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Cover

Marine constituents detected by a SeaWiFS algorithm in the south-eastern Mediterranean

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Remote detection of water-leaving radiance is quantitatively related to three marine constituents that exist in the water column: chlorophyll (Chl); suspended matter (SM) such as sediments; and coloured dissolved organic matter (CDOM), also known as Gelbstoff (Bukata *et al.* 1995). The variation of the volume reflectance of these constituents is rather complicated, as illustrated in figure 1. Volume reflectance of water with minimum Chl concentrations is relatively high in the blue spectral region (400–500 nm) and minimal in the red region (600–700 nm). Conversely, high Chl concentrations lower the volume reflectance in the blue region and heighten it in the red region. The null point of these vertical shifts is located at around 500 nm. Increasing concentrations of CDOM result in a significant decrease of the volume reflectance in the blue region with almost no effect in the red region. As for the SM, increasing concentrations produce a considerable increase of the volume reflectance in the red region with minimal effect in the blue region. Therefore, the detection of slight changes in Chl content through remote sensing is challenging, especially at the higher Chl concentrations commonly found in coastal areas (Rast and Bezy 1990).

Figure 2 (also on the cover) represents the spatial distribution of Chl content in the south-eastern Mediterranean as derived by the SeaDAS OC4 version 4 (OC4V4) algorithm (O'Reilly *et al.* 2000) from the SeaWiFS image of 18 June 2001. This algorithm calculates Chl concentration values as high as $64\,mg\,m^{-3}$. However, ground observations reveal that two types of marine constituents are presented in this image. One is the SM carried by the geostrophic circum-Mediterranean, anti-clockwise gyre from the Nile delta eastwards (Emery and Neev 1970, Karnieli *et al.* 1993, Mayo *et al.* 1993). The other is land-oriented pollutants along the Israeli coastal zone as exhibited by Chl growth (Herut *et al.* 1999). Chl is detected along the shoreline, but is also transported tens of kilometres to the open sea, as shown

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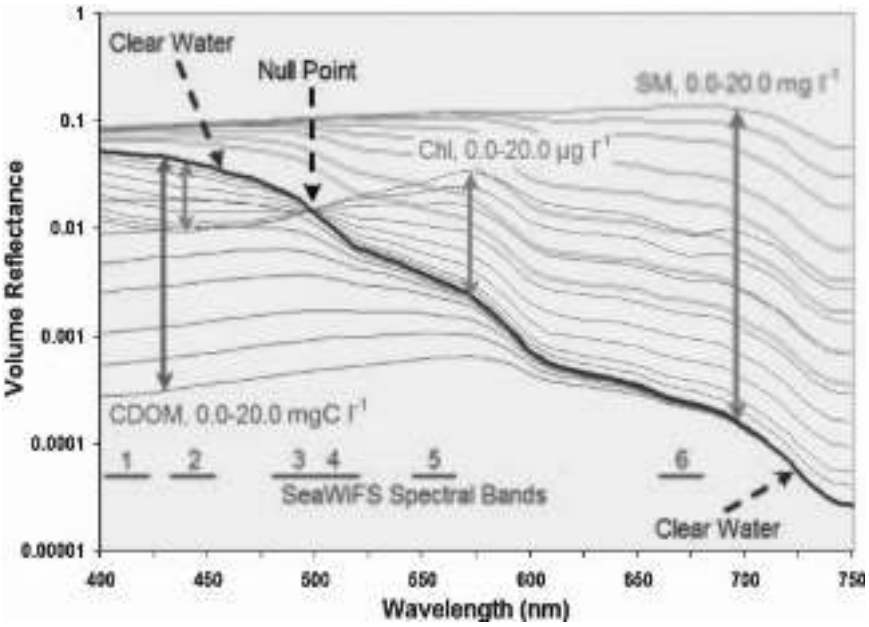

Figure 1. Variation of volume reflectance of chlorophyll (Chl), suspended matter (SM) and coloured dissolved organic matter (CDOM) with respect to their concentration. Clear water indicates no Chl, no SM and no CDOM. The location of the first six SeaWiFS spectral bands is also presented. (Modified from Bukata *et al.* 1995.)

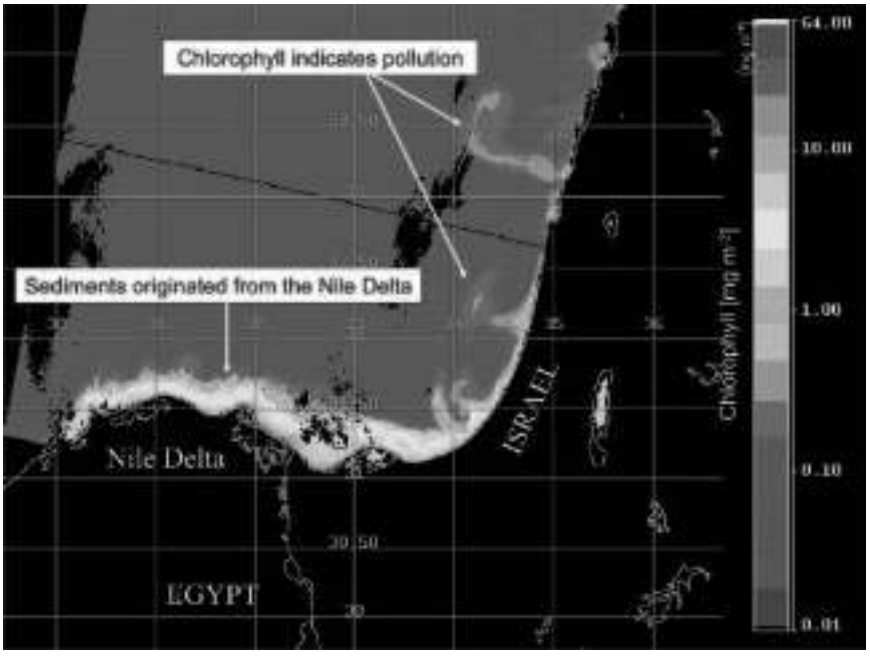

Figure 2. The SeaDAS OC4V4 product demonstrated on a SeaWiFS image of 18 June 2001 of the south-eastern Mediterranean showing the spatial distribution of suspended matter (SM) and chlorophyll (Chl) along the coasts of Egypt and Israel, respectively.

by the elongated plumes. Note that in figure 2 the Chl values are stretched toward much higher values than in reality due to the SM.

Detecting Chl separately from SM is a challenging task since the OC4V4 and other similar algorithms are based on volume reflectance variations at 555 nm. Any increase in the volume reflectance in this spectral band may indicate increasing concentration in either Chl or SM, or both. An attempt to overcome this complexity has been proposed by Figueras *et al*. (XXXX), demonstrated in the south-eastern Mediterranean region.

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