

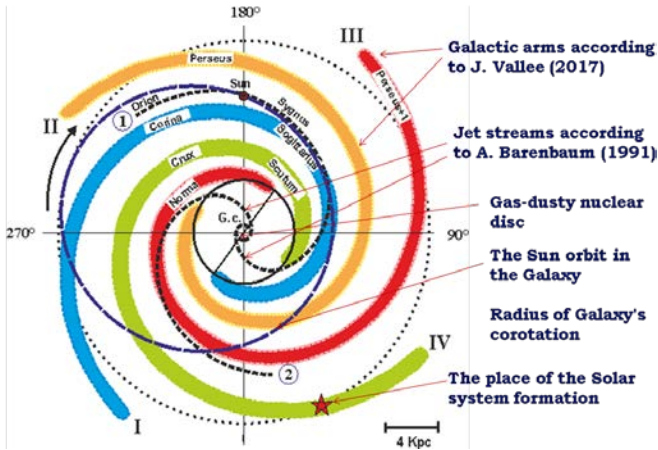
GALAXY CYCLES IN SOLAR SYSTEM

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The cycles of global natural processes on the Earth with periods of ≈30, 250, 1000 and 2000 million years are not a purely terrestrial phenomenon, but a phenomenon that encompasses the entire Solar system. These cycles are the result of the bombings of the Solar system by galactic comets during periods of the Sun's location in jet streams and spiral arms of the Galaxy. A theoretical model has been developed to justify this conclusion. The model is based on adequate models of the spiral structure and of distribution of the gravitational potential in our Galaxy, as well as the calculated orbit of the Sun's movement in the Galaxy, which satisfy the data of astronomy, geology and meteoritics.

Dynamic model of the Galaxy



Model parameters

Gas-dusty nuclear disc

Radius of the disk (R_d) 600 pc
 Period of the disk rotation ($T_d = 2\pi / \omega_d$) 50 million years
 Velocity of jet flow from the disk (V_0) 300 km/s
 Parameter of swirling of jet streams ($\rho = V_0 / \omega_d$) 2.5 Kpc/rad

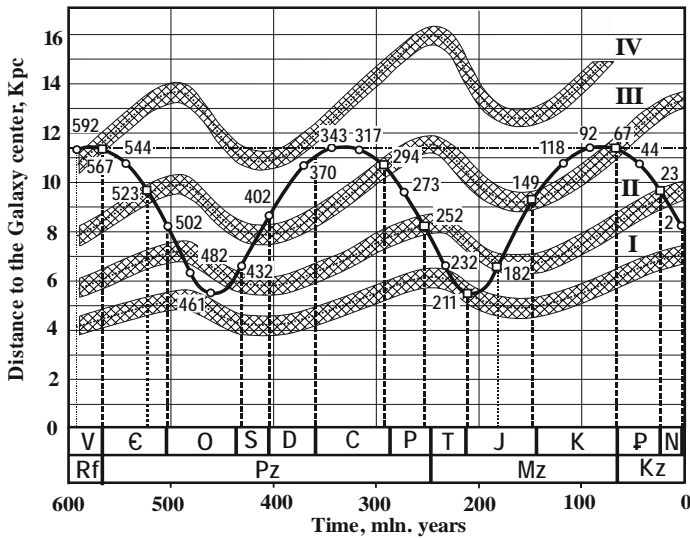
Logarithmic arms

Radius of ring where galactic arms start (R_s) 3.9 Kpc
 Angle of galactic arms twist (i) $-12.2 \pm 0.05^\circ$
 Period of the Galaxy rotation ($T_s = 2\pi / \omega_s$) 200 Ma

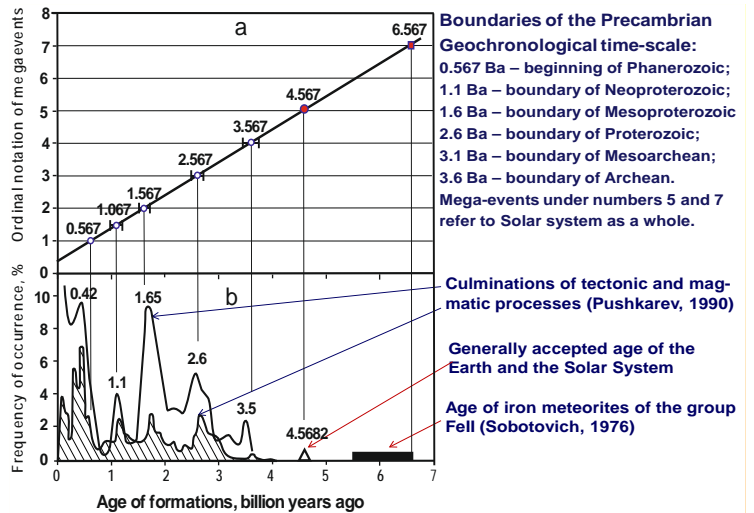
Galactic Sun orbit

Distance of Sun to Galaxy center, Kpc 8.35 ± 0.05 Kpc
 The semi major axis of the solar orbit (α) 8.373 Kpc
 Eccentricity of the Solar orbit (ϵ) 0.37
 The anomalistic period of the Sun rotation (T_R) 250 Ma
 The sidereal period of the Sun's rotation (T_a) 222.22 Ma
 Angle of rotation of the line apsides of solar orbit at Sun's full turn around Galaxy center 45°
 Radius of the Galaxy's corotation ($R_c = \rho / \chi$) 11.47 Kpc

Phanerozoic



Precambrian



Calculation of the boundaries of Phanerozoic geochronological time-scale

Mega-events in the Earth history that define boundaries of the Precambrian Geochronological time-scale

Binding of mega-events to spiral arms of the Galaxy

Spiral arm	Time of event billion years	Boundaries of eons and eonotems
I. Corina-Sogittarius	–	–
II. Perseus	1.567 3.567	Mesoproterozoic Archaean
III. Norma-Perseus+1	1.067 3.067	Neoproterozoic Mesoarchaeon
IV. Crux-Scutum	0.567 2.567 4.567 6.567	Phanerozoic Proterozoic Second cycle of planet formation First cycle of Solar system formation

Conclusions

- The main events in the history of the Solar system and its planets are strictly repeated through 250, 500, 1000 and 2000 million years. Their cause is the bombardments the Solar system by galactic comets during periods of the Sun's location in spiral arms of the Galaxy at a distance of the corotation radius from its center.
- The largest mega-events took place in the Crux-Scutum (IV) arm, less significant events were in the Norma-Perseus + 1 arm (III). Events of even less significance were in the arm of Perseus (II). While in the Corina-Sogittaria arm (I) there was not a single big mega-event.
- Thus the main cycle in the Solar system development has a period of 2.0 billion years and is determined by the Sun's entry into the galactic branch of Crux-Scutum (IV).