Scalable coastal inundation mapping using machine learning

Ophélie Meuriot
Anne Jones

IBM Research Europe

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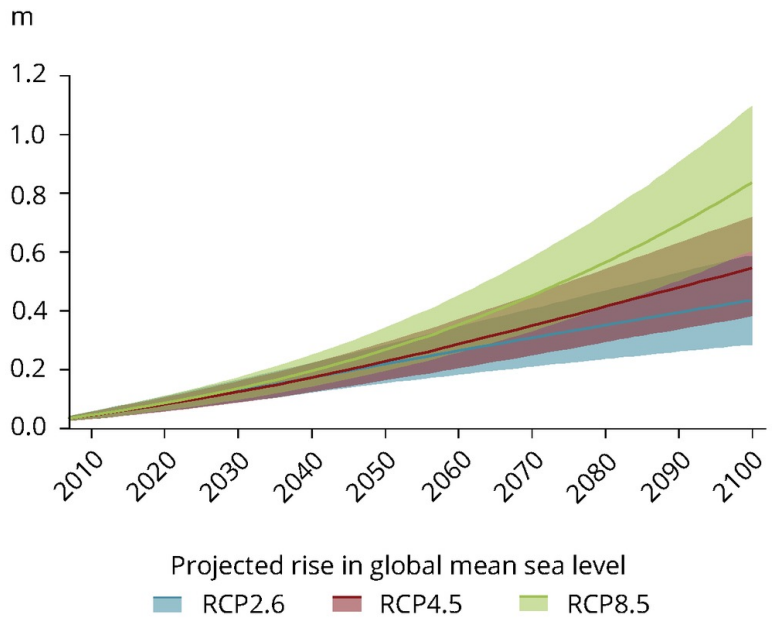
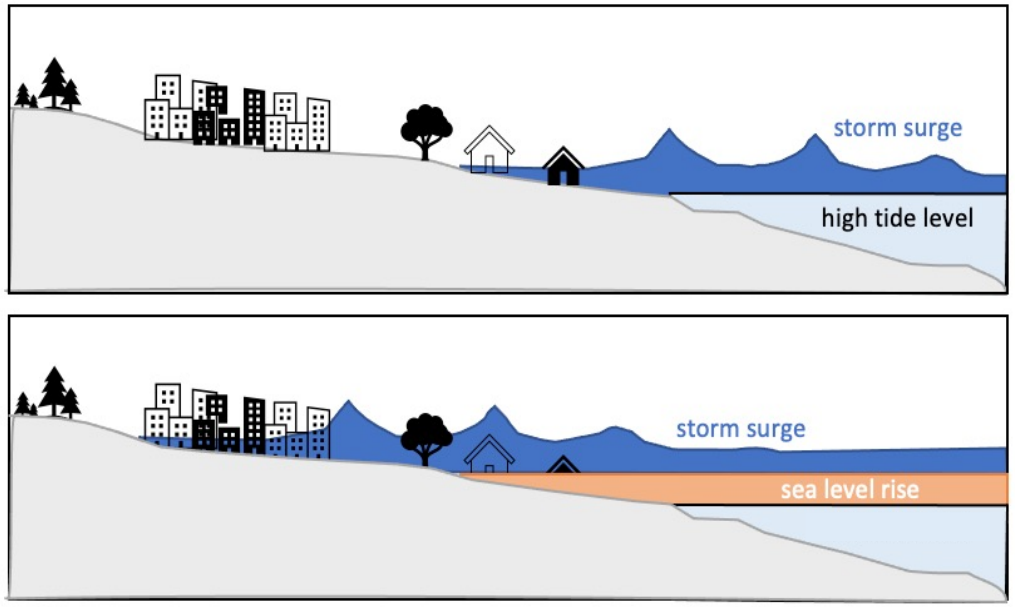
Motivation

- Coastal flooding is a significant climate hazard with impacts across economic sectors and society
- As mean sea level is expected to rise due to climate change, a higher frequency of coastal inundation is anticipated

