SEA SURFACE TEMPERATURE ESTIMATION USING MULTI-CHANNEL INFRARED MEASUREMENTS FROM AVHRR-NOAA 14 FOR THE CANIGO AREA

Poster

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We have developed some improvements on the normally used methodologies in order to obtain the sea surface temperature (SST) in the Canary-Azores-Gibraltar area known as CANIGO. The final accuracy of the AVHRR-based SST retrievals depends both on the accuracy of the measured radiances and the accuracy of the SST retrieval algorithm that converts the measured radiance into sea surface temperature.

For the NOAA-14 AVHRR IR channels calibration on flight, a new procedure is used based in the ones already described by Steyn-Ross et al. (1992) and Walton et al. (1998). This procedure corrects the instrument effects for the AVHRR thermal infrared channels centred on 10.2 microm.(channel 4) and 12 microm.(channel 5), whose Hg-Cd-Te detectors exhibit slight, but well-defined, non-linearities in their responses to incoming radiation. Also assigning a non-zero radiance to the space view response as it is proved by Walton et al. (1998).

A new satellite sea surface temperature algorithm is developed by using the match up data set of AVHRR brightness temperature and in situ data of SST in the CANIGO region. The procedure that we have made in this framework consists of :
(i) An automatic procedure for the geometric correction based on the satellite orbital model and a similarity detection algorithm, achieving accuracy to the order of the pixel.
(ii) An improved algorithm for the cloud detection based in the method of the multiband thresholds adapted to the CANIGO zone after experimental checking.
(iii) A qualitative and quantitative test with in situ SST measurements and nearly-coincident satellite observations. The matchups were carefully screened from the HRPT scenes of all seasons in 1997-1998. The temporal and spatial coincidences are within 30 minutes and one pixel resolution, respectively.

The CANIGO-SST algorithm obtained has the following form:

$$SST = 1.0344 \cdot T4 + [2.0193 - 0.0921 \cdot (T4-T5)] \cdot (T4-T5) + [0.1565\ (T4-T5) + 1.5472] \cdot (\sec(sza)-1) - 0.6514$$

Coefficients are estimated from regression analysis using 80 co-located in situ and satellite measurements (matchups). Error analysis has shown that SST can theoretically be retrieved to within 0.36°C RMS.

For validation purposes we have used 135 data from the AVHRR Pathfinder Oceans Matchup Database (Podestà et Al. 1998) and we have also compared our results with other algorithms with coefficients depending on satellite zenith angle(sza). The CANIGO-SWF had a RMSD of 0.45°C and the RMSDs of the publised SWFs (Antoyne et al.(1992), Badenas et al.(1997)) were in the order of 0.66-0.75°C.

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