

POINTWISE MACHINE LEARNING BASED RADIATION FOG NOWCAST WITH STATION DATA IN GERMANY

Philipps



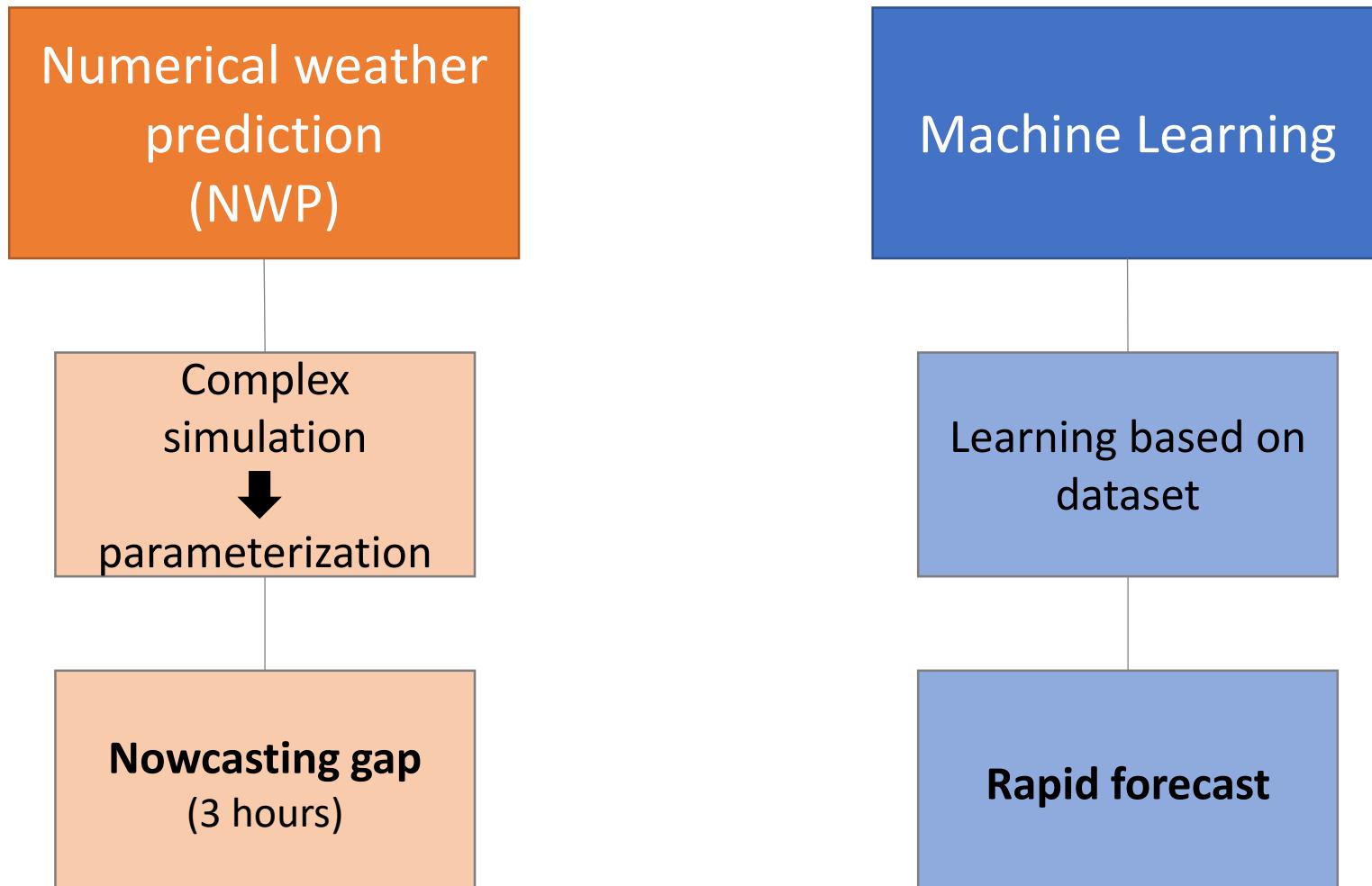
