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The exceptional snow accumulation of winter 2013-14 and the possible response of small glacial bodies: the case study of the Julian Alps (southeastern alpine chain)

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The Julian Alps, located in the southeastern area of the alpine chain, show a Mean Annual Precipitation (MAP) up to 3300 mm, one of the highest for the Alps. MAP also influence the Winter Snow Accumulation (WSA) which is of about 7 m at 1800 m asl, averaged over the period 1972-2013. Some small glaciers, glacierets and ice/firn patches, also fed by snow drifting and avalanches, still exist at an altitude comprise between 1830 and 2340 m a.s.l., representing some of the lowest evidence of the present alpine glacialism. Mountain glaciers are considered to be sensitive indicators of climate and the relationships between glaciers evolution and the precipitation regime is still not well understood. In particular little attention has been paid to the influence of extreme events in the short-medium term response of such glacial bodies which, though small in size, account for about 10% of the total mass balance of the alpine system. The winter season 2008/09, during which an exceptional event of snow accumulation occurred (the highest since 1972), and the following years promoted a quite large mass balance increase, after the dramatic recessional phase occurred between 1986 and 2006. The winter 2013-14 recorded a new historical WSA maximum with almost 16 m of snow fallen between December 1st, 2013 and April 15th, 2014. The maximum snow thickness measured on the ground reached 670 cm. The aim of this work is to analyze the main meteorological causes at the base of this exceptionally snowy winter seasons, to compare this event with the similar one of the winter 2008-09 and with relevant local snow climatology in order to raise awareness about possible future winter precipitation scenarios in a climate change perspective. This could represent a crucial input in driving the evolution of the small glacial remnants of this alpine sector in the near future.