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# How subduction velocity and width of the seismogenic zone control subduction megathrusts seismicity

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Seismic characteristics of subduction megathrusts have been related to various geodynamic parameters. However, correlations are generally weak and difficult to interpret due to the short instrumental record and multi-parameter influence. Here we use benchmarked against each other analog- and numerical models to investigate how subduction velocity Vs and the width of the seismogenic zone W control seismic rate $\tau$, characteristic seismic rate $\tau$c, maximum magnitude Mmax and moment release rate MRR. The models create thousands of years long timeseries of stress build up and release via frictional instabilities (i.e. modeled earthquakes). We find that Mmax increases with W and is unaffected by Vs, $\tau$ increases with Vs, $\tau$c increases with Vs/W, MRR increases with Vs*W. In nature, only the positive correlation between Vs and $\tau$ is significant. By random sampling our time series we suggest that a minimum span of 1 to 5 times $\tau$c (or even longer timeseries in case of outliers) would be needed to observe at least one event that rupture the 80% of the maximum rupture width.