Universität
Marburg



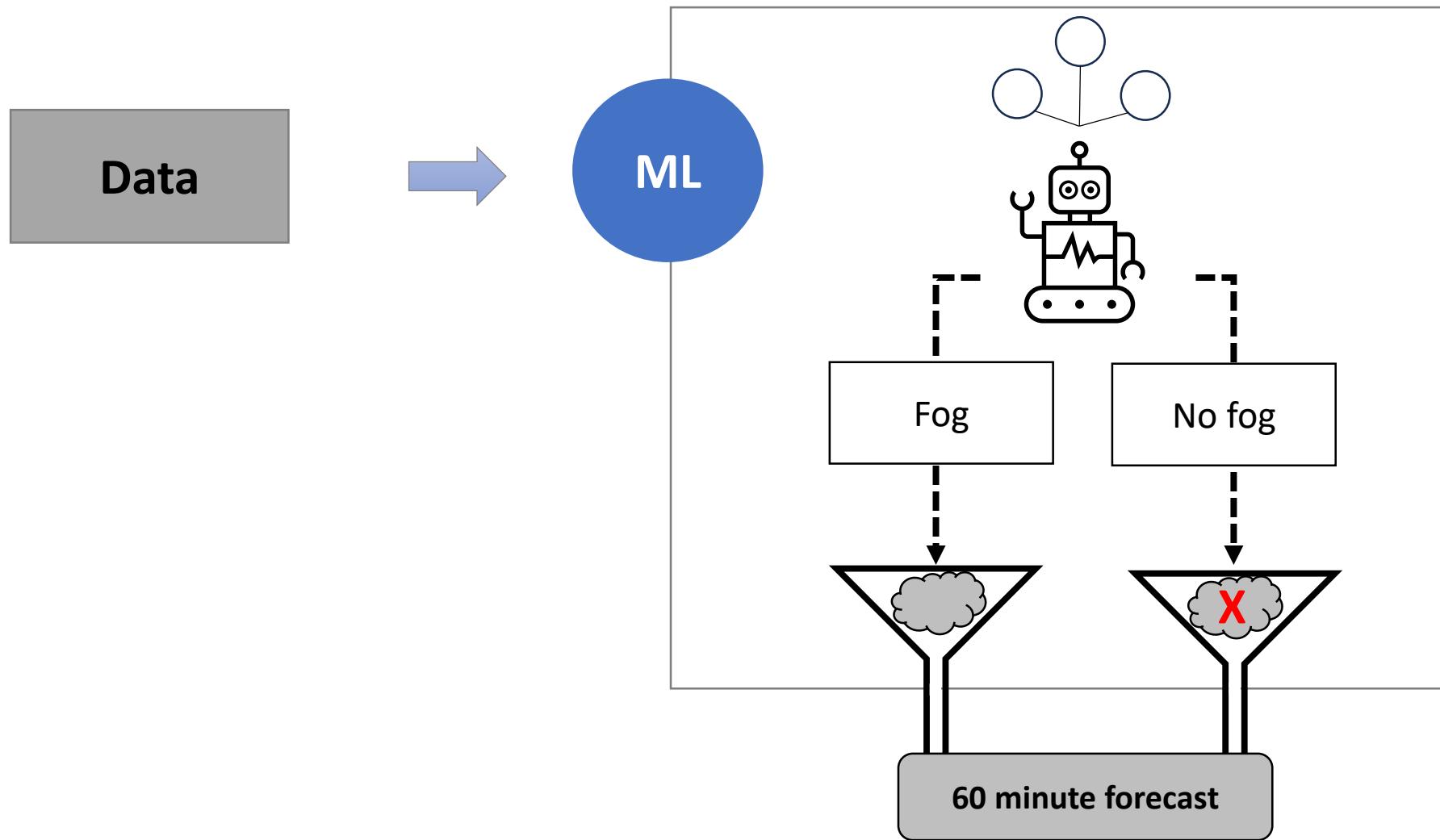
Michaela Vorndran, Adrian Schütz, Jörg Bendix & Boris Thies



