



Forecasting fire activity in Indonesia

Towards an Fire Early Warning System for Indonesia (ToFEWSI)

<https://tofewsi.github.io>

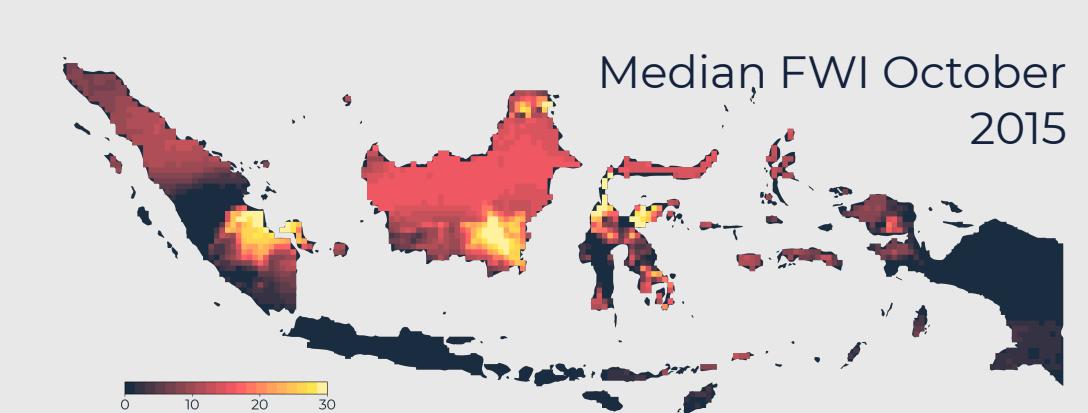
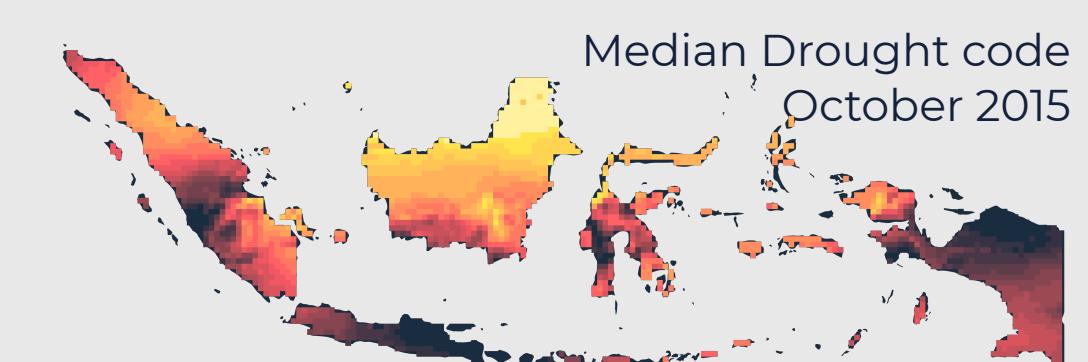
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(1) Swansea University, College of Science, Geography Department, Swansea, United Kingdom (tadas.nik@gmail.com)

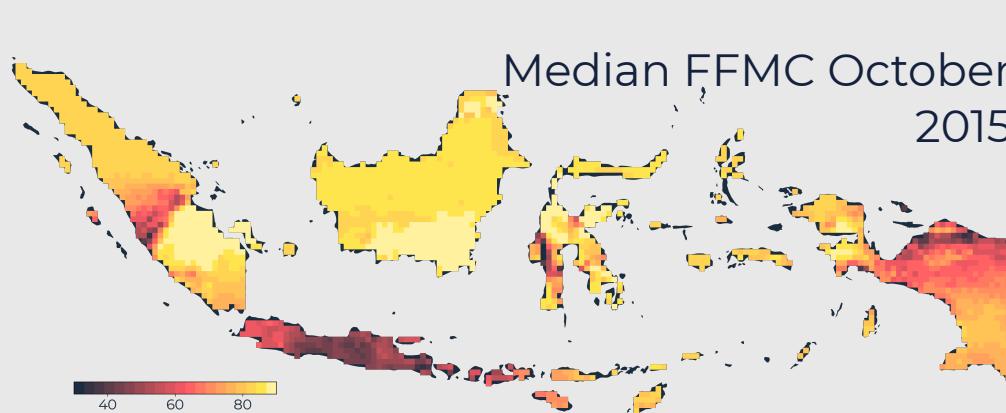
(2) Department of Renewable Resources, University of Alberta, Canada

