

# Amplifying Intuition

Specialist Professions in the age of AI

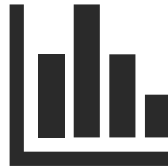
**Steve Ramsdale**

Chief Operational Meteorologist, Met Office

# Who am I?



Chief Operational  
Meteorologist at the  
Met Office



Data Science MSc



Working on Data Science  
projects related to  
operational meteorology

# Weather Forecasting

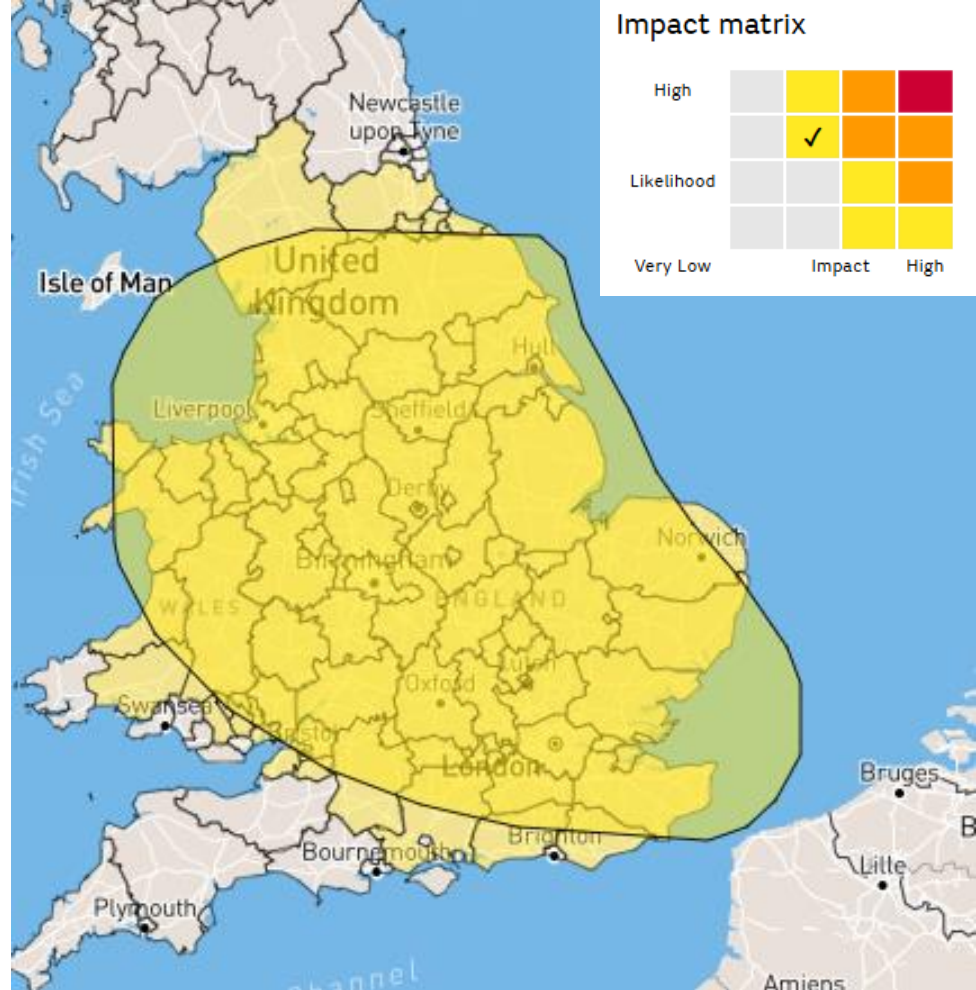
Essentially simple concept

- Take the weather as it is now
- Use physics to understand what will happen in the future
- Much more complex in practise
- Data ► Information
- Operational Meteorology
  - Translation from data to description
  - Towards actionable information



# National Weather Warnings

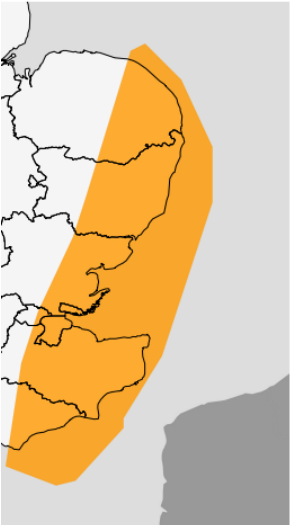
- Take all data
  - Weather models
  - Observations
  - Sensitivities
- Create narrative
  - What is likely to happen
  - What impacts may occur
  - Where can it go wrong
- Communicate



