

Understanding the spatio-temporal variability of SPM dynamics from observations and model analysis

T. v. Kessel¹, M. Fettweis² and R. Verney³

¹ Department of Marine and Coastal Systems, Deltares, Delft, Netherlands. thijs.vankessel@deltares.nl

² RBINS, Brussels, Belgium

³ IFREMER, Brest, France

1. Introduction

The dynamics of suspended particulate matter (SPM) in the coastal zone is influenced by many factors such tidal forcing, wind-induced currents, waves, horizontal and vertical density gradients, sediment supply, primary production, organic matter and flocculation.

In this contribution we will show examples of the observed spatio-temporal variability of SPM concentration along the French, Belgian and Dutch coast and discuss to what extent we can understand this variability from known processes and forcing. We will try to decipher the contribution of «expected seasonal dynamics», unexpected, rare or extreme events and long-term trends. What contribution explained by hydro-meteorological forcing, continental inputs, bio-physical interactions or human activities? These questions are important for our common understanding of SPM dynamics in these coastal systems, autonomous trends and human impacts.

We will provide an overview of the available observations (Figure 1) and will sketch an approach on how we can provide the best contextualized 4D evaluation of the coastal dynamics by aggregating multi-source and multi-parameter information (for example satellite, fixed stations with low- and high-frequency retrieval, ferry boxes, model results). Evaluation in space and time of data from various sources requires an extensive uncertainty analysis of the data and a discussion on how we can best estimate them (Fettweis et al., 2019).

Among these complex interactions, we will specifically discuss the interactions between the organic and mineral components of the SPM, e.g. the impact of turbidity on primary production through light limitation. We will discuss the required integration level of these processes in observation networks and SPM numerical transport models and sketch a pathway for further development of coupled hydrodynamic, sediment and ecological models for a comprehensive evaluation of the bio-physical ecosystem functioning (sediment fluxes, eutrophication, nutrient and organic matter composition).

2. Conclusions

In this study we won't provide final answers, but we will sketch the current practice in SPM and related observations and subsequent analysis. We will also make suggestions on how this current practice can be further extended and improved for critical discussion with the INTERCOH community.

Acknowledgments

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References

Fettweis, M. et al. (2019). Uncertainties associated with in-situ high-frequency long-term observations of suspended particulate matter concentration using optical and acoustic sensors. *Progress in Oceanography* 178 102162.

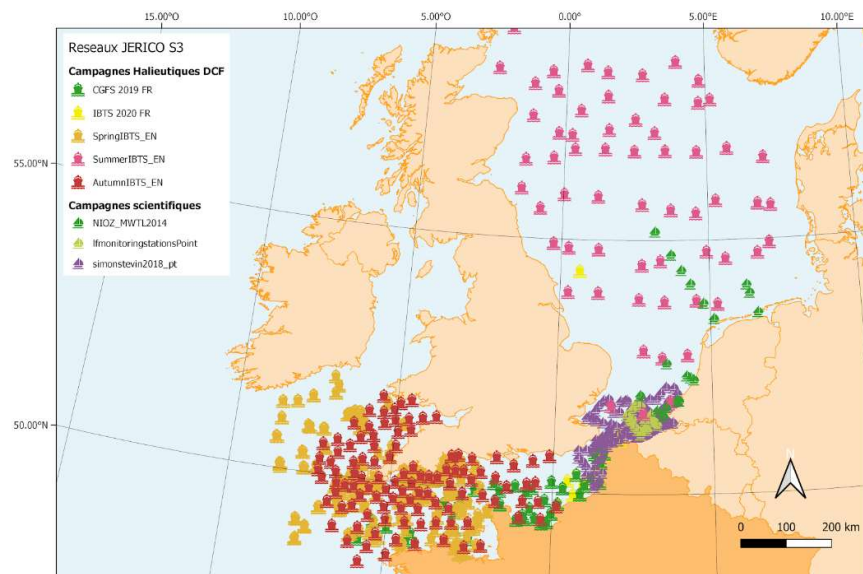


Figure 1: Area of interest with position of the main sampling stations within Jerico-3 from ecosystem/scientific cruises.