Along Track Interferometric (ATI) Mode Products

As for the realization of the quad polarization mode, the Dual Receive Antenna (DRA) configuration capability of the Instrument is used to receive the transmitted signals simultaneously with the fore and aft segments of the antenna. Here the same polarisation is kept. Due to the baseline in flight direction between the separated fore and aft antenna phase centers, this ATI mode allows to exploit the interferometric phases of the two channels for applications like moving target detection or ocean current studies. Experimental ATI products are acquired in stripmap single polarization mode only.

Two *acquisition* variants are offered; the nominal high-PRF setting with correspondingly reduced swath range extent (identical to dual and DRA quad pol data) and a variant with low PRF and a swath width similar to the single pol stripmap mode. The high-PRF variant allows a better spectral tracking of moving targets with respect to the clutter. The acquisition mode is realized and recorded using a very complex signal multiplexing requiring a demanding calibration approach to compensate relative instrument electronics phase drifts. Large scale azimuth phase trends may however remain.

The ATI products are identified and named as stripmap single pol DRA (SM-S-DRA) products. The only nominal ATI product type offered is single look slant-range complex (SSC). The acquisitions mode yields besides the two images representing the two geometrically separated phase centers (DRAFore and DRAAft) additionally the nominal Single Receive Antenna (SRA) configuration data. The SM-S-DRA level 1b products contain thus three CoSAR image files: the SRA channel, processed as a nominal SM-S data set with standard processing parameters, and the two DRA images. All files are co-registered during processing by the TMSP. The product annotation parameters (e.g. weightings) refer to the SRA channel image where not otherwise indicated. Unlike the SRA image, the two **DRA ATI channels are always processed with full azimuth bandwidth (limited by the PRF) and no azimuth or range weighting (i.e. Hamming coefficient = 1.0)** in order to fully exploit the spectral data. Such a processing without optimized bandwidth and no ambiguity reduction results obviously in DRA-ATI image layers not fulfilling the nominal product specifications in terms of point target response and ambiguity level. While the SSC is the only meaningful product type for ATI applications, the ATI data takes may also be processed to detected and geocoded product variants to use the SRA image to support e.g. calibration or crisis monitoring.