Can extreme burning events in Indonesia be predicted?

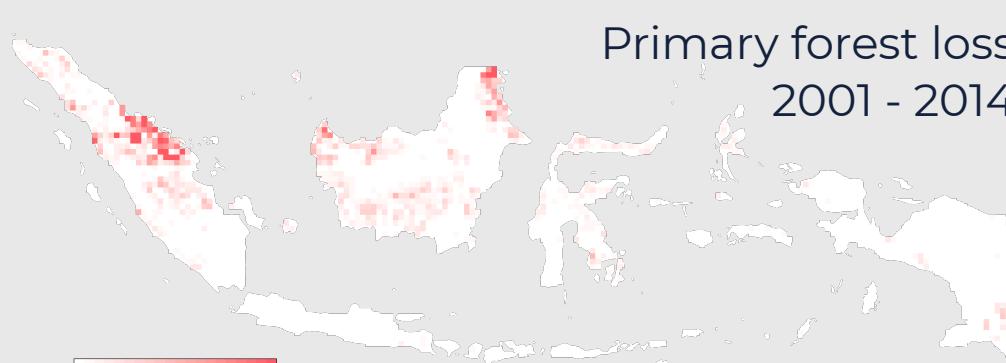
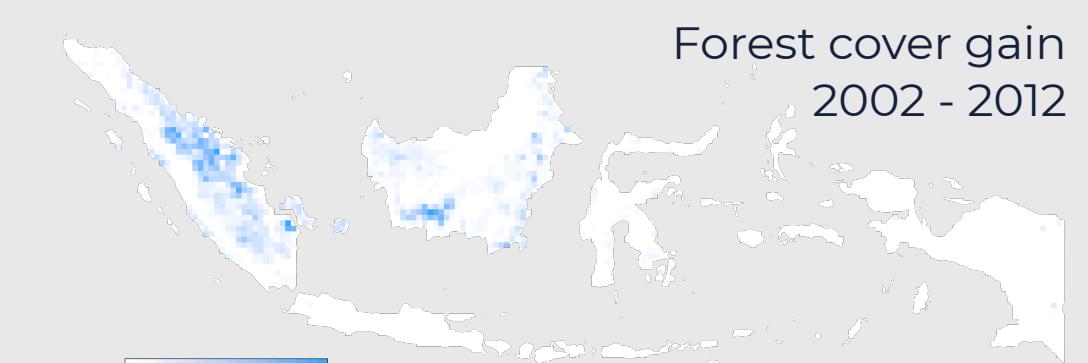
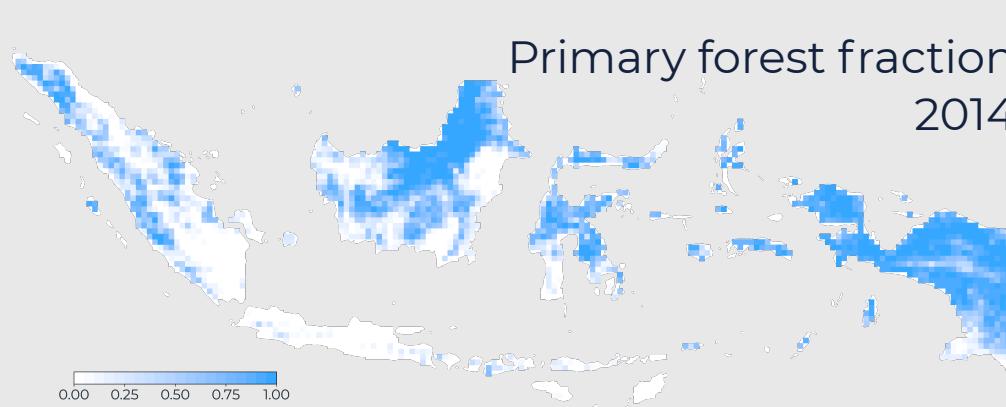
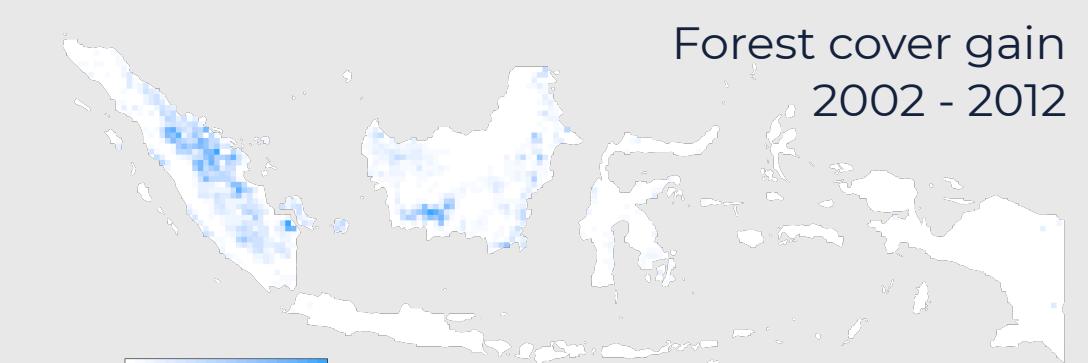
This study, part of the ToFEWSI project, explored the predictive skill of machine learning algorithms using fire weather and forest cover change **datasets**.



