Plate 10

Austria is predominantly a mountainous country, with an average elevation of about 900 m with most of the land falling within the Alpine range. In general the major mountain ranges of Austria run in an east-west direction and are separated from one another by rather broad valleys. The principal areas of Austria that are not within the Alps are the northern and eastern border sections, consisting of rolling hills and the Danube River. The Austrian climate varies with elevation with mountainous regions experiencing more precipitation than the eastern lowlands, which are under continental influences.

Rich terra rosa (red) Calcisols predominate in the Austrian valleys which, at higher elevations, associate with forested Podzols and, higher again, calcareous Leptosols and bare rocks. The large block of Leptosols that dominates this map sheet corresponds to the Hohe Tauern, which contains the highest point in Austria (the Grossglockner reaches 3,797 m), and the NiedereTauern mountain ranges. Alpine meadow soils are usually found in high-elevation regions and are locally important for pasture and related agriculture. Acidification of soil and erosion caused by loss of forest cover are the two main soil degradation threats in Austria.

The Czech Republic lies in the headwater area of the central European watershed. The Elbe rises near the Czech-Polish border and sweeps southwestward across Bohemia before flowing northward into Germany while the Morava River flows southwards towards the Danube. The Czech Republic rests on an elevated block, known as the Bohemian Plateau, which extends from the German border to Slovakia. This region has a primarily continental temperate climate with warm summers and cold winters while the mountainous areas endure very cold winters and receive heavy rainfall.

The soil of the Czech Republic comprises rich, black Chernozems and good-quality Luvic Cambisols in the drier and lower areas, Podzols in wetter regions and stony Leptosols at higher elevations. Fluvisols occur in the river basins and heavy Umbrisols are found in the eastern ridges.

The dramatic colours around Budapest indicate the merging of the Chernozems of the Czech Republic with those of Hungary and mark the beginning of the Chernozem belt that extends all the way to the Ural Mountains of Russia.