# National Weather Warnings

Amber warning  
Thunderstorm

Between  
20:00 Fri 13 Jun 2025 and  
05:00 Sat 14 Jun 2025



**Thunderstorms likely to  
disruption during Friday  
overnight into Saturday**

What to expect

- Flooding of homes and business happen quickly, with damage from floodwater, lightning strikes, and
- Fast flowing or deep floodwater danger to life
- Where flooding or lightning strikes some cancellations to train and
- Spray and sudden flooding prior to driving conditions and some
- Some communities likely to be flood
- Power cuts likely to occur and homes and businesses could be

## Last Weekend

- Homes flooded & evacuated overnight
- Houses struck by lightning

## More than 30,000 lightning strikes recorded overnight



BBC WEATHER WATCHERS / KENTGARDENER

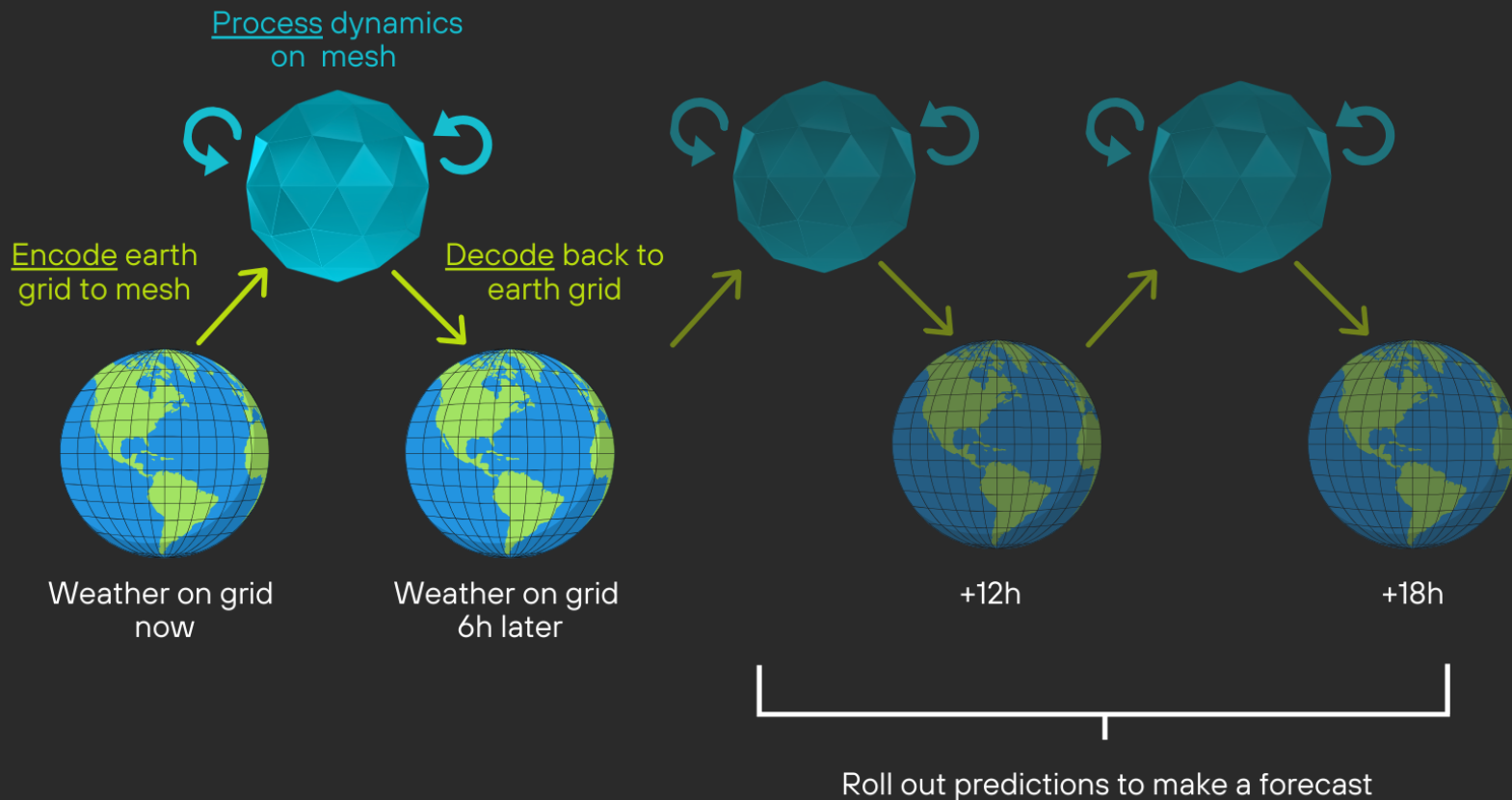
More than 30,000 lightning strikes were recorded overnight up to 06:00 on Saturday, the Met Office says

