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Interactive comment on “Carbon farming in hot, dry coastal areas: an option for climate change mitigation” by K. Becker et al.

Anonymous Referee #1

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The paper by Wulfmeyer et al. deals with an important topic, namely the carbon storage potential on degraded land in coastal arid and semi-arid areas using desalinated sea water for irrigation. It is an interdisciplinary study showing that in a global emission trading scheme irrigation of such degraded lands might be an economic option and could offset a considerable portion of carbon dioxide emissions due to the burning of fossil fuels. The main strength of the paper is the high resolution modeling of the regional circulation in coastal semi-arid areas that is more realistic than the earlier estimates by others. It shows that a 100x100km² area leads to a positive feedback on precipitation reducing in parts the need for irrigation. The paper is well written but has one major weakness. Despite it is talking about rehabilitating degraded land, it does not discuss in enough detail the main reason for this degradation: inadequate irrigation either by not using enough irrigation water to establish regularly contact to

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the groundwater table or by using irrigation water with too high mineral content. In both cases the result is salt layers in the upper layers of the soil. Further weaknesses are, firstly, the use of modelled soil moisture without validation by observed soil moisture from irrigated land in hot climates in the modeling exercise. Data from irrigated land in Arabian countries or in Arizona should be used for the case studies presented, and secondly, I cannot understand the neglection of evapo-transpiration by vegetation in the boundary layer modeling, although plants evaporate strongly in dry climates. Also irrigation type differences are not discussed and no CDM project of a similar kind is named. Recommendation: To be published after major modifications.

Interactive comment on *Earth Syst. Dynam. Discuss.*, 3, 1221, 2012.

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