Getting a grip on the weather

Addressing the challenge of the environmental Operational Design Domain

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Met Office NPL

ASAM Association for Standardization of Automation and Measuring Systems

Met Office

Met Office

UK’s National Weather Service

Owned by Government

Provide critical weather services and climate science

Led by science

The Operational Design Domain (ODD)

"Operating conditions under which a given driving automation system or feature thereof is specifically designed to function, including, but not limited to, environmental, geographical, and time-of-day restrictions, and/or the requisite presence or absence of certain traffic or roadway characteristics."

- SAE J3016 (2021)

The challenge of the weather

The weather is unlike any other part of the Operational Design Domain

It is transient in nature and, even if it stood still for a second, we would never observe it in sufficient detail to fully explain every change in the performance of an automated vehicle

The components of the problem

1. Unambiguous definitions

Are we all talking about the same weather?

2. Simplicity vs accuracy

The trade-off between usable ODD parameters and creating rich scenarios for simulation

3. Embracing uncertainty

Representing what we ***can't*** explain in our scenarios

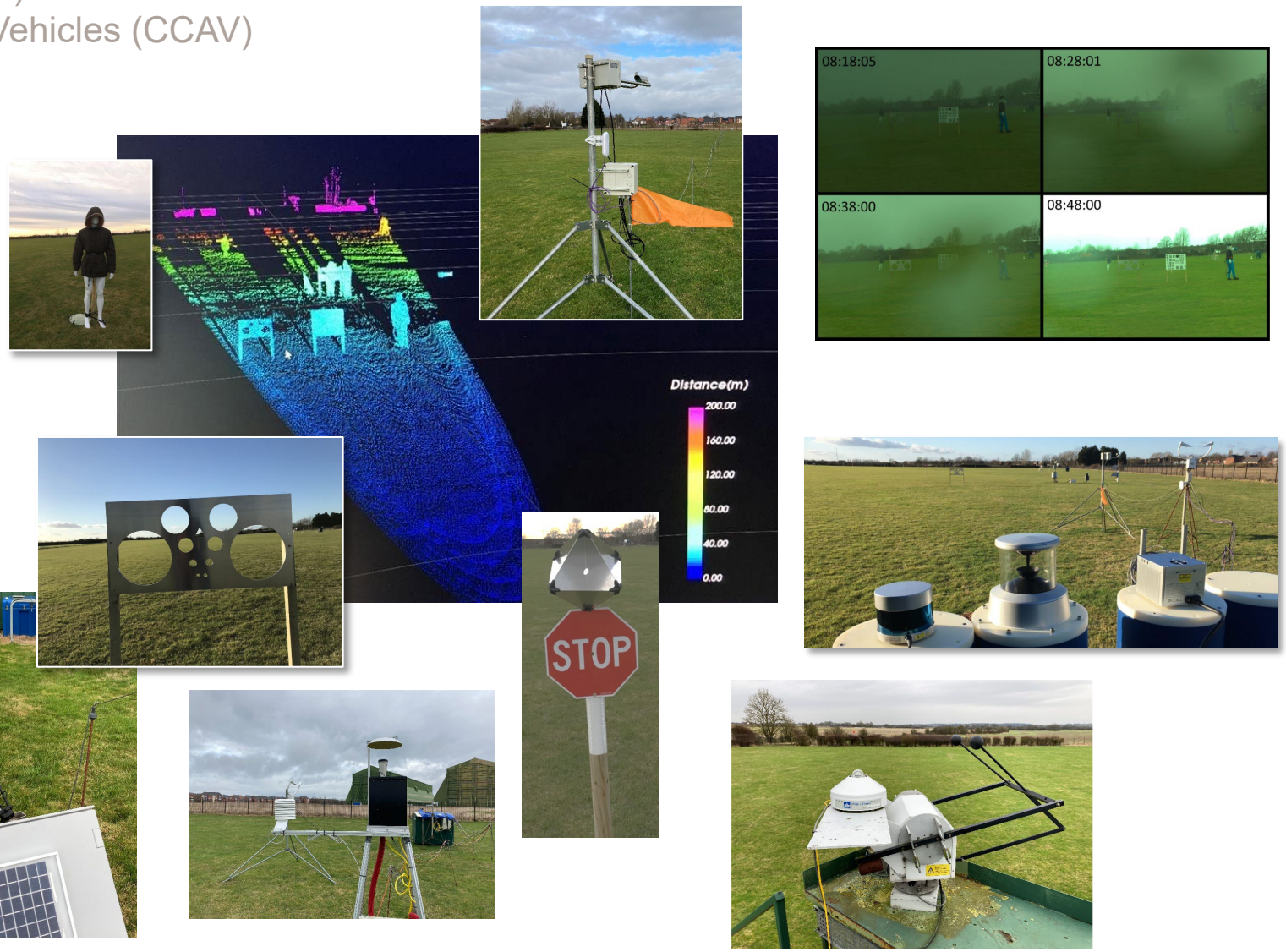
Sensor Assurance Framework

Met Office and National Physical Laboratory (NPL)
funded by Centre for Connected & Autonomous Vehicles (CCAV)

