Title: Wave and stratification effects on surface drift currents: analysis of HF radar data

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Two years of data from a 12 MHz High Frequency radar installed in western France has been analyzed to understand the influence of sea state and stratification on surface currents correlated with the wind. The radar has been providing real time current maps of high quality every 20 minutes for the last two years, allowing the interpretation of the measurements in terms of a variety of processes. Surface currents are measured with a maximum range of 120 km from two coastal stations located in Porspoder and Cleden Cap Sizun. Here we present a detailed analysis at a few locations in the radar field of view, that provide interesting contrasts in terms of vertical stratification and sea state. From previous comparisons with surface drifters, HF radar data is know to yield currents very close to surface drift velocities averaged over a scale of the order of the radar wavelength divided by 8. These measurements contain, in particular, the Stokes drift induced by surface waves. Once the dominating tidal motion has been filtered of the time series, the surface current Us is very well correlated with the local wind, reaching typically 1.5% of the 10-m wind speed, and a deflection angle from 80 to 10° to the right of the wind, decreasing with wind speed.
Using a well calibrated wave model, the surface Stokes drift contribution Uss is estimated, allowing to analyse the quasi-Eulerian current Us-Uss. That component of the current is found to decrease from 1 to 0.3% of the wind speed, with a deflection angle generally constant around 90° to the right of the wind.