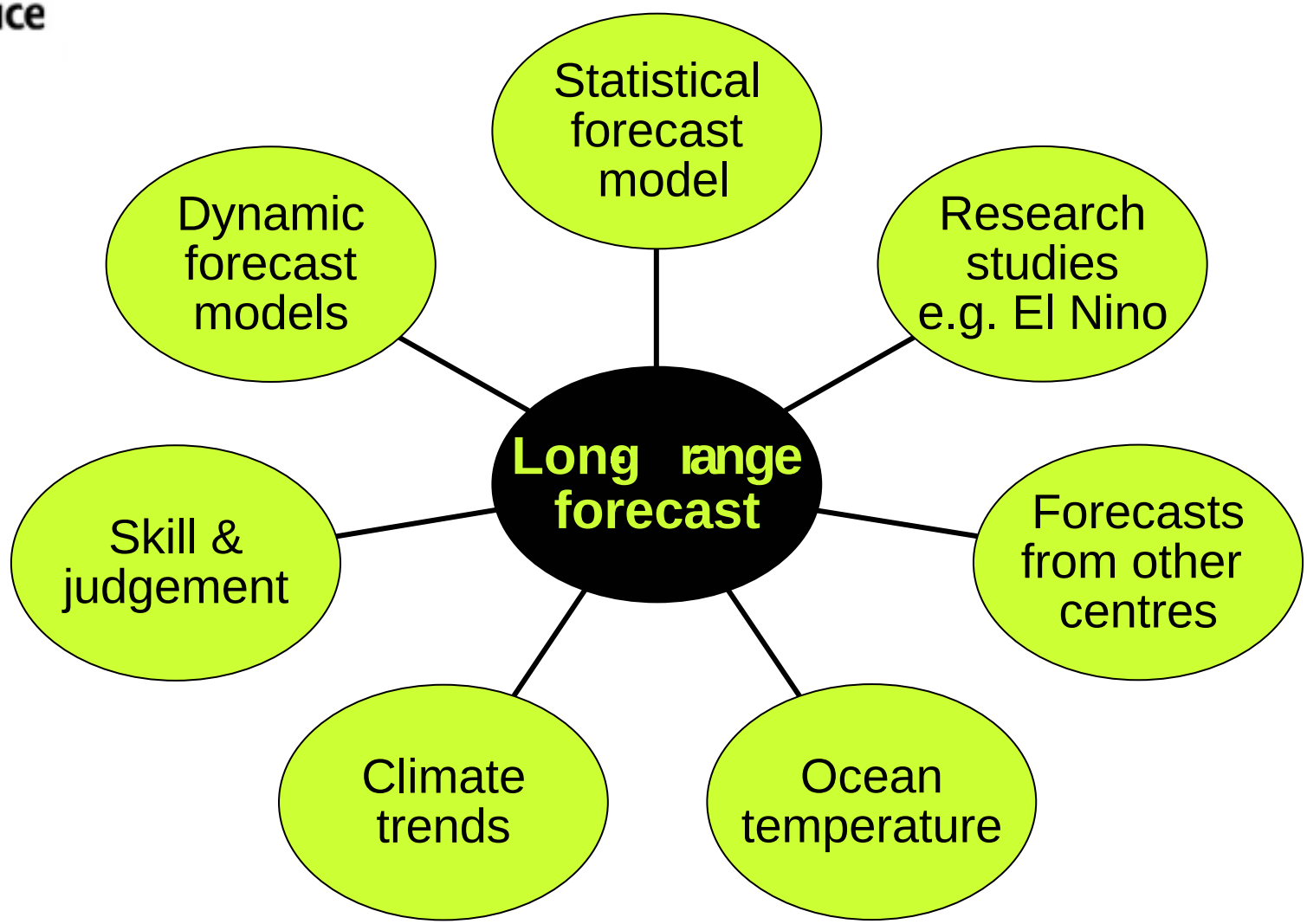




Met Office
Hadley Centre

Project 1
Aim: landfalling tropical storms on seasonal timescales

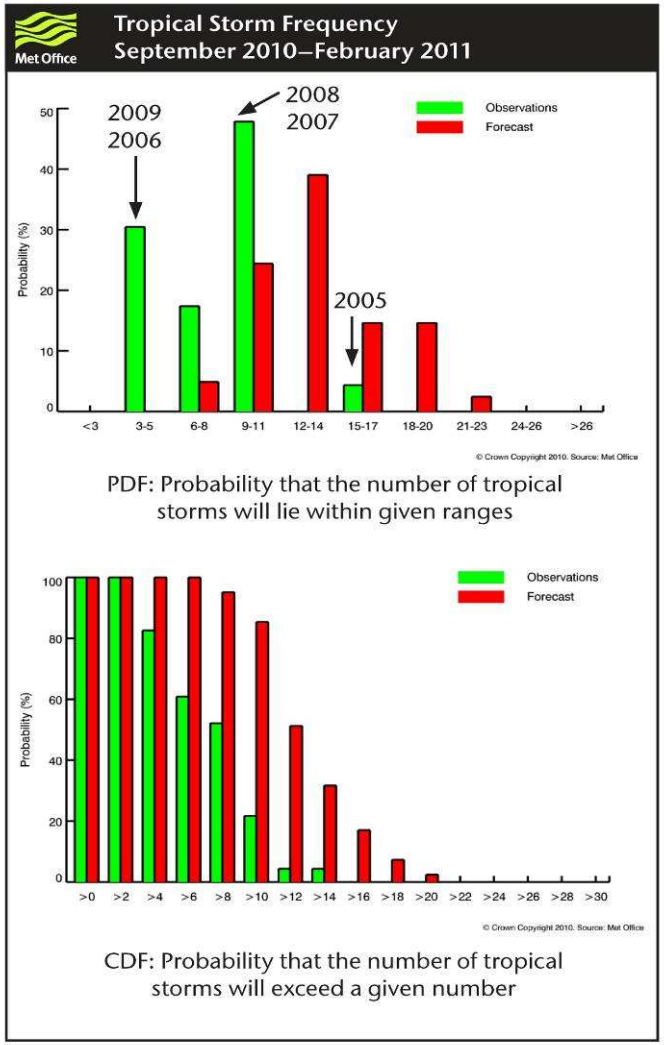
Combining human expertise and models



What do we provide?
Tropical storm Outlook

- **Seasonal forecast** for the North Atlantic for the next 6-months:
  - tropical storm frequency
  - ACE index

- **Probabilistic forecasts**:
  - range of storm numbers
  - exceedance of certain thresholds (to aid assessment of risk)



Verification – 2011 forecasts

2011 Atlantic tropical storm season forecasts – **preliminary** verification as of **8th Nov. 2011**

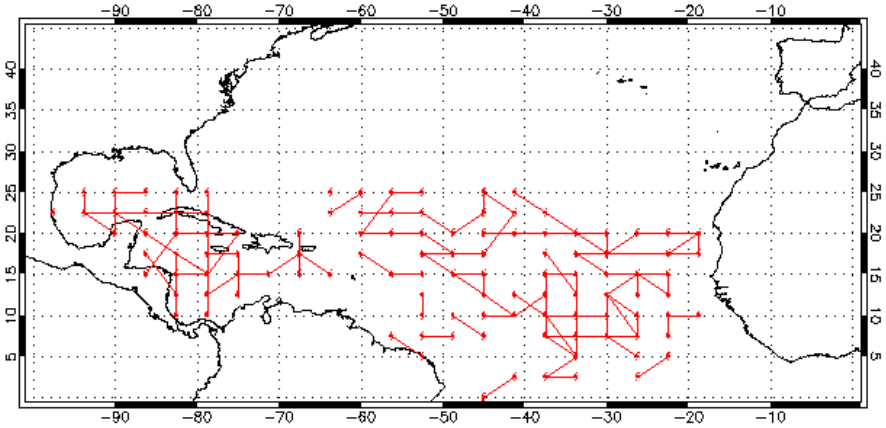
Forecast	Period of forecast	Tropical storm frequency		ACE index	
		Forecast	Observed	Forecast	Observed
March	April–September	11 (8–16)	14	121 (74–169)	135
April	May–October	16 (11–21)	19	186 (98–274)	167
May*	June–November	22 (17–28)	19	282 (198–386)	167
June	July–December	23 (17–29)	18	251 (131–371)	160
July	August–January	20 (15–26)	17	272 (169–375)	159
August	September–February	14 (10–18)	13	135 (86–183)	103
September	October–March	7 (4–9)	5	33 (21–45)	33

* Note each forecast was released with relevant deterministic skill information i.e. correlation of forecasts and observed outcomes for 1987 – 2008. For May, this was 0.59 for storm numbers and 0.74 for ACE

