# Systematic underestimation of soil carbon stocks in sloped terrain: a case study for the Bavarian Alps

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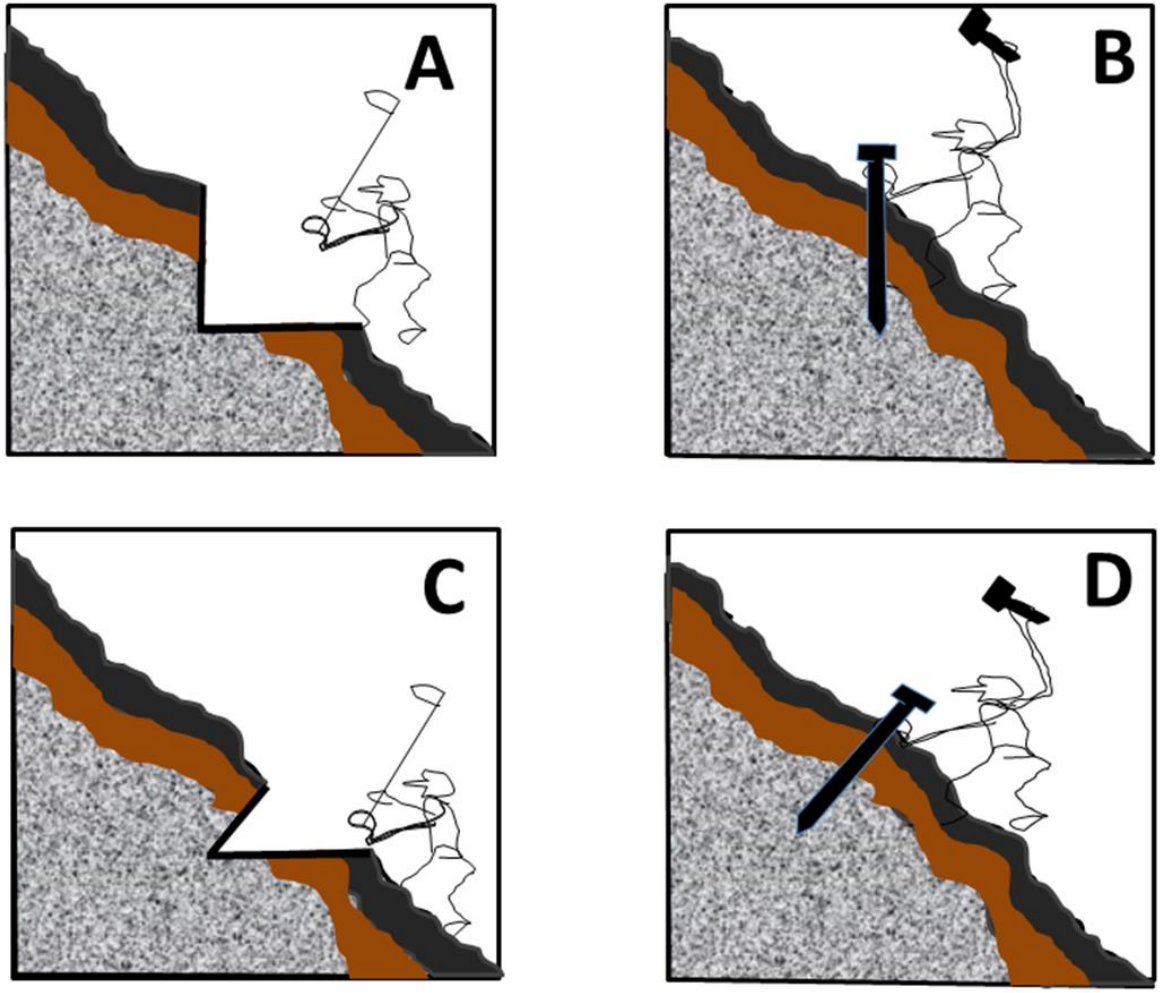
# Soil sampling in mountainous regions/sloped terrain?

Plumb-vertical

or

orthogonal to slope gradient




?



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# Quantification of soil/horizon depth in mountainous regions?

