

SOIL PERMEABILITY using LUCAS TEXTURE MAPS

Following the Czech approach it is possible to derive a rough estimation of the permeability very easily from the weight percentage of fine fraction (< 63 µm). Soils with the weight percentage of the fine fraction < 15 % were designed as high permeable soils, in the range 15–65 % as medium permeable and in the case of the fine fraction above 65 % as low permeable ones (Barnet et al. 2008).

Maps of topsoil physical properties are available (Ballabio et al., 2006) at European level with a resolution of 500m, and in detail maps of:

Clay: < 0.002 mm

Silt: 0.002-0.05 mm

Sand: 0.05- 2.0 mm

Course material: > 2 mm

We assume that the fine fraction of the Czech approach can be approximated using LUCAS data with the sum clay and silt (%) plus the 5% of sand. This latter value is estimated considering that the very sand fine fraction (0.05-0.1 mm) is the 20% of sand (Panagos et al., 2014) and then the 26% of the very sand fine fraction is to be in the range (0.05-0.063 mm).

Using this formula in the raster calculation tool in ArcGIS, we calculate the percentage of fine fraction at 500m resolution.

$$\frac{("SiltLUCAS" + "ClayLUCAS" + 0.05 * "SandLUCAS")}{("ClayLUCAS" + "CoarseLUCAS" + "SandLUCAS" + "SiltLUCAS")}$$

References

Barnet, I., Pacherova', P., & Neznal, M. (2008). Radon in geological environment—Czech experience Czech Geological mSurvey Special Papers, No. 19, Prague, (pp. 19–28).

Ballabio C., Panagos P., Montanarella L. Mapping topsoil physical properties at European scale using the LUCAS database (2016) Geoderma, 261 , pp. 110-123.

Panagos, P., Meusburger, K., Ballabio, C., Borrelli, P., Alewell, C. Soil erodibility in Europe: A high-resolution dataset based on LUCAS, Science of Total Environment, 479–480 (2014) pp. 189–200, Download the article (Open Access): [10.1016/j.scitotenv.2014.02.010](https://doi.org/10.1016/j.scitotenv.2014.02.010)