Lead Author e-mail: *krzysztof.migala@uni.wroc.pl*

Title: *Modeling and measurements of glaciers ablation - a comparison of the effective methods applied in SW Spitsbergen.*

MIGAŁA Krzysztof[1], IGNATIUK Dariusz[2], KRYZA Maciej[1], MAJCHROWSKA Elżbieta[2]
[1]*University of Wrocław*
[2]*University of Silesia*

A spatial model of ablation was compared with the mass balance and hydrological measurements of Werenskioldbreen, Svalbard. Werenskioldbreen is a subpolar polythermal glacier. Area of glacier catchment is 44 km2 and glacier covers area of 27.1 km2. Since the beginning of the 21st century glacier recession is about 2 km with an average retreat of about 20-25 ma-1. Model of ablation was based on combination of the Khodakov formula (1982) and ArcGIS r.sun model of total radiation for Hornsund area, SW Spitsbergen (Kryza et. al. 2010). Absorbed radiation was calculated with the r.sun model of total radiation and albedo obtained from the satellite image as the reflectance of panchromatic band 8 of Landsat ETM+ data. GIS based r.sun model of total radiation for Hornsund was evaluated based on the actinometric data from the Polish Polar Station. Gradient of air temperature (□T = 0,30□/100 m) was measured in glacier catchment. Ablation of snow and ice was observed relative to reference points on aluminum stakes. Snow density was measured on 8 stakes. Its decreases with altitude and the values varied from 401 to 459 kg m-3. Ablation measured on stakes was uniformly applied across the glaciated area corresponding to the same elevation band. Ablation between stakes was estimated by applying a linear gradient between steaks observation. In 2009 total outflow of Werenskioldbreen catchment was modeled at 56.8 million m3, while the total ablation calculated from mass balance measurements was 55.9 million m3. In almost full ablation season, total runoff from glacier catchment was measured on The Glacier River (Werenskioldelva), as 53.94 million m3 (H. Marszałek, M. Wąsik, unpublished data). Both measurements and modeled ablation showed that about 54% of ablation occurs in zone between 300 - 500 m a.s.l., which contribute to the total glacier area of 55%. . The modeled ablation is generally in good agreement to observation of mass balance and runoff from glacier catchment. Presented model of ablation can be used to find differences of various scales of regions and local climates impacting glacier’s behavior and environmental effects.