

Interactive comment on “Satellite data interpretation of causes and controls on groundwater-seawater flow directions, Merseyside, UK: implications for assessing saline intrusions” by S. Mukherjee et al.

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I find the paper addresses an interesting topic, both a relevant issue (exchange of saline water into/from freshwater aquifers through a geologic fault) and a possibly innovative methodology (detection of different permeabilities within fault zones, e.g. proportions of sand and clay, by using remote sensing data).

I agree with the suggestions of reviewer #1 for improvement of the paper and the way the authors followed these are ok.

I also share the concern of reviewer #2, in particular the validity of the remotely sensed

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data (SPOT) values to be used as a signal for different vegetation cover, which is assumed to stand for different fractions of clay and sand. Thus, the most critical part of this paper is the presentation of the methodology in chapter 5. The paper does NOT really explain the findings which are stated in the text of chapter 5, e.g. where and how to derive the faults from the remotely sensed data. The cited figures 6 and 7 do not give an explanation. What does the inset at Fig 7 show us and at what location ?

How to correlate the SPOT data to vegetation (SPOT actually gives you information about the chlorophyll status of the leaves) to the soil moisture? The statement “above the fault zones, it is likely that the reduced permeability of the underlying rock has led to locally enhanced soil moisture since the water cannot drain away as quickly” sounds logical, but one should prove it by ground truth. Groundtruthing both, vegetation data and soil moisture, would be the best, vegetation only should be a minimum requirement. You state that “Faults could be identified in, and directly adjacent to, the intertidal region using the high pass filter of ERDAS software in the SPOT data”. But, again, one should add information about reliability/uncertainty of this procedure.

Further below an equation is given to relate NIR to clay-percentage, possibly based on a regression. Can you show these data in a graph or so ?

I agree with reviewer #2 that it is at least difficult to see, what you state in the text: “faults were visible in the near intertidal region” Fig 8. Also Fig 9 does not obviously reveal the information which you claim. What and where does the inset show ? Concerning Fig 10 it is claimed: “Comparison of published geological maps of the area and the elongate anomalies confirm that the features do indeed represent major geological fault“. Again, one should show the basis of the “confirmation” and not solely state it.

My conclusion is the paper can not be published in the present status. The most interesting and potentially innovative part, the detection of faults by remotely sensed data is not enough justified or supported. These parts of the paper (mainly chapter 5 and the discussion and conclusions derived from there) have to be substantially

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improved.

I disagree with reviewer #2 to merge this paper with the article presently at discussion in Hess-D (same aquifer and geochemical interpretation). This would overload the paper.

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