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# Bayesian analysis of the modified Omori law

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In order to examine variations in aftershock decay rate, we propose a Bayesian framework to estimate the $\{K, c, p\}$-values of the modified Omori law (MOL), $\lambda(t) = K(c + t)^{-p}$. The Bayesian setting allows not only to produce a point estimator of these three parameters but also to assess their uncertainties and posterior dependencies with respect to the observed aftershock sequences. Using a new parametrization of the MOL, we identify the trade-off between the $c$ and $p$-value estimates and discuss its dependence on the number of aftershocks. Then, we analyze the influence of the catalog completeness interval $[t_{\mathrm{start}}, t_{\mathrm{stop}}]$ on the various estimates. To test this Bayesian approach on natural aftershock sequences, we use two independent and non-overlapping aftershock catalogs of the same earthquakes in Japan. Taking into account the posterior uncertainties, we show that both the handpicked (short times) and the instrumental (long times) catalogs predict the same ranges of parameter values. We therefore conclude that the same MOL may be valid over short and long times.