Data, Observation & Modelling

Thu. Nov 12, 2026 2:00 PM - 3:30 PM JST | Thu. Nov 12, 2026 5:00 AM - 6:30 AM UTC | Room A (Oshidori) (2F)

Oral A2 Coastal Resilience & Hazard Mitigation

Chair: Joaquin Tintore, Urmas Lips

2:45 PM - 3:00 PM JST | 5:45 AM - 6:00 AM UTC

[swOhB7iC-04] Dynamical Downscaling of Future Climate Projections Around Penghu Islands in the Southern Taiwan Strait

*Jo-Hsu Huang (1. Institute of Oceanography, National Taiwan University (Taiwan))

This study investigates projected ocean changes around the Penghu Islands in the southern Taiwan Strait under the SSP2-4.5 mid-21st century warming scenario, using two-stage offline nested dynamical downscaling of Taiwan Earth System Model version 1 (TaiESM1). The high-resolution model accurately reproduces many key regional oceanographic features. Our future projection suggests three major regional circulation changes. First, the upstream Kuroshio east of Luzon Island weakens due to an enhanced positive Pacific wind stress curl. This curl strengthens the anticyclonic loop current, which increases current curvature and reduces net westward Kuroshio intrusion. Second, the eastward Ekman current in the Taiwan Strait strengthens due to a weakened northeast winter monsoon. Third, the northeastward South China Sea surface current strengthens, driven by enhanced negative basin-scale wind stress curl. These shifts increase wintertime South China Sea water intrusion into the Taiwan Strait. Furthermore, the topographically induced upwelling surrounding the Penghu Islands significantly suppresses surface warming during summer and autumn. This upwelling generally moderates marine heatwave frequency and intensity. However, rising sea surface temperature variability still amplifies future marine heatwaves intensity. The coarse-resolution model overestimates the increase of regional sea surface temperature by up to 0.4°C, confirming the importance of dynamical downscaling. These findings provide valuable insights for future fisheries management and marine resource planning in the warming climate.

© 2026 DITTO Summit Local Organising Committee. All rights reserved.