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Can we infer the stiffness of the Matterhorn (CH) based on ambient vibrations?

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Reliable rock slope stability assessment depends on the ability to characterize and quantify stability relevant properties as for example the internal structure of a rock slope. So far, to our knowledge, no study successfully determined the stiffness of a whole mountain. Here, we evaluate the structural characteristics of the Matterhorn (Swiss Alps) based on ambient vibration measurements using three seismometer stations (Nanometrics Trillium Compact 20s). We identified the fundamental resonant mode which consists of polarized horizontal ground motion at the summit of the Matterhorn. Based on that, we aim to infer the stiffness of the Matterhorn by reproducing field data in 3D numerical eigenfrequency simulation with Young's modulus that vary with strain magnitude.

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