On the decline of the snow water equivalent over the Northern Hemisphere as observed by satellite micro-wave radiometers

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The recent retreats of mountain glaciers all over the world and the sea ice extent in the Arctic Ocean in summer are drawing more and more public attention because they may have resulted from increasing human activities in recent years and may result in the significant global change of the Earth's environment in the near future. It is also known that the seasonal snow cover in the Northern Hemisphere is on the decline in terms of the length of snow season, the area of snow cover extent, and earlier snow-melting. In particular, the earlier snow-melting may cause not only the problem of water resources but also climatic changes and global warming through regional changes in the albedo of the Earth's surface.

In order too further confirm the decline of the cryosphere, we have analyzed the dataset of the Global Monthly EASE-Grid Snow Water Equivalent Climatology for the period 1979 - 2004, available from the National Snow and Ice Data Center, which is based on the observations by micro-wave radiometers SMMR and SMM/I. It has been found that the snow water equivalent is significantly decreasing in the melting season almost all over the Northern Hemisphere, with the maximum rates of several millimeters per year in the southern coast of the Scandinavian Peninsula and the western Siberian Plain. The fact that the decreasing rate becomes the maximum in the melting season everywhere suggests that the earlier snowmelt may not caused by the global warming but by snow contaminations resulting from, eventually, human activities.