NUS Department of GEOGRAPHY Seminar Series

Perspectives on Global Climate Change Impacts to the Hydrosphere and the Cryosphere

Speaker: **Thian Yew Gan**
University of Alberta

Chair: Lu Xi Xi, Department of Geography, NUS
Date/Time: Wednesday, 12 March 2014, 10am – 11.30am
Place: Honours' Room (AS2 03-02), Department of Geography, NUS

Abstract

In recent years severe storm events have been occurring more frequently and in greater intensity globally. As the Earth warms, there is increased heating of the ocean and the atmosphere, which resulted in increased atmospheric water vapour, and more precipitation will fall over shorter time intervals, leading to more frequent and severe extreme storm events and flooding problems. However, an enhanced hydrological cycle could also mean the occurrence of more frequent and severe droughts in semi-arid to arid regions of the world, such as Africa, the Canadian Prairies and the mid-west of USA. Besides climate change impact to the hydrosphere, the cryosphere is also undergoing rapid changes during the 20th and the early 21st Century: (a) Duration of ice cover of rivers and lakes in high latitudes of N. H. decreased by about two weeks; (b) Significant retreat of glaciers world wide; (c) Thinning of Arctic sea-ice extent and thickness by about 40% in late summer in recent decades; (d) Snow cover of the N. H. decreased by about 10% in area since global observations by satellites began in the late 1960s; (e) In North America, snow water equivalent decreased by about 10mm since observations by passive microwave sensors began in the late 1970s; (f) Degradations of permafrost detected in some polar and sub-polar regions, and (g) the total 20th Century global average sea level rise was about 0.17m. Perspectives on the global energy balance, greenhouse effects and examples of observed changes to the hydrosphere and the cryosphere will be presented. Future climate scenarios projected by general circulation models (GCMs) of the 4th Assessment Report of the Intergovernmental Panel of Climate Change (IPCC, 2007), and that of the 5th Coupled Model Intercomparison Project (CMIP5) of IPCC, and case studies based on regional climate models and land surface schemes will be discussed. The discussions will also include possible implications to the future global climate, hydrology, and water resources under the impacts of climate change.

About the Speaker

Thian Yew Gan is a professor of civil engineering of the University of Alberta specializing in cryosphere, satellite data, hydrology, hydroclimatology, climate change. He is a research ambassador of DAAD (German Academic Exchange Service), and a fellow of the American Society of Civil Engineers (ASCE). He has published over 80 refereed journal papers, a book by the Cambridge University Press, and has about 2,000 H-Index citations. He has been a visiting professor of Aalto University, Finland (2013); a visiting scholar of United Nation University (UNU-FLORES), Germany (2013); a Rossby Fellow of Stockholm University, Sweden (2012); Erskine Fellow of University of Canterbury, New Zealand (2011); Visiting professor of Swiss Institute of Technology (EPFL), Lausanne, Switzerland (2010); Research Scientist of Cemagraf, France (2009); CIRES Visiting Fellow of University of Colorado-Boulder (2007); Guest university professor (W3) of Technical University of Munich, Germany (2006-07); Adjunct professor of Utah State University, USA (1998-2005); Honorary Professor of Xian University of Technology and Yangtze University of China; JSPS Fellow of Kyoto University (2000) and guest professor of Saga University (1999) of Japan, and assistant professor of Asian Institute of Technology (1989-1990), Bangkok.