Centre for Connected & Autonomous Vehicles

Aim:

To specify a usable and reliable framework for characterising AV sensor performance in different weather-related conditions



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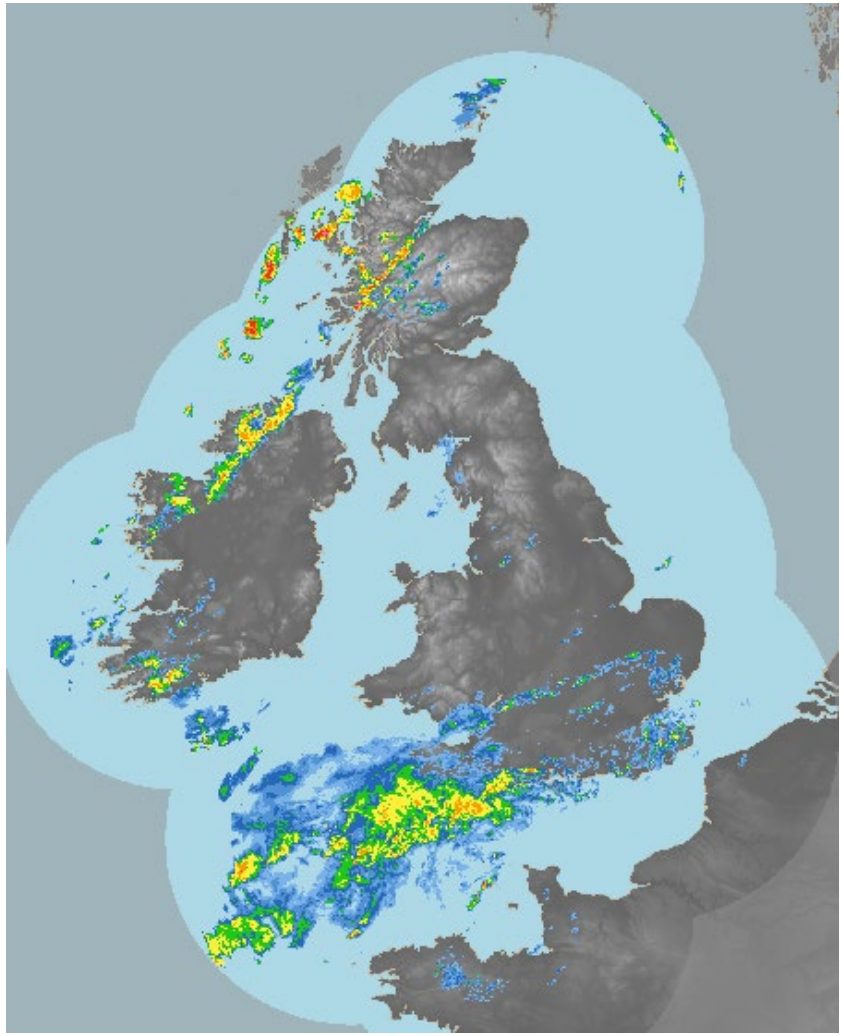
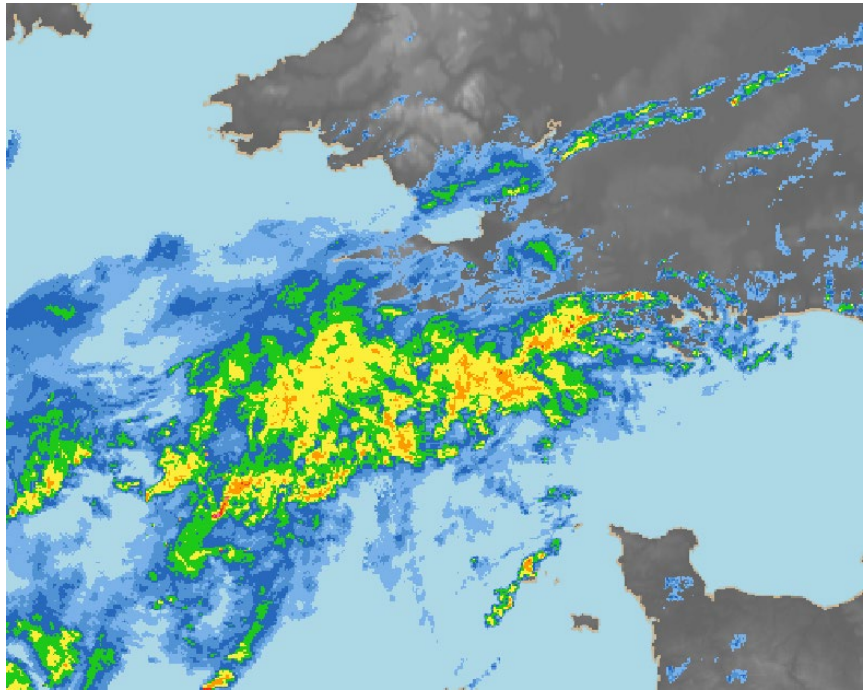
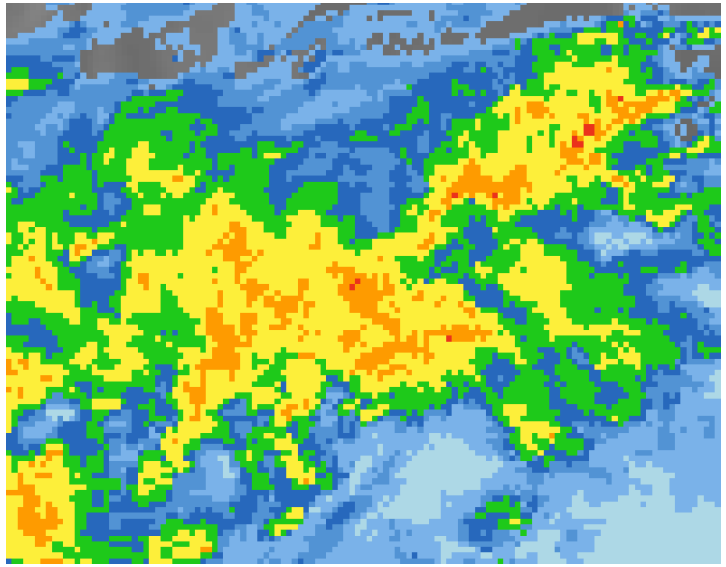
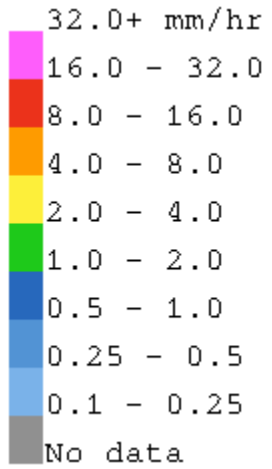
Unambiguous definitions

