Séminaire **vendredi 22** Novembre 2013 **11h** / Seminar **Friday** November **22nd** 2013 **11h**

Sujet/Subject: Balance model for equatorial long waves

Conférencier/Lecturer: Ian Chan (Toronto Univ.)

Résumé/Abstract

When a dynamical system admits both fast and slow timescale dynamics, a simplified model can be constructed by systematically filtering out the fast dynamics. In the context of atmospheric dynamics, these models are called balance models, with the quasi-geostrophic (QG) model being the most notable example. Although the QG model is immensely useful for the midlatitudes, it is not applicable to the tropics as a singularity develops. Previous attempts at deriving equatorial balance models have been unsuccessful as they filter out Kelvin waves, which play a dominant role in equatorial dynamics. In this talk I will demonstrate how a modified asymptotic approach can be used to systematically derive equatorial balance models in the planetary scale regime, which capture slow Rossby and Kelvin wave modes while filtering out fast gravity wave motions. The expansion is based on the smallness of the ratio of meridional to zonal scales, which can also be interpreted as a separation in timescale. Both the adiabatic and the diabatic (forced) case are considered. An interesting result is that even though the leading order balance dynamics fails in the isotropic regime, the balance relations remain accurate; this suggests that the balance relations can potentially be useful in applications such as data assimilation.