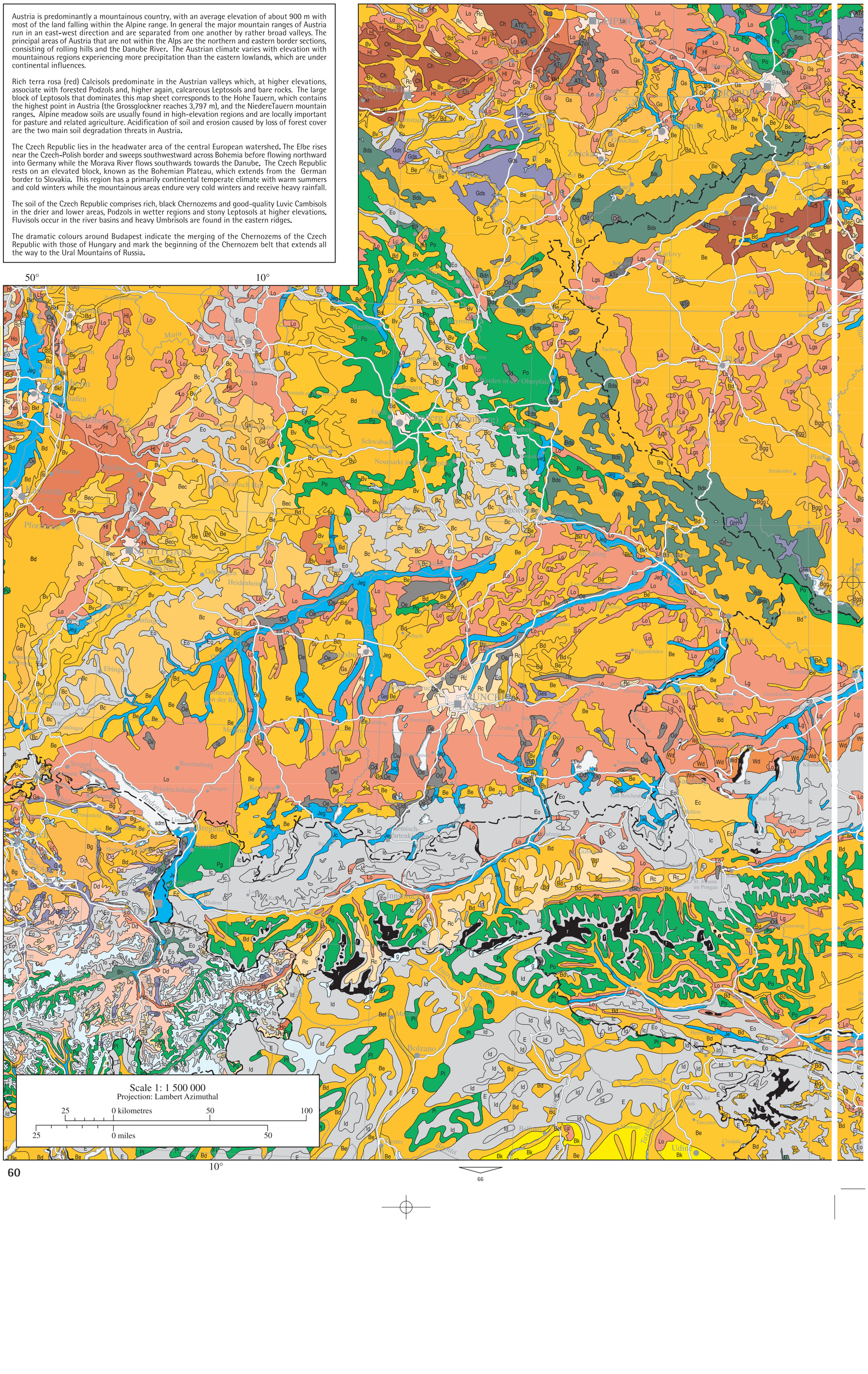

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Plate 11

The great variety of climatic conditions resulting from latitude, physiography (elevations up to 2,654 m above sea-level) and geological conditions have caused a rich variety of soil units in this region. The great orographical structures and geological diversity of this territory is the reason that the Eurasian soil-geographical zonality practically ends in front of the arc of the Carpathian Mountains. The territory is built by two structures: the Carpathian Mountains and Pannonian Basin.

When differentiating the soils in the Carpathian area, especially the vertical and mountainside soil zonality asserts itself. In the mountains, on the same crystalline rocks, the following soil catena occurs: Eutric Cambisols – Dystric Cambisols – Cambic Umbrisols – Enti-Haplic Podzols – Haplic Podzols – Umbric and Skeli-Dystric Leptosols – Lithic Leptosols. From weathering products of recent volcanoes and their pyroclastic sediments even Andosols develop. On the piedmont belt of the Carpathian Mountains, Planosols can occur while in the lowlands hilly parts, the mountainside soil zonality reappears. So on the loessial hills, towards the mountains, the following soil catena is developed: Calcari-Haplic Chernozems – Calci-Haplic Chernozems – Calci-Luvic Chernozems – Luvic Phaeozems – Haplic Luvisols – Albic Luvisols. On the alluvial sediments of the plain close to the mountains, Eutric and Calcaric Fluvisols occur and on older alluvial sediments, where not influenced by floods, Calcari-Mollic Fluvisols and even Calcari-Haplic Chernozems have developed. Solonchaks and Solonetz can be found in shallow depressions where strongly mineralized ground waters are close to the surface. On areas affected by wind blown sands, Protic Arenosols and Arenic Cambisols are present.

The distribution of the soil types in the Pannonian Basin has been determined by the basin characteristics. The current geomorphology and parent materials for soil formation developed mainly during the Pleistocene period. Surfaces and rocks that were formed in earlier geologic periods have been modified. The climatic changes and the tectonic activities of the Pleistocene induced erosion and mass movement from the higher elevation areas and produced sedimentation in the lower basin.

In the mountainous areas, where precipitation is higher and the downward moisture movement is dominant, Luvisols are the most common. Where soil formation has been slow or erosion influenced the surfaces, Regosols and Leptosols occur intermixed with minor areas of rock outcrops. The pediments of the mountains and the transition areas to the lowland plains are covered mainly by Cambisols developed from mixed parent materials. The best agricultural soil, the dark Chernozems and Phaeozems of the plains, are developed from thick deposits of loess. Where aeolian sands were deposited during the Pleistocene and Holocene periods, Arenosols are characteristic. In depressions, where the shallow groundwater contains soluble salts, and evaporation exceeds precipitation, salt-affected Solonchak and Solonetz soils occur. In the river valleys, depending on the age and composition of the alluvial sediments, mainly Fluvisols and Vertisols can be found.

