

Opinion

Wake-up for all on weather forecasting science

Signals point to solution

Australia must bolster its early-warning weather systems, argue TOSHIO YAMAGATA and SWADHIN BEHERA

THE article "Signal Failure" (WT, October 24) by Xavier Duff has raised a very tough but timely issue about the role of advanced research information in society.

The signal of rainfall failure in 2007 was predicted as early as March by a high-resolution simulation model using the Earth Simulator in Japan.

Yet other low-resolution models did not predict the signal until July.

Considering the sensitive nature of declaring a rainfall failure, as well as the diversity in model predictions, we are facing a serious problem of whether we should deliver or not deliver experimental climate prediction results from a single model to society.

Putting aside the sensitive nature of the problem, we must understand that seasonal predictions based on computer models have advanced dramatically in recent years and are close to the stage at which our society can make use of those.

We must also appreciate the fact that some models do better jobs than others; science is not democratic but highly competitive.

We must also know, from an

engineering viewpoint, that multiple models are a more reliable guide and do a superior job to any single model.

This is because model biases are cancelled to some extent.

Xavier Duff is right when he points out that the El Nino in the Pacific is not the only signal to use in long-range rainfall predictions in Australia.

After the identification of the Indian Ocean Dipole in 1999, we realised that rainfall in the Indian Ocean-rim countries was more influenced by the newly identified climate mode.

This tendency was strengthened in recent decades under the global warming stress; our climate is different from the days of Sir Gilbert Walker in the early 19th century.

The major drought of 2006 was clearly due to the strong positive Indian Ocean Dipole phenomenon associated with lower than normal sea surface temperatures in the eastern Indian Ocean.

Another positive Indian Ocean Dipole in 2007 is also one of the main causes of the on-going serious drought in Australia, despite the La Nina sitting in the tropical Pacific.

It is getting more and more important, because of increased global warming, to catch the Indian Ocean signal as early as



Dam dry: computer models are becoming better at predicting impending drought.



Flashback: last week's *The Weekly Times*.

possible, using in-situ observation data and model prediction results for society's benefit.

The tropical Indian Ocean gives birth to climate modes of various scales.

Because of the vigorous interactions among them, the reliability of the prediction signal fades quickly with time.

This is why predictability of the Indian Ocean Dipole is lower than El Nino in the Pacific.

Therefore, we need to establish an extensive ocean-atmosphere observation system in the Indian Ocean.

Observation is the backbone of an early warning system, providing crucial data for models to predict the rainfall — air temperature variability sufficiently ahead of time.

The initiatives taken by scientists from Japan, US, India, Australia, Indonesia and some other countries to establish an observation system in the Indian Ocean is endorsed by international bodies.

Those activities by climate researchers should be encouraged and funded, particularly by Australia which is most vulnerable to the Indian Ocean climate variability.

It is also important to realise

that a super computer may provide better circumstances to develop more reliable prediction models.

The Earth Simulator has provided scientists in Japan with an excellent environment.

This simulator project was designed in the early 1990s, together with the introduction of the Frontier Research Centre for Global Change under the co-operative initiative of leading scientists and government official.

The current situation in Japan was not achieved in a day.

ABETTER computational environment should also be implemented in Australia, to strengthen model-based seasonal predictions.

All centres involved in real-time prediction in developed countries should work jointly for multi-model prediction and its outreach activities.

This would be one beautiful solution to the important problem raised by Xavier Duff.

Scientifically, joint inter-comparison studies to reduce model biases under a healthy competitive environment need to be encouraged.

Those co-ordinated international efforts, with innovative competition, will be extremely beneficial to people who suffer abnormal or extreme weather conditions.

The failure of early warning of the drought this year should be taken in the right spirit, as a wake-up call for research policy makers in Australia to support active Australian researchers in the field of seasonal climate forecast.

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