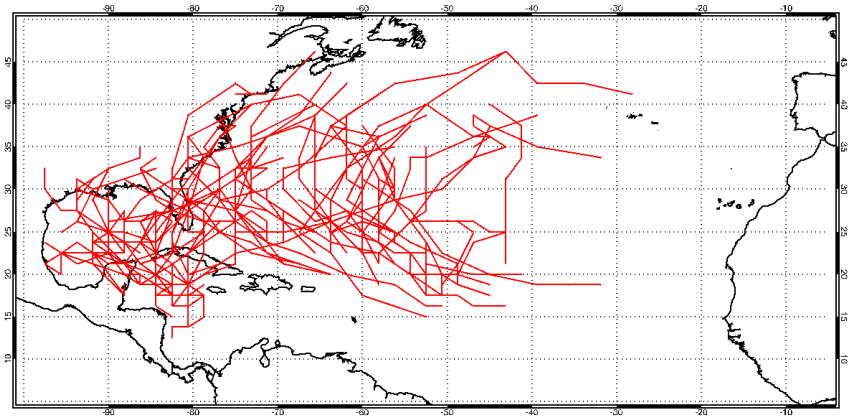
Landfalling research: Tropical Storm Tracks

Hindcast start: June 1st
Period: JASON **1989-2002** (**12 members** per year)

GloSea3



GloSea4



The increased resolution helps to produce more realistic tropical storm tracks

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60 seconds with ... Doug Smith

24 Nov 10 | Interviews

Met Office research has shown for the first time that accurate long range hurricane predictions are a real possibility. The breakthrough will help...

Valuable research rewarded with Science of Risk prize

24 Nov 10 | Lloyd's News

In an initiative that recognises outstanding scientific research that broadens insurers understanding of risk, Lloyd's has awarded its first Science

SCIENCE OF RISK PRIZE

Lloyd's is pleased to announce the winners of the first Lloyd's Science of Risk Prize:

About | Winners | Judges | Related

Congratulations to winner Doug Smith whose entry earned him a £5,000 prize. His paper, Skilful multi-year predictions of Atlantic hurricane frequency, was printed in the Nature Geoscience journal.

- Read interview with Doug
- Summary of winning entry
- More winning entries

I WANT TO...

HAVE YOUR SAY

Has your business experienced a cyber attack or crime in the last 12 months?

Yes | No

BRIGHTER FUTURES

Brighter Futures for Londoners is a new partnership between Lloyd's Charities Trust, Bromley by Bow Centre and Prince's Trust.

- Find out more

KEY CONTACTS

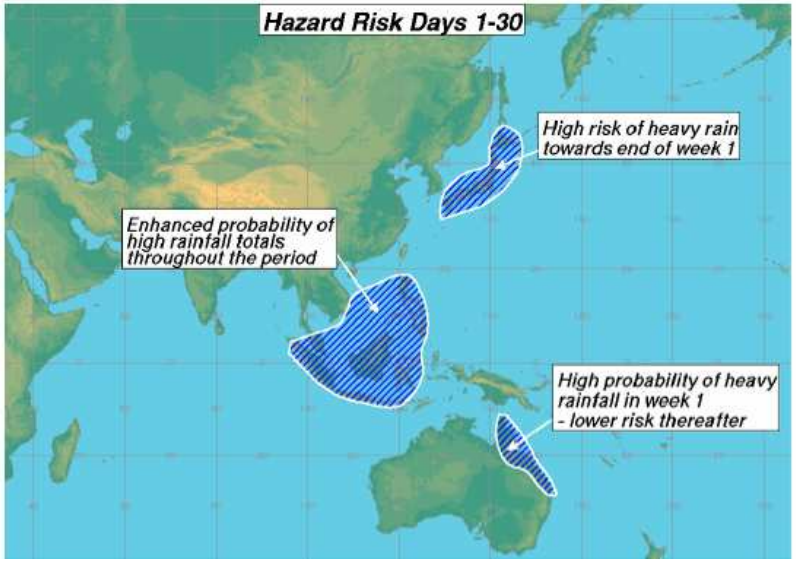
Met Office
Hadley Centre

Project 5
Aim: Seamless forecasts and global risk warnings

Operational climate service

- Monthly global view of risk and extreme weather
  - Met Office Hadley Centre and weather operations working together
  - “Synoptic Climatology” – the science of what weather causes climate anomalies
  - 2 weeks to ~5 years ahead overview
  - Structured by peril and my major insured regions
  - Reports released since July 2010

