Responses to comments of Referee#4 on HESS-D paper hess-2010-65:
"Hydrochemical analysis of stream water in a tropical, mountainous headwater catchment in northern Thailand"

We would like to thank the referee for posting the helpful comments. The referee gives similar comments and has similar concerns as the other referees and does not accept the paper in its current version. In the following, we give a short summary of the comments and explain how we would like to address the mentioned issues.

A technical note: References not yet included in the reference list of the manuscript are listed in Appendix 2 – References. New figures (A1 to A7) and tables (Table A1) are shown in Appendix 1.

Response to Referee#4

Comment 1a) The referee doubts if temperate and tropical regions can generally be distinguished in their hydrological characteristic, as it can be inferred from the introduction. **1b)** The introduction is not well structured and a distinction between inner and outer tropics would help.
Reply 1a) There are fundamental differences between temperate and tropical regions in terms of hydrological characteristic. Rainfall is mostly seasonal and highly variable in regions such as ours, because of climatic conditions (monsoon). Furthermore the amount of rainfall per year, the evapotranspiration over the year (if permanently wet) is higher and soils (e.g. Ferralsol, Acrisols and Cambisols) are far more progressed in weathering (due to higher temperature and humidity). Runoff generation is not necessarily generally different; however, available studies point to a shift in dominant storm flow pathways.
Reply 1b) Hydrochemical studies carried out in tropical regions are scarce, therefore it is very difficult to distinguish the studies within the tropics.
We will restructure the introduction and relate the study better to the region.

Comment 2) There is no distinction on the basic concept to distinguish endmembers based on residence time, source area oriented or process oriented.
Reply 2) The distinction is based on the sources of the components. We agree that the concept and definition were not well explained and discussed. We will put more emphasis on the definition and explanation of the endmembers.

Comment 3) Surface runoff is more enriched in all components other than silica and sodium, which also causes higher EC values. What is the explanation and can it maybe used for other process insights?
Reply 3) This is a matter, which we are not quite sure about. Normally, silica concentration is considered a function of residence or contact time (e.g Stewart et al. 2007) implying 'deeper' sources of the water. The high concentrations of ions can be explained by a higher humus content of the top soil and hence a higher ion exchange capacity of the top soil. Furthermore, the study site is sometimes fertilized, which could also be the reason for higher ion concentrations of the surface runoff (wash-off effect).

Comment 4) The referee asks if a separation of interflow and surface runoff is meaningful, as we state that: „lower concentrations of interflow may have occured due to dilution by quickly infiltrating rainfall water“ and later: „surface runoff is most likely a mixture of HOF, return flow, and SOF“.
Reply 4) This statement is indeed misleading, because the separation of surface runoff between HOF and SOF is imprecise and based on our data highly speculative. The separation between interflow and surface runoff, however is still meaningful as e.g. the EC values are significantly different (see also *Reply 3)*.

Comment 5) Back-up the use of EC as a non-conservative tracer by a calculation from the measured ion concentration.
Reply 5) The EC values of the samples were measured in-situ and again in the lab, while the ion analysis took place. EC measurements are widely used and are a common tool for hydrograph separations, even though it can not be considered as certainly non-conservative. We will, however, try to get the missing data to do a backup calculation.

Comment 6) The referee asks for a comparison of the annual ET and runoff coefficient with other studies in tropical regions, and generally for more details on the annual water balance.
Reply 6) We attached a Figure (see Appendix 1, Figure A8) showing temperature, rainfall, discharge and the evapotranspiration for the subcatchment in 2008. We will provide a short comparison of our measurements based on literature overview in the introduction section.

Comment 7) The referee asks for more information on land use.
Reply 7) A land use map is available and will be implemented in Figure 1 (see also *Comment 1, Referee#3*).

Comment 8) The referee asks for more information on the data collection and how it could be guaranteed that only surface runoff or interflow is sampled.
Reply 8) A picture of the trench is shown in the attachment (Appendix 1, Figure A3). The trench is a metal sheet, which was ‘plugged’ into soil. The interflow was sampled using bottles and funnels directly at the location where water was leaking from the soil over the bedrock into the creek (see Figure A1 and A2, Appendix 1).

Comment 9) Provide information on number of samples and accuracy of measurement.
Reply 9) The number of the samples will be given in Table 2 (see Appendix 1, Table A1). The accuracy of the measurement will be given in the Material and Methods section where the ion analysis is described.

Comment 10) Incorporate uncertainty bounds in the hydrograph separation (variability of endmembers and analytical errors).
Reply 10) We will add the uncertainty bounds, variability (shown as standard deviation) is given in Table 1 in the manuscript and in Table A1 in the Appendix 1.

Comment 11) Generally too many and sometimes redundant numbers.
Reply 11) We will carefully check this. The numbers regarding rainfall characteristic will be shown in a table.

Comment 12) Figure 6 is not needed, because not discussed.
Reply 12) Figure 6 will be removed.

Comment 13) The 'cake diagram' in Figure 8 seems to be wrong.
Reply 13) Figure 8 will be removed. We will only show the three-component hydrograph separation in a revised version.