

Skill of Long Range Forecasts

Comments by Dr. Madhav Khandekar

Allow me a comment on the "skill" of long-range (seasonal, 1-3 months or about) forecasting by dynamical methods/climate models in Canada, where seasonal forecasts of temperature & precipitation are being issued regularly for the past several yrs. These forecasts are based on the CCC (Can Climate Centre) climate models (regional, I presume) which purportedly use dynamical equations and carry out numerical integration/solution over a specified time frame to obtain forecasts. These forecasts are in the public domain and are often shown on the Canadian weather channel where they are discussed in terms of what sort of summer/winter weather to expect in various regions of Canada.

In 2004, the CCC issued their summer temp forecast early in the month of May 2004. That forecast projected summer 2004 (June-July-August) to be "HOT" just about every region of Canada. What was the reality?

Summer 2004 turned out to be one of the coldest summers almost all over North America. Per NOAA in the US, the summer 2004 over conterminous US was adjudged as the 16th coldest summer in US in their 115 yrs of data! In Canada, there was essentially NO summer anywhere in 2004! In western Canada (Winnipeg, for ex) there was snow late May 2004 and most of summer on the Can Prairies was cold, dreary with rains off and on! Elsewhere summer was considerably below normal.

In October 2004 (or about), Environment Canada issued a public apology (first time in its history) in one of the mainstream newspapers for "issuing such a bad forecast for summer 2004" (not exactly in these words!).

The Can Climate Centre's seasonal/long-range forecasts appear to have a warm bias, just as the UK climate modelers' long-range forecasts seem to have. Quite possibly, this may be due to the UK (also Canadian) climate modelers' use of GHG-based forecasts! In May 2006, the Can Climate Centre issued their summer 2006 forecast for various regions of Canada and once again the forecast was for a "Warm to Very Warm (Hot!) summer for most of Canada". Once again the summer 2006 forecast proved to be wrong, though it was not as bad as the summer of 2004!

My former coworker at Environment Canada, Amir Shabbar has been preparing (as a research tool) seasonal forecast for various regions of Canada based CCC-Canonical Correlation Analysis and Amir and coworkers have also evaluated their CCC forecasts and their skill for Canada vs the skill of dynamical-based forecasts. Amir finds that his CCC-based forecasts have a skill of about 30% (range 20-40) while the dynamical-based forecasts have a skill of just about 15% or slightly better for Canada as a whole.

In the USA, these CCC-based forecasts have been issued and also evaluated by NOAA (ex Tony Barnston's several papers in Monthly Weather Review 1990s). The CCC-based

forecasts (out to three weeks or little longer) in the US have a good skill, about 35% or a bit higher. In the US, the dynamical technique (based on models by Arun Kumar and his coworkers) show a reasonable skill of about 25-30%.

The seasonal forecast skill at this time is just about 30% or a little better (dynamical OR statistical technique) for the conterminous US. For Canada, the CCC-based technique provides better seasonal forecasts than the dynamical-based forecasts issued by Can Climate Centre. There are NO peer-reviewed papers published by any of the climate modelers in Canada on evaluation of seasonal forecasts using dynamical techniques. Amir Shabbar has published several papers on evaluation of his CCC-based forecasts.

I have not seen any specific peer-reviewed papers by UK climate modelers on their "long-range forecasts" or their verification. Based on what I have read in the media and in scientific Journals, the UK seasonal forecasting skill is probably NO better than the Canadian dynamical forecasting skill!

In my assessment, statistical techniques provide better seasonal forecasts (of temperaure in particular) today than dynamical-based forecasts. There is a need to carefully evaluate dynamical-based seasonal forecasts and publish such evaluation study in high-profile peer-reviewed Journals. My hunch is that the dynamical-based seasonal forecasts would show a skill of NO better than 25% for UK or Europe.

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