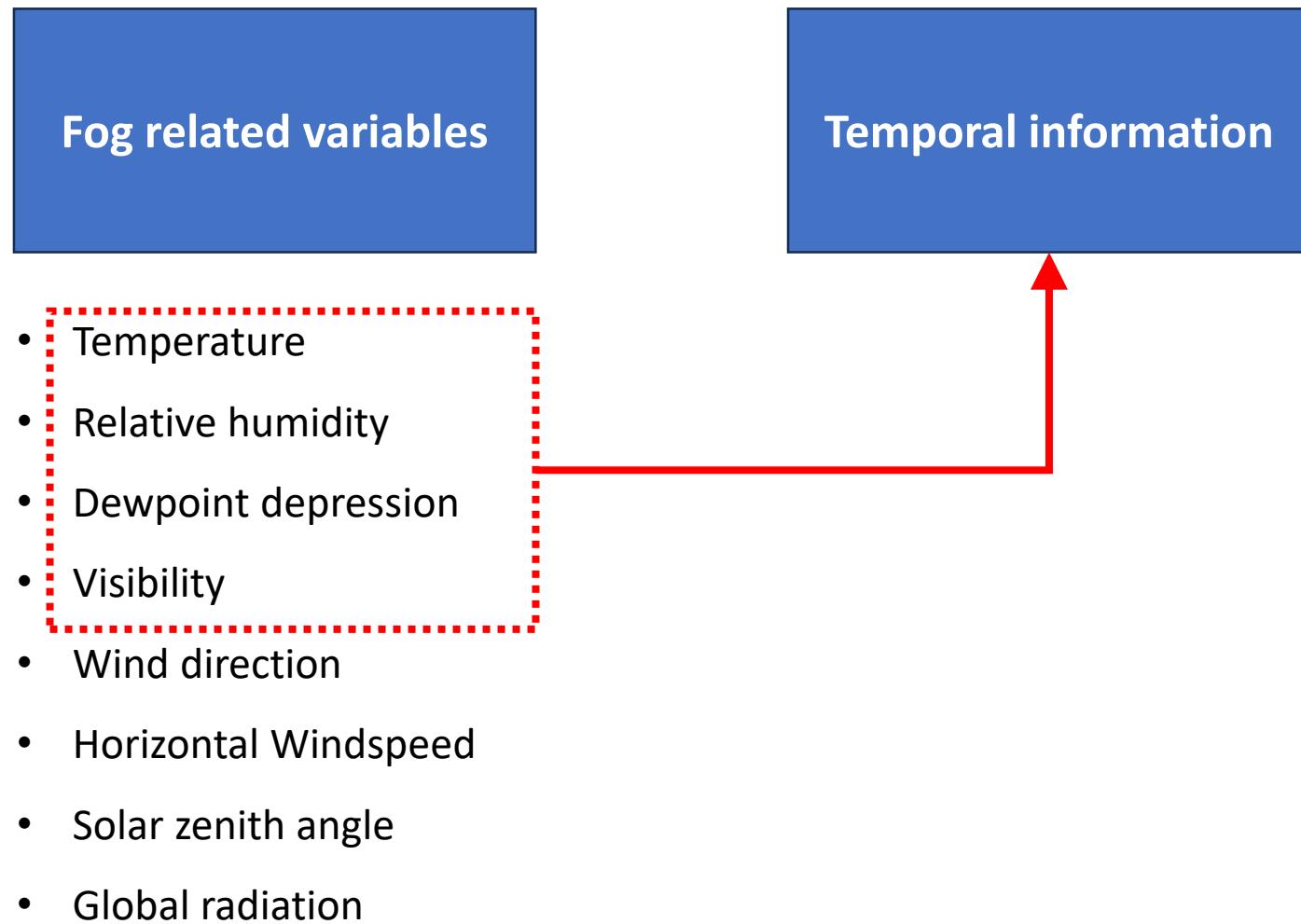
Motivation



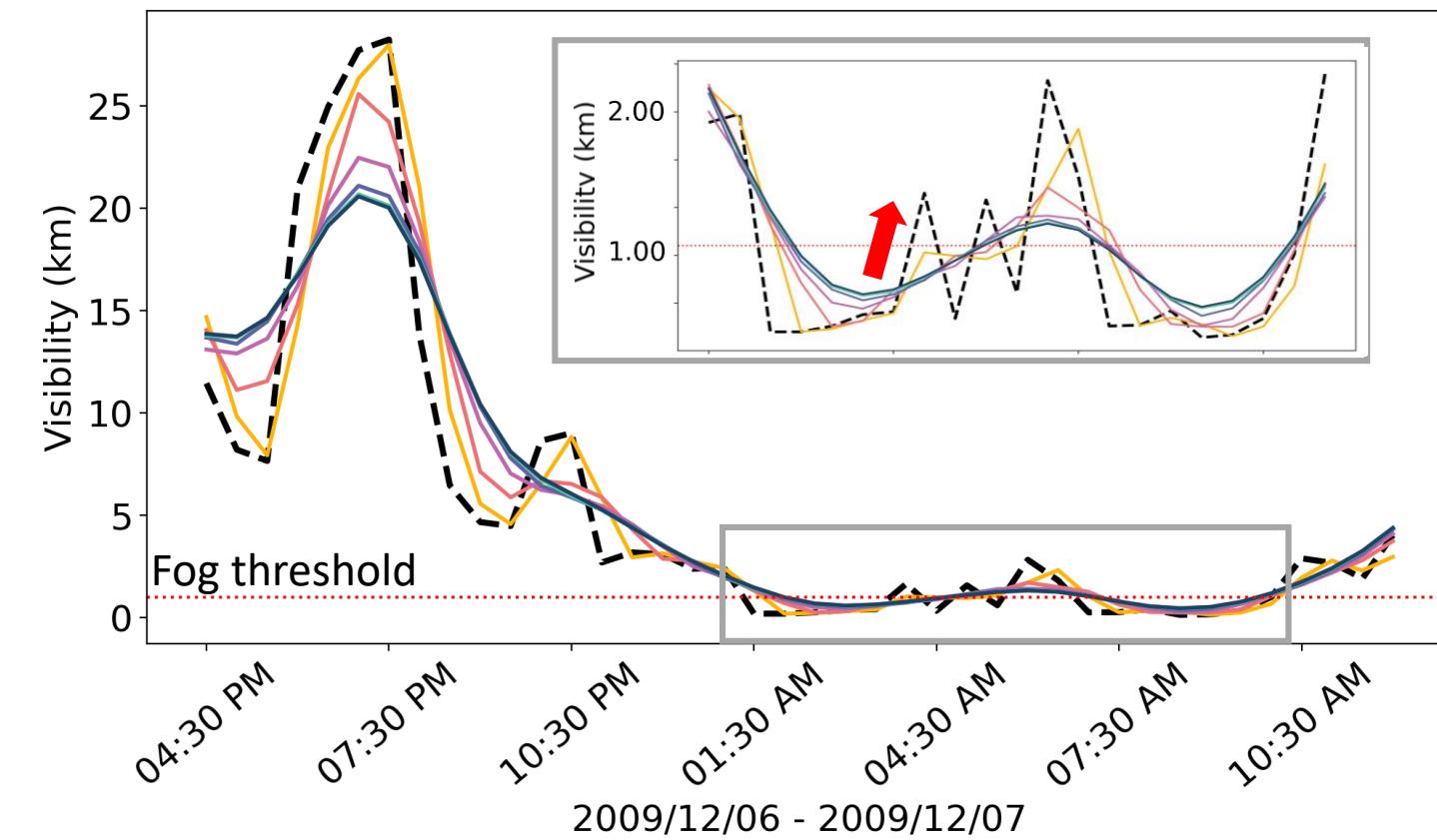
Machine Learning - explained



Data preparation



Data preparation



