SEA BOTTOM TOPOGRAPHY IMAGING WITH SAR

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It is well known that under favorable meteorological and hydrodynamical conditions the bottom topography of shallow seas can be mapped with airborne or spaceborne imaging radar. This phenomenon has been observed for the first time in 1969 by de Loor and co-workers in Q-band Side Looking Airborne Radar (SLAR) imagery of sandwaves in the North Sea (de Loor and Brunsvelt van Hulten '78, Alpers and Hennings '84, Shuchman et al '85).

It is now generally accepted that the imaging mechanism consists of three steps:

1. Interaction between (tidal) current and bottom topography causes spatial modulations in the surface current velocity.
2. Modulations in the surface current velocity give rise to variations in the spectrum of wind-generated waves, as described by the action balance equation.
3. Variations in the wave spectrum show up as intensity modulations in radar imagery.

In order to predict radar backscatter modulations caused by sandwaves, an imaging model, covering the three steps, has been developped by the Dutch Sea Bottom Topography Group (Vogelzang et al '89a, Vogelzang et al '89b, Vogelzang et al '91a). This model and some model results will be shown.

On August 16, 1989 an experiment has been performed with the polarimetric P-, L-, and C-band SAR of NASA/JPL. One scene has been recorded in SAR mode (Vogelzang et al '91b). On July 12 1991 another three scenes were recorded, of which one was in the ATI-mode (Along-Track Interferometer).
These experiments took place in the test area of the Sea Bottom Topography Group, 30 km off the Dutch coast, where the bottom topography is dominated by sand waves. In-situ data were gathered by a ship in the test area and on "Measuring Platform Noordwijk", 20 km from the centre of the test area.

The radar images made during the experiment were compared with digitized maps of the bottom. Furthermore, the profiles of radar backscatter modulation were compared with the results of the model. During the workshop some preliminary results of the ATI measurements will be shown.

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