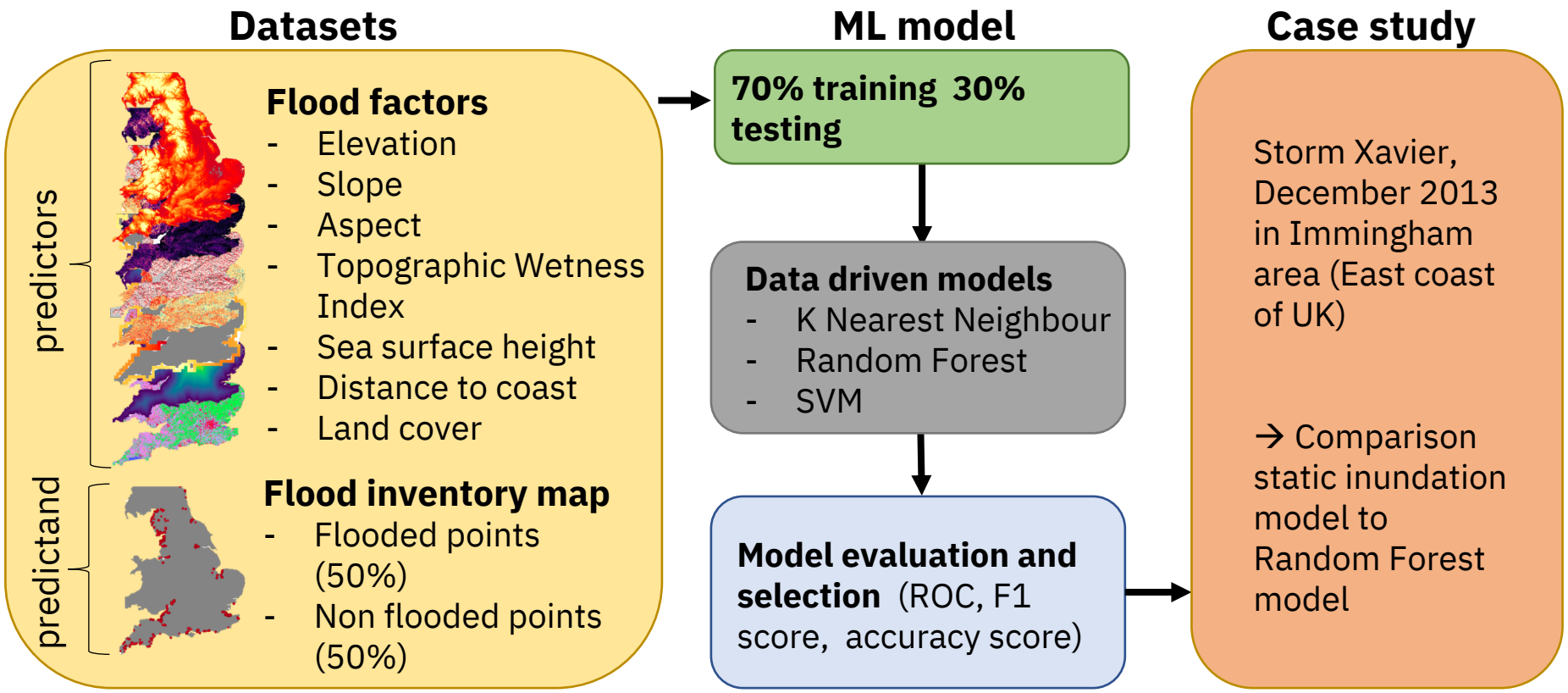


European environment agency (https://www.eea.europa.eu)