**Smoothing intensity
(hours)**

- 1
- 2
- 3
- 4
- 5
- 6
- 7

Dampen
fluctuations

**Temporal
information
(hours)**

- 1
- 1.5
- 2
- 2.5
- 3

Past Temporal
Development

Models

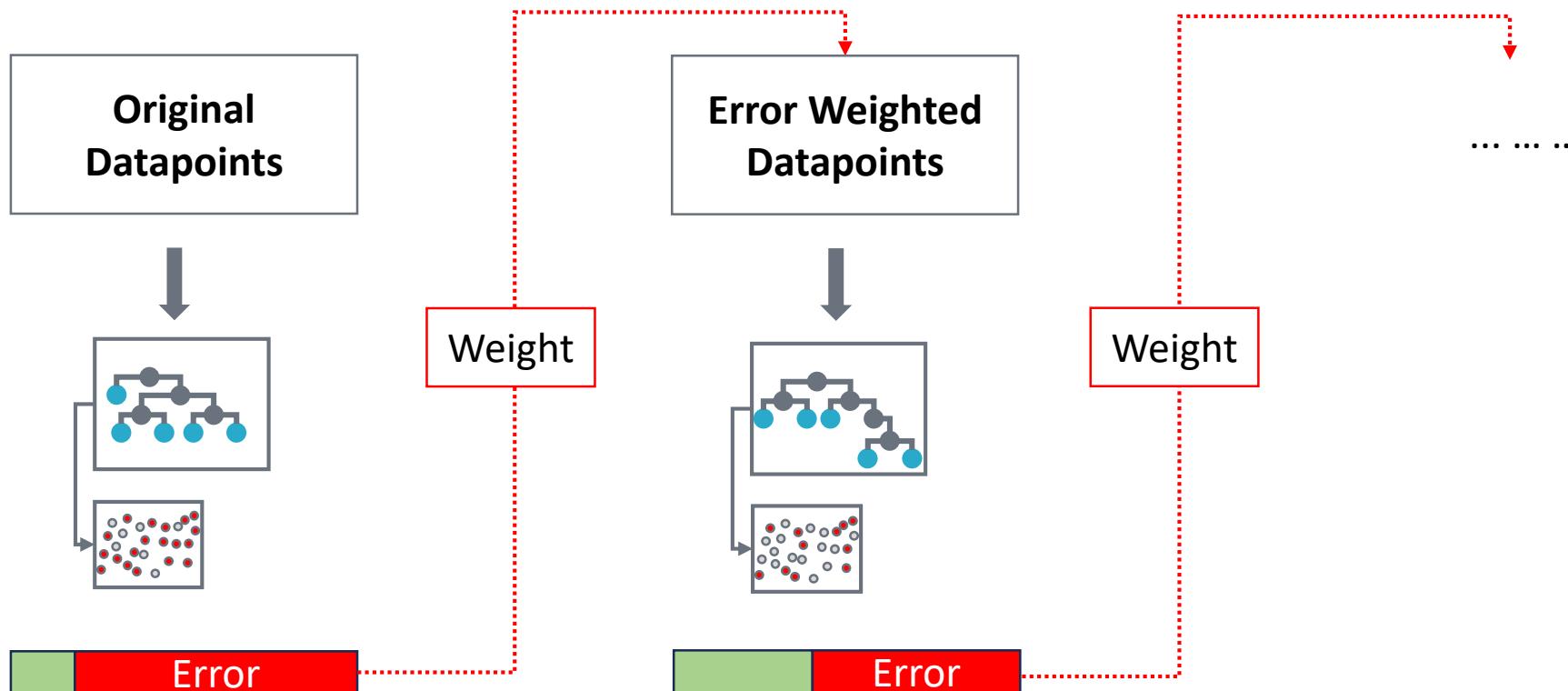
XGBoost

Logistic
Regression

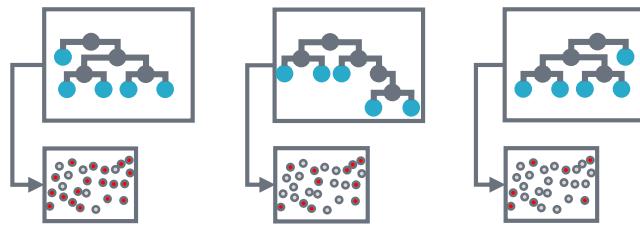
Persistence

Climatology

XGBoost – explained



XGBoost



**Logistic
Regression**

