RSHS18-92
Remote Sensing and Hydrology Symposium (ICRS-IAHS)

Where is the water coming from? At the reservoirs from Vaira and Tonzi Fluxnet core sites (California)

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Most of the California's water resources come from precipitation, rain and snow, that fall in the northern and eastern parts of the state. Increases in air temperature and change in precipitation patterns are altering the dynamics of the water cycle components in the Californian watersheds. The snow coverage is reducing its extension, and consequently its capacity to storage water; and surface and ground water levels, and the snow/precipitation ratio, are also experimenting drastic changes. An example is the earlier onset of the snowmelt, with a variation in the seasonal pattern of the reservoirs recharging and draining processes. All these shifts will have direct effects on the small water reservoirs used as sources on rangeland management.

Are we able to track these effects at the local scale with earth observation? And how they are affecting daily water management? Tonzi and Vaira Fluxnet sites, located on the lower foothills of the Sierra Nevada Mountains, are exceptional to analyze at short/long term basis how the water cycle variation affects local scales. Both locations, separated 2.3 km from each other, are inside the Upper Cosumnes (2459 km2) watershed, receiving the water through Cosumnes river, the defrost water streams, and from deep rocky aquifers. The objective of this study was to track, using earth observation, the effects of the recent climatic extreme events on the small reservoirs of Tonzi and Vaira ranches, linking the shifts in ground/surface water levels with the evolution of the snow in the upstream area of this catchment. Snowcover and water bodies evolution were analyzed using different satellite data and classification algorithms, depending on the spatial resolution needed (Sentinel 2/RapidEye/Landsat/MODIS); and surface and ground water levels were measured on the field. Through the use of remote sensing tools, the ability to track changes on a local scale can be monitor on an automated way, constituting also a powerful tool to help stakeholders and water managers to design adaptation strategies to climate change.