Rainfall example



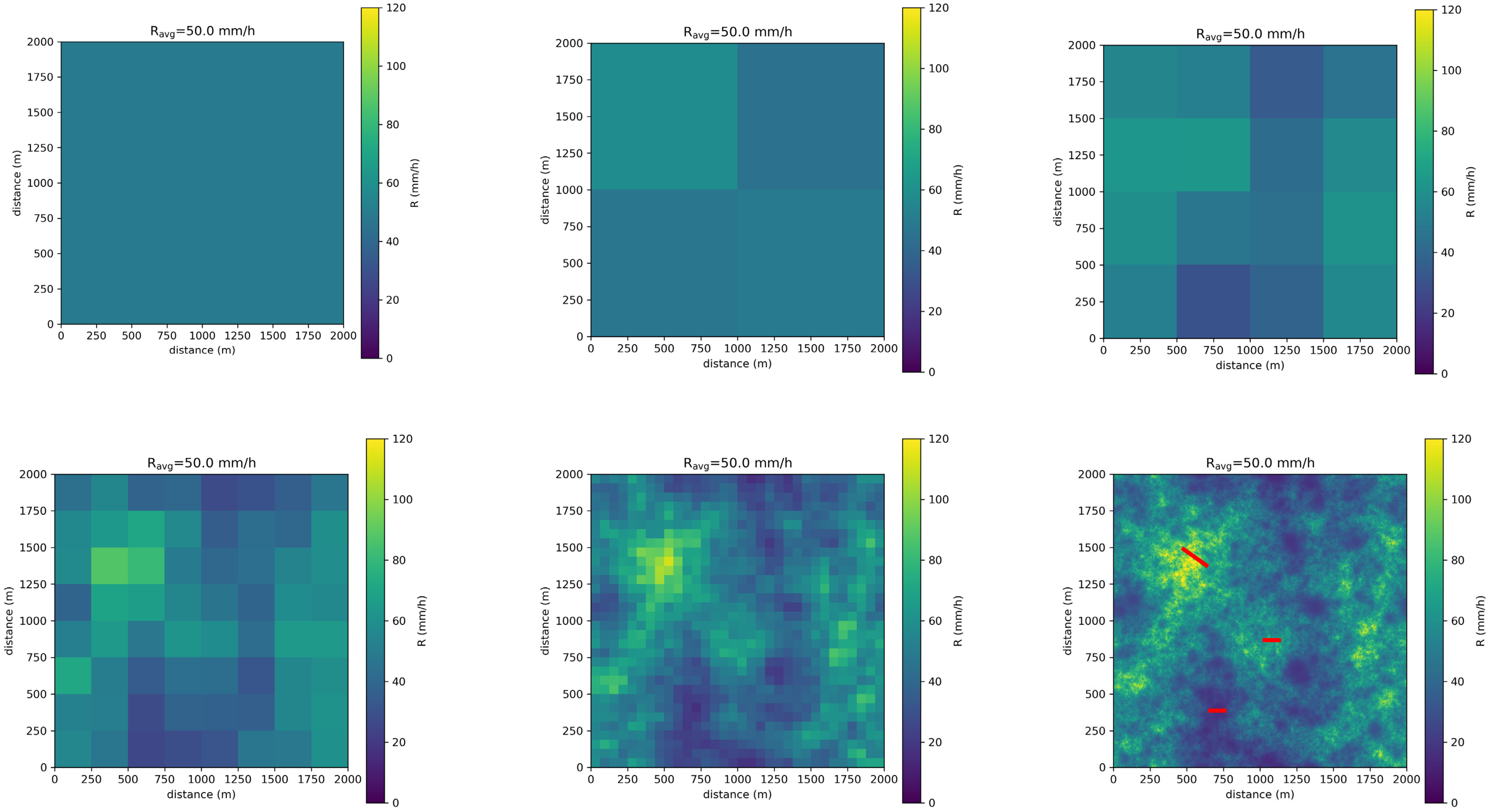






Unambiguous definitions

Rainfall variability within a weather radar pixel



