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Hemispheric asymmetry in future seasonal wave power changes

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Wind-waves exert stress on coastal environment and wave power is a better representative of that stress rather than wave height alone. This study inspects the global changes in seasonal wave power by the end of the 21st century, compared to the 1979–2005 period as a result of projected climate change. We use multi-model wave climate simulations from WAVEWATCH-III, forced with surface winds simulated by 7 different CMIP5 Models. Our analysis of wave power reveals decreases over the Northern Hemisphere and increases over the tropics and Southern Hemisphere, with substantial seasonal and regional variations. We analyzed five different terms of differential wave power representing contribution from wave height and/or period. Although wave height changes dominantly control wave power change, contribution of wave period is pronounced over Southern hemisphere extra-tropics, remarkably over Indian Ocean sector during austral winter. Wave period increase is strikingly higher in austral winter than summer, which resembles with wave height of swells components generated in the Southern Ocean. Strong positive inter-model relationship between future change in wave power and SAM over the Southern Hemisphere is consistent with previously reported intensification of wind belt related to more frequent occurrences of positive SAM in future. Northern Hemisphere decrease can be attributed to reduced storm activity rising from lowered meridional temperature gradient, and lacked swell activity owing to smaller fraction of sea with respect to land than the Southern Hemisphere.