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Vs30 as a proxy for site-response – regional difference and suggested practice

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VS30, the time-averaged shear-wave velocity of the top 30 meters, is used as the primary parameter to describe site effects in many Ground Motion Prediction Equations (GMPEs) around the world. There is no debate that VS30 is not a fundamental physical parameter that controls the site response, but in regions where it is correlated to the full velocity profile it can be used as a proxy to describe the response of the entire soil column to seismic loading.
In this presentation, we explore the correlation between VS30 and ground motion amplification, based specifically on the NGA-West2 ground motion and site databases. We show the range of shear-wave velocity profiles represented in the site database for three different regions and compare the median and variability of profiles as an indicator for the effectiveness of VS30 as a successful proxy for site categorization. We than provide guidance as to the use of the VS30 scaling within the GMPEs. We review typical issues in using VS30 scaling within GMPEs for site response analysis. For example – we discuss the differences in using depth scaling based on Z1.0 vs. Z2.5 and provide guidance on definitions of these parameters. We discuss how to choose the velocity horizon in which to input a rock motion for site-response analysis and how to correct for the velocity gradient at the surface.