**Reading guidelines for Lecture 06: East Asian winter monsoon**

**Part one: Synoptic climatology**

1. The Himalayan Massif and Tibetan Plateau have the great mechanical and thermodynamic influence on the upper air circulation over Asia.
2. Upper-level midlatitude westerlies migrate southward in winter (why?). On striking the western side of the mountain barrier, the flow bifurcates but mainly detours to the south (though also to the north).
3. The thickness of boundary layer right above the Tibetan Plateau is about 1500 m and substantially larger in summer than winter.
4. Notions should be given to the definition of stationary and transient waves.
5. The outbreak of cold surge is induced by the upper-level trough deepening.
6. What is a cold surge event?
7. Some severe cold surge events can flare up the deep convection over the Maritime Continent. Occasionally, some of them even cross the equator converging into the heat low circulation over Australia during the Austral summers.
8. Notions should be given to the development of wintertime explosive cyclogenesis (nickname: weather bomb).

**Part two: variability**

1. In winters, EAWM is the most energetic planetary circulation of the global atmosphere.
2. Situated in the westerlies during the winter, the variability of EAWM is linked to the variability of upper level circulations occurred in the Atlantic and Europe upstream from extratropical Asia.
3. How to define the strength of EAWM? (See Figure 1)
4. Studies have related the variability of EAWM to ENSO, AO/NAO, and AMO from interannual to multidecadal timescales.
5. Based on 2 m temperature, EAWM expresses two types of interannual variability: northern and southern modes. The former is not related to the ENSO activity whereas the latter is.
6. There is some evidence that in the recent decades the EAWM has undergone a weakening that may be related to the global warming (thus Eurasian warming). But there are also some evidences that suggest the recent weakening of EAWM may not be unprecedented.
7. Starting from 2005, the EAWM has been more active than normal. Extremely cold weathers occurred in late winter 2005, January and February 2008, and in the middle of 2009/2010. What are the proposed mechanisms that cause them?