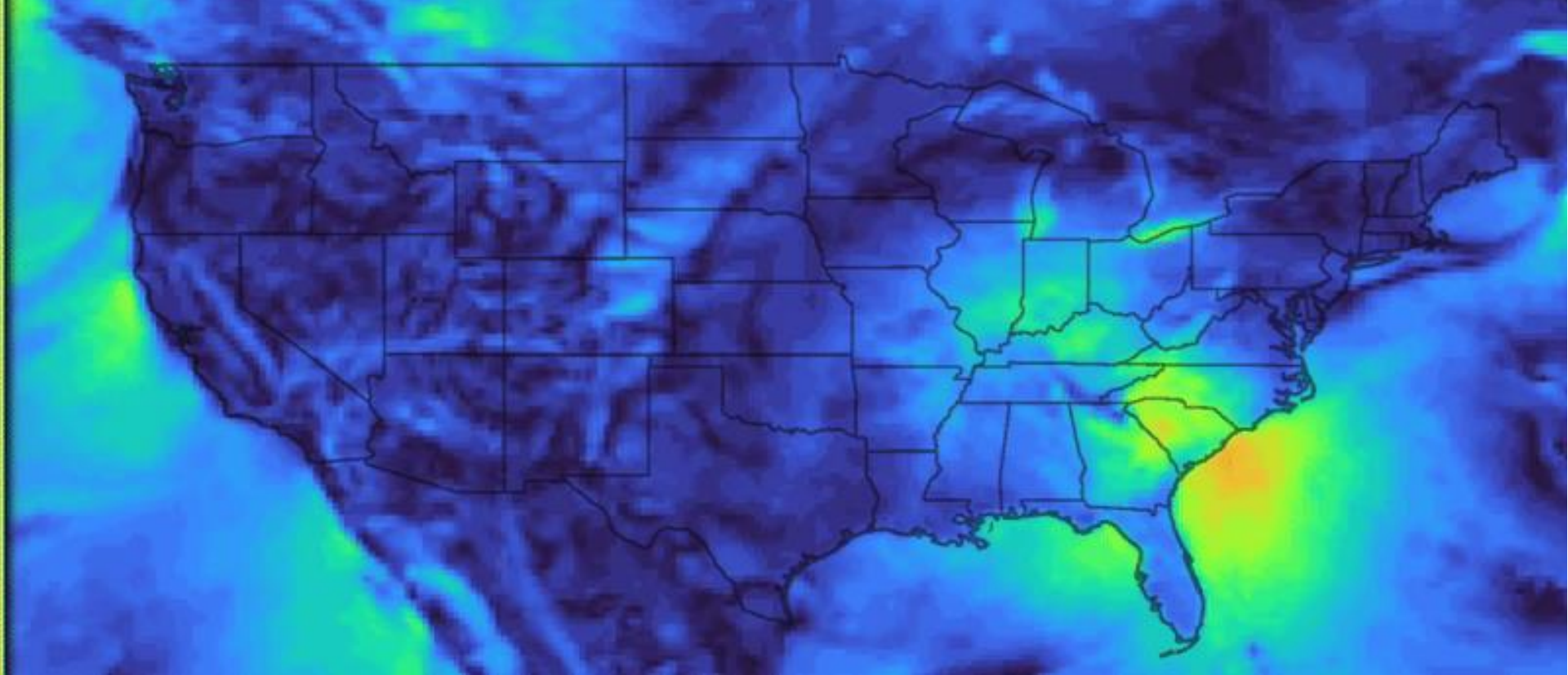
**THUNDERSTORMS  
AND FLASH FLOODS  
HIT PARTS OF UK**



# Data Driven Numerical Weather Prediction

# FastNet: How our model predicts the weather





[https://resources.nvidia.com/en-us-energy-genai-and-omniverse/earth-2-ai-high-reso?ncid=so-nvsh-320664-vt21&source=everyonesocial&network=linkedin&userID=9297d561-04ef-473a-aaa5-33164a2f1b76&es\\_id=147f336196](https://resources.nvidia.com/en-us-energy-genai-and-omniverse/earth-2-ai-high-reso?ncid=so-nvsh-320664-vt21&source=everyonesocial&network=linkedin&userID=9297d561-04ef-473a-aaa5-33164a2f1b76&es_id=147f336196)