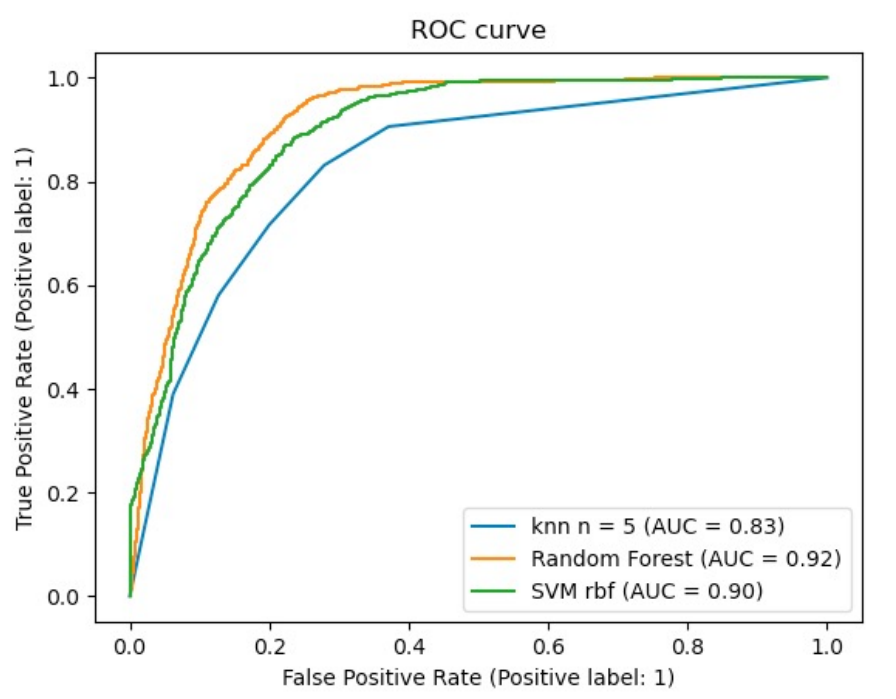
Aim & methodology

Aim: Develop a data-driven coastal flood inundation model at the country scale.



