

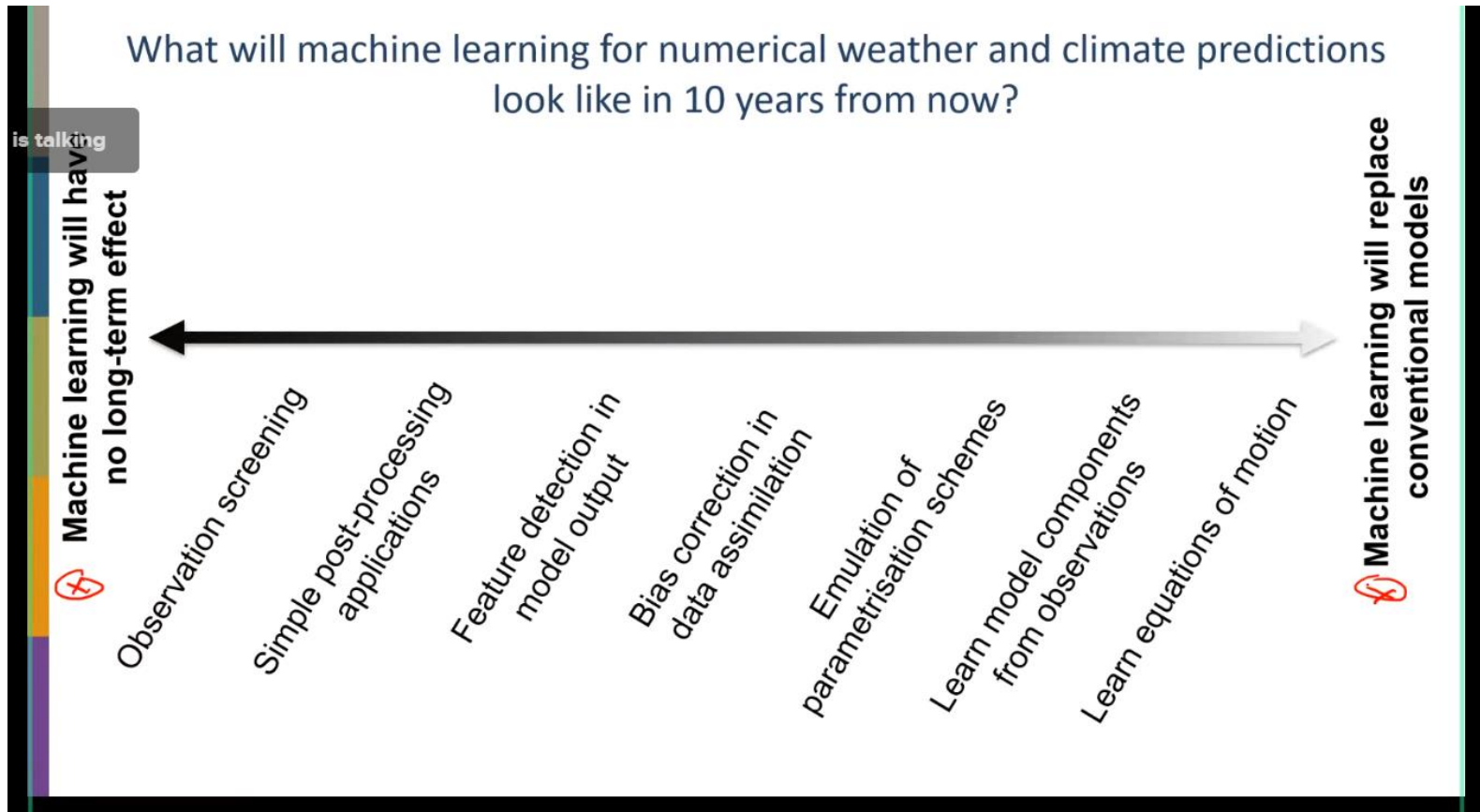
# ET-EPS Discussion

- Use of ensemble by the forecasters:
  - What do the forecasters use of the ensembles? (Probabilities? Percentiles? Pseudo-deterministic?)
  - Do not attribute “higher weight” to the control (or yes?) – A. McCabe, MCH
  - Condense the information (H. Feddersen, C. Marsigli)
- Verification:
  - Neighbourhood (IMPROVER, N. Roberts)
  - testbed (high-impact weather)
- Applications in cascade:
  - Meteo-hydrological ensembles (like EFAS)
  - Sea-state ensembles (C.Wastl)
  - Combine the meteorological uncertainty with the uncertainty in the processes in cascade (hydro, marine, pollution ...)

# ET-EPS Discussion

- Stochastic physics:
  - identify the elements of the schemes which can benefit from a stochastic description
  - Include physical processes but even better the error of these physical processes! (M. Raschendorfer)
  - Estimate spatial and temporal scale of the uncertainties to determine the scales of the perturbations - > difficult (H. Christensen, I.-L. Frogner), use of ML (H. Christensen)
- Use the uncertainty in the estimated physiographic parameters to provide ensemble perturbations -> provide estimate of parameters with an estimate of uncertainty
- Use of Machine Learning:
  - Where? (H. Christensen, N. Roberts)
- SRNWP-EPS database: Value Chain
  - Proposal to populate the database of the Value Chain Project of WWWRP with few European cases (plots, reports, any info)

# ET-EPS Discussion



# ET-EPS Discussion

## What next? ML for improved stochastic parametrisation.

- Many operational stochastic parametrisations are **cheap**, but **ad hoc**
- Can we improve on this by using Machine Learning to learn the stochastic parametrisation scheme?
- *MU-MIP dataset will ultimately provide ideal training data for this undertaking*

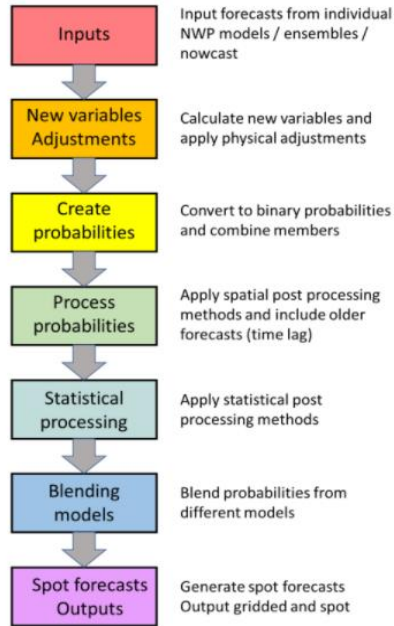
Show proof of concept experiments comparing a stochastic NN to a bespoke stochastic parametrisation scheme

- Use Generative Adversarial Networks to learn a stochastic parametrisation for the toy atmospheric model, the Lorenz 96 system
- Compare to bespoke stochastic parametrisations

Gagne, Christensen, et al, 2020, JAMES

# ET-EPS Discussion

## Met Office



## Machine learning?



Phenomena classification  
 Multi-variate relationships  
 Emulation (new members)  
 Calibration (non-probabilistic)  
 Geographical relationships -> localisation  
 Scenarios / clusters  
 Downscaling



Emulation  
 Optimise scaling (neighbourhoods)



Ensemble calibration



Blending weights



Calibration  
 Text, weather "symbols"  
 Multi-variate relationships -> scenarios (clustering)



## Met Office

## Future?

