

## Generation of a new chaos mode by time varying geopotential field and the effect on ULF electromagnetic emission

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Generation of a new chaos mode by a geopotential change is presented.

This mode is generated at the time when temporal change in crustal deformation is in accord with that in geoidal height. Moreover, around the zone of increasing geoidal undulation, this mode is stimulated by growing maximum shear strain so as to stabilize the geopotential field in the area and regulate further crustal upheaval. In the generation process

of this chaotic mode, temporal change in the geopotential causes the stimulated ULF electromagnetic wave emission through pseudomagnetic temporal change. The intensity of ULF emission is estimated and reported, assuming pseudomagnetic field change.

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Concerning rates of secular changes in ellipsoidal and orthometric heights, approximation of  $dh=dH$  has been so far expected to hold theoretically from continuous GPS and leveling observations, where  $dh$  and  $dH$  are changes of ellipsoidal and orthometric heights, respectively.

Contrary to the theoretical expectation, recent observations by the Geographical Survey Institute(1999) show no coincidence at all between two terms.

For solving this problem, a new equation to determine the temporal changes in geodetic heights is proposed, assuming that the ellipsoidal height  $h$  is a function of  $H$  and  $N$  and totally differentiable.

From the derived equation, it is pointed out that a new chaos mode is physically generated by a geopotential change at the time when the temporal change in the vertical deformation coincide with that in the geoidal height. Moreover, around the zone of increasing geoidal undulation anomalies, this mode is stimulated by the growing maximum shear strains so as to stabilize the geopotential in the area and regulate further crustal upheaval.

In the generation process of this chaotic mode, temporal change in the geopotential causes the stimulated ULF electromagnetic

emission through pseudomagnetic temporal change and so on.

For the purpose of short period earthquake prediction, detection of this stimulated ULF emission is very important.

The intensity is estimated and reported, assuming pseudomagnetic field at the time of geoid induced chaos mode.