

Spatially Distributed Snowmelt Modeling of the Ane River Dam Catchment

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The Ane River Basin is located in the Northeast region of Shiga Prefecture and it is the basin which contributes the largest discharge to Lake Biwa. The North part of Lake belongs to the Japan Sea climatic region and the average the precipitation is around 2000 mm per year. It is in a maritime climate and is considered very susceptible to climate change due to its significant snowfall and relatively warm temperatures in the winter. There are concerns about flood problems during the spring with rain-on-snow events and questions of whether if changes in the snow regime in the future could enhance such flood problems early in the spring or perhaps aggravate water scarcity during the summer are yet to be answered. The snowmelt during spring is a major contribution of total river discharge and its proper estimation is necessary for the understanding of the hydrological processes of the region and for analyzing different climate change scenarios impacts in the future of water resources. The Ane River Dam is a gravity dam built in the upstream part of the Ane River (Fig. 1), its construction was finalized in March 2002. The crest of the dam sits at an elevation of 450 m and the catchment area is about 28 km². The main purpose of the ARD is to provide irrigation water and for flood control. The land use is mainly composed of forest. The objective of the present study was to compare the ability of different spatially distributed snowmelt models for Ane River Dam catchment.

The period we tested the models was for the winter of 2010 and 2011. We used Radar-AMeDAS

precipitation data and also interpolated data collected from the Japanese Ministry of Land, Infrastructure and Transport - www1.river.go.jp - and AMeDAS stations maintained by the Japan Meteorological Agency - www.jma.go.jp. Meteorological data from AMeDAS were collected and interpolated to the study area.

We used MODIS/Terra Snow Cover 8-Day Global 500m Grid of the Moderate Resolution Imaging Spectroradiometer (MODIS) from the National Snow and Ice Data Center (nsidc.org/data) for comparing snow cover and time of snow disappearance.

A temperature index model and a energy balance model were applied and compared to the MODIS snow cover data and to manually measured snow depth and SWE in the winters of 2009-2010 and 2010-2011 at 4 points.

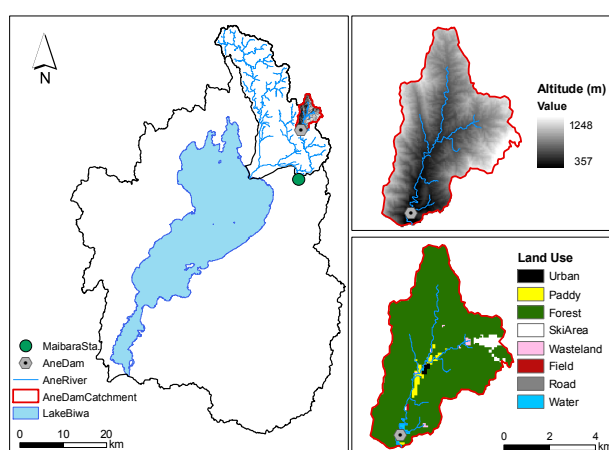


Figure 1. Lake Biwa basin and Ane River Dam catchment.