Some unusual and abrupt changes in soil types at national boundaries can be seen on this map. These are due to differences in interpretation and mapping scales between individual countries (e.g. Poland & Ukraine). Work is ongoing to resolve these differences.

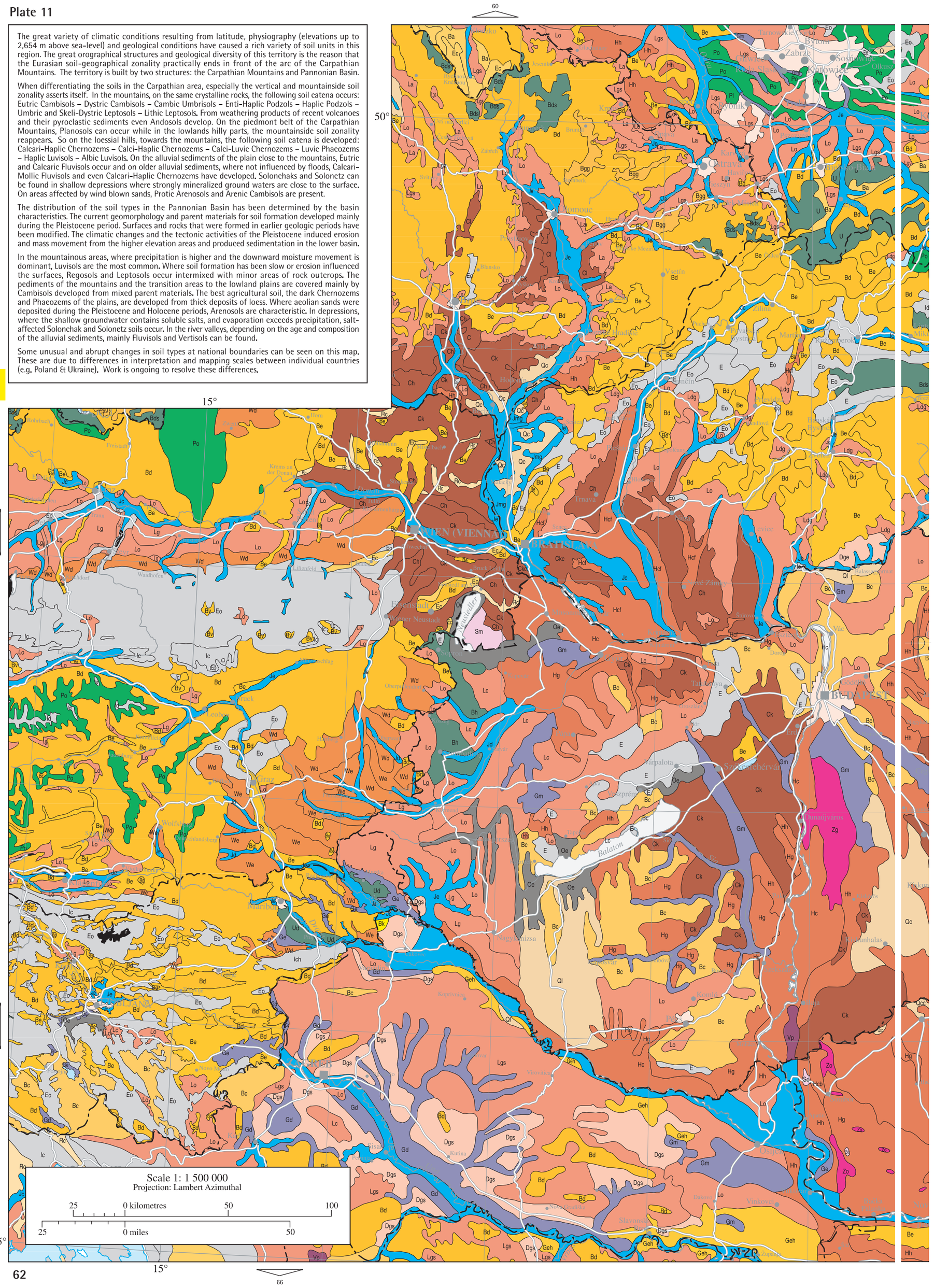


