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Contemporary relevance of Rokliden, Sweden's first forest hydrology field study

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During the last decades of the 19th century a great worry arose about forest landscape paludification in Northern Sweden. This was the original impetus for forest hydrological research in Sweden and the Swedish Institute of Experimental Forestry established the first field research site in 1905 at Rokliden, close to Piteå in North Sweden. It comprised 8.64 ha located 2 km down a 3 km long gently sloping (ca 4%), north facing Norway spruce covered till slope, interspersed with small mires. By 1931 it was concluded that paludification was not spreading across Northern Sweden at an appreciable rate. Within the Rokliden research site 22 groundwater wells were installed and levels measured weekly until 1926. A map with 0.5 m equidistance, 10 vegetation classes, and soil profiles was established. A limited forest harvest was done in 1908, but significant effects on groundwater levels were not found. Groundwater flow velocity was estimated by tracing added sodium chloride. Hydraulic conductivity was measured on undisturbed soil cores, while mechanical and chemical analyses were done on other samples. Groundwater was collected and analyzed for dissolved compounds including oxygen. Hydrology was found important for soil types and vegetation development. The necessary profile drainage for podzol soil development was identified as vein drainage at the bedrock surface. The low lateral hydraulic gradient in the gentle slopes and the low hydraulic conductivity in the deeper till soil made lateral flow much smaller than required. The vein drainage was a perfect solution to the problem and great effort was put into showing the existence and importance of veins. Modern measurements in the re-established groundwater observation network and re-analysis of old data confirmed the plausibility of these original conclusions. Partial catchment area could explain rates of both groundwater level rise and recession. Revisiting this field study reveals that many issues in contemporary hillslope hydrology were already established a century ago, even though the provenance of that knowledge is not generally recognized.