EEA geospatial data catalogue

Concentrations of heavy metals in European agricultural soils, Oct. 2020

This data set contains current and critical metal concentrations and its exceedances in topsoils, as well as data related to the current and critical metal inputs to and outputs from soils (uptake, accumulation and leaching) and the resulting exceedances of critical metal inputs.

This data set has been compiled by the European Topic Centre on Urban, Land and Soil Systems (ETC/ULS) in the context of a study on metal and nutrient dynamics where the fate and dynamics of the most abundant heavy metals and nutrients in agricultural soils were investigated. The purpose of this study was to investigate the impacts of agricultural intensification in Europe, and to understand its environmental impact. Metal concentrations in soils were used from two consecutive Europe-wide geochemical surveys, sampled in 1998 (FOREGS survey) and 2009 (GEMAS survey). For land use, the 2010 Eurostat data were used.

The metals included in this data set are cadmium (Cd), copper (Cu), lead (Pb) and zinc (Zn). The results on the fate of Nitrogen (N) and Phosphorus (P) are included in a separate dataset. Cu and Zn are minor nutrients but at high inputs, they may cause adverse impacts on soil biodiversity, whereas Cd and Pb are toxic metals that may lead to soil degradation, by both affecting soil biodiversity and food quality. Metal budgets based on spatially explicit input and output data were calculated using the INTEGRATOR model; approximately 40,000 so-called NCUs as unique combinations of soil type, administrative region, slope class and altitude class were used. Available critical limits for food, water and soil organisms, from different existing regulations and studies, were converted to soil property-dependent critical metal concentrations (soil-based quality standards), which were then used to calculate critical metal inputs.

The results allow for the first time to identifying spatial hot spots for critical environmental impact of soil pollution for the four most abundant heavy metals. It thus informs policy processes important for planning and guiding sustainable agriculture and soil management. The work is methodologically novel, as it applies endpoint risk to thresholds in soils, and thus guides future impact studies. Updates with more recent land use and soil data are now possible.

The description of the included model results and the reference report is provided under "lineage". The data set is provided as SHP and also in a GDB, the latter including as well the N and P concentrations. An Excel file "Metadata heavy metals nutrients.xlsx" with the attribute metadata is provided with the data set.

Simple

Date (Creation)	2020-10-07T00:00:00
Edition	01.00
Citation identifier	eea_v_3035_1_km_heavy-metals-agri-soil_p_2008-2019_v01_r00
Point of contact	**Organisation name** / **Individual name** / **Electronic mail address** / **Website** / **Role** European Environment Agency / / info@eea.europa.eu / http://www.eea.europa.eu / Point of contact European Environment Agency / / info@eea.europa.eu / / Custodian
Maintenance and update frequency	Irregular
GEMET - INSPIRE themes, version 1.0	• Soil • Land use
Keywords	
Keywords	
GEMET	• environmental pressure • soil • heavy metal • cadmium • copper • concentration (value)

	• soil degradation • zinc • lead • ecosystem degradation • agricultural land • land use • nutrient • soil pollution
Continents, countries, sea regions of the world.	• Hungary • Bulgaria • Romania • Italy • Czechia • France • Denmark • Austria • Estonia • Lithuania • Slovenia • Greece • Ireland • United Kingdom • Latvia • Portugal • Germany • Spain • Finland • Belgium • Sweden • Poland • Luxembourg • Netherlands • Slovakia
Spatial scope	• European
EEA topics	• Land use • Soil
Access constraints	Other restrictions
Other constraints	no limitations to public access
Use constraints	Other restrictions
Other constraints	

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Spatial representation type	Vector
Distance	1 km
Language of dataset	English
Topic category	• Environment • Farming
Begin date	2008-01-01
End date	2019-12-31

70.08	N	27.64	S	31.57	E	-31.28	W



Coordinate reference system identifier	EPSG:3035
Distribution format	• SHP ( )

OnLine resource

No information provided.