# AI Promises

- Faster/more accurate predictions
- Democratisation of weather forecasts
- How revolutionary is this?
  - Still significant tech barrier to get there
  - Doing what we already do but faster
  - Ability for proliferation of misleading output
- More data
  - Need to translate into information and insights
  - Still focus on the human to human

## WEEKLY FORECASTS FOR EXETER, UK

### May 24, 2025 – May 31, 2025

 It's going to be cool! Expect an average daily high of 64°F (18°C) and a daily low of 52°F (11°C).

 There might be rain.

### May 31, 2025 – June 07, 2025

 It's going to be cool! Expect an average daily high of 66°F (19°C) and a daily low of 51°F (11°C).

 There might be rain.

### June 07, 2025 – June 14, 2025

 It's going to be cool! Expect an average daily high of 66°F (19°C) and a daily low of 52°F (11°C).

 There might be rain.

### June 14, 2025 – June 21, 2025

 It's going to be cool! Expect an average daily high of 67°F (19°C) and a daily low of 53°F (12°C).

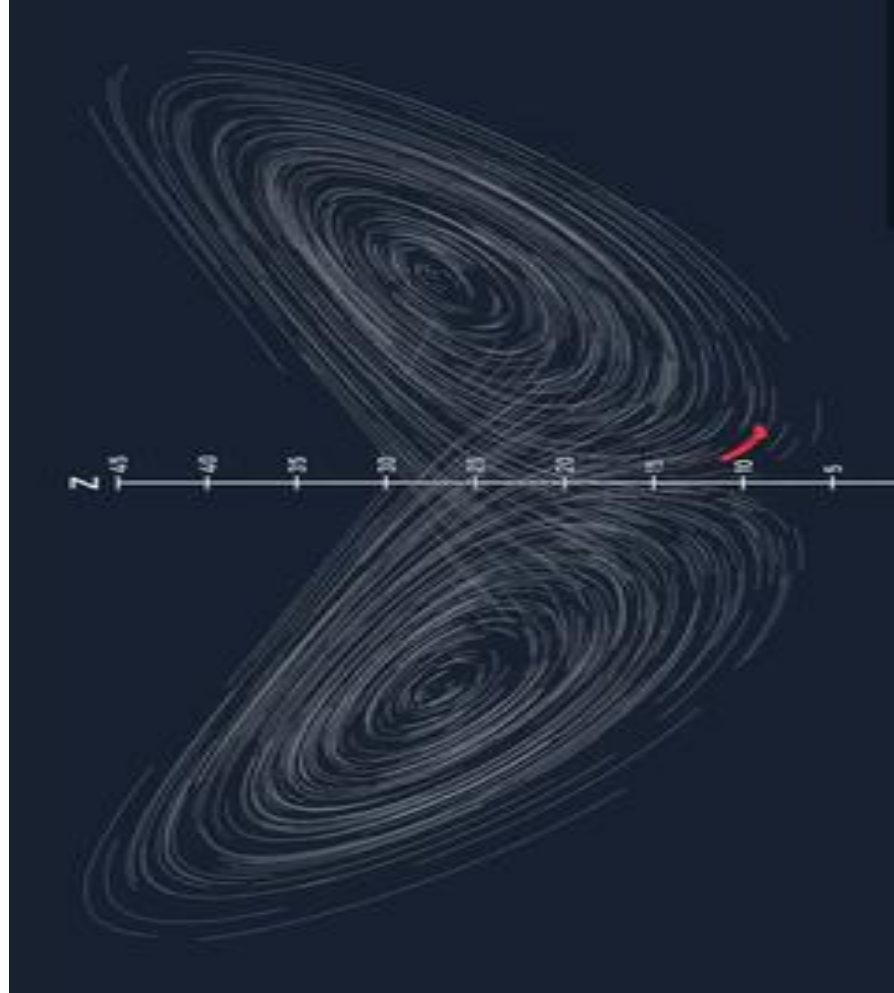
 There might be rain.