Eastern Asia and Australia



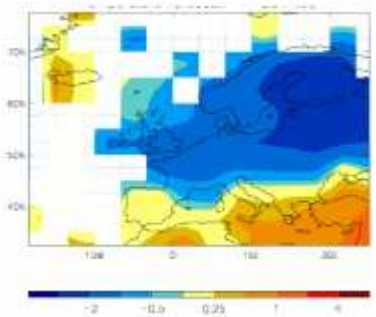
Hazards predicted for 22 November - 20 December from 22 November 2010

Scenario based science:

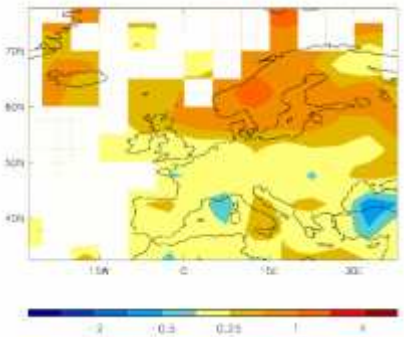
Potential influence of climate factors on European winter 2010/11

Predictor	Predicted phase	Impact on temperature in Northern Europe
climate change	contribution from anthropogenic factors derived from modelled trend	warmer than average
QBO	westerly	warmer than average
NAO	negative	colder than average
ENSO	La Niña	warmer than average
volcanic activity	not present	no impact

Dec – Feb temperature using all statistical predictors vs. 1971-2000



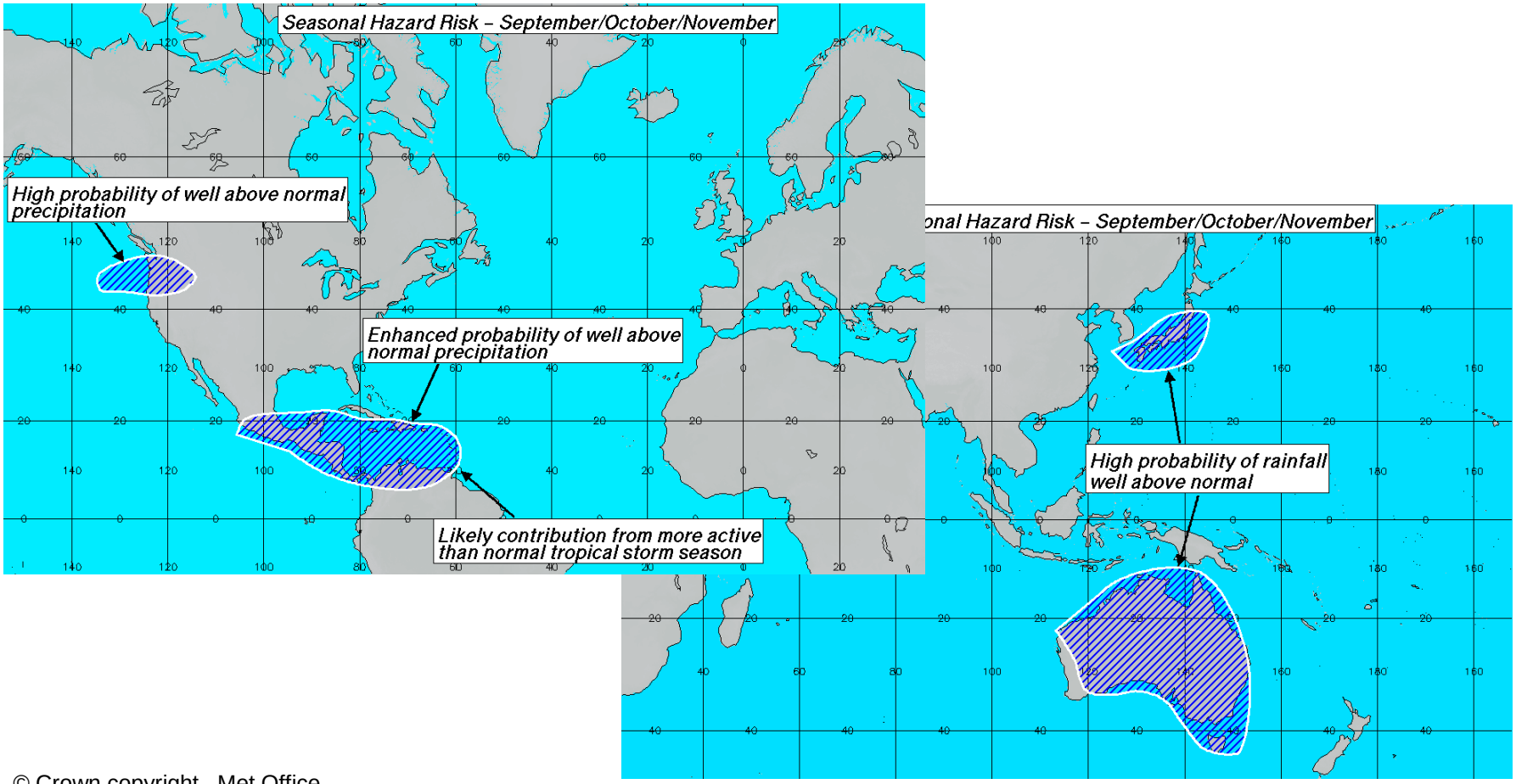
Dec – Feb temperature using all statistical predictors except North Atlantic Oscillation



