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Estimation of ground heat flux from soil temperature measurements

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The ground heat flux is one of the components of the surface energy balance equation at the earth atmosphere interface. The estimation of the ground heat flux requires the knowledge of soil temperature variation as a function of depth. There are four Mini Boundary Layer Masts (MBLM) installed at Kaiga with sensors for continuous measurement of soil temperature at surface (0 cm) and depths of -5 cm, -10 cm, -20 cm, -50 cm and -100 cm. This study describes the use of these data and the one dimensional heat conduction equation to estimate the ground heat flux. The ground heat flux values are estimated numerically. At the same site, the net radiation data are obtained from the individual measurements of short and long wave radiation. The ground heat flux can also be obtained as a fraction of the net radiation and a comparison of the two methods of estimating the ground heat flux is presented. At present, the study is carried out for March 2013 as a demonstration of the method. Considerable diurnal variation in soil temperature is seen up to a depth of ~ 20 cm from the surface. Beyond that the soil temperature remains practically constant with time. Some differences are noted between the two methods of estimating ground heat flux especially in the peak value. This could be because of the value of thermal conductivity used in the equation. This study demonstrates the utility of soil temperature measurements in the estimation of the ground heat flux.

Biography

R Shrivastava is working in the Environmental Modeling Section of Radiation Safety Systems Division. Her field of work is numerical weather prediction using advanced models like TAPM and WRF for DAE sites. Her assignment also includes application of weather prediction data to study atmospheric dispersion of pollutants and radiological dose computation due to releases from various nuclear facilities.

Hydrological risk due to climate change for hydropower schemes in central Himalayan region

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Himalayan region hosts number of Hydropower schemes. It is also potential site for many small and large size hydro projects. However, hydropower plants are among the most vulnerable to climate change because water resource availability is closely linked to climate change. Small changes in climate can effect precipitation pattern and temperature profile of the region significantly. Change in precipitation and snow-melting pattern can increase risk of flooding, landslides, sedimentation, and flash rainfall events (particularly during the monsoon). Greater unreliability of flows poses potentially serious risks to water supplies, particularly in the lean season. Global warming can also increase risk of snow melting resulting in glacier lake outburst further threatening hydropowerstructures. Therefore, increased climate variability, and threatens the potential for hydropower generation. The existing hydropower plants may not function with designed capacity, as the low flows might be decreasing in dry season while flow might increase beyond its design capacity in peak Monsoon. These risks should be investigated to analyze the economic benefit of designing hydropower plants with the possibility of future lowered capacity, provisioning for increased river sedimentation and increased flood protection.

Biography

Alka Sapkota is faculty at Nepal Engineering College. She received her PhD in Environmental Engineeringfrom UNEP-Tongji Institute of Environment for Sustainable Development, Shanghai China. She has been working in environmental and sustainable development field notably climate change adaptation, solid waste management, water resource management, renewable energy and development of EIA and SEA. She has participated in different national and internationals seminars and presented her research work.

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