Tracing Chromophoric Dissolved Organic Matter in Eastern Mediterranean through Excitation Emission Matrices.

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The Eastern Mediterranean Sea comprises from the Adriatic, Ionian, Aegean and Levantine Seas. The Adriatic Sea is well recognized as the main source of dense deep waters in the Eastern Mediterranean. During the last decades though export of dense water masses from the Cretan Sea was traced and the Cretan Sea has been recognized as an important source of dense waters.

The purpose of this study is to investigate the nature of the exported CDOM from the Cretan Sea towards the Ionian and Levantine Seas. Figure 1 shows the identified waters masses in the study area. In the intermediate waters the Cretan Intermediate Water mass (CIW) was identified in the Cretan Sea and eastern straits while the north-western Levantine and the south Ionian Seas were occupied by the Transitional Mediterranean Water (TMW) mass. In the deep layers, Cretan Deep Water mass was traces in the Cretan Sea and the eastern straits while in the South Ionian the Eastern Mediterranean Deep Water (EMDW) mass was found.

For the purpose of our study we used Excitation Emission Matrices coupled with PARAFAC Analysis. PARAFAC analysis identified 4 components as shown in figure 2. We found three humic like components C1, C2, and C3. C1 and C3 present characteristics representative of terrestrial humics and can be attributed to peaks A and C respectively. C2 presents characteristics of marine humics and resembles peak M. PARAFAC also resolved a protein like fluorophore that resembles tryptophan and peak T.

Figure 3 presents the mean values of the intensities of the four components in the intermediate water masses, CIW located in the Cretan Sea and eastern straits and TMW located in Levantine and South Ionian Seas. It is clear that the protein like component C4 as well as the humic components C1 and C2 presents higher intensities in the CIW compared to TMW. Contrary the humic component C3 presents similar intensities in the two water masses. When we look into the relationship of Apparent Oxygen Utilization with the four components in the intermediate waters in figure 4 we can see that among the humic components only C3 presents a weak positive correlation with AOU implying a favorable production of this component. Contrary the protein component C4 shows a negative relationship with AOU implying the consumption of this labile material.

Regarding the deep waters, figure 5 shows that the water mass located in the Cretan Sea and eastern strait, CDW, presents higher intensities of the humic components C1, C3 and the protein component C4. Contrary the humic like component C3 shows comparable intensities in the two water masses.

In conclusion we can say that the Cretan Sea appears to be a potential source of FDOM to the Eastern Mediterranean during the export of dense waters. This export can trigger the microbial activity as it provides the Eastern Mediterranean with proteinaceous material while at the same time it provides the Eastern Mediterranean with more refractory humic material which could be bioaccumulating.