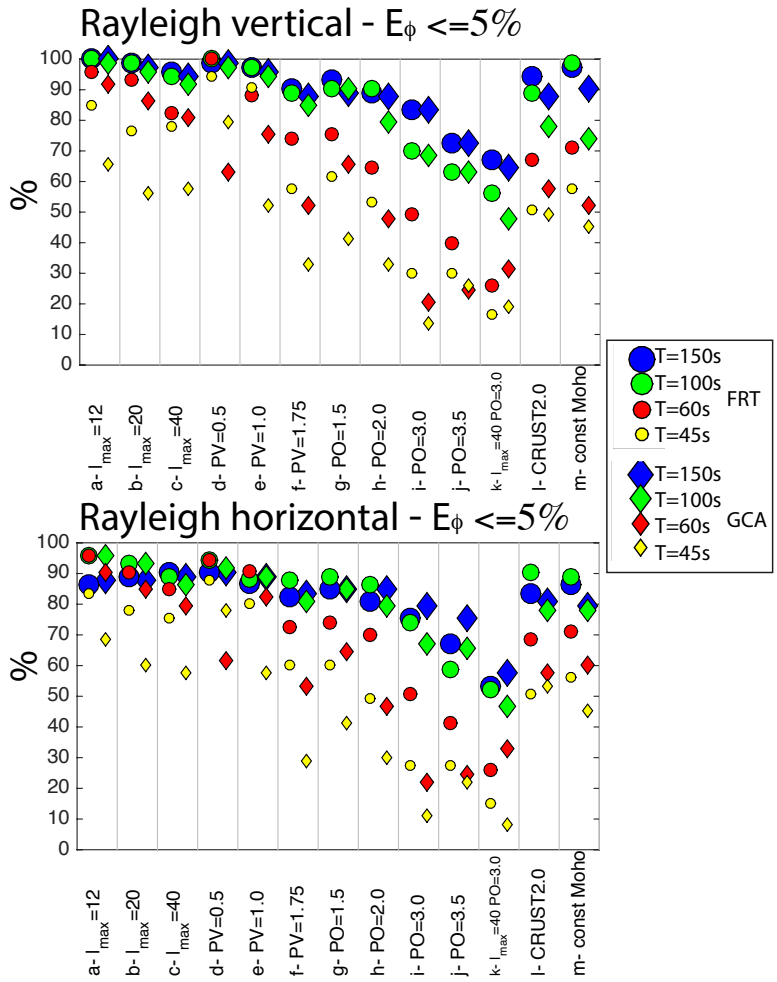

Figure S1: Percentage of all FRT (circles) and GCA (diamonds) waveforms with E_ϕ less than 5% for each model and wave period considered.

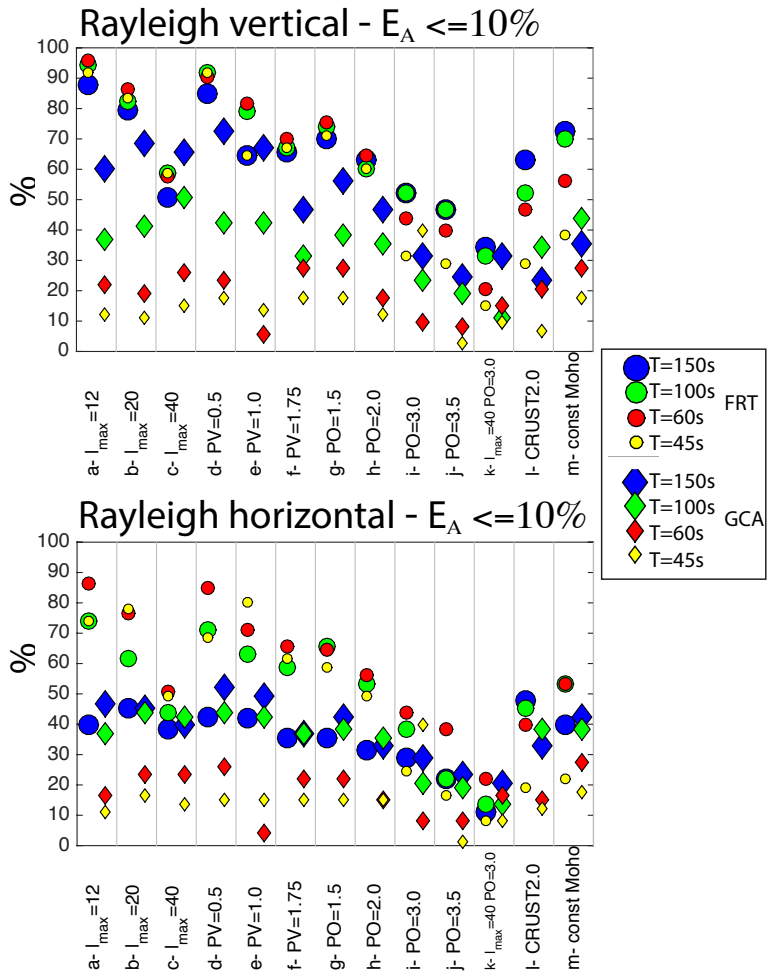

Figure S2: Percentage of all FRT (circles) and GCA (diamonds) waveforms with E_A less than 10% for each model and wave period considered.