Persistence

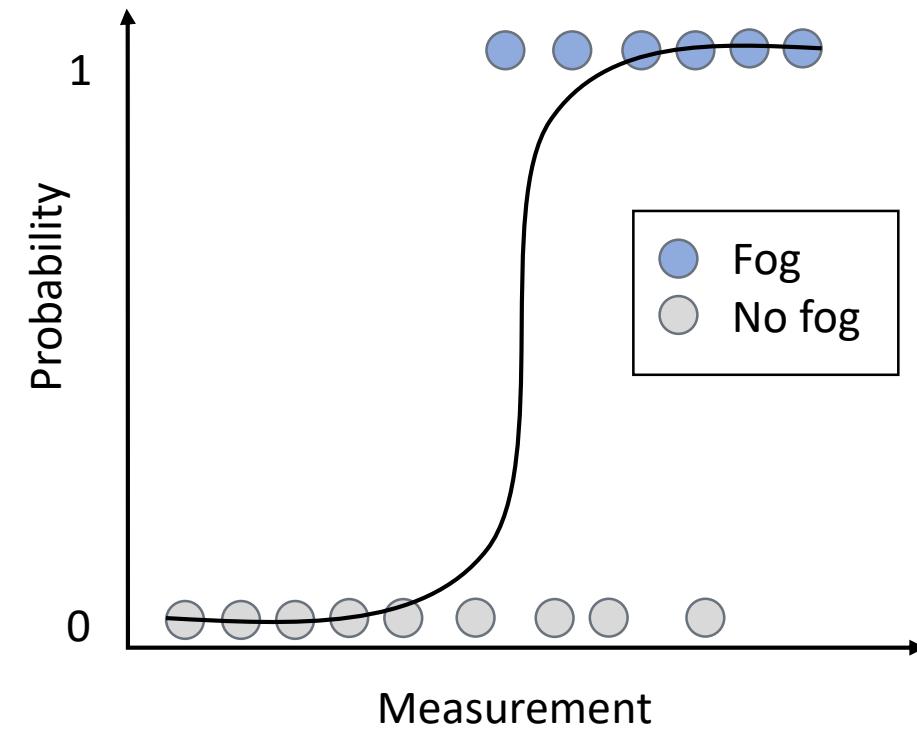
Climatology

Models

Logistic Regression - explained

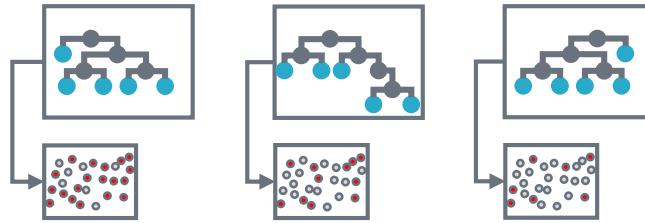
Benchmark model

- XGBoost \geq LR?

