Wednesday, October 10
Oral Session 8
14:00–16:00

15:20–15:40

COUPLED EARTH OBSERVATION-ECOPHYSIOLOGICAL MODELING APPROACH TO SITE SELECTION FOR EXPANDING SHELLFISH AQUACULTURE

The potential for and productivity of shellfish aquaculture is strongly influenced by sea surface temperature (SST), and the concentration and nature of suspended particulate matter (SPM), which can both be monitored from space to determine shellfish growth conditions. Phytoplankton is a main food source for suspension-feeding bivalves. In too high concentrations, SPM has been documented to have a negative impact on shellfish physiological response. Growth has been quantitatively linked to these parameters and to SST through ecophysiological Dynamic Energy Budget (DEB) modelling for a number of species, including Crassostrea gigas. Here, the spatiotemporal variability of SST, SPM, and Chl (as a proxy for phytoplankton concentration) is considered by using Earth Observation data to drive DEB modeling for C. gigas in Bourgneuf Bay, France, thereby obtaining spatial distribution maps of the growth potential from near-shore to off-shore locations. An algorithm blending framework based on the dynamic identification of optical water type (OWT) has been applied to the entire MERIS full-resolution archive to take the optical diversity of the coastal ocean into account, so that the Chl and SPM algorithms selected for each OWT can be seamlessly merged for generic inshore-to-offshore application. Resulting growth potential maps are then used in site selection, and to investigate the potential for expanding aquaculture offshore from intertidal areas, where oyster farming already occupies much of the available space. Validation of satellite-retrieved SST, SPM, and Chl, used as model inputs, and model-output growth potential (oyster dry flesh mass; shell length) is demonstrated using corresponding in situ data.

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