

Soil Subsampling in Environmental Sciences: the role of granulometry

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Supplementary Information

Detailed Experimental Section

The three soil samples were obtained from real samples that are routinely analysed in our laboratories and consisted of clay, sand and non homogeneous gravel of about 1,5 Kilograms each. The soil typologies were chosen because of their general representativeness in our territory. Any sample was divided in 12 aliquots, in order to obtain the subsamples the primary sample was first mixed, arranged in a pile and quartered. The relative quadrants were then subjected to a fractional shovelling until the original four partitions were completely distributed into 12 final subsamples. The granulometry distribution was obtained in dry and wet mode. Dry Mode: the granulometry was determined using a RETSCH sieve shakers AS 200 basic equipped with Giuliani sieves of 20 mm: +/- 0,600 mm and 2 mm: +/- 0,070 mm of diameter. The sieves were assembled placing a collecting pan on the bottom and a 2 mm above. According to our protocol¹ the fraction above 20 mm is discharged during the primary sample collection. Each sample aliquot was placed onto the upper sieve and then shaken for 15 minutes with a vibration amplitude of 60 rpm. Wet Mode: the sieving was at first executed according to the dry mode, after that the soil into the sieve of 2 mm was accurately washed and the water was collected into the collecting pan with its sample content. This strategy was adopted in order to reduce the amount of water used, and then the sieves were dried till constant weight was achieved. The weighing procedures were performed using a technical balance with standard uncertainty of 0.01 g, calibrated in house with certificated E2 class masses^{2,3}.

The ruggedness of the sieving methods was tested on a subsample for each soil typology. It was performed sieving the aliquot at different time and amplitude of vibration around the used parameters, precisely the procedure was tested at 10 and 20 minutes of time in combination with amplitudes of 40 and 80 rpm.

The recovery was obtained for each soil typology by mixing an exactly known amount of thin fraction (below 2 mm), 50 grams, with an exactly known amount of larger fraction and then sieving and weighting. The larger fraction was carefully washed and then dried before the use.

Every weight value reported is a mean value obtained in the following manner: each aliquot was placed on the balance and the weight recorded for three times. Amid each weight the balance was left equilibrating without imposing the tare. The measure repeated showed always the same value, achieving a null contribute for the standard deviation of repeated observations.

1 DECRETO LEGISLATIVO 3 aprile 2006, n. 152. '*Norme in materia ambientale*', GAZZETTA UFFICIALE Serie generale n. 88, Italy.

2 Operative Instruction, IOP-GEAP-01-AR, Metrology Division, ARPAL, internal document, 2007, rev 09, 1-10.

3 Servizio Tarature Italia, SIT/Tec-003/03 '*Linea guida per la taratura di bilance*' 2003