Results

Model performance

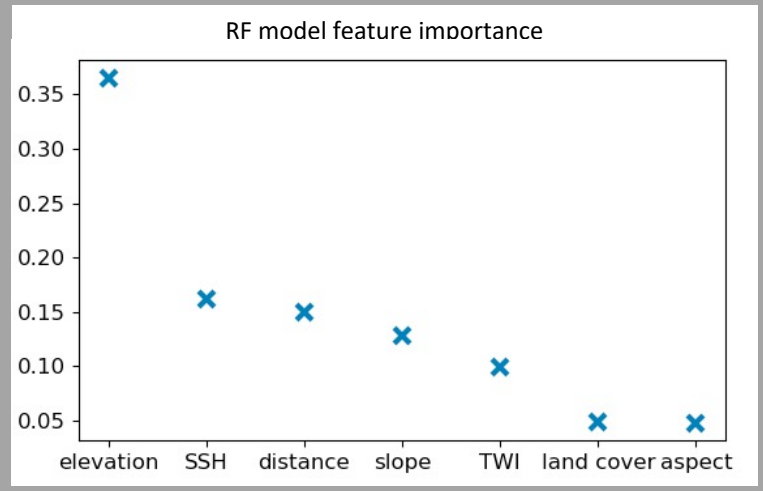


model	accuracy score	f1 score
kNN	0.79	0.67
RF	0.84	0.74
SVM	0.8	0.71

Model selection

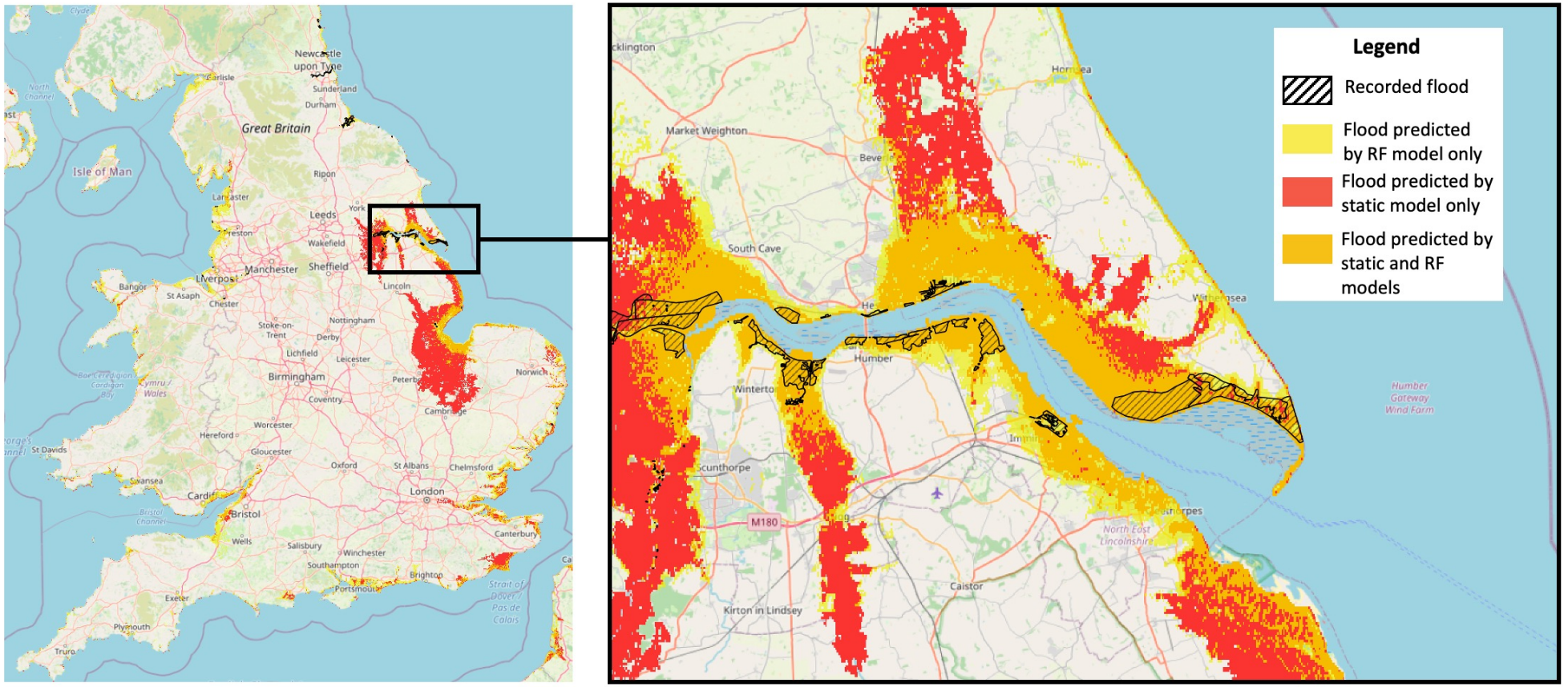
The RF model is selected based on AUC, f1 and accuracy scores.

RF model feature importance provides insight on the relative influence of each factor.



Case study

Comparison of the RF model and static inundation model results for the Storm Xavier event in December 2013 against recorded flood extents:



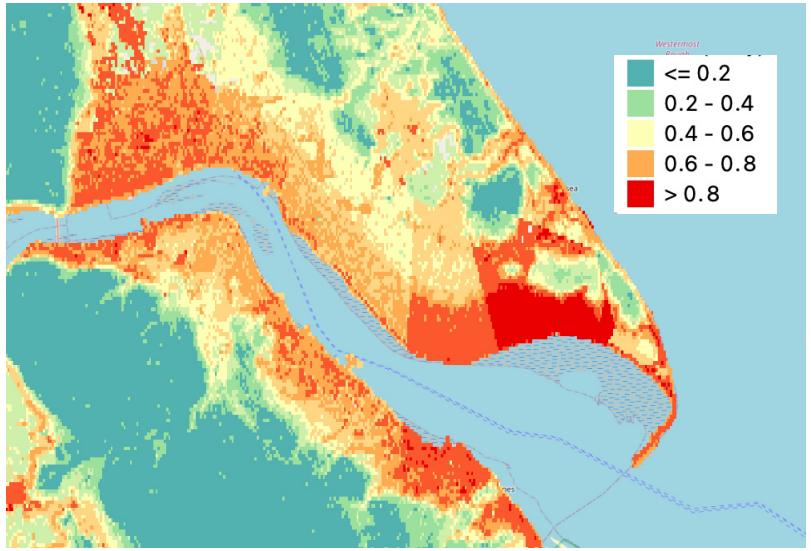
→ Although both models over predicted the flood extents, the RF flood extents are closer to the observed flood extent

Conclusion & next steps

Initial results provide a proof of concept for data driven models for coastal flood inundation at the country scale, incorporating storm dynamics and geospatial characteristics to improve upon simpler static models

Next steps:

- Assessing probability of flooding
- Elevation dataset accuracy & resolution
- Historic flood records may not be accurate
- Comparison of results and computational cost using physics-based dynamic inundation model



Flooding probability for Storm Xavier event

contact: ophelie.meuriot@ibm.com