Hierarchy level	Dataset

Conformance result

Date (Publication)	2010-12-08
Explanation	See the referenced specification

Statement	ETC/ULS, 2016, 'Assessment of critical load exceedances of nitrogen, phosphorus and cadmium in view of food, soil and water quality', Deliverable 1.8.2.3 KD2, European Topic Centre on Urban, Land and Soil Systems, unpublished report available upon request. Description of the included model results: Field \\\\\ Unit \\\\\ Description Cdsoil \\\\\ mg Cd/kg \\\\\ Current cadmium (Cd) concentrations in the topsoil, based on the combined data from the GEMAS database (Reimann et al., 2014) and the FOREGS data base (Lado et al., 2008, Tóth et al., 2016) in EU28 Pbsoil \\\\\ mg Pb/kg \\\\\ Current lead (Pb) concentrations in the topsoil, based on the combined data from the GEMAS database (Reimann et al., 2014) and the FOREGS data base (Lado et al., 2008, Tóth et al., 2016) in EU27 Cusoil \\\\\ mg Cu/kg \\\\\ Current copper (Cu) concentrations in the topsoil, based on the combined data from the GEMAS database (Reimann et al., 2014) and the FOREGS data base (Lado et al., 2008, Tóth et al., 2016) in EU27 Znsoit \\\\\ mg Zn/kg \\\\\ Current zinc (Zn) concentrations in the topsoil, based on the combined data from the GEMAS database (Reimann et al., 2014) and the FOREGS data base (Lado et al., 2008, Tóth et al., 2016) in EU27 Cdin \\\\\ g Cd/ha/yr \\\\\ Cadmium (Cd) input to the soil in 2010 in EU27 Cdout \\\\\ g Cd/ha/yr \\\\\ Cadmium (Cd) output from the soil in 2010 in EU27 Cdacc \\\\\ g Cd/ha/yr \\\\\ Cadmium (Cd) accumulation to the soil in 2010 in EU27 Cuin \\\\\ g Cu/ha/yr \\\\\ Copper (Cu) input to the soil in 2010 in EU27 Cuout \\\\\ g Cu/ha/yr \\\\\ Copper (Cu) output from the soil in 2010 in EU27 Cuacc \\\\\ g Cu/ha/yr \\\\\ Copper (Cu) accumulation to the soil in 2010 in EU27 Pbin \\\\\ g Pb/ha/yr \\\\\ Lead (Pb) input to the soil in 2010 in EU27 Pbout \\\\\ g Pb/ha/yr \\\\\ Lead (Pb) output from the soil in 2010 in EU27

Pbacc \\\\\ g Pb/ha/yr \\\\\ Lead (Pb) accumulation to the soil in 2010 in EU27

Znin \\\\\ g Zn/ha/yr \\\\\ Zinc (Zn) input to the soil in 2010 in EU27

Znout \\\\\ g Zn/ha/yr \\\\\ Zinc (Zn) output from the soil in 2010 in EU27

Znacc \\\\\ g Zn/ha/yr \\\\\ Zinc (Zn) accumulation to the soil in 2010 in EU27

Cdup \\\\\ g Cd/ha/yr \\\\\ Cadmium (Cd) crop uptake in 2010 in EU27

Cdle \\\\\ g Cd/ha/yr \\\\\ Cadmium (Cd) leaching in 2010 in EU27

Cuup \\\\\ g Cu/ha/yr \\\\\ Copper (Cu) crop uptake in 2010 in EU27

Cule \\\\\ g Cu/ha/yr \\\\\ Copper (Cu) leaching in 2010 in EU27

Pbup \\\\\ g Pb/ha/yr \\\\\ Lead (Pb) crop uptake in 2010 in EU27

Pble \\\\\ g Pb/ha/yr \\\\\ Lead (Pb) leaching in 2010 in EU27

Znup \\\\\ g Zn/ha/yr \\\\\ Zinc (Zn) crop uptake in 2010 in EU27

Znle \\\\\ g Zn/ha/yr \\\\\ Zinc (Zn) leaching in 2010 in EU27

Cdsoilcr \\\\\ mg Cd/kg \\\\\ Critical cadmium (Cd) concentrations to the soil in view of impacts on soil biodiversity in EU27

Pbsoilcr \\\\\ mg Pb/kg \\\\\ Critical lead (Pb) concentrations to the soil in view of impacts on soil biodiversity in EU27

ExCdsoilcr \\\\\ mg Cd/kg \\\\\ Exceedance of critical cadmium (Cd) concentrations by current (2010) soil Cd concentrations in EU27

ExPbsoilcr \\\\\ mg Pb/kg \\\\\ Exceedance of critical lead (Pb) concentrations by current (2010) soil Pb concentrations in EU27

Cusoilcr \\\\\ mg Cu/kg \\\\\ Critical copper (Cu) concentrations in the soil in view of impacts on soil biodiversity in EU27

Znsoilcr \\\\\ mg Zn/kg \\\\\ Critical zinc (Zn) concentrations in the soil in view of impacts on soil biodiversity in EU27

ExCusoilcr \\\\\ mg Cu/kg \\\\\ Exceedance of critical soil copper (Cu) concentrations by current (2010) soil Cu concentrations in EU27

ExZnsoilcr \\\\\ mg Zn/kg \\\\\ Exceedance of critical soil zinc (Zn) concentrations by current (2010) soil Zn concentrations in EU27

Cdincr \\\\\ g Cd/ha/yr \\\\\ Critical cadmium (Cd) input to the soil in view of impacts on soil biodiversity in EU27

Pbincr \\\\\ g Pb/ha/yr \\\\\ Critical lead (Pb) input to the soil in view of impacts on soil biodiversity in EU27

ExCdincr \\\\\ g Cd/ha/yr \\\\\ Exceedance of critical cadmium (Cd) inputs to the soil by current (2010) Cd inputs in view of impacts on soil biodiversity in EU27

