WG VA status, activities and plans

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Running/finished PP/PTs

PT EGALITE

Early warninG and AnaLysIs sysTEm
for release and dispersion of contaminants.

Running/finished PP/PTs

PT EGALITE - Early warninG and AnaLysIs sysTEm for release and dispersion of contaminants.

Introduction

A need for improvement/developing early warning systems (EWAS) being able to respond to release of toxic and/or harmful substances into the atmosphere.

”Early Warning” – the ability to quickly provide information about the occurrence of an event and its possible consequences.

Released contamination/pollution – dangerous due to its nature (i.e., radioactive, toxic…) and/or emission intensity (i.e., the amount released).

Operational EWAS use meteorological data (an output from operational meteorological forecast models).

PT EGALITE aims at gathering/exchange the experience available among COSMO partners on the connection: numerical weather forecasts – pollutant dispersion modeling in favor of new- and/or of existing EWAS that respond to the mentioned threats.

Running/finished PP/PTs

PT EGALITE - Early warninG and AnaLysIs sysTEm for release and dispersion of contaminants.

Subtask 1. General survey

- Detailed review, survey of the systems running/plans for further developments at collaborating parties.
- Description and comparison of scientific background, methods used and setup(s).

Subtask 2. Tests and intercomparisons

- Preparing and conducting exercises regarding threats of potential releases from identified sources in domains specific to each participant and/or in a jointly established common area; results -> contribution to the final report.

Subtask 3. General post-processing and verification

- Complementary to sub-tasks 1 and 2 – verification of test results and exercises.
- Results – a detailed description of the exercises, preparation of the final report.

Contributing scientists:

