



UK Health  
Security  
Agency

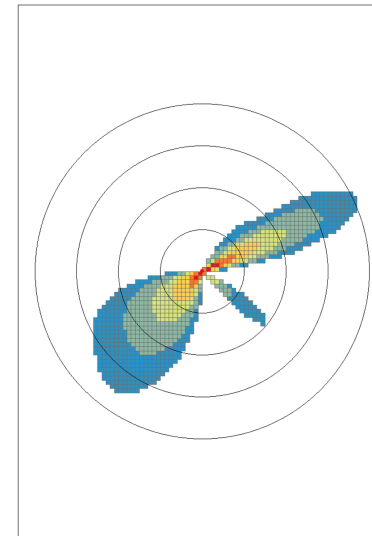
# Using more realistic weather in emergency exercises

NERIS Meeting: 9<sup>th</sup> October 2023

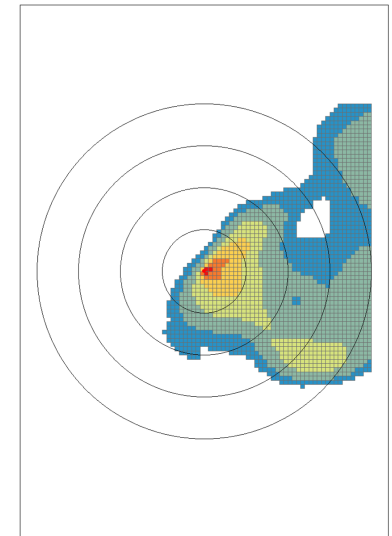
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# Problem...

- Operators of UK nuclear sites & local authorities must produce plans to deal with on-site & off-site emergencies, respectively.
- Operators & local authorities must review & test on-site & off-site emergency plans, respectively. This process of “review & test” is performed by way of emergency exercises.
- All exercise scenarios were designed on the basis of Gaussian plume modelling & simplistic single site weather.
- The application of ADMs for emergency response has evolved.
- Met Office & UKHSA currently use a Lagrangian particle model to formulate emergency response advice.
- Other key stakeholders continue to use a Gaussian plume approach, notably operators of UK nuclear sites.
- In law it is the operators who must test the emergency plans, therefore exercises continue to be designed on the basis of Gaussian plume modelling & simplistic single site weather.
- Some stakeholders are unable to fully review & test their own emergency response plans.



