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Late Pleistocene and Holocene Climatic Variability in the Carpathian-Balkan Region

ABSTRACTS VOLUME

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Embryonic glaciers on the Balkan peninsula: state and changes in the last several years

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Mountain glaciers are among the best natural indicators of short-term climatic variations. Although presently there are no classical glaciers on the Balkan peninsula, mountains in this part of Europe comprise a number of small but permanent firn-ice patches, which can be categorized as embryonic glaciers. They are subdivided into: typical glacierets (most of them) and small glaciers (a hybrid form between glacierets and cirque glaciers). Most of these features have survived the warming since the end of the Little Ice Age, and are considered to have persisted for at least five centuries without a complete melt (Grunewald et al., 2008; Gachev, Stoyanov, 2013).

Researches in the last several years (Milivojević et al.. 2008; Hughes, 2007, 2009; Djurović, 2009, 2012; Gachev et al., 2009 and others) revealed the presence of embryonic glaciers in just three mountain ranges throughout the Balkan peninsula: Prokletije mountains (in Albania), Durmitor (in Montenegro) and Pirin (in Bulgaria) (fig. 1). They are all located in north and northeast facing strongly shaded cirque bottoms of carbonate bedrock (limestone, marble) at altitudes from 2035 to 2620 m a. s. l., and usually have areas from less than 1 ha to 5 - 6 ha.

Prokletije mountains rank no. 1. in permanent and long-lasting ice and snow features – both in number and area covered. Parts of the mountain system are still not researched by glaciologists. To present day about 7 embryonic glaciers are considered to exist in the central area of the mountain system (fig. 2) (Gachev, Stoyanov, 2012, 2013). Five of them lie in the vicinity of Maja e Jezerces – the highest point of the massif. The glacieret Maja e Jezerces III appears to be the largest on the Balkans, its area ranging from about 3 ha in 2012 to 6 ha in 2013. At least one small glacier has been noticed in the mountain ridge Hekurava, south of Valbona valley and another large glacieret to the north – in Kolata massif, was visited in October 2012. The lowermost glacieret – Maja e Koljaet, which lies at 2000-2100 m a. s. l. to the northeast of Maja e Jezerces peak, and was firstly mentioned and described by Milivojević et al. (2008) turned out to be just a snow field: it was completely disappeared in the autumn of 2012, and had the highest snow level ever recorded in the next autumn.

Durmitor massif has just one embryonic glacier – the Debeli namet, but this is the most representative small glacier on the Balkan peninsula, presented at the lowest altitude – 2035 to 2200 m a. s. l. Studies of the glacier made by Djurović (1996, 1999, 2009, 2012) and Hughes (2007, 2008) and show large inter-annual surface variations without expressed tendencies for the last two decades.

Two glacierets are situated more to the southeast – in the Pirin mountains in Bulgaria. These are the only perennial ice masses in Europe to lie south of 42° latitude (Grunewald et al., 2010). Snezhnika glacieret is situated at the NE foot of Vihren peak (2914 m a. s. l.) at altitudes 2400-

2450 m a. s. l. First research of the glacieret was done in 1957-1961 (Popov, 1964), and after a break that lasted more than decades regular observations were renewed by German scientists in the period 1994-2007 (Grunewald, Scheitchauer, 2008, 2011; Grunewald et al., 2008). Since 2008 size measurements have been done on an annual basis by Bulgarian researchers (Gachev et al., 2009; Gachev, 2011, 2014). Here also, results for the last 20 years show great inter-annual amplitudes of size in magnitude of 2.5 (from 0.30 ha to 0.74 ha) with no trend towards shrinkage. The other glacieret, Banski suhodol, which is larger, has been observed still since 2009. It is about twice bigger than Snezhnika, and has the highest altitude (2620-2700 m a. s. l.). For the last 5 years it has been quite stable.

Fig. 1 Location of embryonic glaciers on the Balkan peninsula

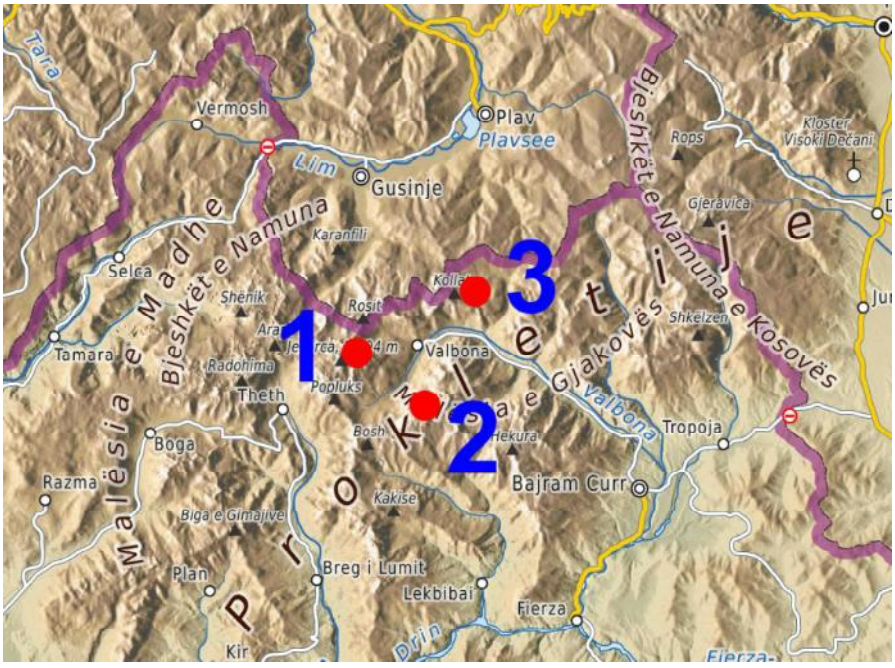

Fig. 2 Areas of present day embryonic glaciers in Prokletije mountains: 1 – Maja e Jezerces; 2 – Hekurava; 3 - Kolata

In the last years all embryonic glaciers of the Balkans show similar size variation trends. Studies of Snezhnika in Pirin have shown a considerable relation between glacieret size and summer temperature, but analyses are often based on climatic information from remote stations. Impact and role of precipitation is still hard to evaluate due to lack of instrumental data. We see the future of this research in the light of cooperation between specialists from the countries within the region (Bulgaria, Serbia, Montenegro, Slovenia and others) and foreign experts (from Germany, the UK, Italy, etc.).

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