中国科学院
东亚区域气候-环境重点实验室
Key Laboratory of Regional Climate-Environment Research for Temperate East Asia (RCE-TEA), Chinese Academy of Sciences (CAS)

全球变化区域研究创新论坛

学术报告

报告题目 **1**：Rainforests & Droughts in Congo;

报告题目 **2**：Why Has Drier Land Warmed Much Faster Since 1979?

报 告 人：Prof. Zhou Liming

单　　位：Department of Atmospheric and Environmental Sciences University at Albany, State University of New York

时　　间：**2014** 年 **6** 月 **19** 日上午 **9:00-12:00**

地　　点：大气所 **40** 号楼 **319** 会议室

欢迎大家参加！

地址：中国科学院大气物理研究所　邮政信箱：北京 9804 信箱　邮编：100029
Address：Institute of Atmospheric Physics, Chinese Academy of Sciences, P. O. BOX 9804, Beijing 100029, China

Rainforests & Droughts in Congo (Published in Nature, 2014)

Abstract: Tropical forests are global epicenters of biodiversity and important modulators of climate change1, and are mainly constrained by rainfall patterns. The severe short-term droughts that occurred recently in Amazonia have drawn attention to the vulnerability of tropical forests to climatic disturbances. The central African rainforests, the second-largest on Earth, have experienced a long-term drying trend whose impacts on vegetation dynamics remain mostly unknown because in situ observations are very limited. The Congolese forest, with its drier conditions and higher percentage of semi-evergreen trees, may be more tolerant to short-term rainfall reduction than are wetter tropical forests, but for a long-term drought there may be critical thresholds of water availability below which higher biomass, closed-canopy forests transition to more open, lower-biomass forests. Here we present observational evidence for a widespread decline in forest greenness over the past decade based on analyses of satellite data (optical, thermal, microwave and gravity) from several independent sensors over the Congo basin. This decline in vegetation greenness, particularly in the northern Congolese forest, is generally consistent with decreases in rainfall, terrestrial water storage, water content in aboveground woody and leaf biomass, and the canopy backscatter anomaly caused by changes in structure and moisture in upper forest layers. It is also consistent with increases in photosynthetically active radiation and land surface temperature. These multiple lines of evidence indicate that this large-scale vegetation browning, or loss of photosynthetic capacity, may be partially attributable to the long-term drying trend. Our results suggest that a continued gradual decline of photosynthetic capacity and moisture content driven by the persistent drying trend could alter the composition and structure of the Congolese forest to favor the spread of drought tolerant species.

Why Has Drier Land Warmed Much Faster Since 1979? (Under review, GRL, 2014)

Abstract: Observations show that the global mean surface temperature has increased steadily since the 1950s and this warming trend is particularly strong and linear over land after 1979. This paper analyzes the relationship between surface temperature trends observed over land for the period 1979-2012 and precipitation by large-scale ecoregions. The land areas between 50°S-50°N are classified into various large-scale ecoregions based on the climatological precipitation values. The regional mean temperature trends exhibit significant spatial correlations with the regional mean precipitation. In general, the warming rate increases nonlinearly with decreasing precipitation, with the strongest warming rate over the driest regions. It is found that there is a negative logarithmic relationship between the warming rate and precipitation in terms of large-scale ecoregions, indicating much stronger water vapor and ecosystem feedbacks to the positive large-scale greenhouse gases enhanced radiative forcing over drier areas where soil moisture and vegetation (and thus evapotranspiration) are more limited. This stronger warming amplification over drier surfaces may help interpret and attribute global warming and assess climate impacts.