Gaussian Plume Model  
run



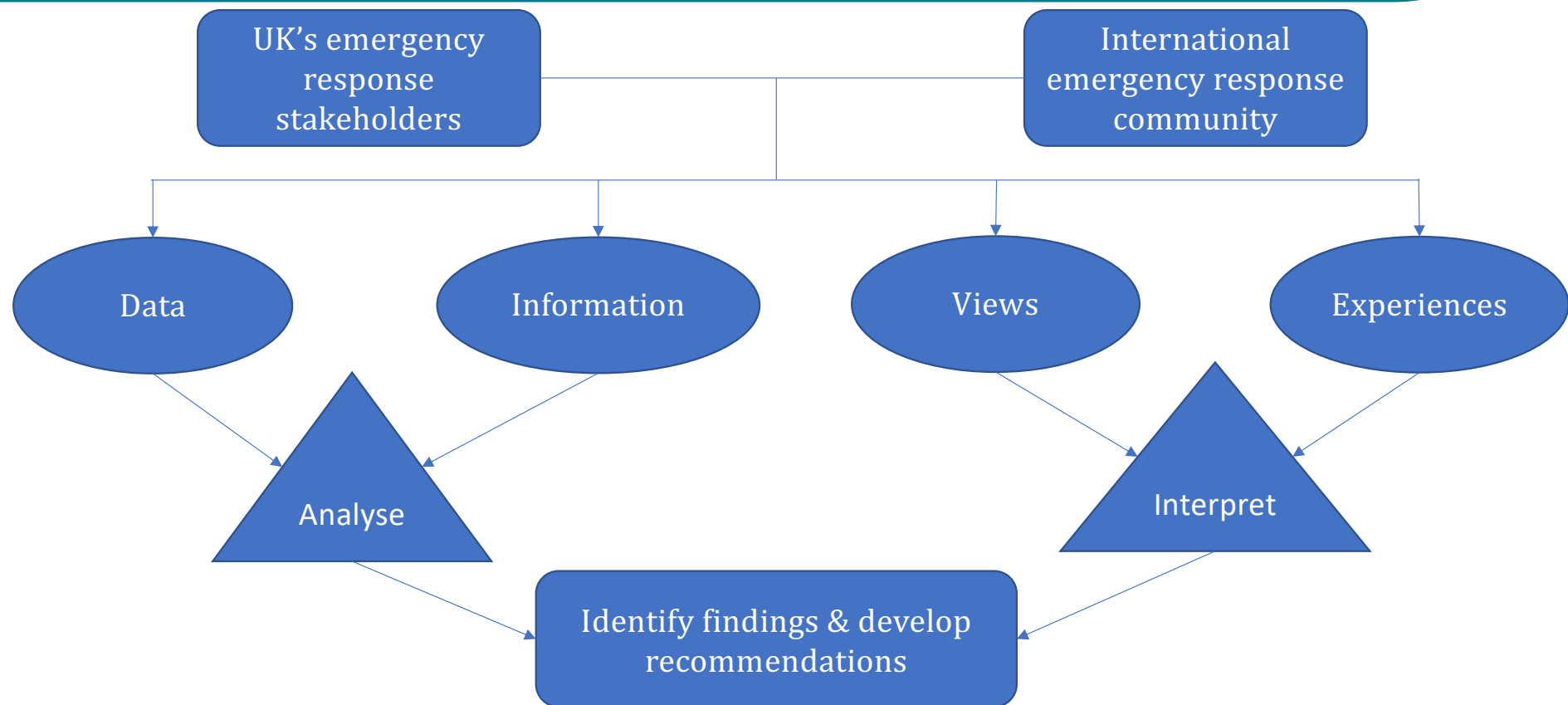
Lagrangian Particle  
Model run

# Introduction

- A group was initiated to consider evidence for, and provide recommendations on, the use of more realistic weather during emergency exercises.
- The group membership comprised of: UKHSA (Chair), DESNZ (Secretariat), EDF Energy, Environment Agencies, Food Standards Agencies, LANWG, Met Office, MOD, ONR and Sellafield.



# Approach



# Benefits of using more realistic weather in emergency exercises

- A greater degree of realism...
  - model endpoints estimated & advice provided will be (more) representative.
  - challenge expectations & understanding. Minimise misconceptions & complacency.
  - a greater challenge of the planning & co-ordination of monitoring teams.
  - better testing of modelling & data.
  - improved description of uncertainties (weather ensembles).
  - improve how advice is presented and uncertainty communicated to decision makers.
- A greater degree of variety...
  - more challenging scenarios.
  - more varied impacts.
- Some aspects of the preparatory work pre-exercise are removed (“on the day” weather).
- A single modelling approach would require less resource & reduce the likelihood of discrepancies.
- Opportunity to identify & address issues not previously acknowledged and encountered.

# Challenges of using more realistic weather in emergency exercises

- ...using more realistic archived (NWP) weather...
  - adds complexity to exercise planning (more steps & wider involvement).
  - Met Office teams still not able to fully test plans & practices.
  - still a lack of realism e.g. the feed of monitoring information into exercises.
- ...using more realistic “on the day” (NWP) weather...
  - scenario details cannot be planned in advance & there is a potential for conflict with non-weather-related exercise objectives.
  - umpiring during the exercise & the review of performance after the exercise.
- ...using more realistic archived or “on the day” (NWP) weather...
  - reduce the likelihood of offsite consequences.
  - exercise generation tools are not currently suitable.



# Short term recommendations for using more realistic weather in exercises

- **Organise trial exercises outside of the regulatory framework**
  - Include: full & modular exercises, workshops & training sessions.
  - Trial the use of both archived & “on the day” NWP weather.
  - Identify lessons learned & a proposed way forward, including:
    - a formal non-regulatory emergency exercise programme
    - introducing more realistic weather into the regulatory emergency exercise programme
    - emergency exercise tool development.
- Within the regulatory framework, **generate more simplistic (single site) weather alongside a respective more realistic (NWP) weather dataset.**
- **Develop a matrix of non-weather & weather related exercise objectives** reflecting needs of all emergency response stakeholders.
- **Observe internationally held exercises** based on “on the day” (NWP) weather.

# Medium and longer term recommendations for using more realistic weather in exercises

- **Develop a weather extraction tool(s)/script(s) and/or a catalogue of weather scenarios.**
- **Replace or extend the current exercise generation tool** for application alongside the Met Office's atmospheric dispersion model (NAME) and the Met Office's UM (NWP) weather data.
- Where practical & beneficial, **fold weather-related objectives, into the regulatory exercise programme.**
- Where weather-related objectives cannot be addressed within the regulatory exercise framework, **develop and implement a formal programme of exercises outside of the regulatory framework.**



# Summary

- Problem: some key emergency response stakeholders are unable to fully review & test their emergency response plans, because of the sole use of relatively simplistic weather data in the current regulatory exercise programme.
- Approach: Collated data, information, view & experiences from emergency response stakeholders.
- Benefits: adding realism, variability & challenge.
- Challenges: exercise planning & availability of tools fit for purpose.
- Recommendations: trialling different exercise formats, developing necessary tools, folding in weather-related objectives into the regulatory exercise programme & producing a formal programme of exercises outside of the regulatory framework.