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Performing Milankoviæ's original oalculations using modern numerical methods

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The mathematical climate of the Earth, the theoretically computed Earth's climate changes, is the masterpiece of M. Milankoviæ published in "Canon of Insolation and the Ice Age Problem (Kanon der Erdbestrahlung und seine Anvendung auf das Eiszeitenproblem, 1941)". In his work Milankoviæ defined the fundamental parameters which govern the variations and march path of insolation of the Earth, the nature of climate and climate feedbacks. These parameters are the eccentricity (measure of the Earth's orbit deviation from circular) with adequately described characteristic period of 100-kyr, the obliquity (tilt of the Earth's rotation axis with respect to the plane of ecliptic) with a period of 41-kyr and the precession (variation in the direction of the tilt at the Earth's closest approach to the Sun) with characteristic periods of 23- and 18-kyr. The records of climate changes in the deep sea sediments and ice cores prove Milankoviæ's theory.

In the development of any mathematical theory, some simplifying presuppositions had to be made in order to investigate the natural phenomena described by means of differential equations, and to be able to integrate these equations. Our aim is to make closer to public Milankoviæ's calculations of the mathematical climate of the Earth performing them numerically and avoid complicated series convolutions. In this contribution we will compare analytical and numerical solutions for the Earth's insolation during the last 600 millennia with an idea to better understand the connection between isolation and the temperature of the Earth and its atmosphere, the displacement of the snow limit caused by march of insolation, the mechanism, complete structure and chronology of ice age and the ice age history the quarternary's great climatic oscillations, this time not "blurred" by complicated series expansions.