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To explanation of annual variation of mean sea level

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The analytical description of oceanic tides with the annual period caused by action of gravitational and rotational mechanisms is given. Among them: tide, caused by a gravitational attraction of the Sun (S); an inversion tide (I), caused by a gravitational attraction of superfluous mass of the core, making annual oscillations (Barkin, 2005); a tide, caused by attraction of the Moon (M); a tide, caused by pole oscillation with the annual period (P); a tide, caused by annual variation of axial rotation of the Earth. The maximal amplitude of the S tide in equatorial zone consists about 9.44 mm. The amplitude of the I tide is evaluated in 8.61 mm in subpolar areas. The polar annual tide also is characterized by the maximal amplitude about 9-10 mm for the definite areas of the Earth. The annual variation of rotation of the Earth causes small equatorial tide R with amplitude about 0.1 mm. The amplitude of lunar annual tide M even less also makes about 0.06 mm. Tides S, I and M depend on latitude and do not depend on a longitude. Tide P depends both on latitude and from a longitude. In particular the I tide is proportional to a sine of latitude, and the S tide is proportional to square of sine of latitude. From a condition of a constancy of volume of tides (mainly the tides S and I) the annual variation of the average level of ocean was revealed and with the maximal amplitude of 5.64 mm, and the maximum of a level of ocean falls to latter summer. This model result will be coordinated with data of satellite altimetry measurements which determine geocentric level of the sea level in 7.6+/- 0.7 mm. TOPEX and POSEIDON results specify amplitude of annual variation of mean average level of ocean with amplitude from domain of 7.1 mm - 9.5 mm. And the maximum of rise of sea level happens on September, 12-24. In Clarke et al. (2002) the identical evaluation of amplitude of an annual variation of mean sea level of 8.0 +/-0.8 mm (with a maximum of value in middle of August) has been obtained. Some correctives in our theoretical result will be made in future by consideration definite climatic factors of redistribution of the ice-water masses and atmospheric masses. Important effects also will be determined by a spatial character of annual oscillations of geocenter (and the

core of the Earth) and oth.

Referenses.

Barkin Yu.V. (2005) Oscillations of the Earth core, new oceanic tides and dynamical consequences. Materials of XI International Scientific Conference “Structure, geodynamics and mineral genetic processes in lithosphere” (September, 20-22 2005, Syktyvkar, Russia), Publisher of Geology Institute of Komi SC of Ural Section of RAS, Syktyvkar, pp. 26-28. In Russian.

Clarke P.J., Blewitt G. (2002) Inversion of solid Earth’s varying shape: global mean sea level variations. American Geophysical Union, Fall Meeting 2002, abstract # G11A-01.