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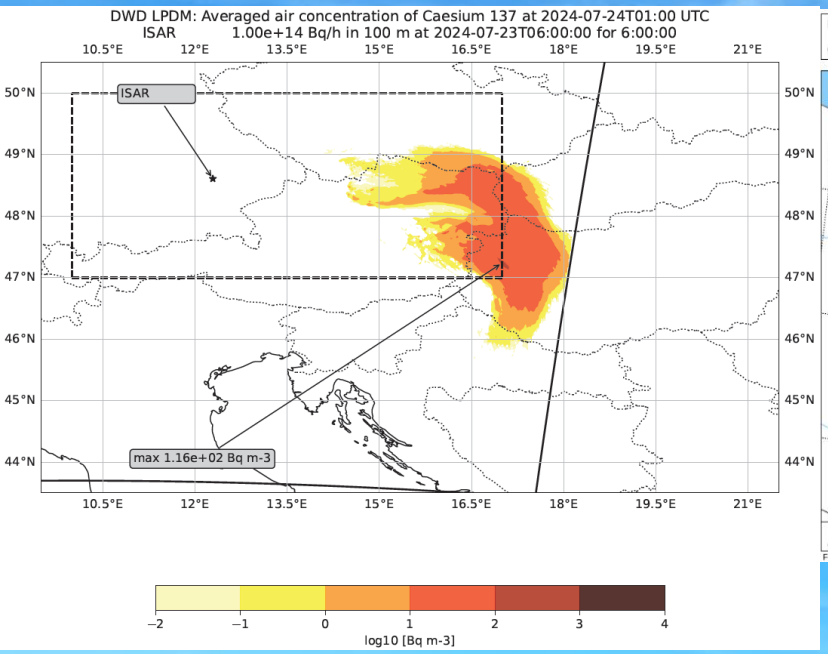
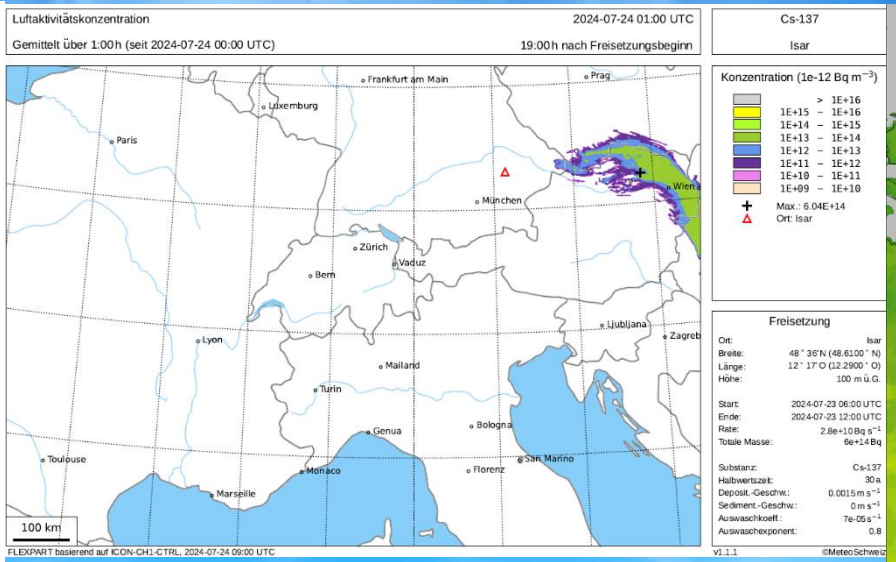
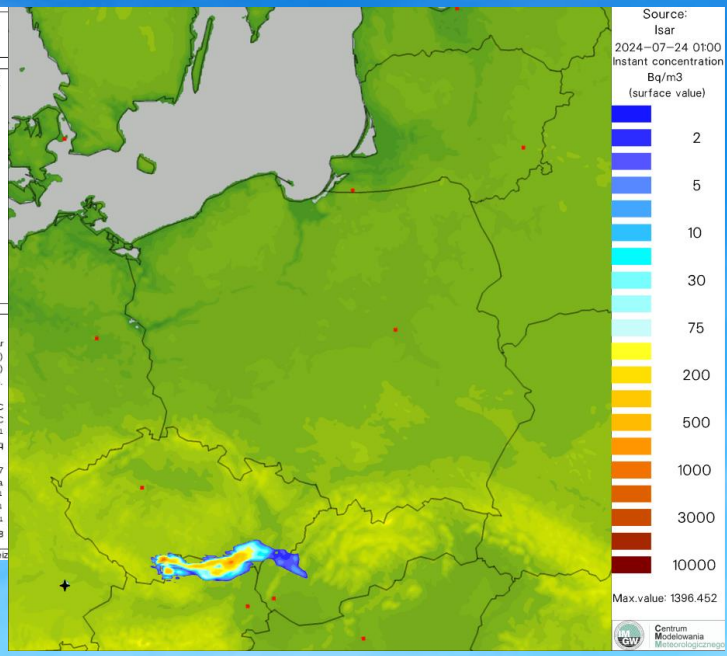
Running/finished PP/PTs

PT EGALITE - Early warninG and AnaLysIs sysTEm for release and dispersion of contaminants.

