Séminaire ven 1 Oct 2010 11h / Seminar Fri Oct 1st 2010 11h

Conférencier/Lecturer:	Zhiwei Wu
Sujet/Subject:	Contribution of the autumn Tibetan Plateau snow cover to seasonal prediction of North American winter temperature
Présentation/Presentation:	Anglais / English
Lieu/Room:	Salle des vents (Dorval)

iweb: http://web-mrb.cmc.ec.gc.ca/mrb/rpn/SEM/
web: http://collaboration.cmc.ec.gc.ca/science/rpn/SEM/index.php

Abstract

Predicting surface air temperature (Ts) is a major task of North American (NA) winter seasonal prediction. It has been recognized that variations of the NA winter Ts are intimately, but not exclusively, connected with El Niño-Southern Oscillation (ENSO) and the North Atlantic Oscillation (NAO). This study presents observed evidence to show that variability in snow cover anomalies over Tibetan Plateau (TP) and the adjacent areas in prior autumn (September-November) are significantly correlated with the first principal component (PC1) of the NA winter Ts, which features a meridional seesaw pattern over the NA continent. The autumn TP snow cover anomalies can persist into ensuing winter via positive feedback between snow cover and atmosphere. The positive snow cover anomalies may induce upper-troposphere negative geo-potential height anomalies over East Asia-western Pacific, and contribute to the southward displacement of the subtropical jet streams and the storm track across North Pacific. This usually favors the occurrence of warm-North-cold-South winter over the NA continent. When the negative snow cover anomalies occur, the situation tends to be opposite. Since the autumn TP snow cover shows weak linkage with ENSO, it provides a new predictability source for NA winter Ts.

Based on the above results, an empirical model is established to predict PC1 by combination of autumn TP snow cover and other sea surface temperature anomalies related to ENSO and the NAO. Hindcast and real forecast are performed for the 1972-2003, and 2004-2009 periods, respectively. Both show a promising prediction skill. As far as the PC1 is concerned, the empirical model hindcast is better than the ensemble mean of four dynamical models from Canadian Meteorological Center. Particularly, the real forecast of the empirical model exhibits a better performance in predicting the extreme phases of PC1, i.e., the extremely warm winter over Canada in 2009/2010, should the model include the autumn TP snow cover impacts. Since all these predictors can be readily monitored in real time, this empirical model provides a real time forecast tool for the NA winter climate.