NB this is not the overall forecast as detailed analysis of the dynamical model is included separately

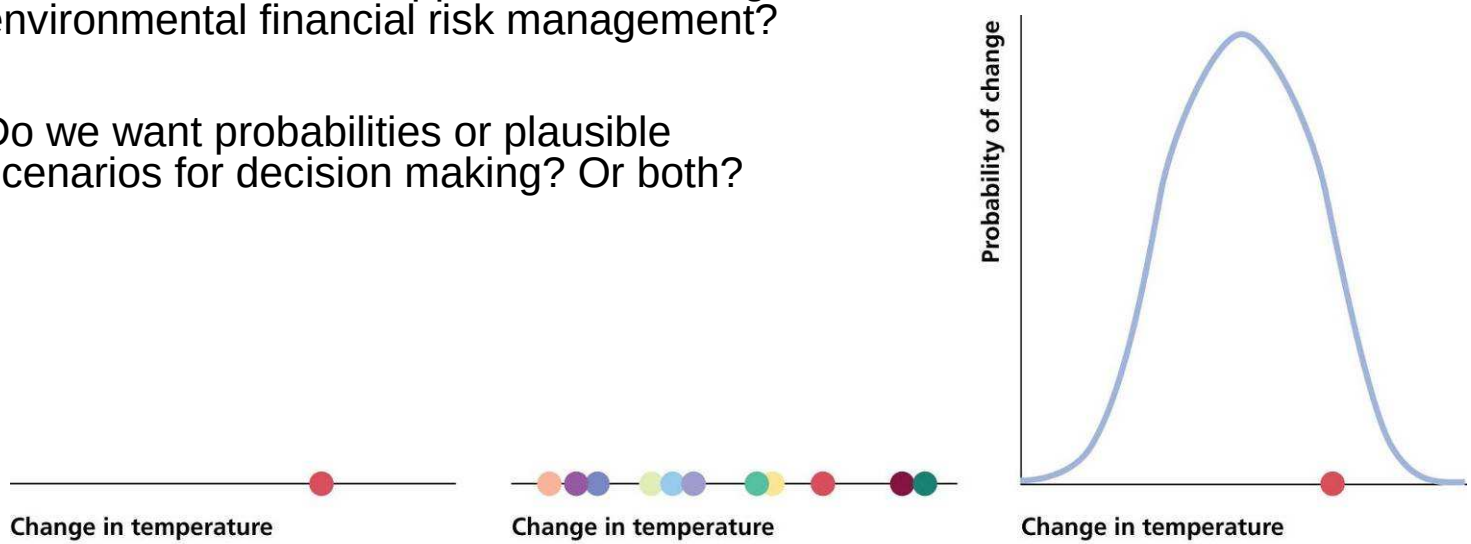
Global Risk Forecast released 26th August

Forecast for September – November 2010



Closing comment:
How do we aid financial market growth and stability?

- Weather & climate science now uses multiple-model analysis of the physical system to overcome structural and natural uncertainty.
- How can this best be applied to modelling environmental financial risk management?
- Do we want probabilities or plausible scenarios for decision making? Or both?



A revolution in risk modelling is taking place

- Changing global agenda means science becoming more business-focused e.g. forecasts of next 10 years & more past data
- Computing and science enabling forecasts capable of capturing extreme weather systems more accurately over longer timescales.
- Technology gives opportunities to overcome data exchange limitations.
- Markets seeking transparency and inter-operability, enabling plug and play user interfaces for analysts and CEOs.


EVACUATION
ROUTE
LS

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