



Sea ice drift from Sentinel-1 SAR imagery using open source feature tracking

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A computational efficient, open source feature tracking algorithm, called ORB, is adopted and tuned for sea ice drift retrieval from Sentinel-1 SAR images. The best suitable setting and parameter values have been found using four representative Sentinel-1 image pairs. A new quality measure for feature tracking algorithms is introduced utilising the distribution of the resulting vector field. The performance of the algorithm is compared with two other feature tracking algorithms (SIFT and SURF). Applied on a test image pair acquired over Fram Strait, the tuned ORB algorithm produces the highest number of vectors (6920, SIFT: 1585 and SURF: 518) while being computational most efficient (66 s, SIFT: 182 s and SURF: 99 s using a 2,7 GHz processor with 8 GB memory). For validation purpose, 350 manually drawn vectors have been compared with the closest calculated vectors and the resulting root mean square distance is 609.9 m (equivalent to 7.5 pixel). All test image pairs show a significant better performance of the HV channel. On average, around 4 times more vectors have been found using HV polarisation. All software requirements necessary for applying the presented feature tracking algorithm are open source to ensure a free and easy implementation.