Soil sampling most often plumb-vertical…

…instead of orthogonal to slope

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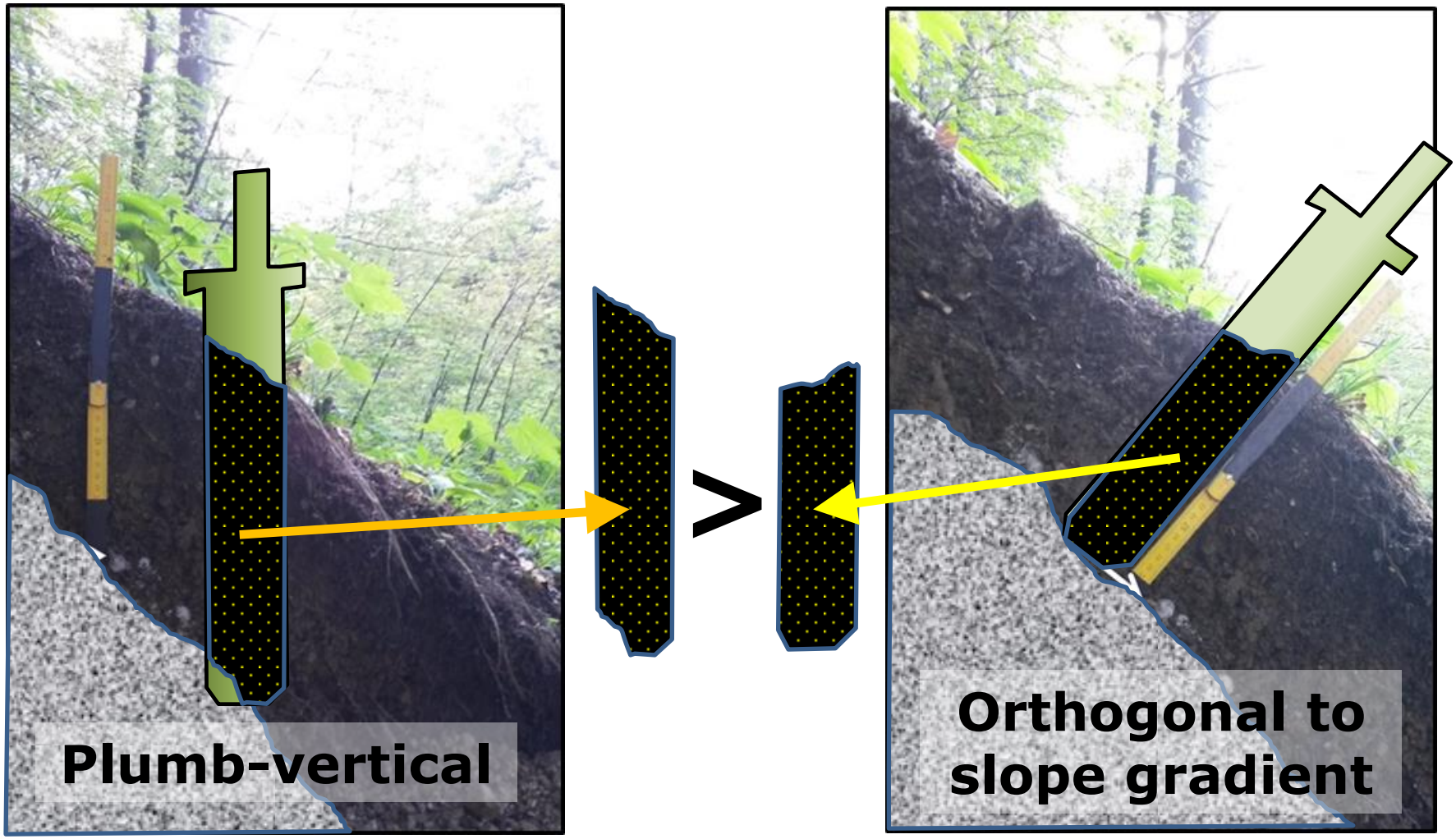
# Effect of soil sampling technique on „local SOC stock“



