# Review of "Influence of model spatial resolution on Sargassum beaching predictions along the Mexican Caribbean coast," by Santos Medina et al.

This manuscript investigates the influence of ocean model horizontal resolution (5 km versus 1 km) on short-term predictions of Sargassum transport and beaching in the Mexican Caribbean using ROMS, OpenDrift, and FTLE diagnostics. The study addresses a practically relevant question for operational forecasting, and the conclusion that 5-km simulations perform comparably to 1-km simulations except during extreme events and in regions of complex coastal geometry is both interesting and useful. The manuscript is generally well organized and the numerical experiments appear carefully conducted.

I nevertheless have several comments regarding the physical interpretation of the results.

1. The particle transport model,
$$\mathbf{u} = \mathbf{u}_o + \alpha \mathbf{u}_w,$$
where $\alpha$ is a constant windage coefficient calibrated using undrogued GDP drifters, has become common in Sargassum studies. Nevertheless, it remains an empirical parameterization rather than a dynamical transport model. Recent work by Beron-Vera, Olascoaga, Miron, Bonner and collaborators has shown that reduced finite-size particle models can account simultaneously for inertia, buoyancy, wave effects, and air-water interaction without introducing an ad hoc windage coefficient. Even if such models lie beyond the scope of the present study, the limitations of the adopted parameterization should be acknowledged and the underlying assumptions discussed.

2. The manuscript relies extensively on FTLE fields to identify transport pathways, barriers, attracting structures, retention regions, and likely beaching locations. These interpretations should be stated more carefully. FTLE fundamentally measures finite-time stretching rather than attraction or transport. The distinction between FTLE ridges and objective Lagrangian coherent structures (Haller, Beron-Vera) should also be discussed. Furthermore, recent diagnostics developed specifically for finite-size floating material (Beron-Vera, Olascoaga, Miron, Bonner) identify attracting transport pathways directly from the effective dynamics rather than indirectly through deformation diagnostics.

3. The study compares two spatial resolutions while keeping the transport model fixed. Consequently, the conclusions concern the influence of spatial resolution under the adopted transport model rather than the intrinsic predictability of Sargassum transport. This distinction deserves explicit mention in the Conclusions.

4. Throughout the manuscript, differences between the 5-km and 1-km simulations are frequently attributed to submesoscale structures resolved only by the finer grid. Since these structures are not independently diagnosed, this interpretation should either be supported with additional diagnostics or presented more cautiously.

5. The Introduction would benefit from a clearer statement of the main scientific contributions of the paper. Likewise, terminology such as "transport pathways," "attracting structures," "retention," and "barriers" should be used more precisely, as these refer to distinct dynamical concepts.

Overall, I believe the manuscript constitutes a useful contribution to operational Sargassum forecasting. Addressing the comments above would strengthen both the physical interpretation and the connection with the contemporary literature on Lagrangian transport of finite-size floating material.