The Cryosat Mission Performance Simulator (CRYMPS) is an end-to-end software simulator developed and run by University College London. The simulator has been used to model the problem from LEO altitudes, for example, 3D descriptors of the Earth surface to produce Cryosat L1B and L2 SAR altimeter waveforms. CRYMPS SAR waveforms were obtained for simulated ocean wave conditions with changing elevation and realistic ocean wave fields. Figure 3 shows a single example with changing significant wave height condition. This data was used to validate and calibrate a new range model for the satellite altimeter waveforms. The Cryosat Mission Performance Simulator (CRYMPS) was used to model a conventional (LRM) and a multi-looking SAR ocean altimeter waveform model. The Cryosat Mission Performance Simulator (CRYMPS) for ocean wave conditions with realistic ocean wave fields. L1B (LRM) waveforms were obtained in both pulse-limited low-rate mode and SAR altimeter mode. The Cryosat Mission Performance Simulator (CRYMPS) was used to model a conventional (LRM) and a multi-looking SAR ocean altimeter waveform model. The Cryosat Mission Performance Simulator (CRYMPS) was used to model a conventional (LRM) and a multi-looking SAR ocean altimeter waveform model.

4 - Epoch and SWH retrieval by retracking LRM and SAR waveforms

The CRYMPS LRM and SAR waveforms were retracted to retrieve epoch and significant wave height over the ocean. Figure 7 shows the principles of multi-looking in SAR mode, leading to larger number of independent looks from successive bursts over LRM to yield higher SNR and further backscatter spatial resolution.

Conclusions & Future Work

The new SAR ocean retracker was found to perform well, producing excellent fit to the CRYMPS model and multi-looking SAR waveforms. A number of different retracker models were also tested, although none were found to perform better than the new model. However, these results are preliminary given the limited data available, and further testing is needed to confirm these findings.

Future work will include the analysis of new CRYMPS scenarios over ocean wave surfaces to investigate, in particular, the sensitivity of the CRYMPS waveform to the scattering polarisation states of the ocean.

References


[2] R.K. Raney, R.K., “A new theoretical model for SAR Delay and Doppler frequency space for a single look. The CRYMPS LRM and SAR waveforms were retracted with appropriate theoretical retrackers and the relikely done at 20Hz, where “20Hz” refers to the L1B pulse repetition frequency (PRF) to ensure independent look trials over ocean regions of high spatial capability to increase the number of looks. The altimeter payload for conventional low-rate mode (LRM) with continuous generation of pulses at a low pulse-repetition frequency (PRF) is similar to the CRYMPS SAR waveforms. In order to re-track the CRYMPS SAR waveforms, a new theoretical model was developed from first principles (Martin-Puig & Raffel, 2009). The theoretical model describes the distribution of residual power in Doppler and Frequency space for a single look. The theoretical model is based on a new analytical model for SAR Delay and Doppler frequency space for a single look. The theoretical model is based on a new analytical model for SAR Delay and Doppler frequency space for a single look.