



A linear radio wave velocity model on polythermal glaciers

Songtao Ai, Zemin Wang, and Hong Geng

Chinese Antarctic Center of Surveying & Mapping, Wuhan University, Wuhan, China (ast@whu.edu.cn)

The glaciers in Svalbard are mostly polythermal type. On these polythermal glaciers, the radio wave velocity (RWV) of ground penetrating radar (GPR) is variable, and the RWV is an important parameter for the ice volume estimation. But the ice volume estimation usually uses a single RWV for one whole glacier in order to simplify the calculation. How about the difference between the actual volume and the estimated result?

We used a linear RWV model, derived from common mid-point (CMP) profiles of GPR measurement, to simulate the RWV for each GPR trace on Pedersenbreen in Svalbard. Then a relative accurate volume of glacier Pedersenbreen was acquired. From which we found the difference among those volumes calculated from a single RWV, three RWVs and our RWV model. Our RWV model for polythermal glaciers refined the volume estimation and enhanced the precision in mass change study. And the difference between different models could raise an error up to 10% of the volume results. Moreover, the fixed RWV usually used was probably larger than the actual one in those polythermal glaciers.

Acknowledgements: This work was supported by the National Natural Science Foundation of China(41476162) and the Chinese Polar Environment Comprehensive Investigation & Assessment Programmes.