Marine Ecological Modelling Global Climate Change

Model fitting and transferability in space and time

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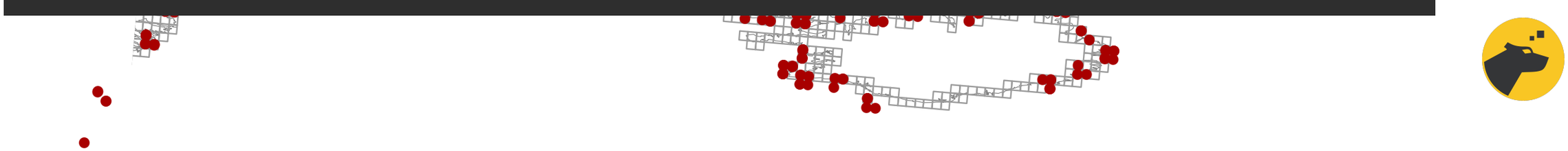


Presence / absence

(current; e.g., year > 2000)

Lat_1 Lon_1

Lat_2 Lon_2

(...)

Lat_i Lon_i

Environmental layers

(current; e.g., year > 2000)

Ocean temperature

Ocean salinity

Nitrates

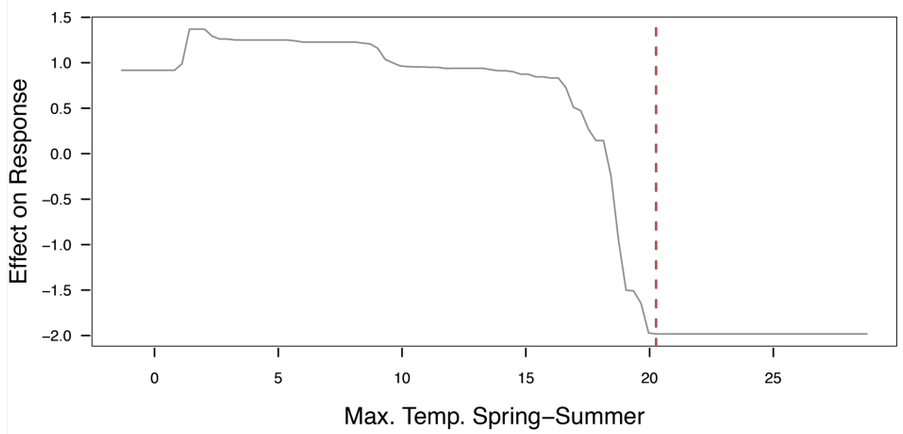
Ice thickness

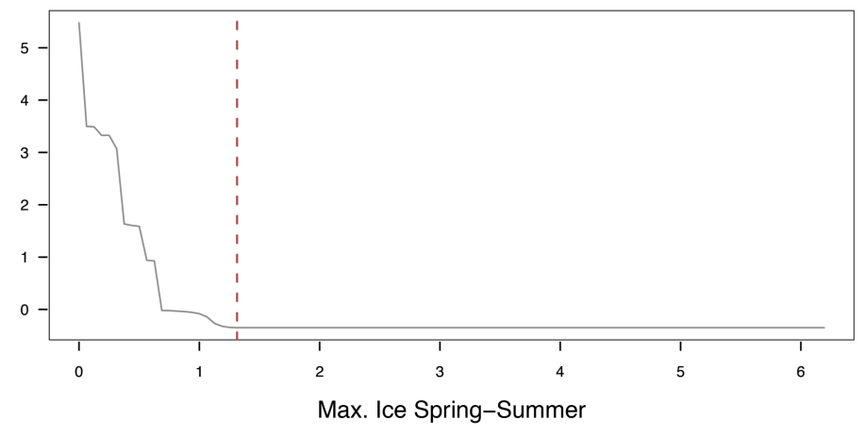
Algorithm to fit a function

The **records of occurrence and the predictor variables** are called the **training data**, which are **used to fit (calibrate) a model** that can make predictions.

Model prediction and transferability (forecast or hindcast).

Fitted functions





Layers past → Past distribution

Layers present → Present distribution

Layers future → Future distribution

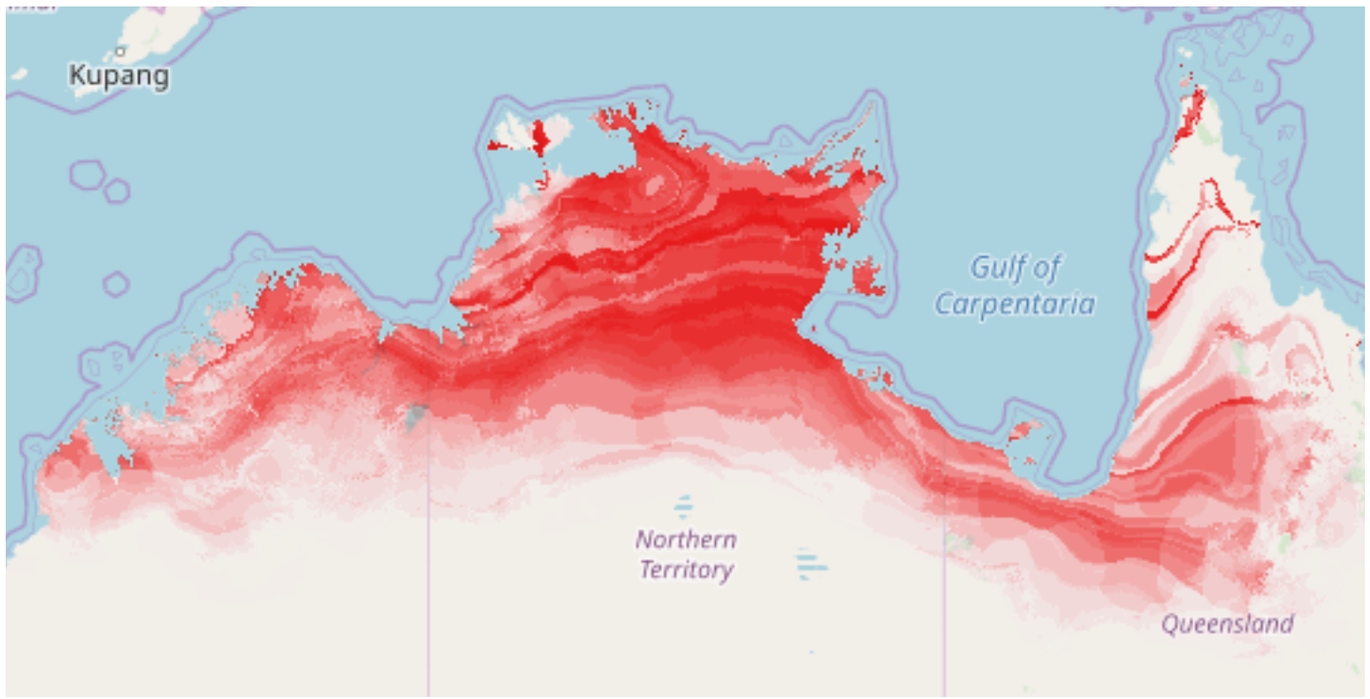
All layers must be included in the transferability process.

