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Interactive comment on “Modeling biogeochemical processes in sediments from the Rhône River prodelta area (NW Mediterranean Sea)” by L. Pastor et al.

Anonymous Referee #1

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The paper of Pastor and co-authors describes the fate of organic matter originated from the Rhone River and settled down to the bottoms of the river mouth and adjacent continental shelf using a diagenetic model. This paper is a contribution to a joint study CHACCRA conducted in the frame of the French Research Agency ANR and part of the international RIOMAR initiative. Only few papers addressed this topic in recent years and the use of models to infer the major processes of mineralization in this system is rather new. The differences in sedimentation rates of particles with high labile compounds explain the variations in mineralization rates and the predominance of anoxic versus oxic processes. Even if the conclusions do not help in setting up a complete carbon budget, the paper highlights some interesting figures on carbon mineralization

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pathways.

Some minor corrections should be considered in a final version of the ms. 1) End of & 2.4: The cited article of Hulth et al., 1997 is not appropriate as they worked in deep waters of the Weddell Sea. Other more related sites can be found in Denis L., et al., for Gulf of Lions) 2) End of 2.7 Replace T="They ranged from 10 cm/y" by "These rates ranged . . ." 3) Middle 3.2: and decrease with "water" depths and distance from mouth 4) End of 3.3: You state "DOU estimated from the model at stations F, I and J are lower than TOU. It seems the case for stations I but not for J and F with high SD. 5) Middle 4.1: What does "Biomass accumulation" refer to in these lines? 6) End of 4.2: "the OC inputs in ocean margins" Do you mean export from the prodelta? 7) 4.3: Delete "Nevertheless" line 3. Line 8 and 9, you stated "significant" on a statistical point of view? No test is given. Moreover K, N, C data of SO₄ do not show the decrease. 8) 4.3 upper page 3: replace "towards major reduced products burial" by "towards the burial of major reduced pr.." 9) 4.3 page 4: rebuilt "they do not .. products" "re-oxidation do not contribute to O₂ consumption, for example. 10) Are the conclusions valid during other seasons or events. The model was run for the April cruise. Same in Winter, during floods, droughts, some discussions need to be added on this point to give more strength.

References need to be checked . 1) Durrieu De Madron or Madron (5 times in the ms. 2) Huerta-Diaz instead of Huerta-diaz 3) Package in R (Soetaert et al., 2009) instead of (S, P and M) 4) Rasmussen and Jorgensen (1992) not in ref list 5) Cathalot et al., in prep: is this submitted? If not delete as she is a co-author. 6) Berg et al 1998 ? 2003 in ref list 7) Before mineralization equation Soetaert et al 1996 (a or b) as in ref list. 8) Berner 1984, Wegrzynek et al 1997, Hedges and Keil 1995, Bottrell et al. 2009 absent in ref list. Reference List 1) Anschutz, . . . 2000 not in the text. 2) Canavan, . . . 2006, idem 3) Froelich1979, idem 4) Hartnett,1998, idem 5) The typing is not the same, underlining the Journal titles (Berg, Berner, Deflandre, Holligan, McKee, Pastor, Pratihary 6) Change position of dates in Berner 96 and Boudreau 91 7) Change

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“carnon” to “carbon” in Wollast 8) Verify all the upper-case letter, you missed a lot: Buscail, CanfieldCharmasson, Epping, Haese, Hall, Helder, Herman, Huerta-diaz (x2), Kasih, Westrich 9) Verify Grasshoff pages 10) Verify Mucci the title. 11) Sempéré instead of Sempere

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