

Interactive comment on “A model perspective on the dynamics of the shadow zone of the eastern tropical North Atlantic. Part 1: the poleward slope currents along West Africa” by Lala Kounta et al.

Anonymous Referee #1

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This interesting paper is a welcome attempt to cast light into the “shadow zone” of the region equatorward of the Canary Current’s separation from the African coast by examining the regional dynamics with the aid of a numerical eddy-resolving model. This is an area with relatively sparse observations even during the period in the 1970s when the adjacent northwest African upwelling was subject to considerable international interest. The focus is on the spatial and seasonal variability of the poleward flow that has been reported throughout the region but never subject to systematic observation over time. Both local and remote wind forcing are found to be instrumental in driving the flow, but vary in relative importance between spring and autumn. The model indicates a westward propagation of the poleward flow, at least south of Cap Blanc, consistent

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with Rossby wave dynamics. The thorough and coherent approach of the analysis progresses our understanding of the region, although many uncertainties remain. The authors provide a caveat in their concluding section that the model fails to reproduce the well-established penetration of the SACW mass to the north of Cap Blanc. As they also point out in the validation section, the model does not convincingly reproduce the zonal structure of the Guinea Dome as indicated by hydrographic data. Although both inconsistencies may reflect inadequate horizontal resolution, or other problem, of the model, it is also true that observations of the hydrography and current field are far from sufficient to provide realistic comparisons with the model. So clearly, much work remains.

While in general the writing is clear and correct, a rather relaxed and somewhat conversational style leads to lengthy text that could be made more terse, with a modicum of effort. Examples include “are quite noisy but the overall impression is that they tend to be more toward the west. . . p7 l24) or “note also that significant small-scale noise results from the sinuosity of the flow past topographic irregularities whose position can thus locally depart from the shelf break, e.g. in relation to standing meanders in the lee of headlands, as noticeable in . . . p13 l10”. Quite so, but it could surely be said more succinctly.

Figures are inconsistently labelled, some with panels marked by letter, others not. Even when so labelled, the panels are in some cases referred to not by letter but by position.

Overall the paper is significant, of excellent quality, and well prepared and the scientific development is sound. If the authors could tighten up the text a little, and attend to the few specific points mentioned above and the details below, the paper is recommended for publication as an innovative and useful contribution.

Abstract: p1 l4 “a suite of” is unnecessary l6 “southernmost” rather than “outmost”

Introduction: p2 l5 preferable to refer to “northwest Africa” for generality and to avoid controversy with respect to the internationally disputed borders in the area. p2 l5

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Delete"see geographical and oceanographical" p2 l9-10 The water mass front and its weakening with depth have been recognized long before the work cited, e.g. Allain (1970), Fraga (1973) and other papers of that period, and more over later years. P4 l19 "literature" not "litterature"

Model evaluation: p7 l16 Figure 6 is called out of order, before Figure 3. p8 ll5-12 The doming structure on the zonal line in Fig 2 is weaker in the model. The localized uplift at almost all levels near coast is not mentioned. Incidentally although the figure panels are labelled a-d, the legend refers to left,right, top and bottom.

Seasonal cycle of the WABC: p10 l10 State "Alongslope vertical sections of ..." to emphasize the difference with Figure 7. p10 l11 "across-shore averaging" would be better expressed as "across-slope averaging" as the shore bounds the flow. This occurs in a few other places in the text.

WABC coastal dynamics: p11 l10 "as more classically estimated" - does this mean calculated from the observations? If so, please state it more directly. P12 l15 Delete "it" before "as occurs".

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