

大地形の変遷と気候変動

本井達夫* 鬼頭昭雄** 緑川 貴***
荒川 理** 笹井 義一**** 陳 永利*****

Evolution of Large Scale Topography and Variation in Climate

Tatsuo MOTOI*, Akio KITOHO**, Takashi MIDORIKAWA***,
Osamu ARAKAWA**, Yoshikazu SASAI**** and Wing-Le CHAN*****

Abstract

Climate model experiments are carried out to understand the relationship between large-scale topography and climate variation. Mountain uplift experiments show that sea surface temperature, surface wind fields, precipitation and sea surface salinity are strongly influenced by mountain uplift. An enhanced Asian monsoon due to mountain uplift causes stronger seasonal coastal upwelling in the Indian Ocean and freshening in the Bay of Bengal, Yellow Sea and East China Sea. Mountain uplift experiments using a higher resolution atmospheric general circulation model reveal that the spatial pattern of precipitation becomes finer as resolution increases, and that there is a sharper contrast in the salinity distribution near coastal regions. Experiments in which the Panamanian Gateway is closed, opened and re-closed suggest that reorganization of the ocean current due to closure of the Panamanian Gateway induces a cooler and drier climate with a permanent halocline and sea ice in the subarctic Pacific.

Key words : mountain uplift, ocean gateway, climate model, monsoon evolution, world ocean general circulation reorganization

キーワード : 山岳上昇, 海洋ゲートウェイ, 気候モデル, モンスーンの変遷, 世界海洋大循環の再編

* 気象研究所海洋研究部

** 気象研究所気候研究部

*** 気象研究所地球化学研究部

**** (独) 海洋研究開発機構地球環境フロンティア研究センター生態系変動予測研究プログラム

***** (独) 海洋研究開発機構地球環境フロンティア研究センター地球温暖化予測研究プログラム

* Oceanographical Research Department, Meteorological Research Institute

** Climate Research Department, Meteorological Research Institute

*** Geochemical Research Department, Meteorological Research Institute

**** Ecosystem Change Research Program, Frontier Research Center for Global Change, Japan Agency for Marine-Earth Science and Technology

***** Global Warming Research Program, Frontier Research Center for Global Change, Japan Agency for Marine-Earth Science and Technology