# Variation of strong motion amplitudes inferred from observed data pairs which magnitudes and hypocentral distances are almost same

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The variation of the strong motion amplitudes is investigated using 245 observed data pairs due to events which magnitudes and hypocentral distances are almost same. The epicenters of these events are located mainly in the area of east off Fukushima prefecture, southwestern Ibaraki prefecture and east off Izu peninsula. The analyzed strong motion data are observed at 11 sites around these areas. Using these data, we evaluate component dependent variation, which represent random fluctuations of seismic waves and/or anisotropic site responses, from the differences of the amplitudes between NS and EW components of each event. Also we evaluate event dependent variation, which is originated by the variation of the source radiations and/or the differences of wave propagating paths, by comparing logarithmic average amplitudes of NS and EW components between two events in each pair. From the acceleration peak amplitudes of the above all data pairs, the natural logarithmic standard deviations (LNSTD) of component dependent variation, event dependent variation and both of them are estimated at 0.23, 0.43 and 0.49, respectively. Evaluated LNSTD of 0.49 for the total variation is in good accordance with the results of Takahashi et al.(1998). LNSTD of the event dependent variation and the total variation decrease to 0.38 and 0.44, respectively, when excluding data pairs of different epicentral areas. In this study, the total variation of the strong motion amplitudes is resolved into variation due to source radiation, rupture directivity and component dependent variations. According to the above results and the previous study on the variations of the strong motion amplitudes due to the rupture directivity by Nakamura and Yasiro(2000), LNSTD of the variations of the peak accelerations due to these factors are inferred as 0.32, 0.20, 0.23, respectively.