So, the **availability of layers for climate scenarios also determines the choice of predictors for model fitting.**

Predictions result in continuous surfaces (probability or suitability; 0 to 1).

Predicted distribution :: Map

One of the outputs of niche models are **maps showing the present-day predicted / potential distribution of species**.

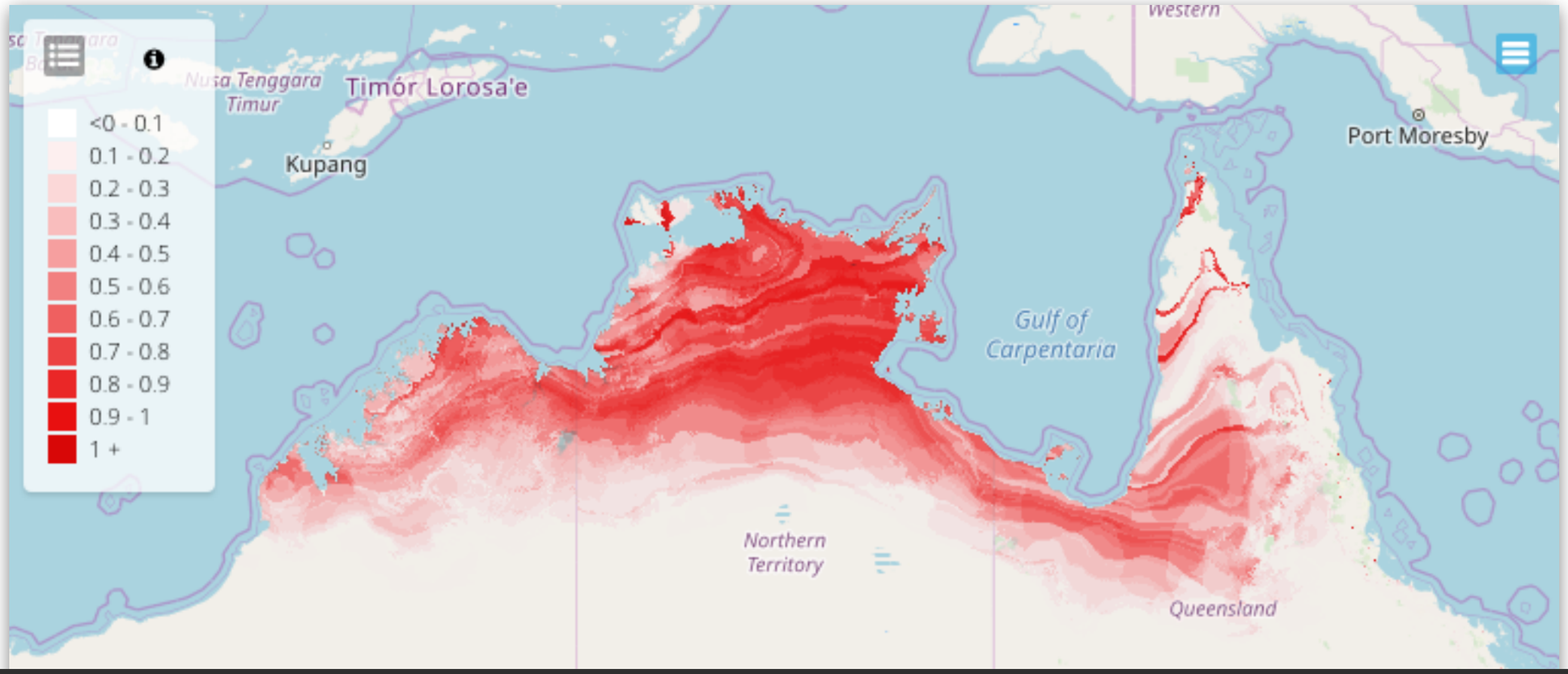


These maps **do not show where a species occur, but rather the distribution of suitable habitats**.

Model transferability :: Map

Model transferability to layers of **different climate scenarios** can be **analysed (per cell) with different approaches**:

(1) **predicted probability under different conditions** than those where the model fitted;



(2) **change in probability**, determined as the **difference in the** predicted **probability between the transferred model and the baseline model**; The map scales from -1 to 1, where negative refers to lower suitable conditions and positive higher suitability.