Geophysical Research Abstracts
Vol. 16, EGU2014-1134, 2014
EGU General Assembly 2014


# SENSITIVITY ANALYSIS AND BAYESIAN INFERENCE OF MANNING'S N FRICTION COEFFICIENT DURING A TSUNAMI EVENT USING POLYNOMIAL CHAOS

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We present an efficient method to perform a sensitivity analysis of the Manning's N friction coefficient in the event of tsunamis. We also infer Manning's N friction coefficient using water surface elevation data obtained during Tohoku tsunami. We characterize the Manning's friction coefficient by three different parameters assumed constant in three regions: $N_1$ on-shore, $N_2$ near-shore and $N_3$ deep-water. The efficiency of our approach stems from the use of polynomial chaos expansions to build an inexpensive surrogate for the numerical tsunami GeoClaw model that can be used to perform the sensitivity analysis. The surrogate also reduces the computational burden of the Markov Chain Monte-Carlo sampling needed for the Bayesian inference. Our objective is to sharpen three initial estimates of the three uncertain parameters. Our results indicate that Manning's N friction coefficients have a Maximum-A-Posteriori (MAP) values of $N_2$=0.011 and $N_3$=0.185 while for $N_1$ no meaningful MAP value can be determined using the available data.