

Application of Remotely Sensed Ocean Surface Vector Winds to Determine Wave Generation Areas

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Ocean surface vector winds from satellites have been successfully integrated into operations at weather centers. Usage by operational forecasters includes the determination of cyclone location and intensity, aerial extent of wind radii, and identification and characterization of weather phenomena such as orographically enhanced jets. Lacking to date in operational applications is a standard method to use gridded ocean surface vector wind fields to determine potential wave generation areas sensitive to specific coastal locations. Waves travel over great circle paths once generated and through ray tracing techniques specific fetches can be identified. Although great circle paths are known, only coarse empirical or graphical techniques are used in NWS operations.

The Ocean Prediction Center is developing a technique using the GEMPAK software to calculate great circle rays and through ray tracing identify potentially threatening fetch areas for wave generation. The technique will allow forecasters to calculate, on the fly, a grid of vectors with magnitude of unity and direction of the great circle rays emanating outward from a desired location. The fetch is determined by simply calculating the magnitude of the ocean wind vector opposing the site specific great circle rays. This technique can easily be applied to gridded ocean vector wind fields from QuikSCAT or ASCAT or from Numerical Weather Prediction output. The intent of this project is to make better use of gridded ocean surface vector wind fields in determining the generation of threatening waves and to raise the awareness of distant fetch areas such as the Southern Ocean for the West Coast of the U.S. and South Atlantic for the East Coast. This presentation will explain the technique and give several examples of its application.