# Freedom or Destruction?



# Data Volumes

- Met Office takes in ~215 billion weather observations each day
- Creates > 100 Tb information daily
- Deterministic and Ensemble data
- Dealing with concepts of chaos in the weather system

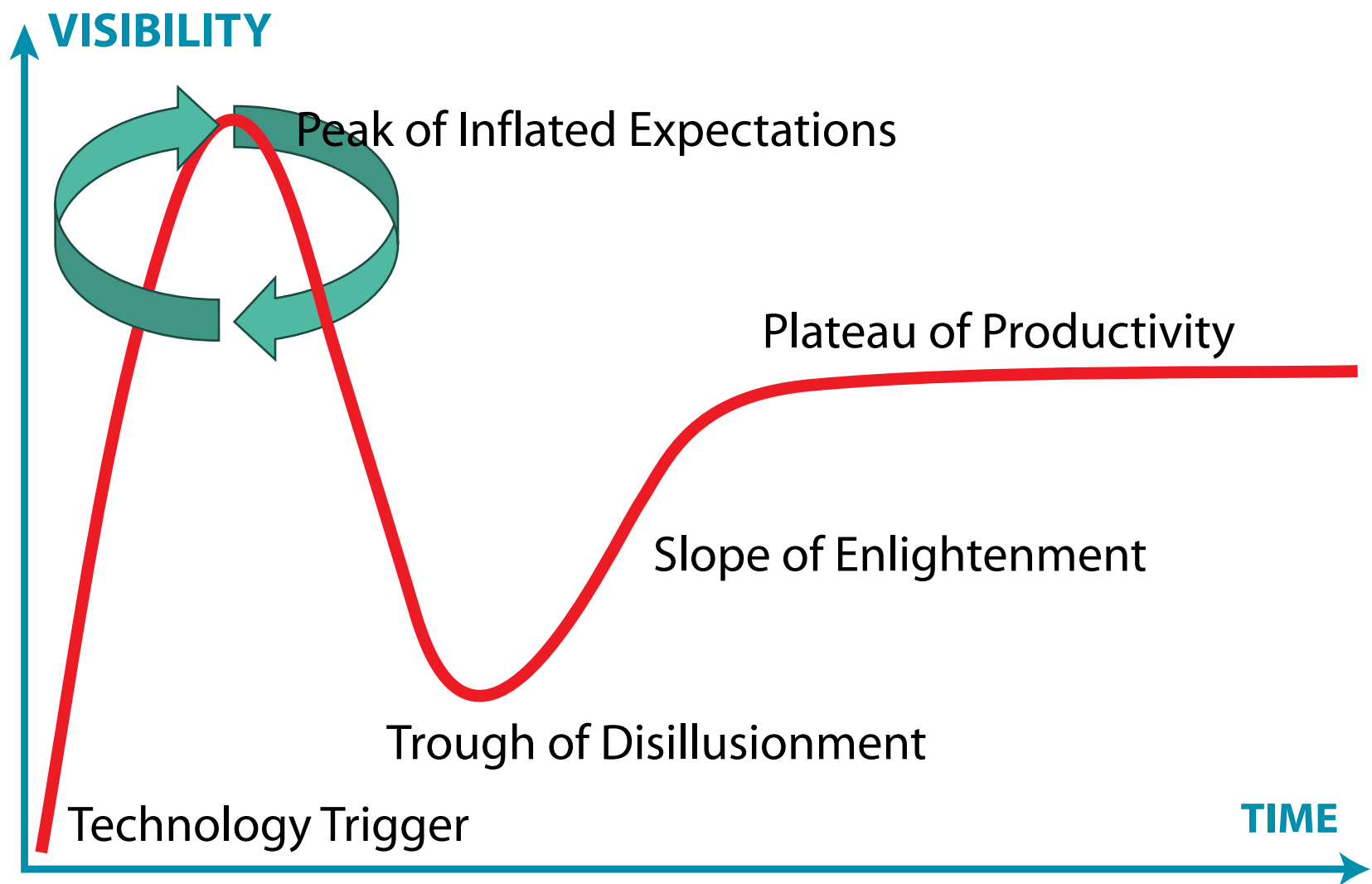


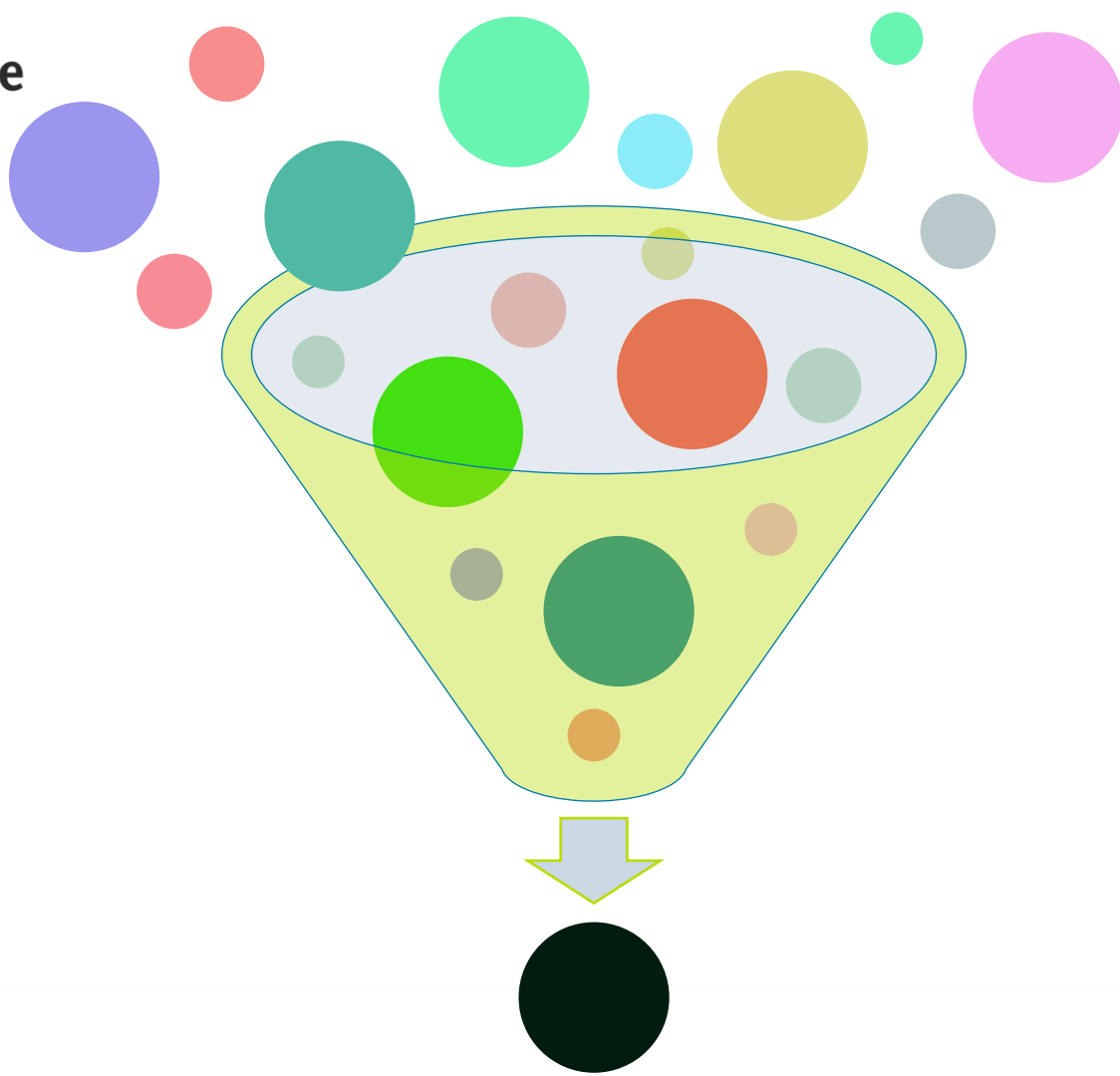
# Data River

- Constant flow of information
  - Observations
  - Model data
  - Social data
  - Potential impact data
- Only so much we can access
- Op Mets very experienced
  - Know about informative data
  - Ensure we access right data at right time

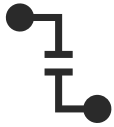


# What about the hype





# Specialists in control



**Disconnect between  
hype and actual usage**



**Need to look at user  
& customer focus**

What do users & customers need  
What do they want?