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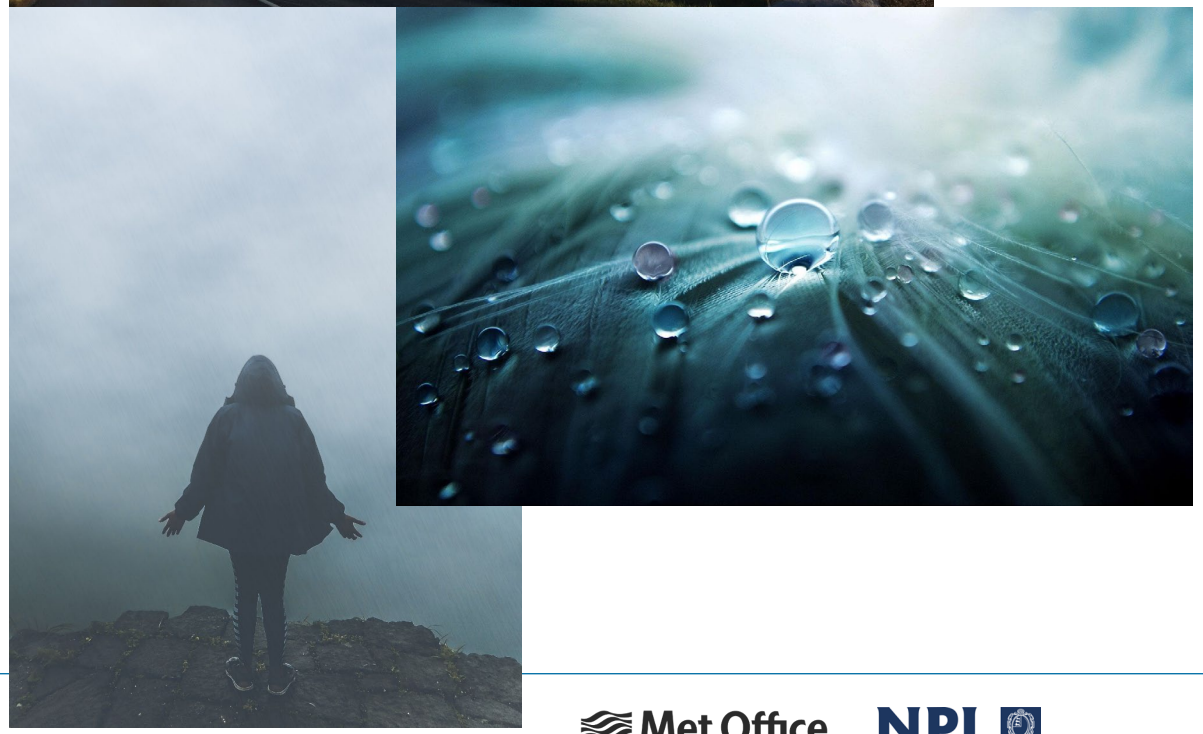
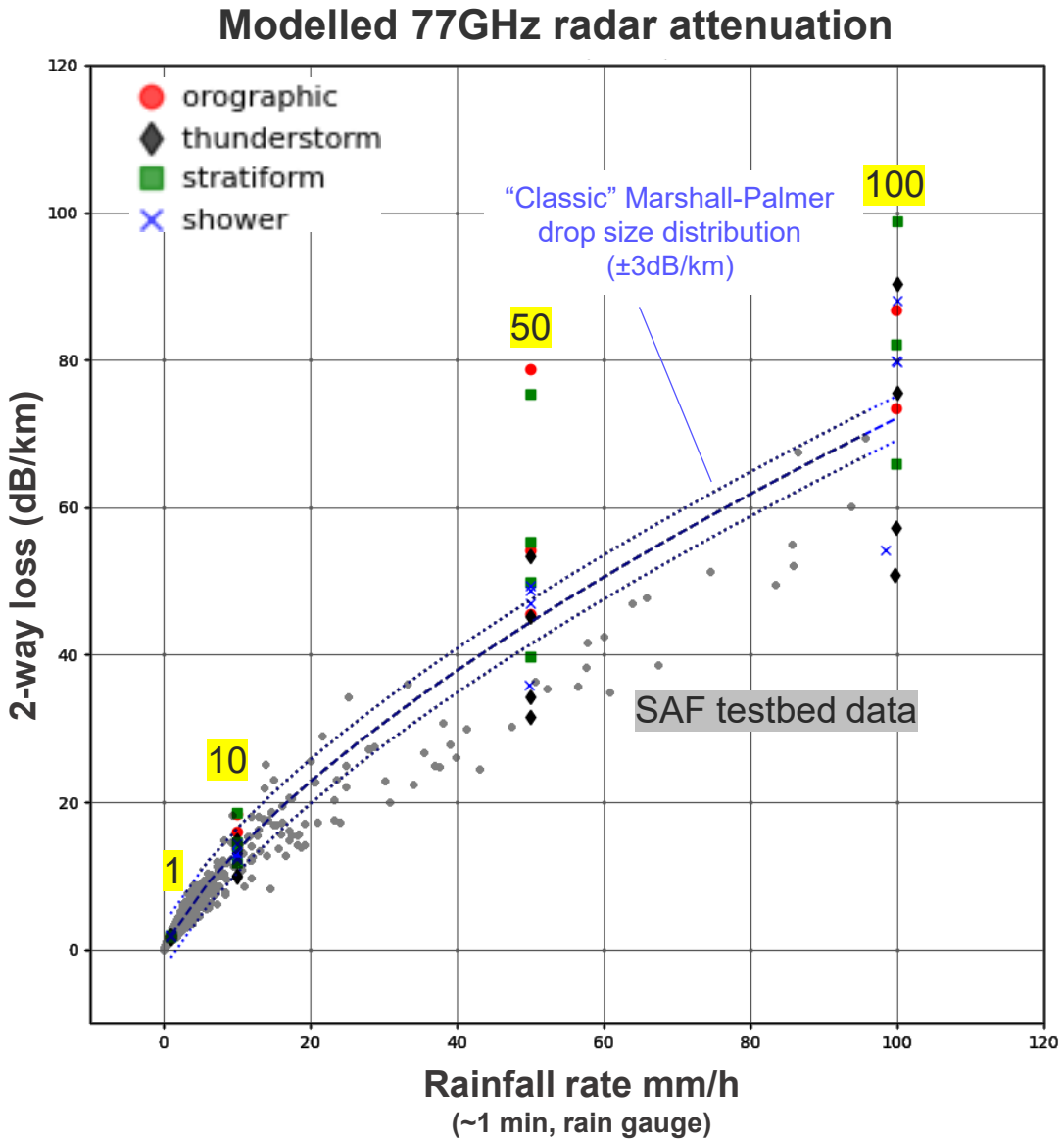
Simplicity vs accuracy