Fire weather indices were calculated from the ECMWF ERA5 reanalysis dataset.



Some of the **forest cover change** datasets used for model training. Derived from Hansen et al., 2013, Science 342.

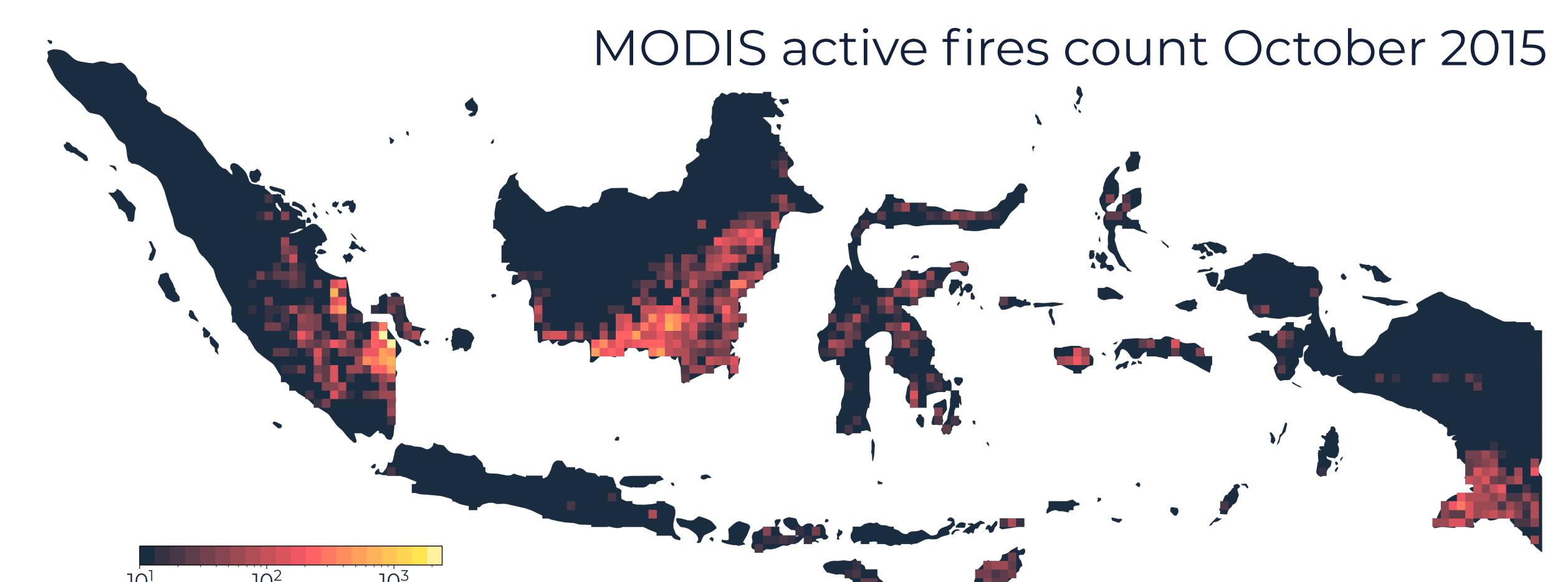


Supervised learning algorithms; logistic regression, Maxent, support vector machines and neural networks were trained to predict fire occurrence on 25km grid and monthly time steps for 2002 - 2018 period in Indonesia.

