

## On precise analyses of the earth tidal extension

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The solid earth is composed of deformable materials. So, the observed apparent angular velocity of the component wave in the earth tide may be not equal perfectly to those of the tidal potential. To study the behavior, by use of 44,965 observed values of the tidal extension on S 52 deg. E in old Osakayama tunnel are analysed 8 main components tide. By this analysis, the phase lag of the semi-diurnal tide are nearly equal to 0 deg., and that of the diurnal is about 20 deg. And the value of S2 wave is occupied fairly large effect from the radiation tide.

Analyses of 4 observed series larger than 6,000 values show that the angular velocity of M2 and O1 are in agreement within 0.01 deg. to those of the tidal potential.

The earth is constructed from deformable materials. So, apparent periods of the deformation would be observed on the earth tide is not equal to that of the tide generating potential. To study the behaviour of the deformation, the earth tidal extensions which have been observed on S 52 in degree E in the old Osakayama tunnel from 1975 to 1982 are analyzed precisely.

In this analyses, the tidal variations are extracted at first the semi- and diurnal tidal variations from the observed value every 30 minutes. Then, Fourier integral of the series of the tidal variations is calculated individually for 8 main waves.

According to the model analysis, by use of 10,000 observed values, for example, the series is can be separated nearly into S2 and K2 waves.

By use of 44,965 in degree S observed tidal values, following 8 main waves are analyzed.

wave	amplitude	phase	wave	amplitude	phase
M2	0.61E-08	359.05°	K1	0.29E-08	18.42°
O1	0.25	20.13	K2	0.12	17.53
S1	0.05	264.67	P1	0.15	20.09
S2	0.29	298.53	N2	0.14	0.17

It seems that the phases of the semi-diurnal waves are about 0 in degree, and those of the diurnal waves are about 20 in degree. The each seasonal amplitudes of S1 are large, and their phases show a violent variation with the observing season. So, the mean amplitude for long period are not large

According to 4 analyses of M2 and O1 of the series whose data are more than 6000, the peaks of the characteristic curve of the amplitude vs. the angular velocity are in the agreement within 0.01 in degree with that of the tidal potential. The peaks of the characteristic curve for S2 are at 29.9 in degree to 30.01 in degree, and those for N2 are at 28.93 in degree to 28.95 in degree. From these results, we may have the hope for the study of physical property.