Developing a feedbacks toolkit for
Regional water resource assessments

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There is a need to include the atmospheric feedbacks that alter the evaporative demand in a region when water availability is changed. This is because the water resource implications of large scale irrigation or soil water depletion cannot be assessed unless the subsequent changes to air temperature, humidity and cloudiness are accounted for. Morning profiles of temperature and humidity from reanalysis fields can be used to prime a slab model of the Planetary Boundary layer and its entrainment of the overlying air. This can be used in combination with a simple land surface model to estimate the evolution of the air temperature, humidity and cloudiness. The impact of advection of air on the feedback can then be assessed from afternoon ERA40 profiles and to distinguish between local and advection feedbacks. This tool can be used to assess feedback strengths anywhere in the globe, although it will not always be appropriate (see discussion). A prototype of the tool will be applied in a region that will be chosen from a global analysis of feedbacks. Atmospheric feedbacks can play an important role in water resource assessments in some regions. If the region has a relatively straightforward feedback regime dominated by one dimensional feedback processes, this can be quantified using a simple model. The appropriateness of this depends on the spatial scale of the land-surface change. A simple model can be used to quantify feedbacks if the spatial scale of the change leads to one-dimensional feedbacks.