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Thoughts on the optimal shape of steep rock walls

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Rock-fall dominated landscapes cover a quarter to a third of the area in mountain belts, but this common landscape has so far been little studied by geomorphologists. While there are abundant studies dealing with the rock fall process, especially from a natural hazard perspective, the reasons for the creation, and the disappearance of rock-fall source regions and their long-term evolution has received little attention. Here, I present a conceptual model of the rock wall system and suggest nomenclature. Based on mechanic considerations I propose that there is an optimal shape for rock falls made of massive rock, i.e. where the length scale of cracks, joints and other weaknesses in the rock is much smaller than the height of the rock face. The size of deviations from such an optimal curve in the profile of cliffs could be used to map rock-fall prone regions. A tentative theoretical curve is compared to the shape of various rock domes in granitic massifs.