Not all rain is the same



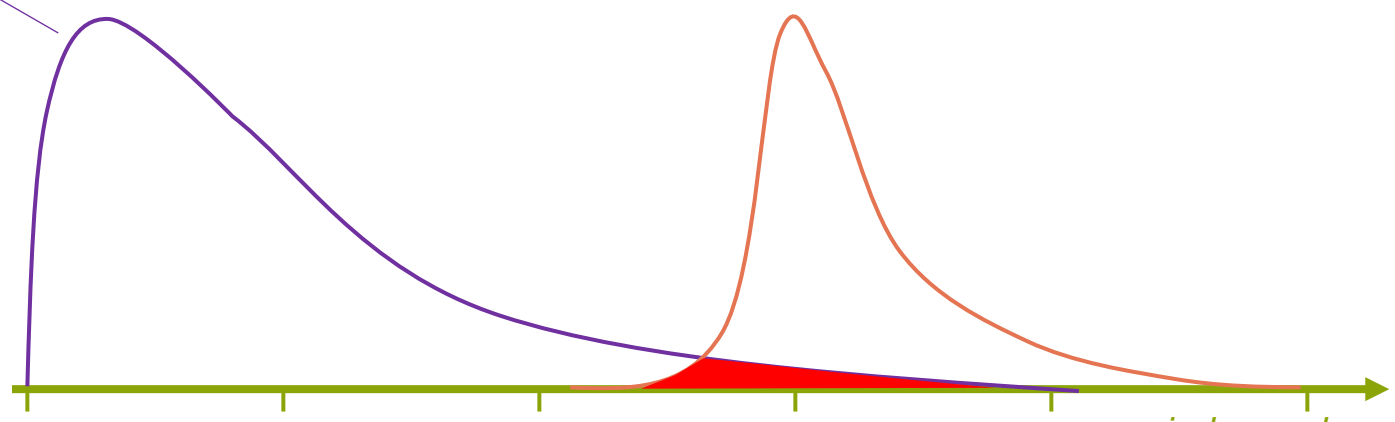


Embracing uncertainty

All aspects of the problem have uncertainty

The ODD boundary for that parameter **will** have an uncertainty (even if your testing is great!)

The climatology of an ODD parameter
e.g. rainfall rate



Embracing uncertainty

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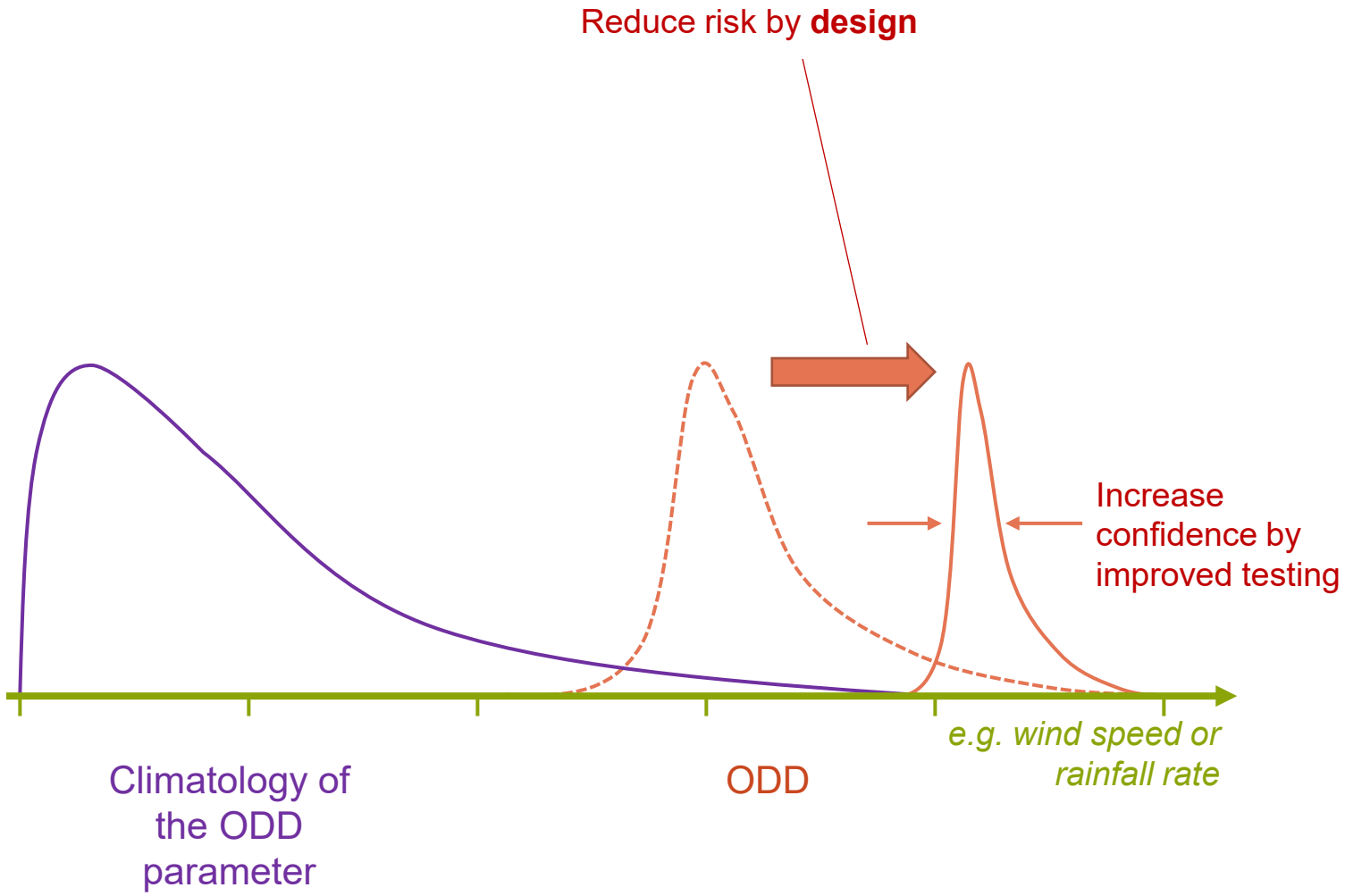

