京都大学	博士（都市環境工学）	氏名	Khagendra Pralhad Bharambe
論文題目	Spatiotemporal modeling of climate change impact on hydro-meteorological risk under a large ensemble d4pdf future warming scenarios: an implication for agriculture risk over Godavari River Basin, India (時空間モデルを用いた気候変動予測と将来シナリオにおける水文気象学的リスクの評価～インドのGodavari 川流域を対象として～)		

（論文内容の要旨）

Disaster Risk Reduction (DRR) is a cross-cutting issue to Sustainable Development Goals (SDGs). Drought has become a constant visitor and most accruing natural disaster in India, affecting badly to the agriculture and water resource sector, especially most at the central part where the agriculture is the primary economic activity of more than 80% of populations. Unevenly distributed and unpredicted rainfall made it difficult in understanding the extreme situation, and its consequences on agricultural production.

Most previous studies are limited to any particular sub-basin, and focused mostly on analyzing the trend in mean, maximum and minimum time series, as this is not sufficient in the context of the present rapidly changing climate. Hence, this study has addressed this issue by analyzing long-term (40 years) of high-resolution spatial gridded data using spatiotemporal modeling for impacts of climate change on climate variability, extreme climates, and drought. Because spatiotemporal modeling is extremely important to determine the changes over space and time in the whole river basin, and helpful for effective implementation of adaptation strategies.

As the globe continues to warm, more extreme climate situations can be expected in the future. The average mean temperature in India is predicted to increase by 2.4 to 4^0C by the end of the 21st century, which may surely cause more hydro-meteorological hazards. However, the changes in the frequency and characteristics of droughts and extreme events in the future are not fully examined yet. Therefore, keeping in mind, the present drought risk, and future challenges for agriculture this study has used a large ensemble of high-resolution future projection data (d4PDF) under two different warming scenarios (+2K: 2 ^{0}C increase and +4K: 4 ^{0}C increase by preindustrial warming level. This database has developed by the Japanese Meteorological Business Center (JMBC) mainly intending to study global warming impacts and to minimize uncertainty in projection. No study has yet used this data in the Indian river basin. Therefore, this study has taken into consideration to project future changes in extreme climate situations and drought over each-sub-basin with different timespans over the Godavari River Basin (GRB), which is 2nd largest and most important water resource in the central part of India. Hence, it is very much crucial to understand quantitative impacts to protect from adverse effects of climate change.

Moreover, no study has been investigated the comprehensive drought risk for crop production suggesting the best feasible location-specific risk mitigation strategies. The results do not only help to understand the impacts of drought but also help to adapt the best feasible drought risk mitigation strategies and effective climate-proofing strategies over the most affected region under the worst-case scenarios. The results of future projections help prioritize the risk mitigation strategies and justify utilizing the appropriate resource inventory of implementation. Eventually, this will support government efforts to achieve sustainable agricultural development, alleviate hunger, and move closer to meeting the pledged international targets, including the Sendai Framework and the SDGs.