Number 2, February 1963

Tidal Evolution of the Earth-Moon System, E. L. Ruskol, pp. 129–133.

It is shown that the present observed lag in the tides in the solid body of the earth allows us to construct a consistent picture of the formation of the moon from a swarm of small satellites moving about the earth at distances of 5–20 earth radii, with the subsequent recession of the moon to its present distance being a

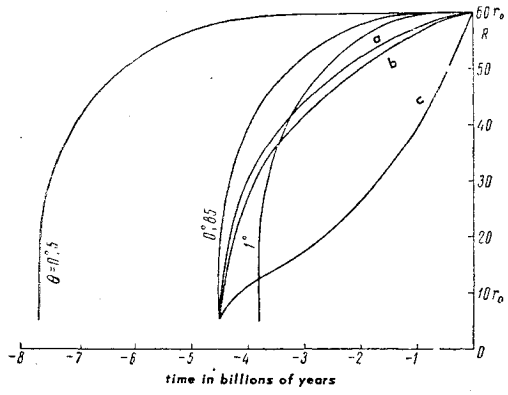


Fig. 1 Change of the earth-moon distance with time for different earth tide lag angles θ: a) $\theta = 1.7° (1 - t/t_{\text{initial}})$, $t_{\text{initial}} = 4.5 \times 10^9$ yr, $\theta_{\text{present}} = 1.7°$—; b) $\theta = 0.05° + \beta (t - t_{\text{initial}})^2$, $\theta_{\text{present}} = 2.1°$—; c) $\theta = 0.02''$ exp$\gamma (t - t_{\text{initial}})$, $\theta_{\text{present}} = 10°$.

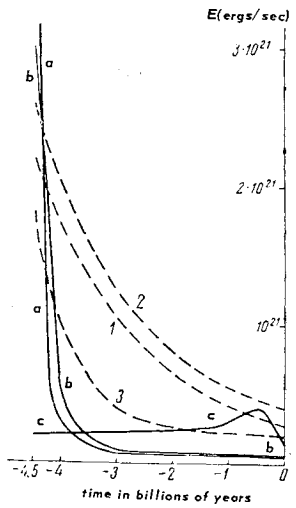


Fig. 2 Generation of heat within the earth by tidal friction (a, b, c refer to cases where the lag angle θ changes) and by radioactivity for an earth-moon system age of $4.5 = 10^9$ yr: 1) radiogenic heat for $n = 1$ ($U = 10^{-8}$ gm/gm; 2) the same for $n = 2$ ($U = 2 \times 10^{-8}$ gm/gm); 3) radiogenic heat according to Urey.

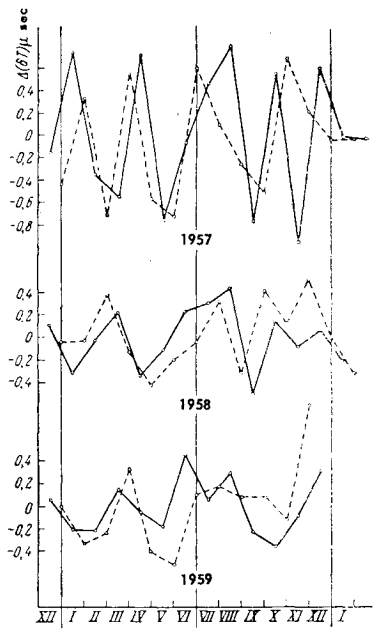
result of tidal interaction with the earth over a time of 4.5 billion years. An estimate is given of the generation of heat within the earth as a consequence of tidal friction at various epochs, in comparison with the heat generated by the disintegration of radioactive elements.

Earth Tides and the Internal Structure of the Earth, N. N. Parĭiskiĭ, pp. 115–128.

A summary is given of the contemporary state of various methods of studying the tidal deformation of the earth with the object of investigating its internal structure, and determining the Love numbers h, k, and l. Nine methods of determining the Love numbers are described, and a résumé is given of results (in the form of tables) with estimates of their accuracy. Particular attention is given to the most accurate method—that of measuring the tidal variations of the force of gravity. A formula is derived for the factor δ for the tides expressible by spherical harmonics of both the second and third order. The necessity of taking the inertial terms into account is proven. The main results of the theoretical work of M. S. Molodenskii are described, with his results in the theory of static tides and their relation to the internal structure of the earth, and also conclusions from his new dynamic theory of diurnal tides and nutation which takes the liquid state in the earth's core into account. Results are given of observational dipmeter and gravimeter work carried out recently by the Institute of Physics of the Earth, Academy of Sciences, USSR, that confirm this theory: the difference between the values of δ for O_1 and K_1 waves in Tashkent is $+0.027 \pm 0.003$. We give a preliminary survey of the determination of the phase lag of earth tides from observations taken by the Institute of Physics of the Earth in Central Asia and from international results, which shows that the tidal lag is approximately 20 min. The reality of this value is discussed and also its geophysical significance. The main problems of future work in the investigation of earth tides in connection with determining the internal structure of the earth are considered.

Influence of Fluctuations of Atmospheric Circulation of the Earth's Rotation, N. S. Sidorenkov, pp. 234–236.

The earth's atmosphere is constantly in motion relative to its surface because of effects produced by external fields, especially that of solar radiation. Consequently, a constant exchange of angular momentum occurs between the atmosphere and the earth. We shall here consider the effect of this exchange on the rate of the earth's rotation.



Variation of the monthly increments in length of day: —— Paris Observatory, --- theoretical.

The comparison and analysis of the theoretical and observed characteristics of the earth's rate of rotation lead to the conclusion that fluctuations of atmospheric circulation can evidently account for much of both the annual and irregular variations of the earth's rate of rotation.

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Radiation from Charged Particles Moving Faster Than Light and Its Utilization in the Physics of High-Energy Particles, P. A. Cerenkov, pp. 14–20.

Uses of Luminescence in Biological Research, L. A. Tumerman, pp. 84–92.

Spectral Investigation of the Luminescence of Malignant Tumors, A. V. Karyakin, pp. 93–97.

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Use of Computers for Analysis of Crystal Structures, M. A. Porai-Koshits, pp. 328–336.