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Relationship of climate and glacier mass balance to circulation types and natural hazards in the Mountains of North-Eastern Siberia

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This paper involves a classification of atmospheric circulation patterns, worked out by Boris Dzerdzeevsky in 1970's. This classification provides a set of Elementary Circulation Mechanisms (ECMs) differing in circulation character, availability/absence of Arctic air mass invasions and their position within the Northern Hemisphere, and number and geographic location of the southern cyclones outlets. All variety of macrocirculation processes are described by 41 ECMs.
Using the classification, we analyzed circulation processes over North-East Siberia by correlation of various ECMs recurrence with mean summer temperature (Tsum), precipitation (Xtot), its solid part (Xsol), and representative glacier mass balance. From the range of ECMs we identified those that intensified mountain natural hazards such as mudflows and avalanches. The conclusions obtained are the following.
Positive correlation with Tsum is characteristic of those ECMs which bring continental anti-cyclones. Negative correlations are related to the ECMs with active cyclone activity or to penetrating of Arctic air from Arctic anti-cyclones. Positive correlation with precipitation is related to its fall-out on the fronts of western and southern cyclones; negative correlation to anti-cyclonic regimes or small-gradients of lower pressure.
Fast melting of glaciers and glacier floods are caused by ECM "13summer" when significant positive Tsum anomalies combine with those for Xtot. Formation of mudflows is facilitated by ECMs, responsible for positive anomalies of Xsol (glacial mudflows) as well as by those for both Tsum and Xsol positive anomalies. Avalanche activity is most probable under ECMs providing positive anomalies of Xsol and negative for air temperature. A decrease of avalanches is probable under those ECMs for which negative air temperature anomalies are not always accompanied by positive anomalies of Xsol.