

论文

气候变暖背景下典型冰川储量变化及其特征 ——以天山乌鲁木齐河源1号冰川为例

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摘要:

冰储量变化与冰川水资源变化及其对河川径流的贡献有密切关系。论文以天山乌鲁木齐河源1号冰川为例,基于雷达测厚、冰川测图等多年实测资料,通过GIS技术,计算出该冰川不同时期的储量值,并对其变化特征进行分析。结果表明,乌鲁木齐河源1号冰川1962、1981、1986、2001和2006年的储量分别为 $10\ 736.7\times 10^4$ 、 $10\ 296.2\times 10^4$ 、 $9\ 989.4\times 10^4$ 、 $8\ 797.9\times 10^4$ 和 $8\ 115.0\times 10^4$ m³。1962—2006年44 a间,在气候变暖背景下,冰储量亏损24.4%,厚度减薄12.1%,面积减小14.0%,最大长度缩短7.6%,且均呈加速趋势。1981年之前,冰川面积和长度的减小是造成冰储量减少的主要原因;1981—2001年,冰川厚度、面积、长度的减小共同造成储量的减少,面积的缩小仍是主导因素;2001年以后,冰川厚度的减薄成为冰储量减少的主要因素。

关键词: 冰储量 冰川厚度 冰川变化 乌鲁木齐河源1号冰川

Ice Volume Changes and Their Characteristics for Representative Glacier against the Background of Climatic Warming —A Case Study of Urumqi Glacier No. 1, Tianshan, China

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Abstract:

The changes of ice volume are closely related to the changes of glacial water resources and the contribution of melt water to the river runoff. Based on the ice thickness measured data, topographic maps and the long-term field observation data, this study has calculated the ice volume of Urumqi Glacier No.1 in different periods using GIS technique and analyzed the characteristics of their changes. Results indicated that the ice volume of Urumqi Glacier No.1 is 10736.7×10^4 m³, 10296.2×10^4 m³, 9989.4×10^4 m³, 8797.9×10^4 m³ and 8115.0×10^4 m³ in 1962, 1981, 1986, 2001 and 2006, respectively. During 1962-2006, the total ice volume of the glacier has reduced by 24.4% and the reduction rate of ice thickness, area and maximum length is 12.1%, 14.0% and 7.6%, respectively. The glacier was in a state of rapid shrinking with an accelerated tendency against the background of climatic warming in the past several decades. Before 1981, area shrinkage and terminus retreat was the key cause of the ice volume reduction; during 1981—2001, the reduction of ice volume was caused by three aspects: ice thickness, area and length, and area shrinkage was considered as the main factor; the noticeable reduction in ice volume is due to the intensive thinning of the ice thickness after 2001.

Keywords: ice volume ice thickness glacier change Urumqi Glacier No.1

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