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Assessment of the impact of climate change on wind field in the Gulf of Oman

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Abstract

Increasing the concentration of the greenhouse gases causes changes in climate. This phenomenon cause change in ocean circulation and also the wind pattern.Wind has an important role in wave formation and thermal structure in seas. Because of high dependency of people life and Industries which are in beaches to the seas, assessment of the impact of climate change on the wind regime is important for these regions. In this paper, wind speed components, obtained from The CORDEX (Coordinated Regional Climate Downscaling Experiment), are used for assessing the accuracy of these data in comparison with ECMWF data and also effects of climate change on the wind regime in the Gulf of Oman. CORDEX results for the periods of (1980-2000) and (2080-2100) were compared quantitatively with those of ECMWF in the Gulf of Oman for the period of (1980-2000).The comparison of seasonal average wind speed in period of (1980-2000) for two sets of mentioned data, showed high accordance of CORDEX data with ECMWF data. Results also showed that CORDEX average wind speeds in future will decrease in all seasons. However, the trends of wind data in the two periods seem to be similar. The comparison of monthly averaged wind speed also showed highest wind speed for ECMWF and CORDEX data occur in July which implies the monsoon wind comes from Indian Ocean .The wind roses showed that dominant wind directions represented by two wind fields are nearly similar.

Key words: Climate change, Regional climate modeling, CORDEX, ECMWF, Gulf of Oman, Wind speed

1. Introduction

Climate change is any long term significant change in the weather pattern of a specific area or the whole earth [1]. It can be natural or caused by people activities. Excessive use of fossil fuels by human activities which increase the concentration of greenhouse gases and cause global temperature to rise, has been identified as primary reasons of ongoing climate change.This phenomenon can change wind field characteristic, ocean circulation, sea ice and glacial melt, species extinction and sea level rise, etc.