

Interactive comment on “A geophysical analysis of hydro-geomorphic controls within a headwater wetland in a granitic landscape, through ERI and IP” by E. S. Riddell et al.

Anonymous Referee #2

Received and published: 4 June 2010

General comments: Interesting study! The combination of geophysical methods, in particular geoelectrical techniques for investigating hydro-geomorphic structures is a suitable approach in a headwater wetland area. The application of geophysical methods in hydro-geological studies at different scales has become increasingly important since the last years due to the increase in information on spatial structures and the observation of subsurface processes. Hence, this study is very relevant for HESS and should be of high interest for a broad geo-scientific audience. The paper is well organized and structured and generally well written. However, sentences in some parts of the manuscript are very long and complicated written and thus not easily to understand.

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Read more in the technical comments. The figures are all helpful and refer to the text. Summing up I recommend minor revision of the submitted manuscript according to the following suggestions.

Specific comments in addition to Referee #1: 1) p. 1975, 23: At which times have the ERI surveys performed? Seasonally or monthly, and is it important for analysis of ERI data with regard to different soil-moisture content? Please specify. 2) p. 1978, 3: Is there a recent uplift movement? When were the periods of uplift? If it is not important for the presented study, this information could be omitted. 3) p. 1980: Some information on the control of data quality is really missing. 4) p. 1982, 13: “the bedrock material type is made with...” What does it mean? Does it mean the conductivity or resistivity range of known bedrock materials for inversion process? Please reword. 5) p. 1983, 5: What kind of substrate is this conductive material at the surface seen in Fig. 7 and also in Fig. 5 and 6? It was mentioned that due to the geology sandy soils dominate through the wetlands and clay concentrations do not increase towards the valley bottom, except around the doleritic dyke. Are there differences in the soil-moisture content? At which depth is the groundwater table located? This information is missing in Fig. 4 to 7. It also remains unclear, what is causing the conductivity differences between -80 and -20 m with low resistivity and the adjacent high-resistivity area between -20 and 40 m? When parts of the wetland are used for agriculture, what about the influence of fertilization and nutrient input and storage in the soils that can directly affect resistivity/conductivity of the subsurface? Are there effects of salinization of the soils in this semi-arid setting? Have these aspects on ground conductivity taken into account when interpreting 2-D profiles across agriculture areas? 6) p. 1988, 17: Do the resistivity and IP data originate from the pseudosections or from separate 4-point resistivity measurements? Please specify.

Technical comments in addition to Referee #1: 1) Long and nested sentences are for instance on p. 1976, 9-13; p. 1978, 20-26; p. 1983, 18-23, which could be easily broken into two sentences for a better understanding. I would also suggest checking

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the comma placement in a couple of sentences. 2) p. 1978, 8: "lowveld" as a name should start with a big letter or should be set in double quotes. 3) p. 1978, 9: What is the source of meteorological data? Is a citation necessary? 4) p. 1988, 20, 28: A depth value in mm is unusual, especially when exceeding the meter range. Please use meter values. 5) Fig.2 is not of good quality, the sketches of the location of transects should be enlarged, and the use of colored lines for the different transects would increase the readability. 6) Fig. 4: Fig. 15: What is the meaning of the legend? Is it the depth of the respective auger samples? Please specify. Moreover, a depth scale at the image on the right site would be useful.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 1973, 2010.

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