

## **Title**

Modeling the Wake of the Marquesas Archipelago : a First Step to Assess this Island Mass Effect

## **Authors**

[Hirohiti Raapoto](#)

Institut de Recherche pour le Développement

[Elodie Claire Martinez](#)

Institut de Recherche pour le Développement

[Andrea Michelangelo Doglioli](#)

Mediterranean Institute of Oceanography

[Anne A Petrenko](#)

Mediterranean Institute of Oceanography

## **Abstract**

The Marquesas archipelago (French Polynesia, central South Pacific) presents a high planktonic biomass (Island Mass Effect – IME) particularly remarkable, partly due to the extended area covered by the biological plume regarding the size of the islands. However, the physical mechanisms responsible for the nutrient enrichment of the surface layer is still debated since the region has been poorly studied. The location of the islands plays a key role in the island wake formation. Indeed, the flow of the South Equatorial Current and the trade winds are diverted when they encounter these 10-40 km wide obstacles rising steeply from the abyssal plain. To assess the processes driving vertical mixing and upwelling in the lee of the islands, we implemented a regional ocean dynamic nested model with a coarser grid ( $1/15^\circ$ ) and a higher resolution one ( $1/45^\circ$ ) around the archipelago. Several configurations based on climatologies with different resolutions were used to assess the impact of various forcing conditions. Model outputs have been compared with available satellite and *in situ* data. Here, we present some physical mechanisms involved in the IME at seasonal timescale with a focus on submesoscale and mesoscale features.