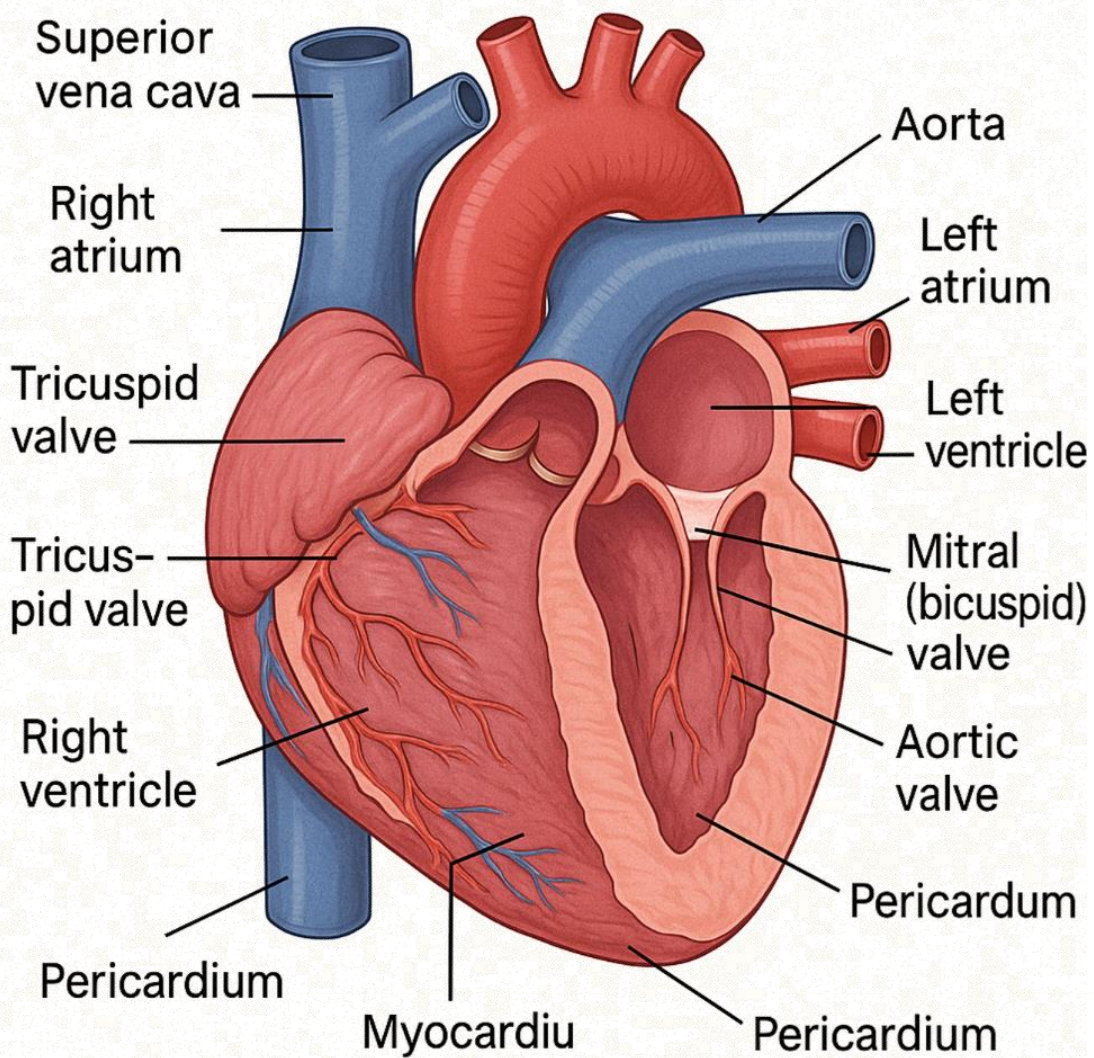


**Understanding**

What is possible?  
How does it work?