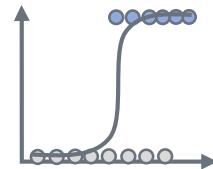


Simulation

XGBoost

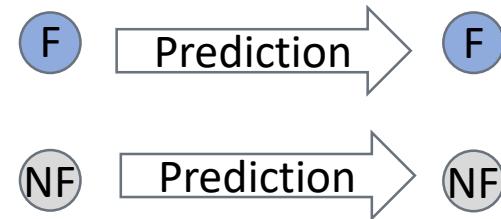


Logistic
Regression



Persistence

„The weather stays the same“

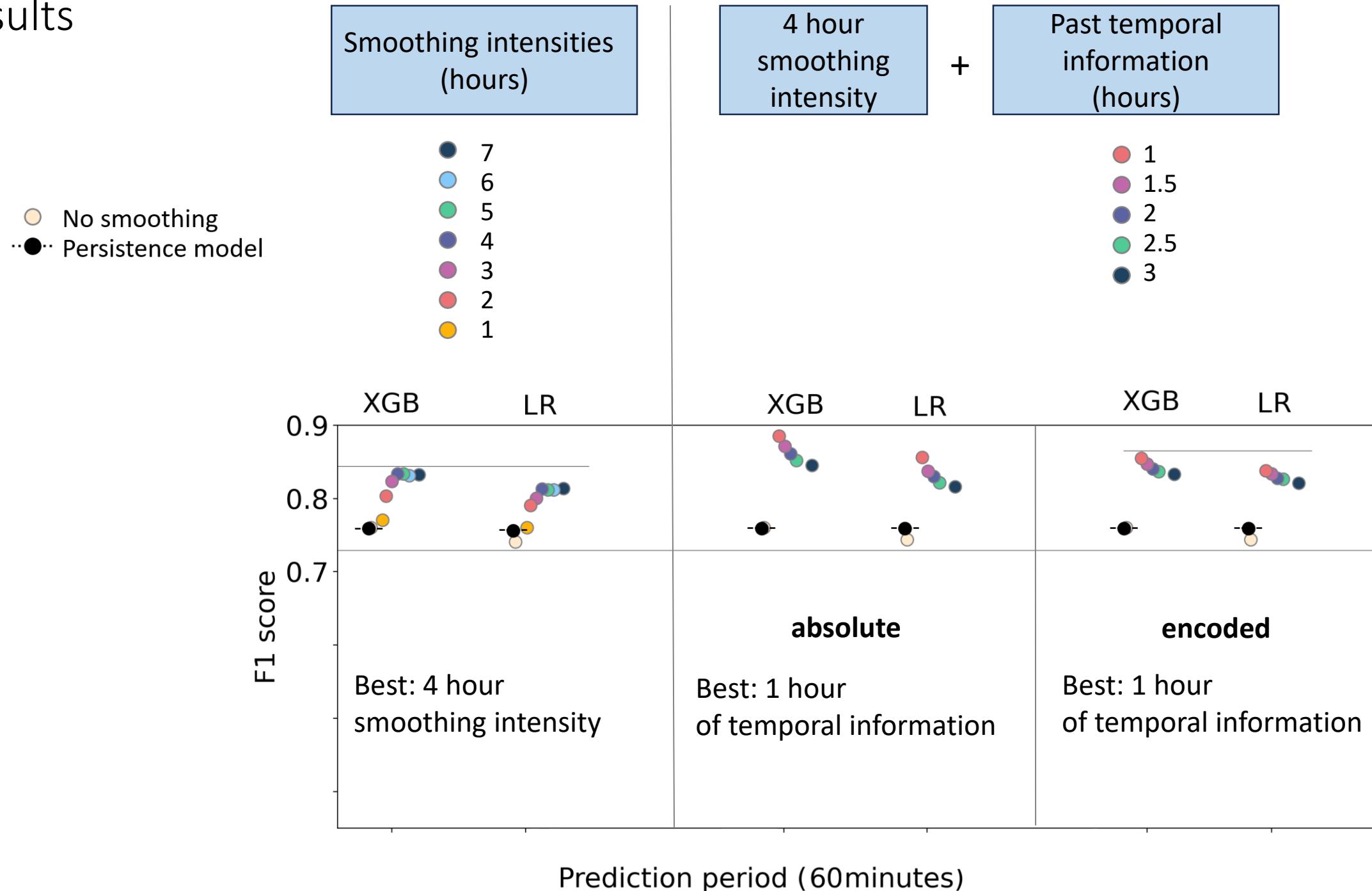


Climatology



Models

Results

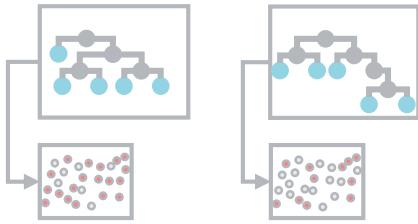


Results – best case

Overall Performance

Fog Formation

XGBoost



F1: 0.88



+17%

Accuracy: 46%



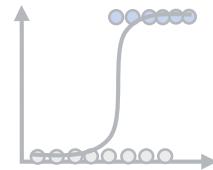
+253%

Precision 69%



+53%

Logistic Regression



F1: 0.83



+12%

Accuracy: 58%



+70%

Precision 53%



+60%

Persistence

„The weather stays the same“

F1: 0.75/0.82

0%

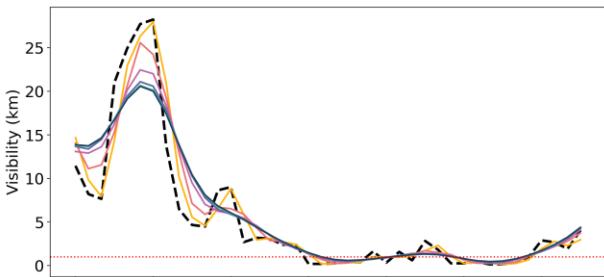
Climatology



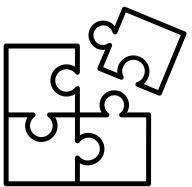
Accuracy: 5 %

Precision: 5%

Conclusion