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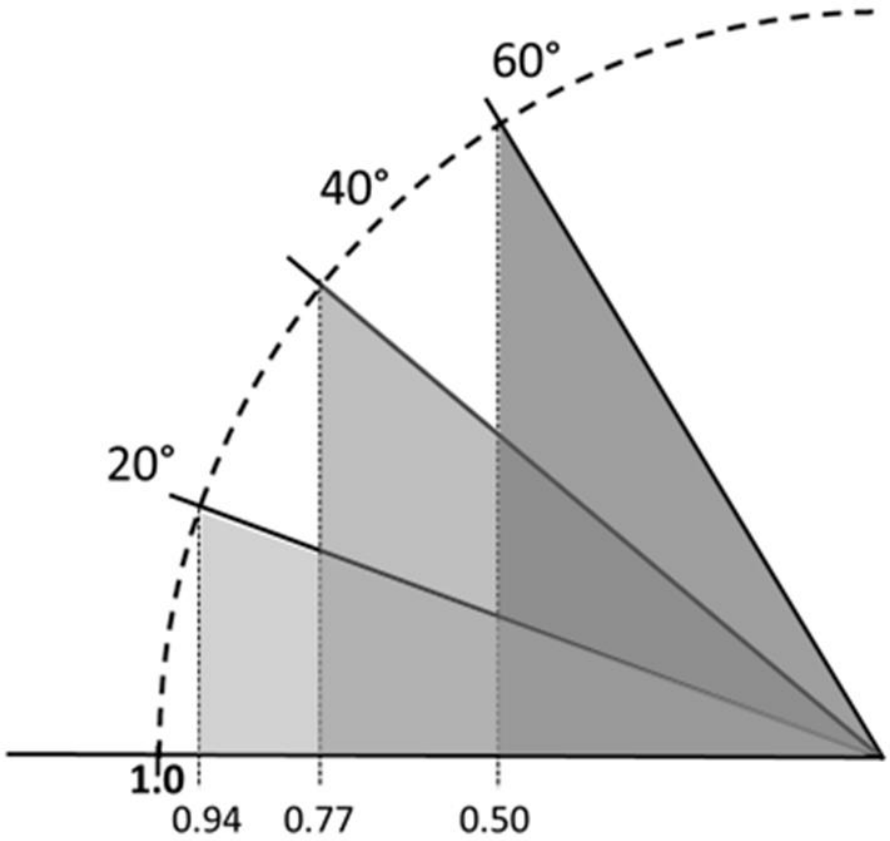
# Effect of horizontal projection on „regional SOC stock“




Area (Horizontal projection)
= Slope area * *cos* (slope angle)

60°

40°

20°



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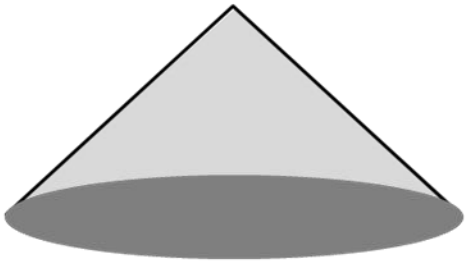
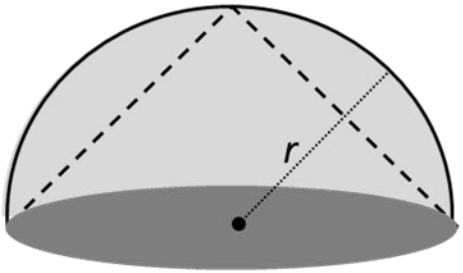
# Effect of horizontal projection on „regional SOC stock“

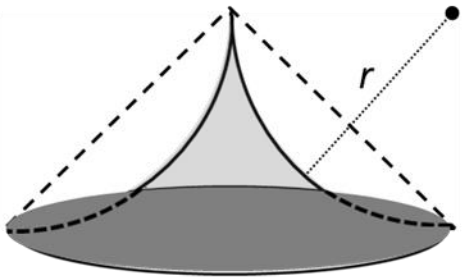
**Cone (circular base):**
*Constant slope inclination*
*Slope: 40°*
M/B= 1.31