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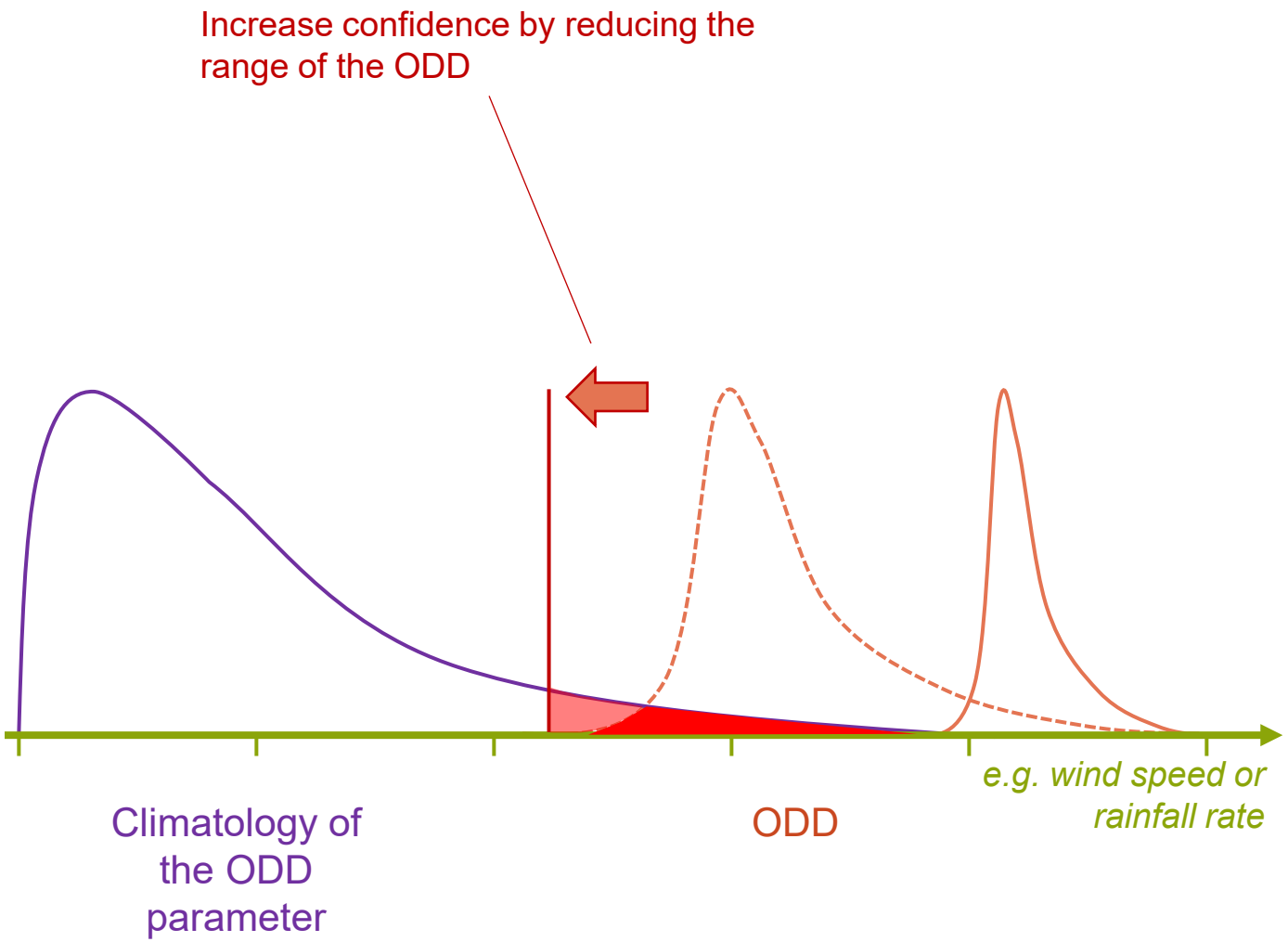


