

## Climate Change and Advancing Rice Production in Asia

Chair: Jun-Ichi Sakagami (Kagoshima University, Japan)

2021年9月8日(水) 13:55 ~ 16:30 Plenary Room

14:40 ~ 15:00

### [S-03]Global Climate Changes and Their Impacts on Crop Production (Japan)

Toshihiro Hasegawa (Division of Climate Change Adaptation Research, Institute for Agri-Environmental Sciences, National Agricultural and Food Research Organization (NARO), Japan)

Atmospheric concentrations of major greenhouse gases (GHG) such as carbon dioxide (CO<sub>2</sub>), methane, and nitrous oxide have increased by about 50%, 160 %, and 23 %, respectively, since the preindustrial era (<https://public.wmo.int/en>), mainly as a result of anthropogenic activities. These changes have already raised air temperatures globally for the past 100 years and increased extreme climate events in various regions across the globe. There is a growing body of evidence that the long-term change in air temperatures and associated changes in precipitation amount and patterns have already been affecting crop production, but with varying degrees across different regions. As climate change progresses, the impacts will be greater, but they depend on various factors such as GHG emission scenarios, times, locations, and warming degrees. Since the last assessment report by the Intergovernmental Panel on Climate Change in 2014, a large body of literature has become available for the projected impacts using crop simulation models run under different representative GHG concentration pathways at different spatial scales. Recently, a global dataset has been developed by compiling more than 8000 simulation results from 203 independent studies, providing a valuable source of comprehensive analysis on the projected impacts on major crops. Here I first summarize the impacts of plausible climate change in the current century on the major crop yields, demonstrating that the sign and magnitudes of the effects are heavily dependent on the current temperature levels, with special references to Asian regions. The impacts of climate change also appear in various processes of food systems, including food prices, labor capacity, transport, storage, and food safety, which ultimately undermine food and nutrition security. On the other hand, food systems are a major source of GHG, accounting for about 1/3 of the anthropogenic emission. In the later part of the presentation, I introduce some examples of complex interactions between food systems and atmospheric conditions that need better understandings to enhance synergies and reduce trade-offs between adaptation and mitigation measures.