Supplementary Section HESS-2012-188

This section details the individual relationships between two land cover types and two general soil types in the PRAMS and SWAMS regions, as summarised in the paper in Figures 4 and 5, respectively.

[FIGURES 4-1, 4-2, 4-3 and 4-4]

Figure 4-1 shows the percentage change in rainfall *versus* recharge for grass cover and sandy soils. There is a general relationship in the data, with several points indicating a small increase in rainfall results in a decrease in recharge, and a best fit least-squares line that passes below the origin. These results indicate that rainfall alone does not explain the recharge relationship, and that increased temperature, solar radiation and vapour pressure deficit contribute to the vegetation cover using more water than under current conditions for the same amount of rainfall. On the timescale of the model runs it was assumed the vegetation did not adapt to these conditions, or suffer significant species change, as the same vegetation parameters were retained from previous fitting. Figure 4-2 shows the same relationship for trees over sandy soil profiles, and exhibits more scatter with a larger negative shift on the recharge axis, and slightly greater slope of best fit line.

Figures 4-3 and 4-4 show the relationships between grass and tree cover types over clayey soil profiles. Here the grass cover type shows lower sensitivity to rainfall change while tree cover type is more sensitive than on sandy soil. The observation that there is more scatter with tree cover than grass cover remains with clayey soil.

[FIGURES 5-1, 5-2, 5-3 and 5-4]

Figures 5-1 and 5-2 show the relationship between percentage change in rainfall *versus* runoff for grass and tree cover over sandy soils in the SWAMS region. In this region the best-fit lines both pass approximately through the origin but with different slopes, indicating that the sandy soil types here are less likely to suffer from a decrease in recharge under current rainfall. The SWAMS region has higher rainfall than comparable coastal parts of the PRAMS region, most pronounced in the southern parts of SWAMS. As with the PRAMS region, there is a great deal more scatter with the tree cover type than with grass cover.

Figures 5-3 and 5-4 show the relationships between grass and tree cover types over clayey soil profiles in the SWAMS region. In contrast to the sandy soil type, here the best-fit lines have a pronounced negative shift on the recharge axis, indicating a reduction in recharge with the same overall rainfall, due to non-rainfall climatic factors. While scatter remains greatest in the tree cover type, there are no instances modelled where recharge increases over the clayey soil type.