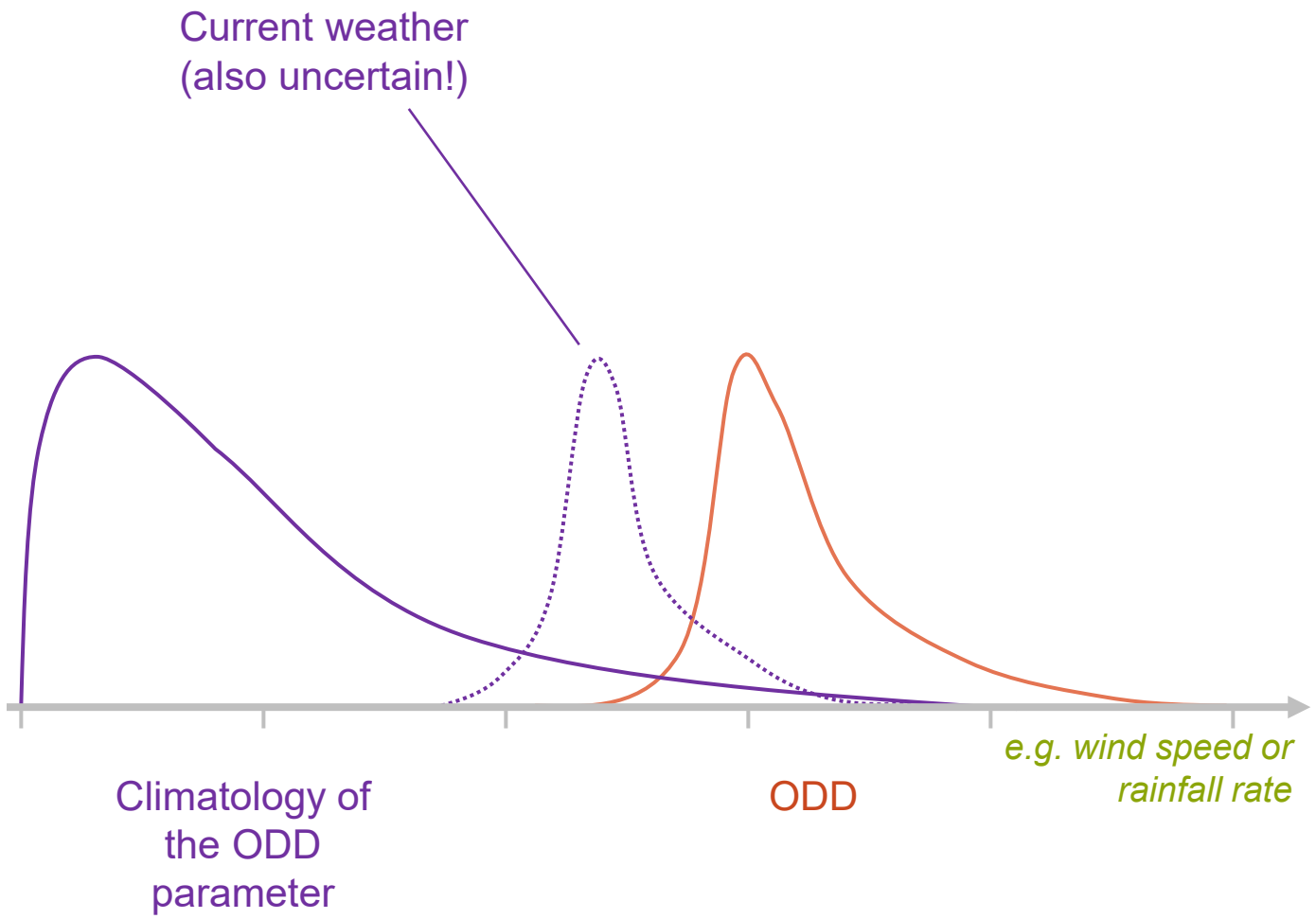
Embracing uncertainty

All aspects of the problem have uncertainty

ASAM opportunities:

Work towards common methods of describing uncertainty

Develop methodologies for sampling the uncertainty in simulation



Thank you!

Please do get in touch:

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