

Guihua WANG



Talk title:

The possible impacts of climate change - from offshore to the coastal and estuarine regions

Summary:

We explore the ocean response to anthropogenic climate forcing. Ocean general circulation model (OGCM) experiments show that sea surface warming is the dominant forcing for the subtropical gyre change in contrast to the natural variability for which the wind dominates, and that the ocean response is insensitive to the spatial pattern of surface warming. Our models also show that the sea surface warming causes the upper-layer Kuroshio to intensify and the surface salinity to decrease at high latitudes slows down as part of the Atlantic Ocean. We also discuss the linkages among climate change, basin-scale ocean and coast.

Personal brief introduction:

Guihua Wang is a professor at Department of Atmospheric and Oceanic Sciences&Institute of Atmospheric Science, Fudan University. His research centers on multi-scale ocean-atmosphere interactions and their role in ocean. He carries out both observing and modeling studies covering all three major oceans, especially the Pacific including the South China Sea. His research has led to the first basic understanding of mesoscale ocean eddies, large scale wind driven circulation, deep ocean circulation in the South China Sea and their interactions with tropical cyclones. These researches has also provided ideas about the multiscale variability of strong currents such as the Kuroshio, the Gulf Stream and the Antarctic Current, and their responses to tropical cyclones and climate change.

Wen ZHOU



Talk title:

Indian Ocean Marine Heatwaves: Genesis, Trends and future perspectives

Summary:

Marine heatwaves (MHWs) are prolonged periods of anomalous warm temperatures that can have significant effects on the marine environment. Unlike traditional SST variability studies, MHW research goes beyond the ocean-atmosphere interaction and focuses on how extreme warming affects marine ecosystems. Metrics for extreme ocean warming events have been developed to evaluate their features and impacts on specific sectors such as ecosystems and services. This study specifically examines MHWs in the Indian Ocean, an area with limited research on the topic. The study covers the period from 1982 to 2020, analysing seasonal and interannual timescales to understand the effects of extreme warming on the region's marine ecosystems. The study investigates the spatial and temporal characteristics of summer MHWs in the Indian Ocean and explore their variability on an interannual timescale. It is found that major climate modes significantly influence the occurrence of summertime MHWs by altering regional ocean-atmospheric processes in the Indian Ocean. Subsurface warming plays a major role in the genesis of MHWs in the Bay of Bengal and Arabian Sea during 2015 positive Indian Ocean Dipole where it led to both sever MHWs event and reduction in surface nutrients levels. The frequency and duration of MHWs in the Indian Ocean have increased significantly since the mid-1990s, with a peak in 2019. El Niño events also strongly influence MHW occurrences, as evidenced by peaks in 1998 and 2015. Global climate model datasets are used to analyse the variability of MHW characteristics over the world's oceans. Different emission scenarios show varying impacts on projected MHWs, with anthropogenic influence expected to accelerate intensity and duration of these events. Further, we highlight the urgency of mitigating anthropogenic influence, enhancing marine conservation efforts, and building resilience to address the increasing threat of MHWs to ecosystems and economies worldwide in the near future.

Personal brief introduction:

Wen ZHOU is a Professor at Department of Atmospheric and Oceanic Sciences & Institute of Atmospheric Sciences, Fudan University. She is also an Alexander von Humboldt Fellow, a scientific advisor to Hong Kong Observatory. Professor Wen Zhou obtained her bachelor and master degrees in atmospheric science from Sun Yat-Sen University and her Ph.D. in atmospheric Science from City University of Hong Kong (CityU). After 2 years as a Post-Doctoral Fellow in State Key Laboratory of Numerical Modeling for Atmospheric Sciences and Geophysical Fluid Dynamics (LASG), Institute of Atmospheric Physics, Chinese Academy of Sciences. She joined CityU as a lecturer in 2006, then promoted to an assistant Professor in 2008, a tenured associate professor in 2014, and a tenured full professor in 2019. She also served as the director of Guy Carpenter Asia-Pacific Climate Impact Center at CityU in 2021. Her research area centers on climate change and climate variability, climate prediction, monsoon dynamics, air-sea interaction, and tropical cyclone. She has published over 200 international journal articles. She is one of "Top 1000 scientists" in Climate Change-The Reuters.

Yan ZHANG



Talk title:

Multiscale atmospheric environmental and climatic effects of coastal shipping and marine natural emissions

Summary:

The land-sea interface or the coastal zone is significantly different from inland and marine areas in terms of atmospheric thermodynamics and complex anthropogenic activities. The emission, transformation, diffusion, and transport of air pollutants in the coastal zone also involves the process of multi-interface mass exchange, which is a difficult issue in the field of atmospheric environment research. This study will present the shipping emission and marine DMS emission inventory, their regional and continental scale transport. The contributions of marine emissions to PM_{2.5}, sulfate and trace metals as well as the climatic radiative forcing of DMS have been evaluated. The research results will help in understanding the importance of the prevention and control of atmospheric pollution and adaptation of climate changes in coastal areas.

Personal brief introduction:

Yan Zhang is a full professor from the department of environmental and Engineering, Fudan University. Her research concerns coastal air pollution, emission inventory, ship traffic related air pollution and atmospheric deposition of S, N and trace elements. She has led three international cooperation project and four NSFC projects focus on marine air pollution field. She has published more than 80 papers. Her group has built an AIS-based and oceanic originated emission model system to estimate anthropogenic and natural DMS emissions in regional and global scale. She has joined the fourth GHG study group and served as the leading author of the report chapter organized by IMO.