Smoothing + temporal information significantly increased the performance



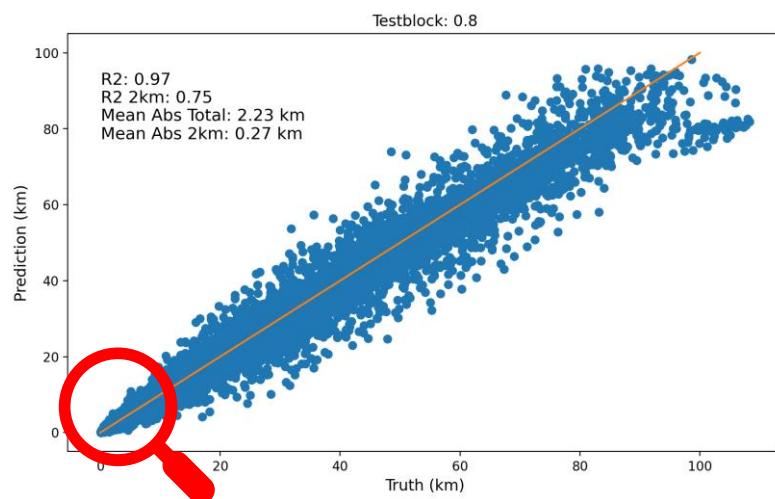
Evaluation of overall performance + transitions



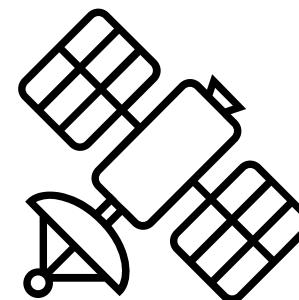
Baselines are needed
puts results in contrast + makes studies comparable

Outlook

Regression based forecast



Satellite Data



Contact information:



Michaela Vorndran
Marburg University
Laboratory of Climatology and Remote Sensing
michaela.vorndran@geo.uni-marburg.de

Philipps



Universität
Marburg



DFG

Deutsche
Forschungsgemeinschaft



Vorndran, M., Schütz, A., Bendix, J., & Thies, B. (2022). Current Training and Validation Weaknesses in Classification-Based Radiation Fog Nowcast Using Machine Learning Algorithms. *Artificial Intelligence for the Earth Systems*, 1(2).