Geophysical Research Abstracts, Vol. 8, 03678, 2006
SRef-ID: 1607-7962/gra/EGU06-A-03678

Use of phase space representation to investigate points of geodynamical interest

G. Bartha (1), M.G. Doufexopoulou (2), B. Massinas (2)

(1) University of Miskolc , Dpt. of Geodesy and Mine Surveying, Hungary,

email: iitgabor@uni-miskolc.hu / Phone: +36 -46 -565070

(2) National Technical University of Athens, School of Rural & Surveying

Engineering , Greece,

email: mairiedf@central.ntua.gr / Phone: +30 -210 -7722664

The kinematical behavior of points on an area of geodynamical interest is analyzed in a low – dimensional Riemann phase space in contrast to classic approaches that operate in time or frequency domains or in physical space. The phase space is reconstructed from series derived from regularly repeated GPS measurements that were transformed into a unified terrestrial frame. For the reconstruction the time-delay method was used, a concept in nonlinear time series analysis as developed by Packard (1981) and proved by Takens (1981). The underlying dynamical model is a Hamiltonian motion equation so the reconstructed space is extended according to holonomic conjugated Hamiltonian coordinates. The GPS measurements are selected from a small area of geodynamical interest after its investigation based on analysis of raw geoidal signals, done by Doufexopoulou at al. (2005). Points from a neutral zone are used also for comparison purposes.

The investigation aims to show that there exist significant differences in essential features of the chaotic behavior of the dynamical systems derived from the points of geodynamical interest and those from the neutral zone (in level of determinism and stability, in attractors, etc.). The method can be used to detect and investigate areas with geodynamical interest where already exist time dependent GPS measurements and at a large, continental scale.