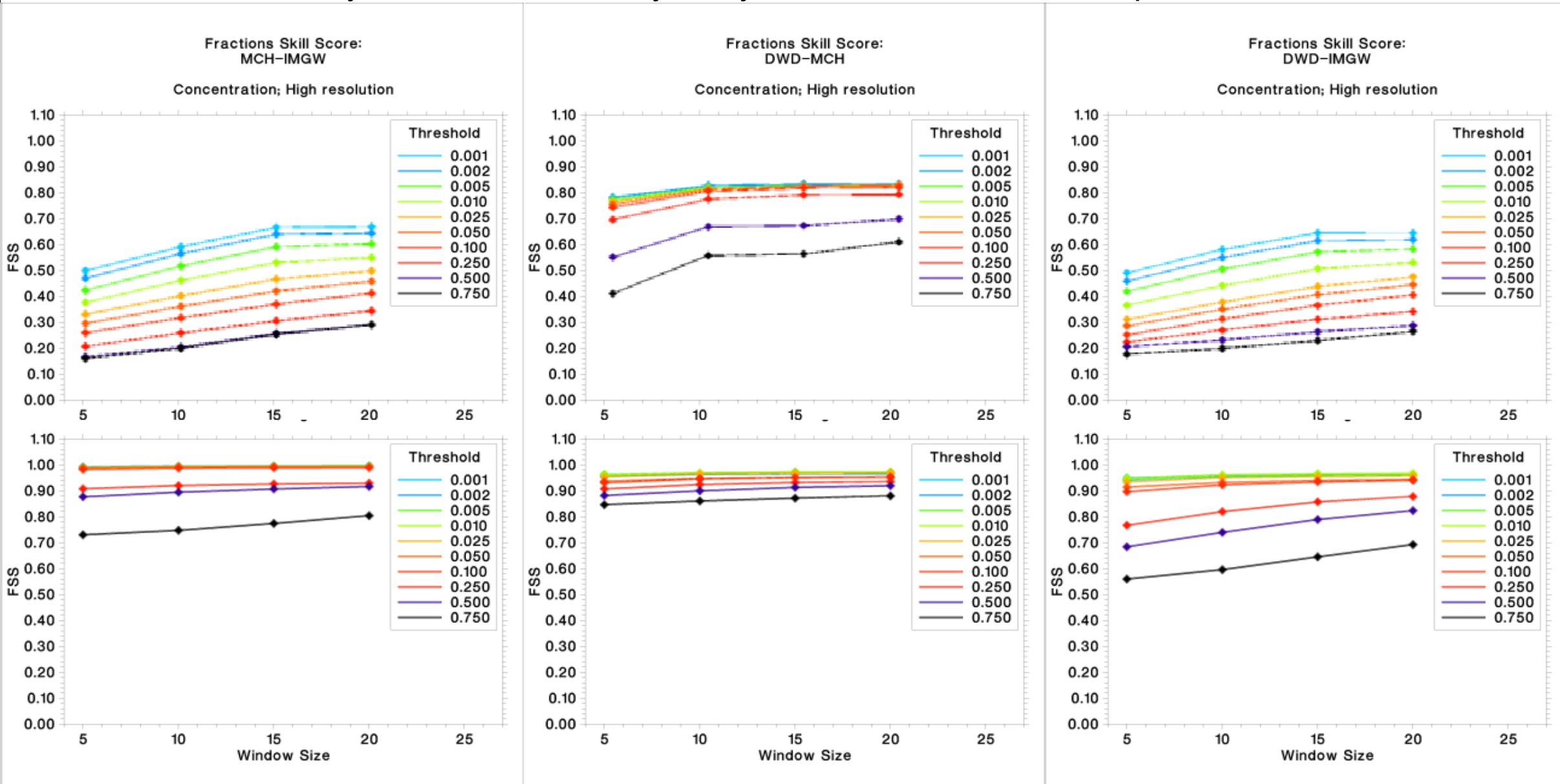






The setup of "dry runs" for release of radioactive material from NPP of Isar, Germany – location in domains

PT EGALITE - Early warninG and AnaLysIs sysTEm for release and dispersion of contaminants.



Upper line – first dry run; lower line – second dry run

Running/finished PP/PTs

PT EGALITE - Early warninG and AnaLysIs sysTEm for release and dispersion of contaminants.

- Current status: PTask finished; final report is ready – in preparation to publication
- All (sub)tasks have been completed
- Suggestion for follow-up – working title AFFORD (AFtermath of early warning and analysis system FOR Release and Dispersion of contaminants)

Suggestions for future PP/PTs and other possible activities

MODEL Suggestions for future PP/PTs and other possible activities,

A follow-up of EGALITE – Priority Project AFFORD (AFtermath of early warning and analysis system FOR Release and Dispersion of contaminants).

