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## The three geochemical atlases of Europe

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The EuroGeoSurveys' Geochemistry Expert Group has carried out three continental-scale geochemical projects in Europe. The first, known as the FOREGS Geochemical Atlas of Europe, which started in 1997 during the period of the Forum of European Geological Surveys, the forerunner of EuroGeoSurveys, was completed in 2006 with the publication of two volumes [1, 2]. The second, with the acronym EGG Atlas that mapped the **E**uropean **G**roundwater **G**eochemistry, started in 2007 and was completed in 2010 with the publication of the groundwater geochemical atlas of Europe [3]. The third, with the acronym GEMAS Atlas, which mapped the **G**EOche**M**istry of **A**gricultural and grazing land **S**oil, started in 2008 and was completed in 2014 with the publication of a two-volume geochemical atlas [4]. In all three projects, the raw analytical data, maps and basic statistics are freely available to users, either through the project's website, the case of the FOREGS atlas, or from the accompanying CD or DVD by purchasing the books, the case of the EGG and GEMAS atlases.

The FOREGS Geochemical Atlas covered 26 European countries with a sample density of 1 site/4600 km<sup>2</sup> and collected samples from five different media, i.e., stream water, stream and floodplain sediment, residual top- (0-25 cm) and sub-soil (>75 cm). It followed closely the specifications of the IGCP 259 project [5]. The EGG atlas used an innovative idea by utilising bottled mineral water as a proxy to groundwater. The GEMAS Atlas covered 33 European countries with a sample density of 1 site/2500 km<sup>2</sup> and collected topsoil from ploughed agricultural fields (0-20 cm), and from grazing land (0-10 cm). In all cases, the samples were analysed in the same laboratory for the same suite of elements to produce fully harmonised and strictly quality controlled databases. The results of all three projects have shown that geology and climate are the main driving forces of the mapped continental-scale geochemical patterns. High trace element values are most often related to mineral deposits and metallogenic provinces. The anthropogenic impact is hardly detectable at the European scale. Exceptions are, for example, London and Paris, which both are marked by high values of Au, Pb and Hg in their surroundings. Furthermore, high NO<sub>3</sub><sup>-</sup> values occur in stream water over the intensively used agricultural areas of northern-central Europe.

### *References:*

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[3] Reimann, C. & Birke, M. (Editors), 2010. Geochemistry of European bottled water. Borntraeger Science Publishers, Stuttgart, 268 pp.,

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