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Long term prediction of rivers flowing in latitudinal direction

The sun's energy is the driving force behind the water cycle.The sun bathes the Earth's equator with enormous amount of solar energy. This energy evaporates water, causes atmospheric convection and is transported polewards by winds.

The total amount, or mass, of water in the water cycle remains essentially constant. The hydrological cycle is a closed system because there are no external inputs or outputs of water to or from the system. The same water has been continually circulating since the beginnings of life on Earth.

The specific objectives of this study were analysis of a long term data of solar activity and runoff of the Amur River and the Amazon River. Both rivers flow in latitudinal direction. The average values of Wolf's numbers for solar cycles were compared with rivers discharge.

The study shows the following results:

An empirical relationship between solar activity phases and the Amur River discharge can be written as:

$Q_{Amur} = -0,95W + 297,36; r = 0,85$

-where Q_{Amur} - average calculated discharge of the Amur River in phases of solar activity over the period 1902-1996 in km³/year; W- mean number of sunspots in the same period; r – coefficient of correlation.

An empirical relationship between solar activity phases and the Amazon River discharge can be written as:

$Q_{Amazon} = -15,63W + 6538,7; r = 0,98$

-where Q_{Amazon} - average calculated discharge of the Amazon River in phases of solar activity over the period 1933-1996 in km³/year; W- mean number of sunspots in the same period; r – coefficient of correlation.

Both relationships clearly show, a rise of solar activity leads to decrease of rivers discharge.

There is also a close connection between the Amur River and the Amazon River. This relationship can be described as:

$Q_{Amazon} = 12,7 Q_{Amur} + 2440,1; r = 0,97$

- where Q_{Amazon} and Q_{Amur} - average calculated discharge of the rivers in phases of solar activity in km³/year, r- coefficient of correlation.

The source of the rivers discharge data: The Global Runoff Data Centre.