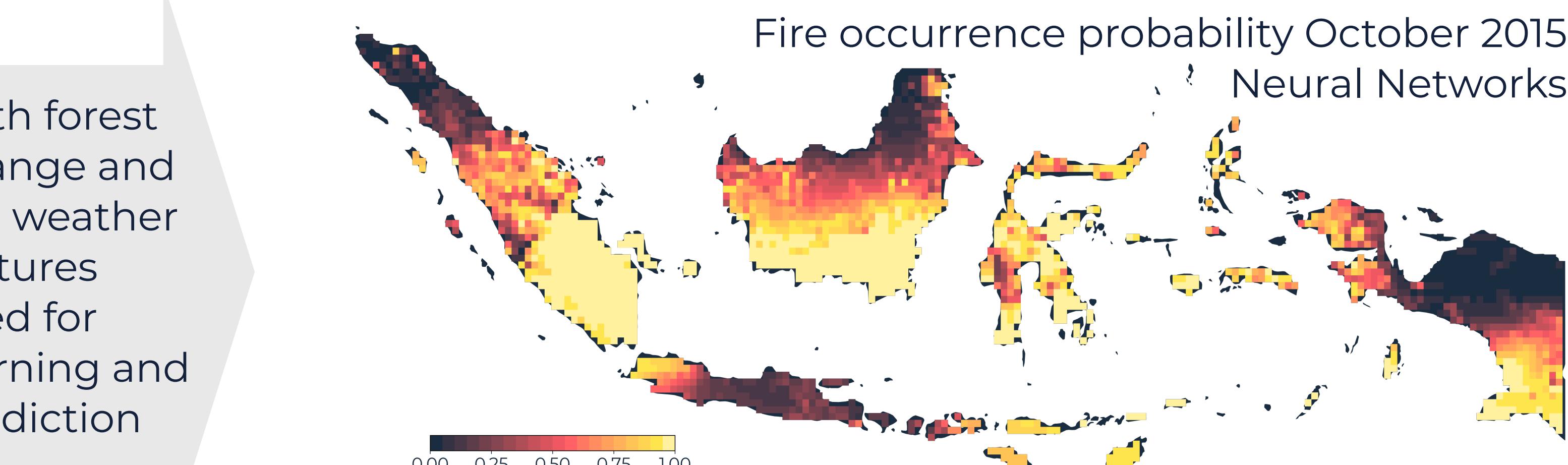
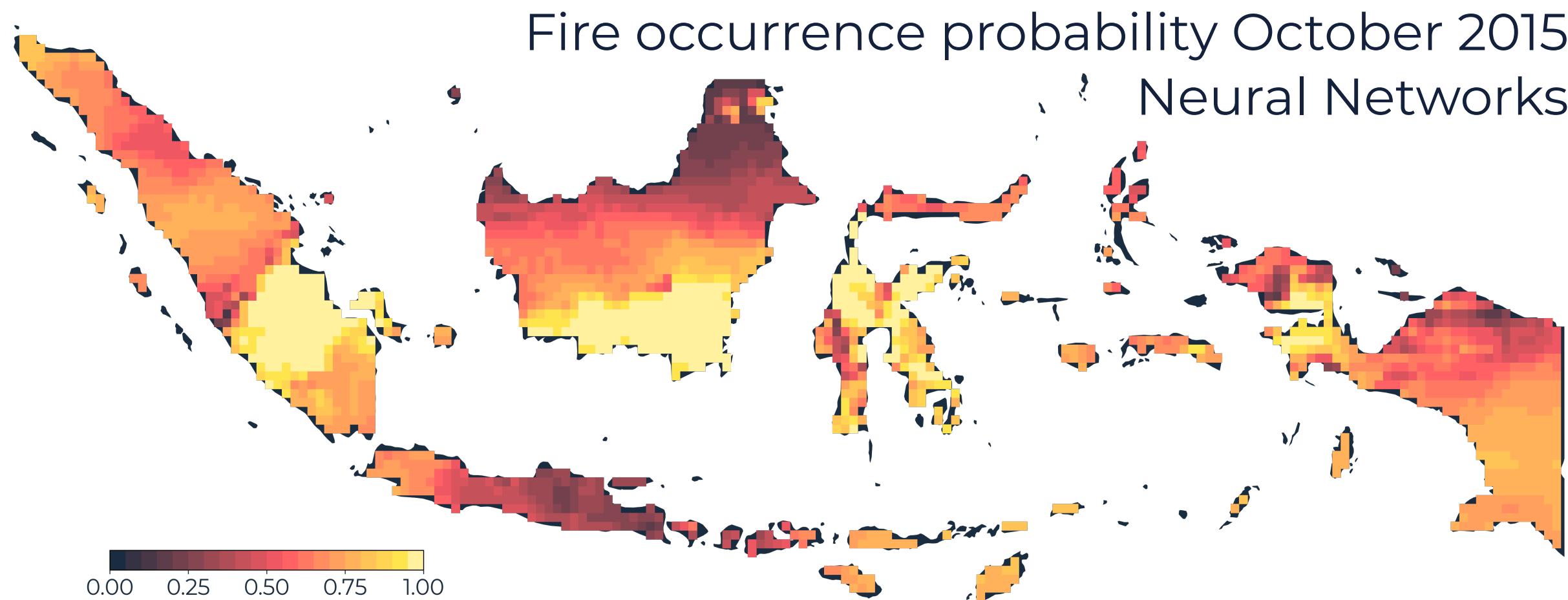
Validation was performed leaving one year out during training and using it as testing data.

Land cover and land use information is critical for modelling fire activity in Indonesia