- We would like to continue to improve and develop our early warning systems, the properties and capabilities of which were studied during this project's predecessor, the EGALITE priority task.
- The EGALITE priority task resulted in the collection and exchange of experience among COSMO partners regarding the interconnection between numerical weather prediction and pollutant spread modeling.
- Several numerical experiments were conducted to simulate radioactive emissions from a (disused) nuclear power plant in Germany. The experiments included modeling using meteorological data from each partner AND common data provided for the project by DWD.
- The next (logical) step in the research should be experiments using both common (unified) meteorological data and software. For this purpose, we plan to use the FLEXPART program (available at NILU and/or PHAIDRA websites). In addition to conducting the experiment on the initially selected source, the work should be repeated for several other sources, not just nuclear power plant(s).
- Additional benefit: the ability to replace (replace) one partner's system with another in case of a failure (to be discussed and tested during the project).
- The PP would involve 3 COSMO Partners (IMGW-PIB, DWD, MCH) with a total of 1 FTE/year.

Methodology for determining the Most Unfavorable Meteorological Conditions (MUMC) for the needs of locating NPP.

MUMC – meteorological conditions that cause long-range, fast transport of particle released from NPP or as conditions that provide the maximum surface deposition after release from NPP over given area.

The combination of these two approaches allows to determine how a hypothetical incident in a future NPP might affect the environment. The most unfavorable – for society, state organization, economy, etc. – are those that facilitate the spread of contamination

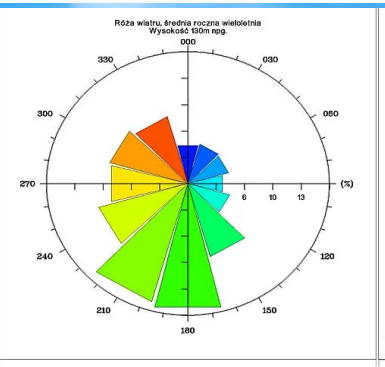
1. A long-term analysis to be carried out – find meteorological conditions that could cause the fastest arrival of radioactive material to the (predefined) receptor.
2. The most unfavorable conditions – in the first approximation – are those for which (1) ETA (Estimated Time of Arrival) is minimum and (2) POI (Probability Of Impact) – maximum.
3. Of course, there can be a lot of sets of such conditions. If so, the second stage is decisive, which consists not only of a specific ETA, but also of other meteorological conditions related to the dispersion of contamination – the amount of precipitation (causing wet deposition), convective conditions (determining vertical diffusion) or local conditions (e.g. terrain roughness > the amount of dry deposition).

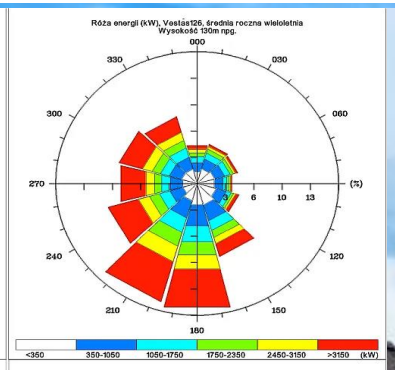
First steps towards the project: poster at ICCARUS 2025; one paper published (https://doi.org/10.1016/j.anucene.2021.108837) and one publication submitted

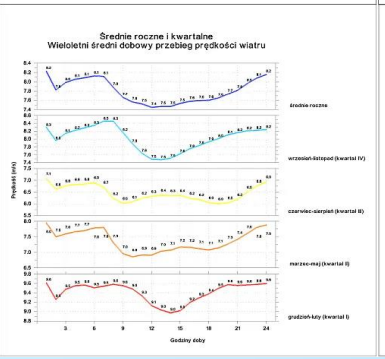
Suggestions for future PP/PTs and other possible activities,

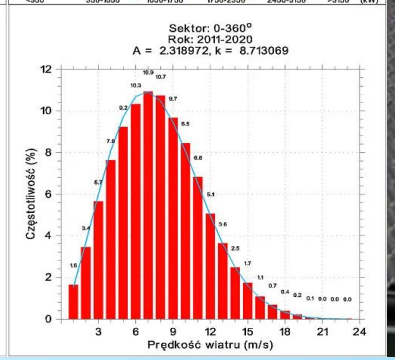
Applications for renewable energy sources

