A study on effect of range bunching on modulation spectrum measured by a wave scatterometer

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Résumé

Now linear tilt modulation model is used widely to invert the wave slope spectrum from the modulation spectrum measured by a wave scatterometer. This linear modulation model ignores the range bunching effect, namely the distortion of backscattering signals when several surface pixels are illuminated by a pulse at the same time due to the large-scale elevations. However, the effect is significant when the incidence angle is on the order or smaller than the steepness of the dominant wave just like SWIM and results in a filtering of the shorter wave components. In this paper, we study the effect of range bunching on modulation spectrum by Monto Carlo simulations. The simulation results show that range bunching results in not only a filtering of shorter waves but also a reduction of the peak wavenumber in the modulation spectrum compared to the referenced linear estimations for wind wave conditions with the wind speed lower than 10 m/s. The results are validated by the measurements of SWIM L1B modulation spectrum.

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