ExPbincr \\\\\ g Pb/ha/yr \\\\\ Exceedance of critical lead (Pb) inputs to the soil by current (2010) Pb inputs in view of impacts on soil biodiversity in EU27

Cuincr \\\\\ g Cu/ha/yr \\\\\ Critical copper (Cu) inputs to the soil in view of impacts on soil biodiversity in EU27

Znincr \\\\\ g Zn/ha/yr \\\\\ Critical zinc (Zn) inputs to the soil in view of impacts on soil biodiversity in EU27

ExCuincr \\\\\ g Cu/ha/yr \\\\\ Exceedance of critical cupper (Cu) inputs to the soil by current (2010) Cu inputs in view of impacts on soil biodiversity in EU27

ExZnincr \\\\\ g Zn/ha/yr \\\\\ Exceedance of critical zinc (Zn) inputs to the soil by current (2010) Zn inputs in view of impacts on soil biodiversity in EU27

Cdsoilcq \\\\\ mg Cd/kg \\\\\ Critical cadmium (Cd) concentrations in the soil view of food safety for wheat in EU27

ExCdsoilcq \\\\\ mg Cd/kg \\\\\ Exceedance of critical soil cadmium (Cd) concentrations in the soil by the current (2010) Cd concentrations in view of impacts on food safety for wheat in EU27

Cdincq \\\\\ g Cd/ha/yr \\\\\ Critical Cadmium (Cd) input to the soil in 2010 in EU27

ExCdincq \\\\\ g Cd/ha/yr \\\\\ Exceedance of critical cadmium (Cd) inputs to the soil by current (2010) Cd inputs in view of food safety for wheat in EU27

Data quality info

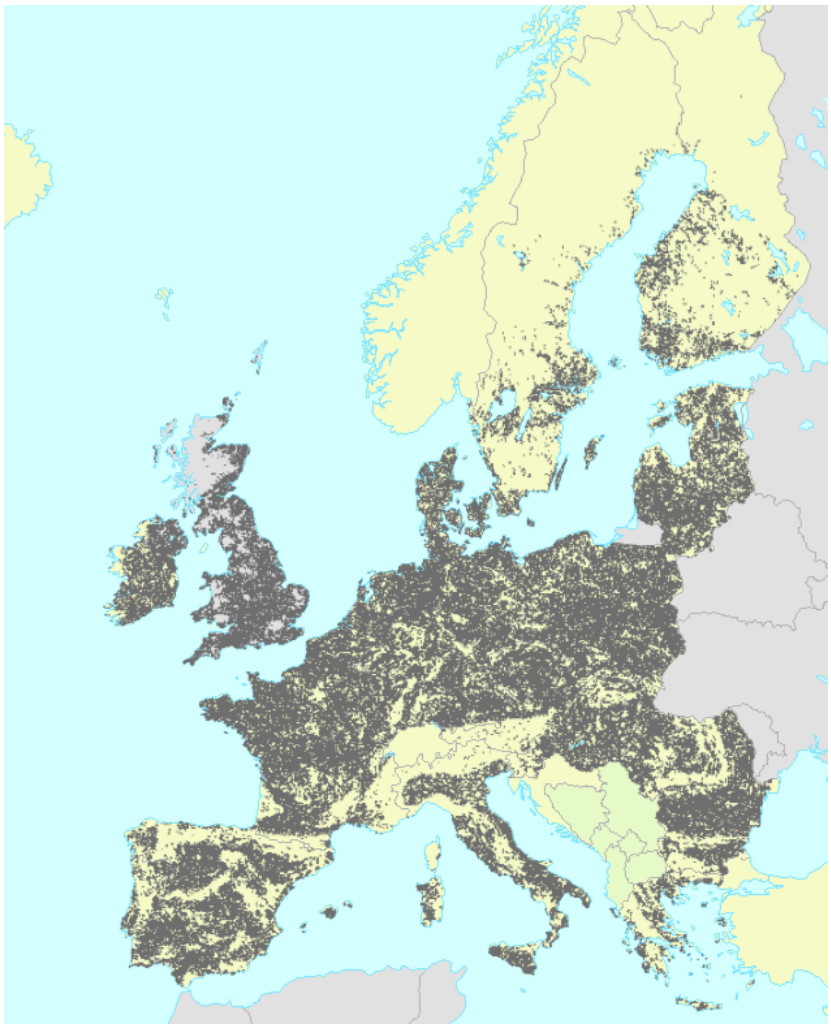
No information provided.

Metadata

File identifier	f23391fd-2524-42be-91cb-27d930d6a099 XML
Metadata language	English
Character set	UTF8

Hierarchy level	Dataset
Date stamp	2021-09-21T12:29:45.75Z
Metadata standard name	ISO 19115/19139
Metadata standard version	1.0
Metadata author	**Organisation name** / **Individual name** / **Electronic mail address** / **Website** / **Role** European Environment Agency / / sdi@eea.europa.eu / / Point of contact

Overviews



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