# Trust & Understanding

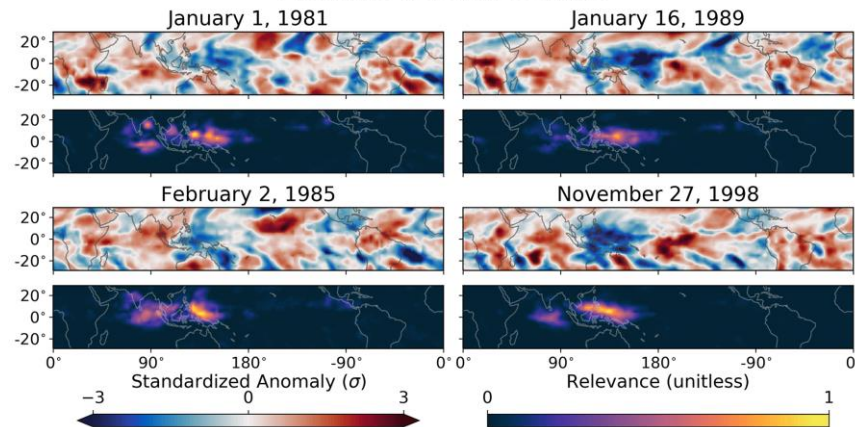




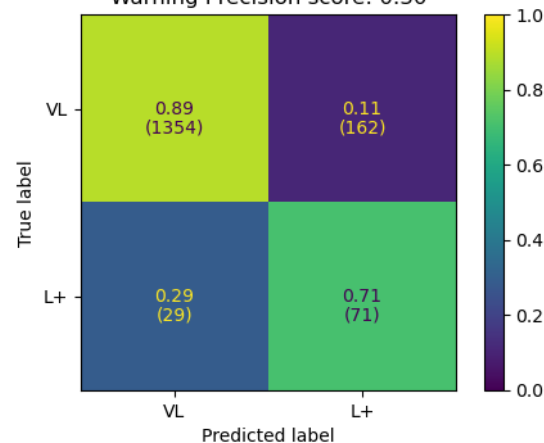
# XAI & Scientific Candour

- All guilty of overselling
- Real understanding of performance vital
- Informed decision making

**Example Relevance Maps**



**Test performance**  
Warning Precision score: 0.30



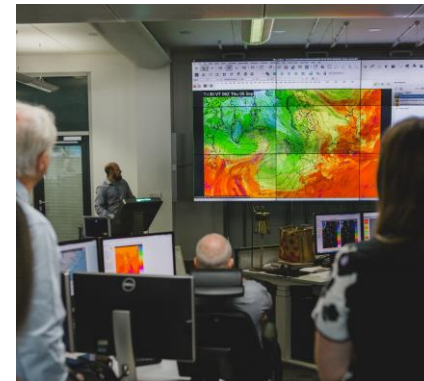
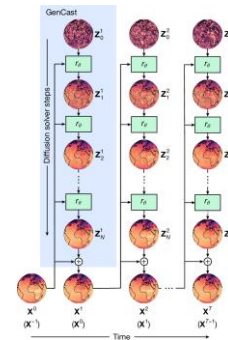
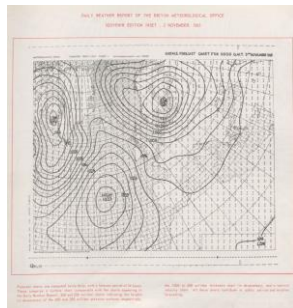
# Foundation Model Dangers

- Can be simple to apply to specialist problems
- Outputs can superficially look good
- Don't actually know why the model is giving the answer
- Are we prepared to delegate authority to these models



# What does this all mean?

# Specialists' importance grows



People

# Support not replacement



Parallels to  
medical field



Ability to suggest  
diagnoses



Human retains  
final decision

# Support not replacement

- Don't want the AI version of googling symptoms



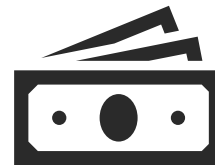
# Specialist Modelling



Need to train in our  
specific domains



Industrial Foundation  
Models interesting



Large overhead in  
development

# CoPilots for specialisms



# Iterative Benefits

- Jumping to these large projects risky
- Potential long-time scale and may not deliver
- Need to deliver smaller scale benefits on the road to build trust and usability in AI systems

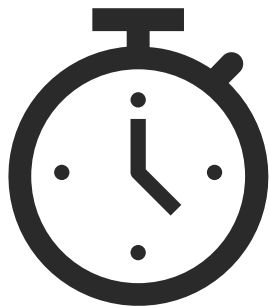


# Back to Data River

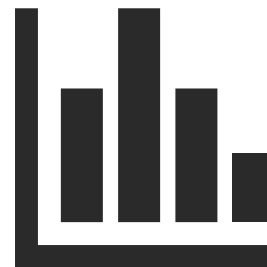
- Use AI to expose valuable data to experts
- Understand why this data valuable
- Support decision making



# Specialist Role Evolution



Maintain value of specialist  
real time application



Emergence of role as  
curators of training data

# Some of what we're exploring



## **Replicating forecaster intuition for warnings**

Use uk wide high value parameters to understand risk of hazards



## **Understand forecaster language and connections**

Using expert weather assessments

Network analysis of meteorological language

Relate to weather parameters for prediction

Link to data sources to support decision making



## **Risk Based Decision Making**

With colleagues from UoE

Reinforcement learning based decision-making accounting for different sources of vulnerabilities and risk influences

Physical

Socio-Economic

Community Preparedness

Recovery Capacity

# Conclusions

- AI very powerful but needs to be approached with caution in specialised professions
- Must maintain trust in our professions even whilst embedding AI usage
- This requires open communication of how these AI tools perform
- These tools needed to support not supplant specialists
- Need to engage with curating training data for models of the future
- Will only do that if delivering what specialists need for their roles

# Any Questions?



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