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# Influence of surface meteorological parameters and solar activity on the modification of atmospheric processes in glacier drainage systems



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## **STUDY AREA**

The aim of the present study is to establish the relationships between the formation of glacial crevasses on Livingstone Island and solar activity. the study will use in situ data as well as optical and radar data from various satellite platforms **Satellite** 





**Glacial karst (Cryokarst)** – a set of phenomena and processes developing on the surface of and inside a glacier as a result of the melting of ice and the action of flowing water, similar to the karst phenomena that develop in carbonate rocks.



Schematic vertical cross section of glacier with developed drainage system:

bedrock, 2. layer of temperate ice, 3. layer of cold ice, 4. snow-?m deposits, 5. moraine sediments, 6. supraglacial lakes,
englacial and subglacial channels, 8.glacial crevasses.

I - IV development stages of glacial karst: I - early, II - young, III - mature, IV - old,

I - accumulation area, II - IV - ablation area, H - wadose englacial channels, R - freatic englacial and subglacial channels, Lc - linked-cavities channels in shadow of rock ledges, L - supraglacial lakes.

#### **Correlations between outside temperature ('Temp') and all other**

#### variables are:

0.003997 Rain Temp 1.000000 SunSpots 0.111024 SunFreq 0.026695 -0.647297 S130\_Temp -0.544902 S40\_Temp S130\_Temp\_Lag3 -0.714367 S130\_Temp\_Lag-3 -0.465519 S40\_Temp\_Lag3 -0.427206 S40\_Temp\_Lag-3 -0.554904 Temp\_Lag3 0.554964 Temp\_Lag-3 0.554964



### **CORRELATIONS IN FOCUS**

The outside temperature correlates negatively with that of both indoor sensors. It is also 3 days ahead and 3 days back. Preliminary findings, obtained after more than 5 months of data collection and analysis, show a significant negative correlation between air temperatures in the deep underground streams (at a depth of 130 meters below the surface) and temperatures at the cave entrance (at a depth of 40 meters) during of the winter months. The opposite trend is observed in spring and summer, where higher outdoor temperatures are associated with increased temperatures at the cave entrance, accompanied by lower temperatures in the deeper zone. Additionally, by using "lagged correlations" in the resulting analysis—examining correlations between indoor temperatures and outdoor temperatures over the preceding and following seven days—cyclical changes in heat exchange between the near-atmospheric layer and underground temperatures in the karst system were observed. In particular, a constant increase in temperature at the entrance of the cave was noted three days before an increase in outside temperatures during the spring-summer season.