Geoscientific Model Development Discussions

Geosci. Model Dev. Discuss., author comment AC1
https://doi.org/10.5194/gmd-2021-132-AC1, 2021

Reply on CC1

Rachel Furner et al.

Author comment on "Sensitivity analysis of Ocean Temperature Regressor v1.0; a data-driven model of ocean temperature" by Rachel Furner et al., Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2021-132-AC1, 2021

Thanks for your comment and the interest in our paper.

In this instance we've intentionally chosen a very idealised and simplified set up, allowing us to more easily analyse the behaviour of the regressor in relation to the simulator. This means the underlying MITgcm simulation which the regressor is learning has constant surface forcing, so the training dataset has no El Nino/La Nina cycle, and hence the regressor (which is intended to mimic this dataset) also won't show any signal related to El Nino/La Nina.

It is however an interesting question as to how much the regressor would be able to learn from a more realistic set up which did include El Nino/La Nina, given the relatively small geographical extent of this. In our set up the regressor is learning a single equation, to be applied at each grid box in the domain (rather than learning specifics about the dynamics of different regions) and it is learning the (relatively) small scale, local dynamics, rather than large scale patterns such as El Nino/La Nina. In this sense it is very similar to the way that traditional GCMs make their predictions – values for a variable at a grid box are changed according to a consistent algorithm which takes as inputs the values at the grid cell and its surrounding cells. This grid-cell scale physics then leads to the wider circulation features such as El Nino/La Nina rather than these being incorporated into the GCM directly.

Given this we might reasonably expect the regressor to capture the cell-level dynamics which lead to larger features such as El Nino/La Nina in the same way as GCMs do. This is however dependent on how closely the regressor learns the physics of the system.