Precession of the equinoxes

According to 'MATTER (Re-examined)'

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Abstract: Wobbling, caused by a slow, continuous change in the orientation of the Earth's apparent rotational axis, is called 'precession of the equinoxes'. The rotation of the Earth is an apparent motion only with respect to its central axis. Deflection of the Earth's apparent rotational axis is caused by a shift in Earth's centre of gravity from its geometrical centre due to the non-uniform distribution of its 3D matter-content rather than by precession due to its apparent spin motion. Deflections of Earth's apparent spin axis, caused by a northward shift of its centre of gravity, during Earth's orbital motion on either side of the Sun's mean path are in opposite directions, and hence the resultant magnitude of deflection of the spin axis depends on the eccentricity of Earth's apparent elliptical orbit around the Sun.

In astronomy, 'axial precession' is a gravity-induced, slow, and continuous change in the orientation of an astronomical body's apparent rotational axis. In particular, the term 'axial precession' of the Earth relative to the distant stars refers to the gradual shift in the orientation of Earth's apparent spin axis in a cycle of approximately 26,000 years. At different stages of history, the precession of earth's apparent spin axis due to the shift of the equinoxes westward along the ecliptic, relative to the fixed stars (opposite to the yearly motion of the Sun along the ecliptic) and its components were also called by different names, like precession of the equinoxes, planetary precession, lunisolar precession, precession of the equator, precession of the ecliptic, or general precession.

The stars viewed from Earth appear to move from east to west daily due to Earth's diurnal motion, and yearly due to Earth's orbit about the Sun's mean path. At the same time, the stars appear to anticipate such motion slightly, at approximately 50 arc seconds per year. This apparent phenomenon is known as the 'precession of the equinoxes'. Due to the apparent precession of the Earth's central axis, the positions of the south and north celestial poles appear to trace out circles on the sky against the space-fixed backdrop of stars, completing one circuit in approximately 26,000 years. This also causes slow changes in the Earth's position in its orbit about the Sun's mean path at different times, defined relative to the seasons.

It is physically impossible for a free macrobody to revolve around another moving body in any type of geometrically closed path. This can be observed by watching a person trying to move around another person running along a defined path. Planets are free macrobodies; the central body (the Sun) is a moving body, and a circular/elliptical path is a geometrically closed path. The present explanation of planetary orbits does not take these facts into consideration. All macrobodies in a planetary system, together as a group, move (in the same direction) in a circular path around the galactic centre. The real orbital path of the Earth about the Sun is wavy along the Sun's mean path (solar system), with the Earth moving alternately to the front and to the rear of the Sun. Only when the central body (the Sun) is assumed to be stationary in space does the Earth's orbit appear elliptical, with the Sun at one of its foci.

For rotary motion, diametrically opposite points on a body, in the plane of its rotation, have to move in opposite directions. The Sun is estimated to move in space at a linear speed of about 250000 m/sec. The Earth (its central axis) moves in space along with the solar system at an average linear speed between 250000 ± 3000 m/sec (about 3000 m/sec in its imaginary elliptical path with respect to the static sun). Differences in the linear speeds of diametrically opposite points on the Earth's equatorial plane produce the Earth's apparent spin motion about its central axis. Due to the Earth's apparent spin motion, diametrically opposite surface points on its equator appear to move in opposite directions at a linear speed of about 463.8 m/sec with respect to its central axis. Therefore, any point on Earth's equator moves in space in the same direction at a linear speed between 250000 ± 3000 ± 463.8 m/sec along the Earth's real orbital path. As all points on the Earth move in the same direction, the motion of the Earth does not constitute real rotation. Earth's rotation is apparent only in relation to its central axis. Therefore, the assumption that the 'axial precession' of the Earth's central axis is caused by apparent spin motion is not tenable.

