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Spatial distribution and effects on soil pH of agricultural land in Germany

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From 2011 until 2018, the German Agricultural Soil Inventory collected 3104 soil samples from arable land and permanent grassland. It is the first inventory that presents a harmonized, representative and reliable database for the soil pH across Germany. Additionally, it includes soil management data such as liming. Soil pH is one of the key variables of various important processes in agroecosystems. It affects nutrient availability, crop growth inhibition due to Al toxicity and soil structural properties. The soil pH should be within the desired range for optimum crop management, in Germany recommended by the Association of German Agricultural Analytic and Research Institutes. The mean soil pH (CaCl2) was 6.1 for the cropland and 5.5 for the grassland sites. About half of the sampling sites were below the optimum range. For half of these sites lime was not applied in the last ten years. Besides the anthropogenic impact, precipitation and parent material control the pH in Germany. In general, soils with lower pH value occurred on sandy soils in northern Germany whereas high pH values dominated on loess and carbonate-rich soils. Further factors influencing the soil pH will be analyzed to generate a model describing the interaction of liming practice and soil pH of German agricultural soils.