Abstract Details

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Title: Transient and seasonal signals in GPS: How to discriminate?

Abstract:

Densely deployed GPS permanent tracking stations are useful in identifying faults where slow slip events have occurred. On the other hand, GPS signals contain fairly large amount of seasonal components whose considerable part comes from seasonal changes of surface loads, such as snow, atmosphere, reservoirs, and soil moisture. Such seasonal signals have been removed in an adaptive way, i.e. amplitudes and phases of annual and semiannual components are estimated by the least-squares method using parts of time series not affected by transient signals. This scheme could break down by several factors, e.g. inter-annual variation of seasonal changes and insufficient duration of normal periods. The Tokai slow slip event started in 2000 autumn, and has been continuing until now. Its seismic moment release curve seems to show a certain seasonal modulation. It is not clear at the moment whether this is a real variation driven by surface loads or a spurious signal due to inappropriate removal of seasonal signals in GPS data. In this paper I explore a way to correct GPS site coordinate data time series for seasonal signals without relying on the adaptive method, i.e. by (1) calculating load changes with meteorological and geophysical data and models, and (2) calculating consequent crustal movements, and (3) removing calculated seasonal signals from GPS data. In the paper I also discuss factors giving rise to false seasonal signals, such as vertical movements of fixed references, scale changes due to absolute atmospheric delay errors, and negligence of atmospheric delay gradients.

Presentation Mode:

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