The Earth is not a perfect sphere but an oblate spheroid, with uneven 3D matter (mass) distribution. The greater part of Earth's land mass above mean sea level is situated in the northern hemisphere. Hence, the centre of mass of the Earth is away towards the North Pole from its geographical centre. Greater gravitational attraction on the northern hemisphere tends to continuously tilt the Earth's central axis in the direction of gravitational attraction on it. Tilting efforts on Earth towards each of its neighbouring bodies, together, produce continuous resultant angular deflection of Earth's central axis that appears as wobbling of the central axis in space. Therefore, 'precession of the equinoxes' of the Earth is caused by the gravitational attraction between the Earth and the Sun, the Moon, and (to a lesser extent) other nearby macrobodies.

Figure 1 shows the representation of displacements of the Earth and the Sun in space during a one-year period. [All other planets in the solar system also undergo similar displacements]. The median path of the Sun in

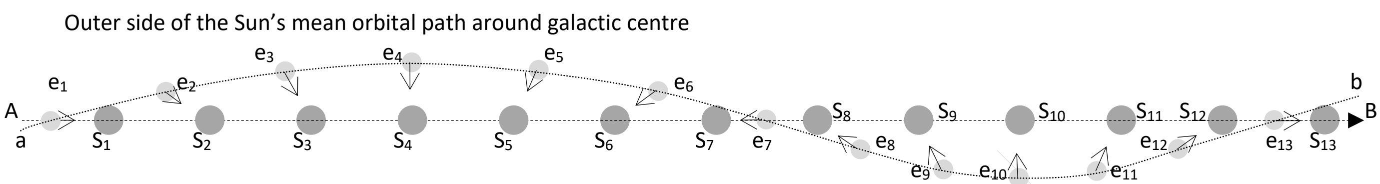

Figure 1

space is represented by the arrow AB. Positions of dark circles S1, S2, S3, …………… and S13 represent positions of the Sun at intervals of 1 month each. Positions of the Earth, corresponding to the positions of the Sun at S1, S2, S3, …………… and S13, are shown by grey circles e1, e2, e3, …………… and e13 on the curved wavy orbital path of the Earth, ab. The small arrows, originating from the grey circles towards corresponding dark circles, show the directions of Earth's displacements due to gravitational attraction (central force) between the Earth and the Sun. The most important function of the central force on the Earth is to shape its orbital path about the Sun's mean path around the galactic centre. Other less important functions cause apparent spin motion of the Earth about its central axis, changes in the Earth's shape due to tides, apparent precession of the Earth's central axis, etc.

Displacement of the centre of gravity of the Earth (from its geometrical centre towards the north pole) tends to tilt the Earth's central axis in the plane of its apparent spin motion. Greater gravitational attraction on the northern hemisphere of the Earth tends to tilt its central axis towards the sun. During its orbital motion, the Earth places itself on either side of the Sun's mean path every successive half-orbit. Directions of deflection of the central axis during successive half-orbits, when the Earth is on either side of the Sun's mean path, are in opposite directions, and they tend to almost wholly cancel each other. Therefore, the magnitude of the resultant tilt caused by the gravitational attraction between the Earth and the Sun in one whole year is very minute and cumulative. The magnitudes of resultant tilts caused by the gravitational attractions between the Earth and other neighbouring macrobodies depend on their relative positions with respect to the Earth.

The resulting tilt of the Earth's axis during one full year is very small (like 50 arcseconds per year) and may be noticed after a very long period. This motion is called 'precession of the equinoxes' and consists of a cyclic wobbling in the orientation of Earth's axis of apparent rotation. Similar tilting efforts due to gravitational attraction between Earth and all other macrobodies in the neighbourhood are also present. The resultant of all these displacements, together, shows a ‘precession of the equinoxes’ of Earth. The ends of the Earth's central axis wobble and trace apparent circular paths in space with an estimated period of ‘25,772 years’.

The magnitude of the wobbling of a planet’s central axis depends on the difference between the eccentricities of its orbital path on either side of the central body’s mean path. Should the eccentricities be equal on either side of the central body’s mean path, the central axis of the planet would not wobble at all. For a full description of this phenomenon, kindly refer to the book 'MATTER (Re-examined)’ and http://www.matterdoc.in.

Reference:

https://www.matterdoc.in

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