SESSION: (B3) S2D ensemble predictions and forecast information

(B3-08)

Calibration and Combination of NMME precipitation forecast over South America using Ensemble Regression

Osman, Marisol (1), Vera, Carolina (1)

Centro de Investigaciones del Mar y la Atmosfera (CIMA-UBA/CONICET)

In this study we calibrate the climate predictions available at the North American Multi Model Ensemble to develop seasonal precipitation forecast tools over South America. Forecasts valid at each overlapping season made with initial conditions of the prior month (Lead 1 month) over the period 1982-2010 are considered. A Multi-Model Ensemble (MME) using 8 models with around 10 ensemble members was constructed and its performance was evaluated against CMAP and CPC-UNI database. The domain of application spans [15°N-60°S;275°E-330°E] and it is also divided in two subdomains: tropical South America and extratropical South America.

The Ensemble Regression technique (EREG) applies a regression equation developed for the ensemble mean to each ensemble member to obtain a probability density function (PDF) which represents the ensemble prediction. EREG is first applied to each model and its ensemble members to calibrate them. Then, the relative importance of each model is determined by weighting them according to their historical performance. To do this, the magnitude of each calibrated PDF is evaluated at the observation point and the weight is proportional to the number of times this magnitude was maximum for each model. Finally, two approaches are used to obtain the consolidated PDF. The first one consists in using the weighted MME in a new ensemble regression, resulting in a weighted super-ensemble regression (WSEREG) to get the consolidated PDF. The other technique consists in obtaining the consolidated PDF computing the normalized summing of the weighted models' PDF (weighted PDFs, WPDFS). The consolidated PDFs obtained are used to forecast the three equally probable categories below, near and above normal. These forecast are confronted against those obtained counting the proportion of ensemble members of the MME falling in each category (counting estimate technique, CE).

Results show that both WPDFS and WSEREG outperform CE in terms of the Ranked Probabilistic Skill Score (RPSS) and Brier Skill Score (BSS) in both seasons. However, only in northern South America the performance of both consolidation techniques is slightly better than the climatological values of the predictand (three categories equally probable). In extratropical South America both RPSS and BSS values change from less than -0.5 for CE to near 0 for both WPDFS and WSEREG. On the other hand, reliability diagrams computed over the entire domain shows that WPDFS and WSEREG substantially improve the forecast in terms of reliability respect to than obtained with CE.

Further studies are being conducted to test the sensitivity of the skill to changes in the model's original spread as well as changes in the way that weights between models are being determined. The results of these studies will be presented during the conference.