

The following article comes courtesy of Ian Hunter of the South African Weather Service. Due to space requirements I have had to reduce the main picture, but, should any reader wish a copy of the original, please contact me on dougy@telkomsa.net and I will gladly send this to them.

I have magnified the “bulker” as high as I can without losing resolution and I think it shows what Ian mentions in paragraph 3. Thanks Ian. Doug Young, Editor

TerraSAR-X Maritime Security and Surveillance by Satellite

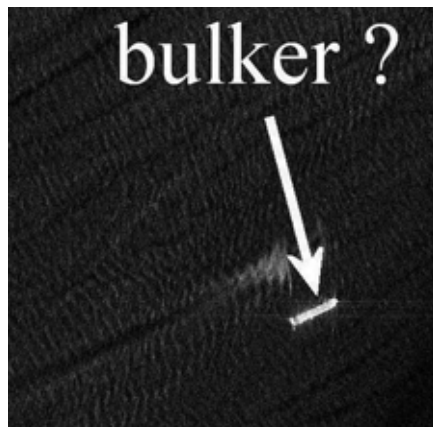
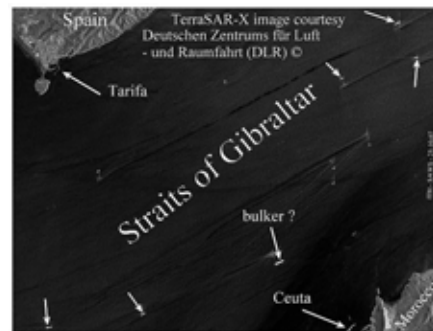
The satellite radar image comes courtesy of the German Aerospace Centre (DLR). Their TerraSAR-X satellite, launched in June, has a significantly improved resolution in comparison with existing synthetic aperture radar (SAR) systems flying on other satellites. In ‘Spotlight’ mode, resolution is up to 1m, with a 10x10 km coverage. By comparison DigitalGlobe’s WorldView-1 satellite launched last month has an imaging sensor with sub-metre resolution (visible and near-IR). However it is of no use when there is extensive cloud cover, let alone precipitation.

One of the many uses of SAR is vessel detection at sea. The synthetic aperture radars on ESA’s Envisat and ERS-2 satellites (the latter is still operating after 12 years) have long been used to deliver this service to MARISS (MARitime Security Service). High resolution, all-weather SAR imagery is integrated with the terrestrially-based AIS (Automatic ship Identification System) and the satcomms reliant VMS (used for fishing vessel surveillance) – to get additional information on the detected vessel. For example, AIS can provide vessel type/cargo and even ship’s draught.

On the SAR image from the TerraSAR-X satellite (alongside), certain features have been highlighted and the image annotated. Note that this is the lower resolution, ‘Stripmode’ : 3 to 6 m with a swath width of 30 kms. Nevertheless if you magnify it several times, the target northwest of the Spanish enclave of Ceuta could well be a large bulker, with the hatch covers faintly visible forward of the superstructure. One can also infer vessel characteristics from their wakes. The centreline (linear) wakes from the various vessels passing through the Straits have been displaced by the strong surface current (up to 5 knots) flowing in from the Atlantic.

As regards the V-shaped wave patterns, centre-right on the image, it is possible that they are the result of bottom flow (westwards) interacting with the bathymetry – i.e. internal waves. Submarines exiting the Mediterranean during WWII were tempted to drift out in silent mode, using this subsurface current. However they took a risk with the complex bottom topography in the Straits – the water can be as shallow as 100m in places.

The SAR can provide other information on marine surveillance. For example it can detect oil slicks, specifically those emanating from tankers (in ballast) illegally cleaning their tanks offshore. This would be especially useful off the South African coast with the heavy tanker traffic rounding the Cape. Coastal air patrols have limited coverage, temporal and spatial. It is not always possible to make a positive identification of an oil slick visually, and of course this becomes impossible after dark.



DLR very kindly switched on this new synthetic aperture radar for the South African Weather Service earlier this month. This was following a reported iceberg sighting southwest of Cape St. Francis. Stripmode was used in order to get a reasonable swath width, but even at 30 kms it is possible that the sensor might not have had the target in view – during either overpass. Thus it was impossible to completely discount the sighting, however unlikely.

Ian Hunter – SAWS – 25-10-07

Following receipt of the above I was copied in by John Prinsloo of Capetown Radio advising that there is a Navarea in force re another iceberg sighted at 32S 003E – not visible on radar – about 10m in length and 0.5 m in height – danger to navigation – vessels to navigate with caution – NA VII/156 refers. Editor