

THE USE OF SATELLITE IMAGERY FOR THE STUDY OF SEA WATER PROPERTIES
AND ITS COMPARISON WITH SEA TRUTH DATA: TEMPERATURE DISTRIBUTION
IN THE NORTHERN ADRIATIC

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The Northern Adriatic is one of the chosen test-sites in the EURASEP project. The group of ISDGM, Venice, has chosen 1979 as a test year during which to conduct regular sea-truth expeditions. Maps of horizontal distributions of properties, derived from the campaign, have been produced. In particular, the maps of surface temperature relative to June 15 are compared with the corresponding ones inferred from NIMBUS 7 thermal infrared imagery for that day.

L'Adriatique du nord est un des endroits choisis comme lieu de test du projet EURASEP. Le group de l'ISDGM de Venise a choisi 1979 comme année de test pour y exécuter des expéditions régulières de vérité mer.

Sur la base de cette campagne on a reconstruit les cartes des distributions horizontales des propriétés. En particulier on compare les cartes des températures superficielles du 15 juin avec celles déduites des images thermiques à l'infrarouge du NIMBUS 7 du même jour.

The Northern Adriatic is one of the chosen test-sites in the EURASEP project. The group of the ISDGM, Venice, in cooperation with the Joint Research Centre, Ispra, chose 1979 as a test-year during which to conduct regular sea-truth expeditions, about twice a month, starting April 1979. The major campaign was carried out during June 1979, and densely covered two successive sea areas: the first (June 11-15) was concentrated in the region in front of the Venice Lagoon, centered around the ISDGM shallow water oceanographic platform. The second (June 19-25) covered the area south of the Po River delta, where horizontal gradients of chlorophylla, solid transport and temperature are particularly enhanced. The examples hereafter shown refer to the period June 11-15.

The criteria followed during the NIMBUS 7 passages were those recommended by the EURASEP workshops. Before every passage, two or three days of oceanographic pre-exploration allowed us to obtain a picture as exhaustive as possible of the hydrological and dynamical conditions of the

considered water mass in the considered period.

Figure 1 shows the sea surface distribution of temperature in $^{\circ}\text{C}$, scaled by 10^4 , for June 15, 1979, as obtained from sea-truth data. The map was constructed applying an interpolating routine (Surface II from Scripps Institution of Oceanography, USA) especially designed for irregularly distributed data points.

Figure 2 shows the surface temperature distribution as inferred from NIMBUS 7 thermal infrared imagery (channel 6; 10.5-12.6 micrometer), for the same region. Raw satellite data have been correlated through the application of the NASA algorithm designed to give absolute temperatures in Kelvin degrees (and consequently in centigrades). Again, data are in $^{\circ}\text{C}$ scaled by 10^4 , but, as evident from the comparison with Fig. 1, the algorithm does not work properly in furnishing a correct reference (zero) value, at least for what the Northern Adriatic test-site is concerned. Therefore, quantitative significance can be attributed only to the temperature gradients which can be evaluated from the isoline values and their relative spacing. Moreover, one must always bear in mind that the thermal resolution of satellite inferred temperature maps is often too low to resolve the smaller gradients which can be detected at sea.

However, the qualitative comparison of the two figures shows a good correspondence. The thermal fronts with intense gradients in the north-western quadrant are correctly reproduced, as well as the general trend of the isolines in the southeastern quadrant, showing a front intruding shoreward from the interior of the basin. The region in which the cold water lens is observed in the sea-truth map is more complex in the satellite imagery, as can be expected. These correlations, though good enough, are only qualitative, as the correlation of data with physical quantities constitutes the biggest gap in remote sensing research to be filled up. Only further steps towards developing numerical correlation algorithms between surface distribution of sea-truth measured data and satellite imagery will relate the two different sets of "sea level" parameter matrices according to objective criteria and not to subjective, visual interpretation.

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SURFACE II, 1979. "Interpolating routine manual", Internal rep., SIO, UCSD.

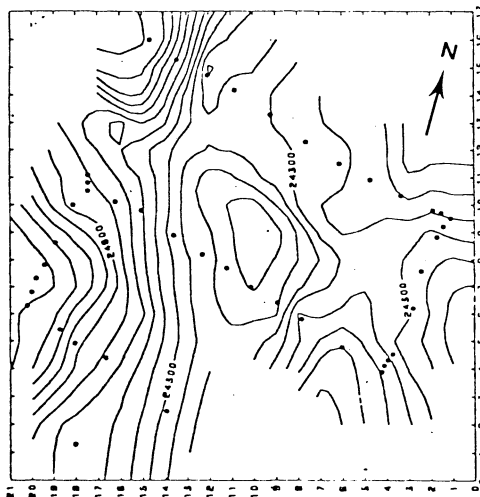


Fig. 1

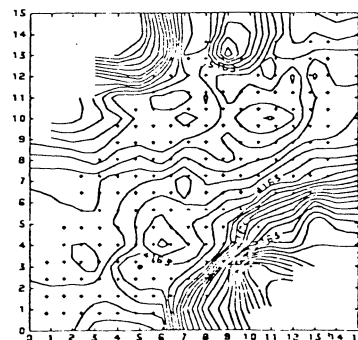


Fig. 2