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The surface wave-induced vertical mixing in the ocean can improve the performance of climate models

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Although the scale of surface waves is much smaller than that of circulation, the surface wave-induced vertical mixing (Bv) can fix the problem faced by nearly all ocean circulation models, which the simulated mixing layer depth (MLD) is always too shallow for ocean general circulation models (OGCMs) especially for summer season. As the upper ocean plays as flywheel of climate system, the improved simulation of the upper ocean mixed layer results in better simulation of climate system. We examine the effects of Bv on two climate models, CCSM3 (NCAR, USA) and FGCM0 (IAP, China). Both the two climate models show dramatic improvements from mean state to different variations such as ENSO periodicity and seasonal cycle etc. The Asian summer monsoon and related water vapor transport are also much improved. All above suggest that the surface wave should be an important clue and so a low-lying fruit for improving the performance of ocean and climate models.