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Title: *Analysis of monthly variation of Mass balance and Equilibrium line Altitude at Vestre Broggerbreen glacier, Ny-Alesund , Svalbard*

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Surface mass balance, Equilibrium Line Altitude (ELA), temperature and precipitation data for the period of one year (October 2011 to September 2012) has been analysed to understand monthly mass budget and their relationship with ELA at Vestre Broggerbreen glacier (area 4.6km^2), Ny-Alesund, Svalbard. It has been observed that overall glacier wide specific annual surface mass balance is negative (0.6±0.2 mweq) while winter surface balance and summer surface balance were 0.68±0.2 m we and -1.28±0.2 m we respectively. Equilibrium Line Altitude (ELA) and Accumulation Area Ratio (AAR) were 349 m amsl and 30% during 2011-12 hydrological years. The ELA is inversely proportional to specific mass balance and observed that specific mass balance of this glacier will be reduced by 20-30% with increase of ELA by 50 metre. The maximum and minimum specific balance month was March and July respectively during studied period. Mean annual vertical gradient of ablation of this glacier is 123cm w.e. 100 m^{-1} between 100m and 250 m amsl and 100cm weq 100 m^{-1} between 100 and 350 m amsl. The specific mass balance calculated from the surface energy balance and ablation stakes are is -1.6.±0.40 m w.e. and -1.28±0.2 m w.e. during ablation season (May-September 2012). Mass balance calculated by surface energy balance is approx. 28-30% over estimation than measured by ablation stakes. The average air temperature were observed -5.9^{o}C(May 2011-September 2012) including -11.7^o C in winter (October 11-April 12) and -0.1^{o}C in summer (May-September 2012) near to the ELA (350m amsl). Data revealed that more than 70% melt energy is contributed through solar radiation and rest from turbulent fluxes. Subsurface heat flux is not calculated and assume as negligible contribution through it. Overall, ablation rate of this glacier is influenced by incoming solar radiation (surface and air temperature), flow direction and drifting of snow.