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Spatially Tracking Wave Events in Partitioned Numerical Wave Model Outputs

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Wave partitions derived from spectral partitioning techniques in the numerical wave model output are usually organized according to the magnitude of their wave energy without considering the coherence of wave parameters in space or in time, making it difficult to observe some features of wave fields. In this study, an approach for spatially tracking coherent wave events using partitioned numerical wave model output is presented to solve this problem. This two-step approach first traverses the wave event using the continuity of partitioned wave parameters (such as partitioned wave heights, partitioned peak wave periods, and partitioned wave directions) by an efficient algorithm termed breadth-first search, which works for both structured and unstructured grids. Then this approach merges the events of which the spatial boundaries and the wave parameters on these boundaries are both in good agreement, in order to reduce the impact of the swell garden sprinkler effect in the frequency direction. Partitioned wave information from the output of a WAVEWATCH-III hindcast is used to test the performance of this tracking approach. The results show that this approach can well capture the primary features of partitioned wave fields, demonstrating its potential for global or regional wave spectral data analysis.