Both forest change and fire weather features used for learning and prediction

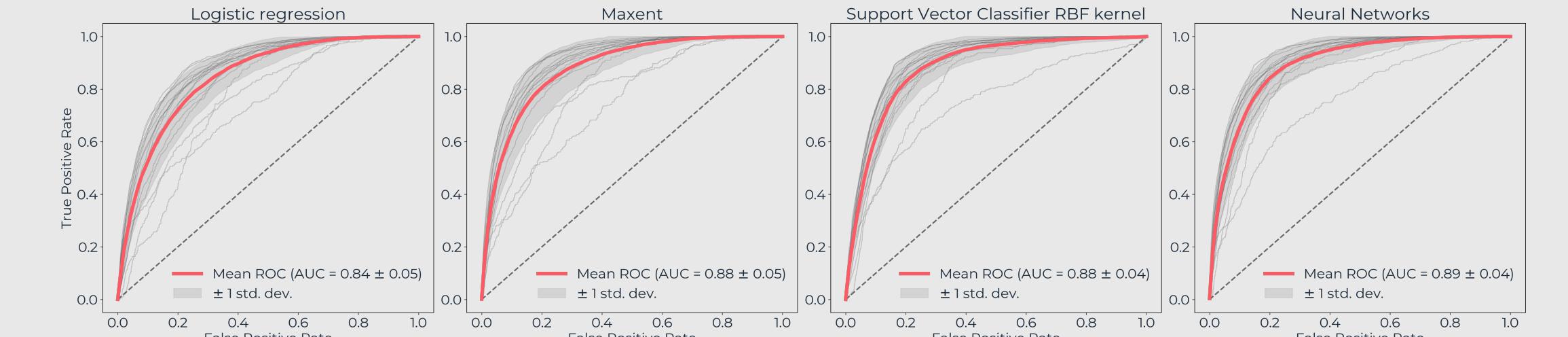


Only fire weather features used for learning and prediction

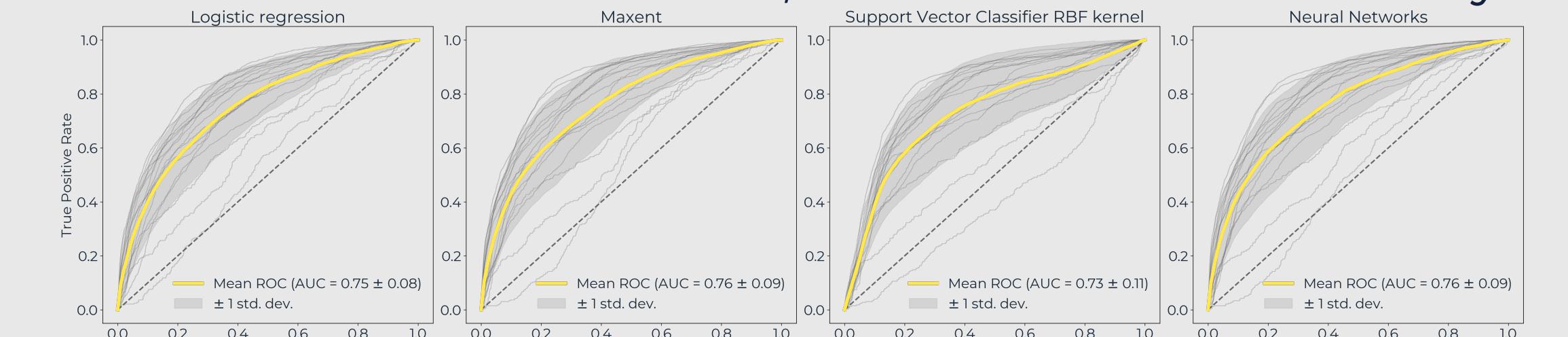


Good prediction skill was achieved when models were trained with the full feature set. Deforestation was linked to increased fire occurrence probability in the area.