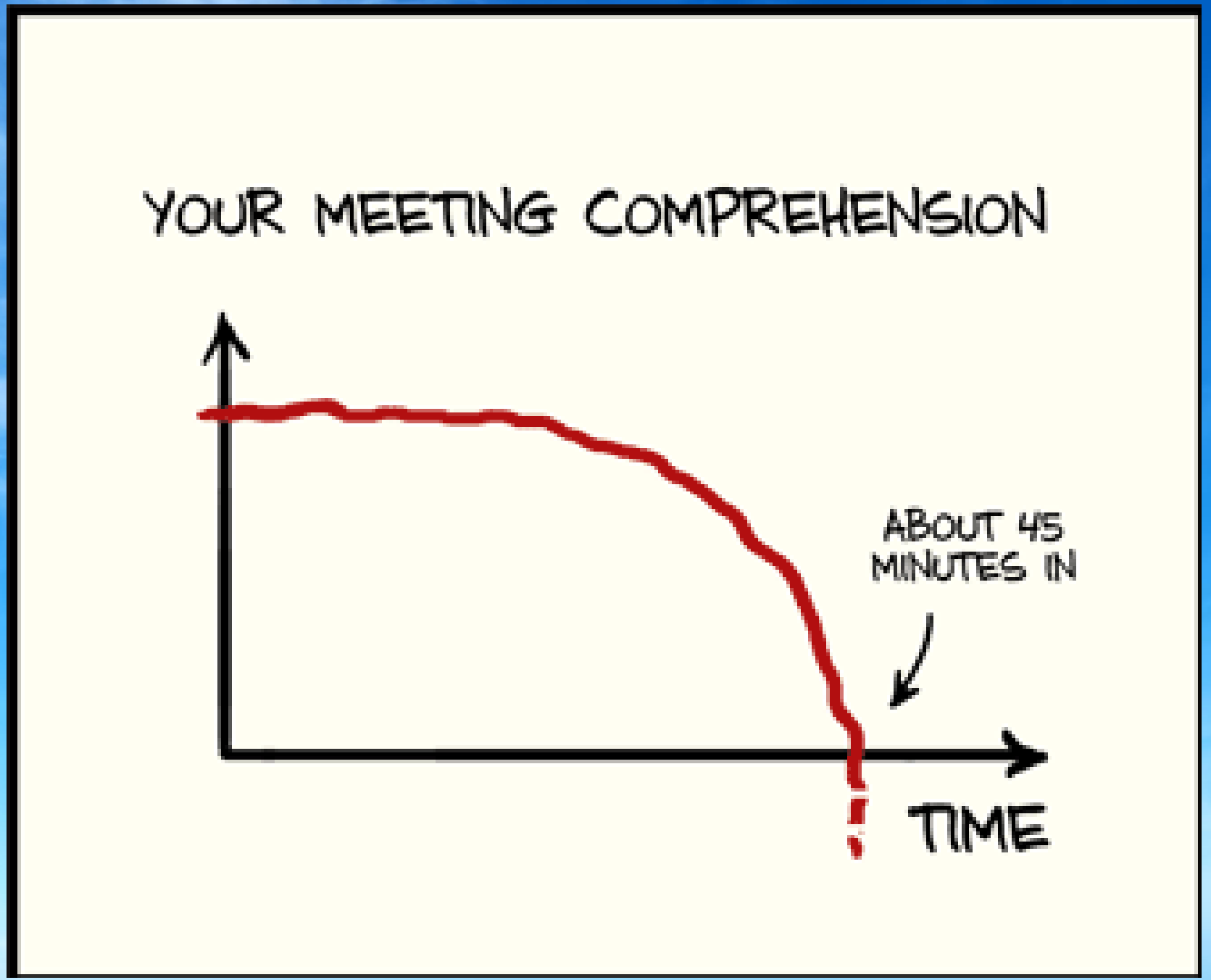
- Wind energy applications – statistical estimates of windspeed, energy and power.
- Photovoltaic applications – statistical estimates of solar radiation, energy and power.
- Parameterization – for a given location – of maximal energy availability in an ideal case and power generation for specific device.
- Both for house instalations and for commercial energy producers







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TIME