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PREDICTIVE ANALYTICS APPLICATION EXPERIENCE FOR CLIMATE TRENDS IN CAUCASUS MOUNTAIN REGION

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Summary: *Data about dependences of air temperatures and precipitation from solar activity in Armenia, Azerbaijan, Georgia and Turkey are presented.*

Key Words: *air temperature, total solar irradiance.*

Predictive analytics encompasses a variety of statistical techniques from data mining, predictive modeling, and machine learning, and that analyze current and historical facts to make predictions about future or otherwise unknown events.

The climate change in Caucasus region and its effects on the environment, ecology, and economy in the 20th century close connected with global climate trends.

The growth in the quantity and diversity of data has led to data sets in climatology, larger than is manageable by the conventional tools. To manage these data sets, new methods of data science and new applications in the form of predictive analytics proposed.

The study is based on two fundamental principal in geosciences:

– The global climate is regulated by how much energy the Earth receives from the Sun.
– Uniformitarianism is the fundamental principle that geologic processes and natural laws now operating to modify the Earth's crust have acted in the same regular manner and with essentially the same intensity throughout geologic time.

The goal of this study is to reveal the general underlying structure which generates or allows such a variations in climate and precipitation trends in Caucasus region.

The Earth atmosphere is an open energy system receiving energy from the sun.

We compared solar activity with yearly averaged air temperature and precipitation for four Caucasus region states over the period 1902-2008.

Dependences of air temperatures (T, °C) and precipitation (P, mm) from solar activity (Total Solar Irradiance – TSI, W/m²) in region are following:

Country	Regression (R- coefficient of linear correlation)	
Armenia	T=1,217·TSI – 1655; R=0,73	P = -86,54·TSI + 11874; R=0,78
Azerbadjan	T = 0,853·TSI – 1155; R=0,79	P = 48,14·TSI – 65313; R=0,76
Georgia	T= 1,170·TSI– 1592; R=0,72	P = 73,18·TSI – 99055; R=0,75
Turkey	T = 1,115·TSI- 1512; R= 0,73	P = -74,29·TSI + 10204; R =0,75

Correlations between solar irradiance and climate parameters are higher for directly station measurements, for example an air temperature in Istanbul, T= 0,641TSI – 861,6; r=0,91

Precipitation rates are slightly decreased in cases of Armenia and Turkey on 50 mm over the 100 years observations.

In the next two decades NASA has predicted very weak solar activity, this actually will lead to the temperature decrease in all studied countries on 0, 5°C in the both averaged solar cycles.