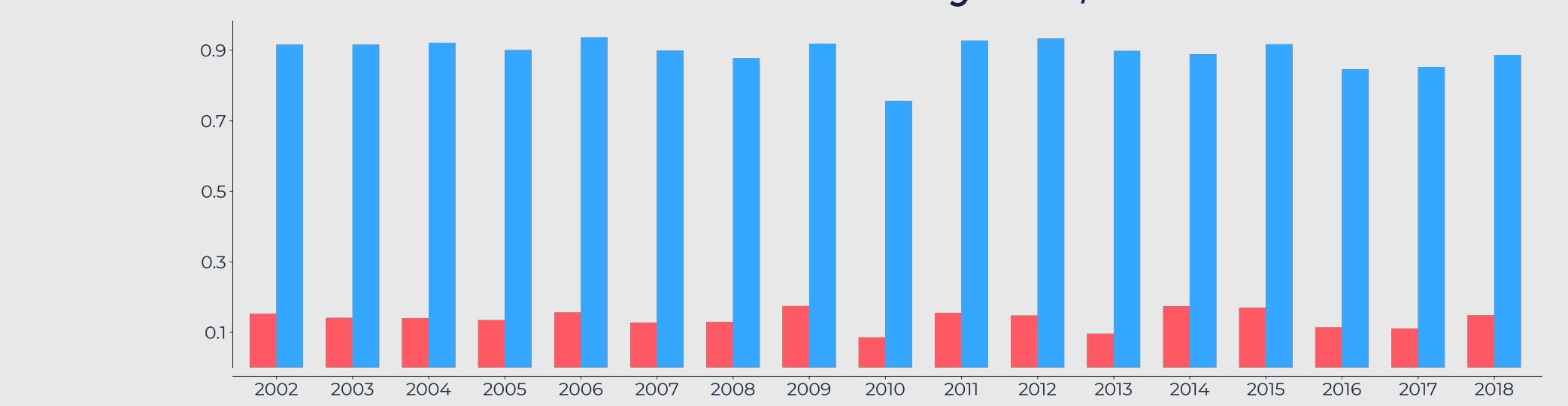
ROC curves for the models, full feature set.



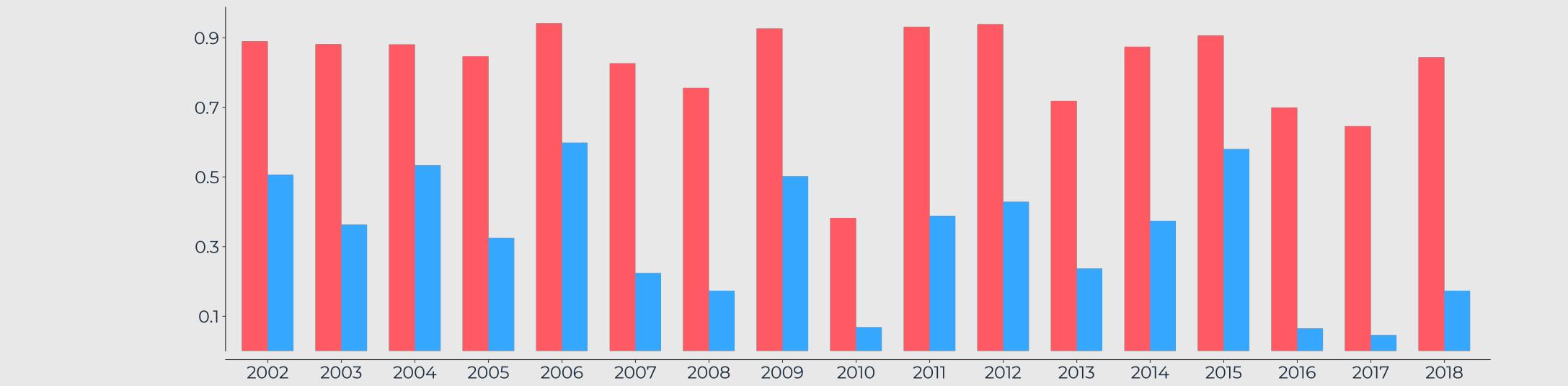
ROC curves for the models, fire weather features only.



Brier score and **AUC** for each year, Neural Networks



Recall and precision for each year, Neural Networks



The results demonstrate feasibility of fire activity **prediction on seasonal scales** using long-range forecasting systems such as ECMWF SEAS5.

ToFEWSI project is funded by the UK's National Environment Research Council (NERC) and the Indonesia Endowment for Education (LPDP). For more information visit <https://tofewsi.github.io>