CNRM, UMR 3589

SOUTENANCE DE THESE CNRM

N° 2019_04

mercredi 17 avril 2019 à 14h30

MEDITERRANEAN MARINE HEATWAVES : DETECTION, PAST VARIABILITY AND FUTURE EVOLUTION

par Sofia DARMARAKI (CNRM/GMGEC)

en salle Joel Nolihan

Résumé :

The Mediterranean Sea is considered a “Hot Spot” region for future climate change and depending on the greenhouse emission scenario, the annual mean basin sea surface temperature (SST) is expected to increase from +1.5 °C to +3 °C at the end of the 21st century relative to present-day. This significant SST rise is likely to intensify episodes of extreme warm ocean temperatures in the basin, named as Marine heatwaves (MHWs), that are known to exert substantial pressure on marine ecosystems and related fisheries around the world.
In this context, the main aim of this PhD work is to study the past variability and future evolution of MHWs in the Mediterranean Sea. We propose a detection method for long-lasting and large-scale summer MHWs, using a local, climatological 99th percentile threshold, based on present-climate daily SST. MHW probability of occurrence and characteristics in terms of spatial variability and temporal evolution are then investigated, using additional integrated indicators (e.g. duration, intensity, spatial extension, severity) to describe past and future events.
We first assess past surface MHW variability (1982-2017) and their underlying driving mechanisms using the CNRM-RCSM6 model. We examine their characteristics from surface to 55m depth, where most thermal stress-related mass mortalities of Mediterranean ecosystems have been observed in the past. We then use the Med-CORDEX RCSM ensemble to assess the future MHW evolution in the basin over 1976-2100. Our results suggest longer and more severe events with time and higher global-warming rates.
This study provides a better understanding of Mediterranean Sea sensitivity to climate change considering for the first time the uncertainties related to global and regional climate models. We believe that this constitutes key information for the marine ecosystems and marine-related activities and societies in the basin that are under considerable risks due to the devastating effects of these events.

Jury de thèse : Claude Estournel, Laboratoire d'Aerologie, Samuel Somot et Michel Déqué, Meteo France, CNRM, Gabriel Jorda, Instituto Espanol de Oceanografia, Michel Crepon, Laboratoire d'Océanographie Dynamique & Climatologie Universite Paris 6, Eric Oliver, University of Dalhousie, Laurent Li, LMD, CNRS.

Pour tout renseignement, contacter Y. Poirier (05 61 07 96 55) ou J.L. Sportouch (05 61 07 93 63)
Centre National de Recherches Météorologiques
42, Avenue G. Coriolis - 31057 Toulouse Cedex