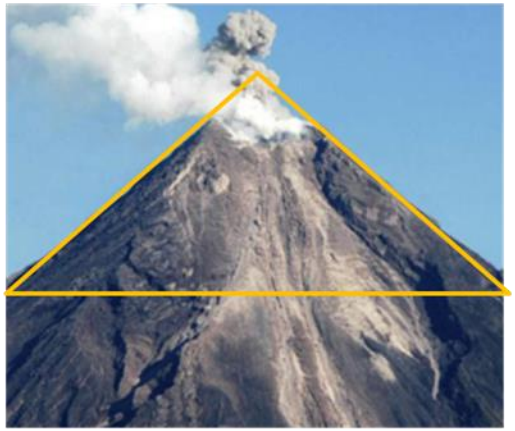
**Dome (circular base):**
*Convex curvature 1/r*
*Mean slope: 40°*
M/B=1.45

**Horn (circular base):**
*Concave curvature 1/r*
*Mean slope: 40°*
M/B=1.45



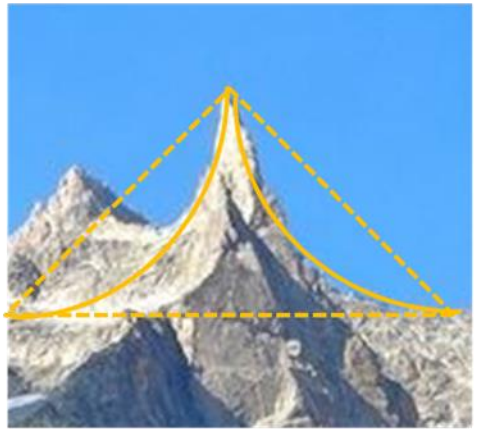


Mt. Majon

Mt. Kailash



Aiguille Dibona



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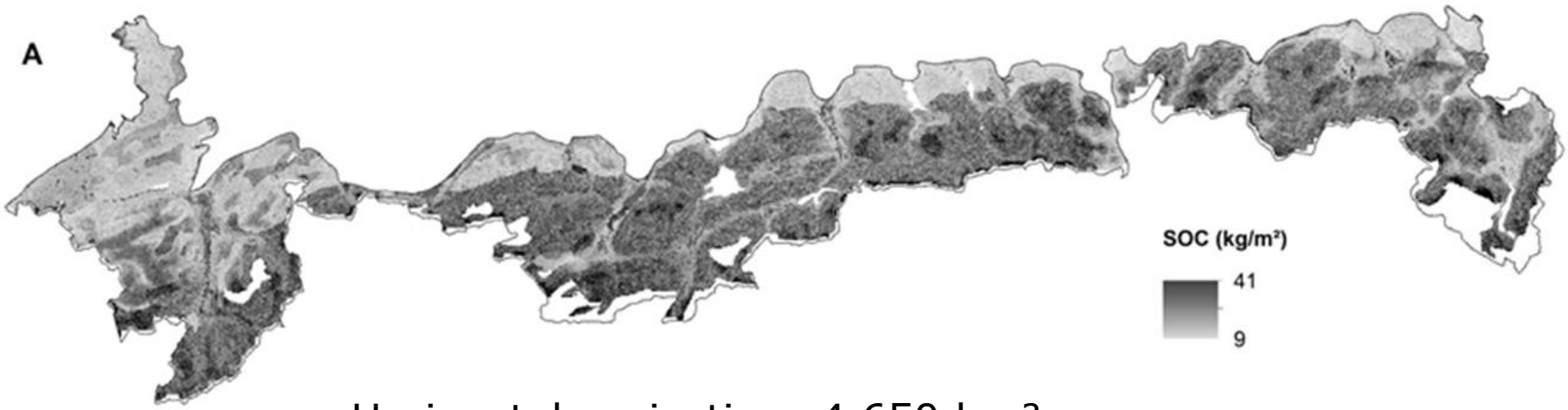
# How large is the area of the German Alps?




