Physical modelling of the Akkajaure reservoir

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Abstract. This paper describes the seasonal temperature development in the Akkajaure reservoir, one of the largest Swedish reservoirs. It lies in the headwaters of the river Lulealven in northern Sweden; it is 60 km long and 5 km wide with a maximum depth of 92 m. The maximum allowed variation in surface water level is 30 m. The temperature field in the reservoir is important for many biochemical processes. A one-dimensional lake model of the Akkajaure reservoir is developed from a lake model by Sahlberg (1983 and 1988). The dynamic eddy viscosity is calculated by a two equation turbulence model, a k–ε model and the hypolimnic eddy diffusivity formulation which is a function of the stability frequency (Hondzo *et al.*, 1993). A comparison between calculated and measured temperature profiles showed a maximum discrepancy of 0.5–1.0°C over the period 1999-2002. Except for a few days in summer, the water temperature is vertically homogeneous. Over that period of years, a weak stratification of temperature occurred on only one to two weeks a year on different dates in July and August. This will have biological consequences.

Keywords: temperature profile,reservoir, 1-D lake model, stratification, Sweden

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