Geophysical Research Abstracts
Vol. 21, EGU2019-4741, 2019
EGU General Assembly 2019

Modeling surface water-groundwater interaction in Little Akaki Sub-basin, Ethiopia

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Integrated use of surface and groundwater resources is essential to provide reliable water supply and to sustainably manage the water resources. Through the use of hydrological models, the hydrologic processes and management strategies that affect the water resources can be assessed in a watershed setting. In the Akaki watershed groundwater pumping contributes for more than 25% of the water supply to Addis Ababa City, the capital of Ethiopia. The groundwater abstraction is significantly increasing without reliable quantification of hydrologic components and the extents available for extraction. To address the gap this study applied the SWAT model calibrated with SWAT-CUP for surface water simulation and the estimation of distributed groundwater recharge rates in Little Akaki watershed (area of 134 km2) which is part of the Akaki Watershed. The recharge values estimated by SWAT were used in a MODFLOW model for groundwater simulations. Surface water and groundwater potentials in the Little Akaki sub-basin were estimated based on aquifer hydrodynamic conditions from calibrated and validated modeling results. The combination of the two models, SWAT and MODFLOW models successfully estimated the surface water and groundwater resources and the results found were acceptable.

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ACKNOWLEDGMENTS: This work was supported by a grant (19RDRP-B076272-05) from Infrastructure and Transportation Technology Promotion Research Program funded by the Ministry of Land, Infrastructure, and Transport of Korean government.