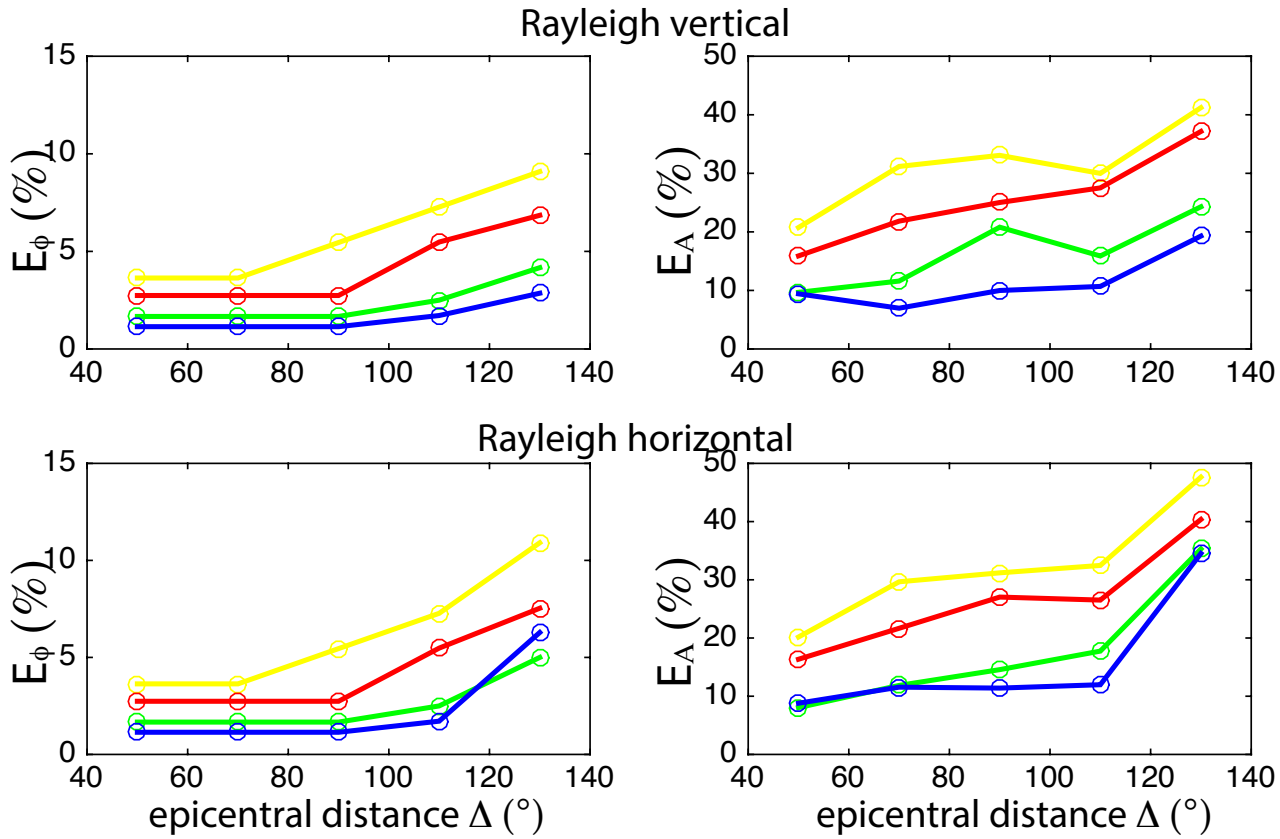

Figure S3: Phase (left) and amplitude (right) errors for GCA waveforms plotted as functions of epicentral distance, for models obtained by varying PV, PO and l_{max} . For each period, each point (circle) in the plot corresponds to the median of the errors for the models from a to j calculated in bins of epicentral distance 20° wide. The curves are obtained interpolating the obtained points.

Error/misfit		Data vs			SEM vs	
		GCA	FRT	SEM	GCA	FRT
$\delta\phi/E_\phi\,(\%)$	45s	25.55	25.35	25.45	5.45	3.64
	60s	14.38	17.81	13.70	4.11	2.74
	100s	5.42	5.83	5.00	3.33	1.67
	150s	2.45	2.96	2.86	1.71	1.14
$\delta A/E_A\,(\%)$	45s	49.77	54.74	71.60	27.36	18.76
	60s	40.36	44.02	50.26	19.16	9.18
	100s	20.23	22.10	34.90	16.31	6.88
	150s	13.24	11.72	16.34	17.34	6.05

Table S1: Middle column: data misfits in phase ($\delta\phi$) and amplitude (δA) for synthetic waveforms calculated with GCA, FRT and SEM. Right column: errors in phase (E_ϕ) and amplitude (E_A) for waveforms calculated with GCA and FRT (against SEM). Misfits and errors are shown at wave period of T$\sim$45 s, 60 s, 100 s and 150 s.