Horizontal projection: 4,650 km²

| DEM | Slope | Area | Area increase |
|---|---|---|---|
| 1000 m | 9° | 4589 km² | +2% |
| 100 m | 19° | 5080 km² | +9% |
| 10 m | 24° | 5329 km² | +14% |
| 2 m | 26° | 5457 km² | +17% |



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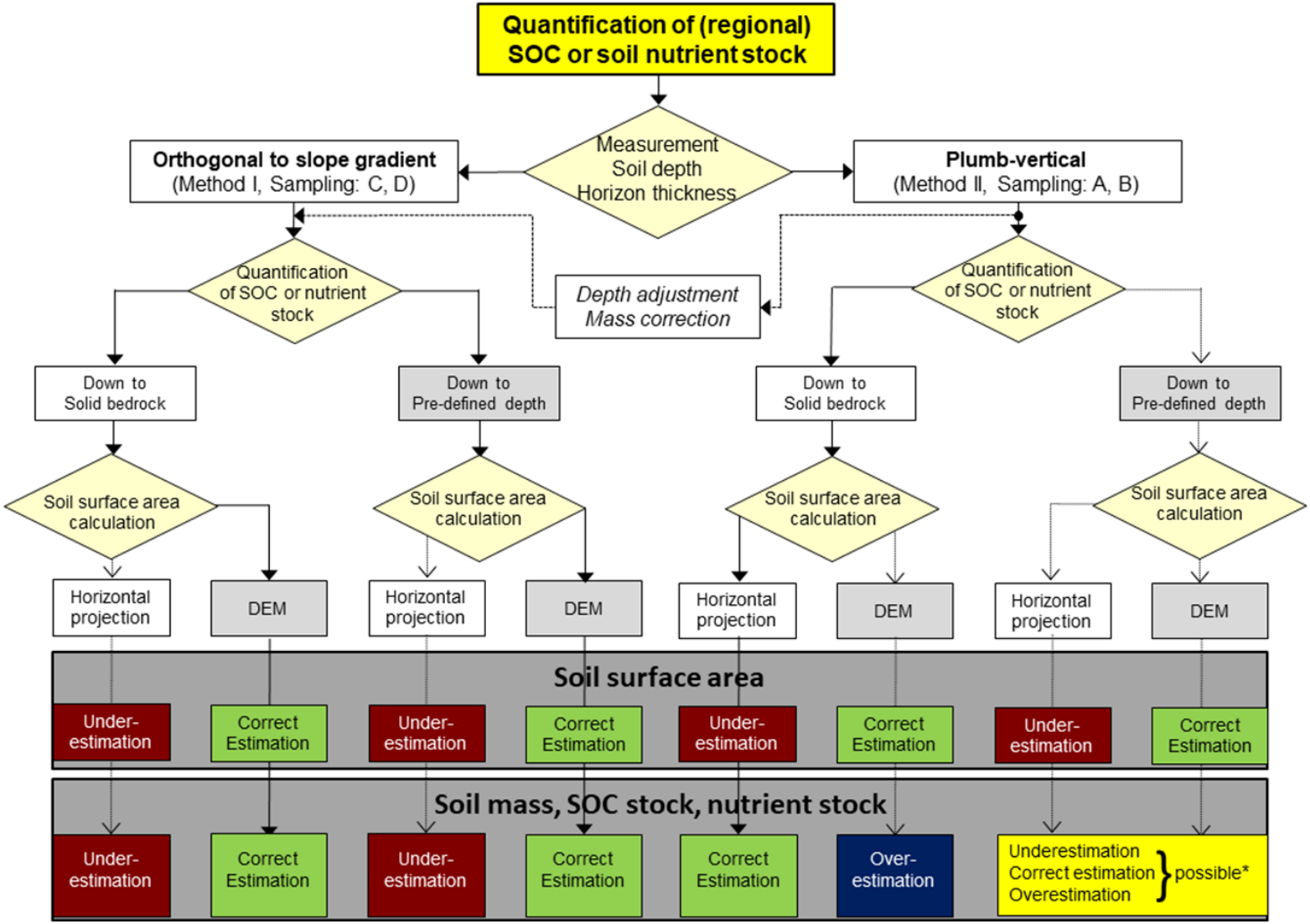
# Correct quantification of regional SOC stocks in sloped terrain

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