Plate 11

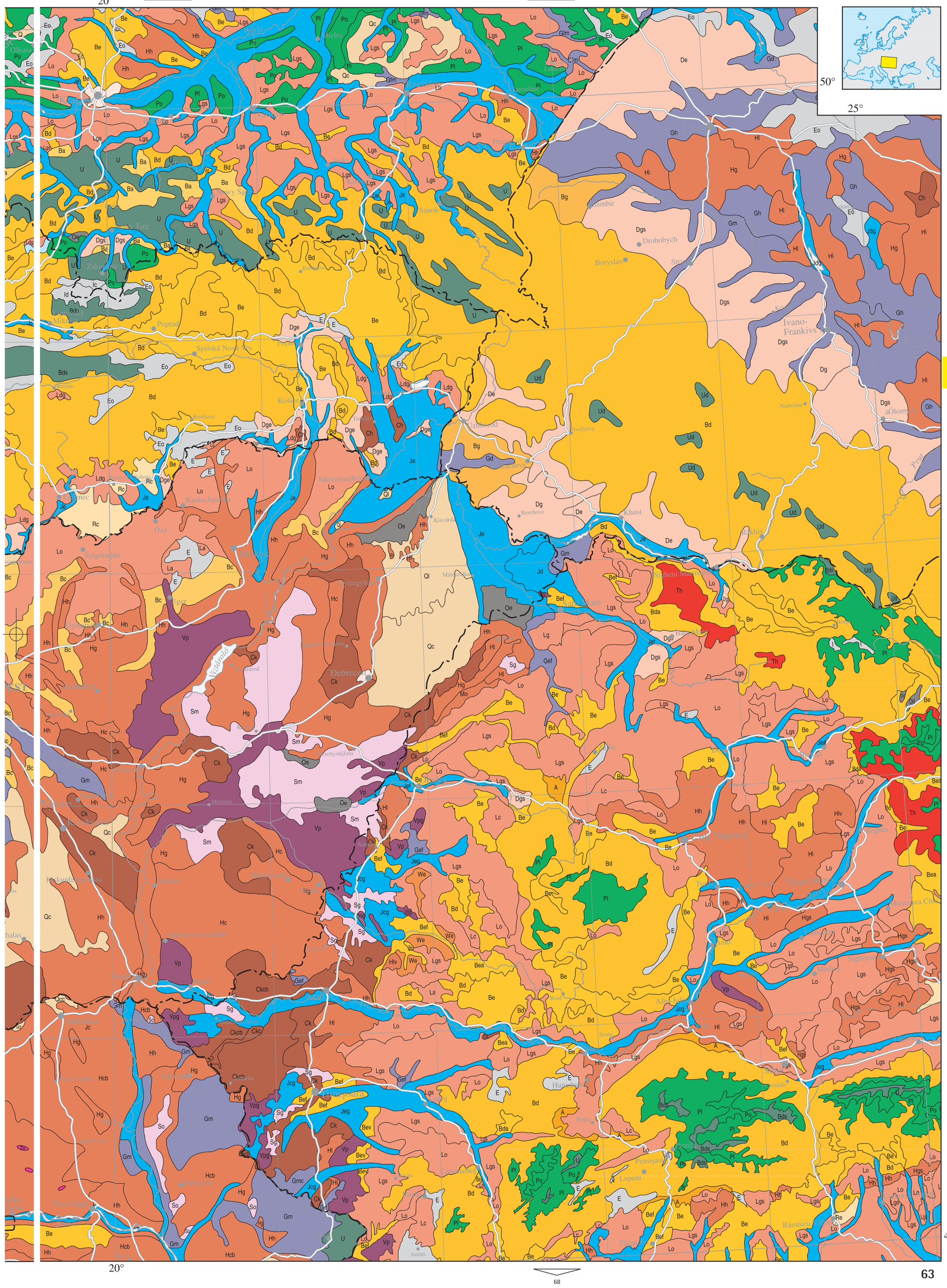


Plate 12

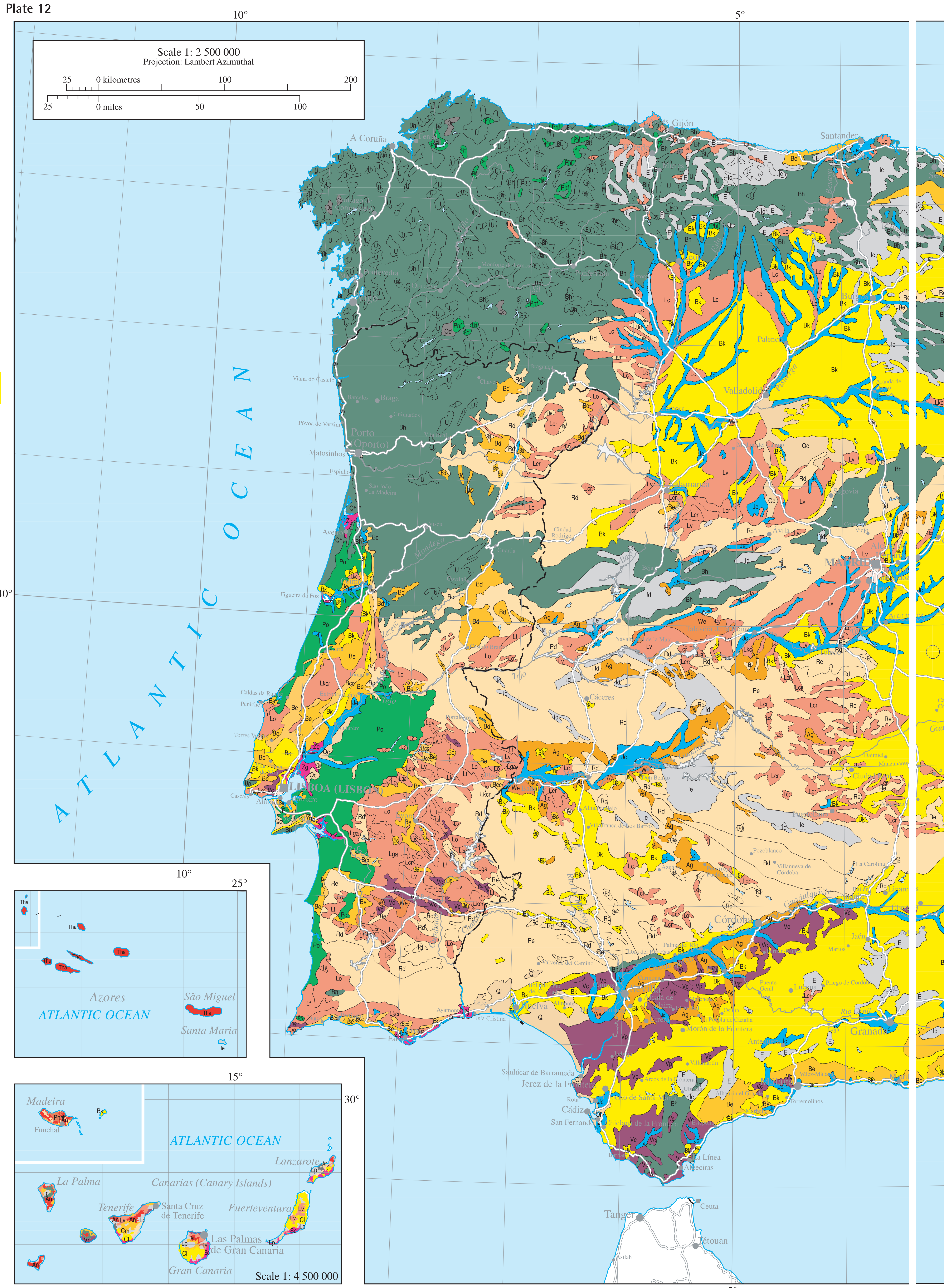
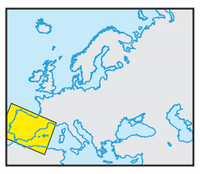


Plate 12



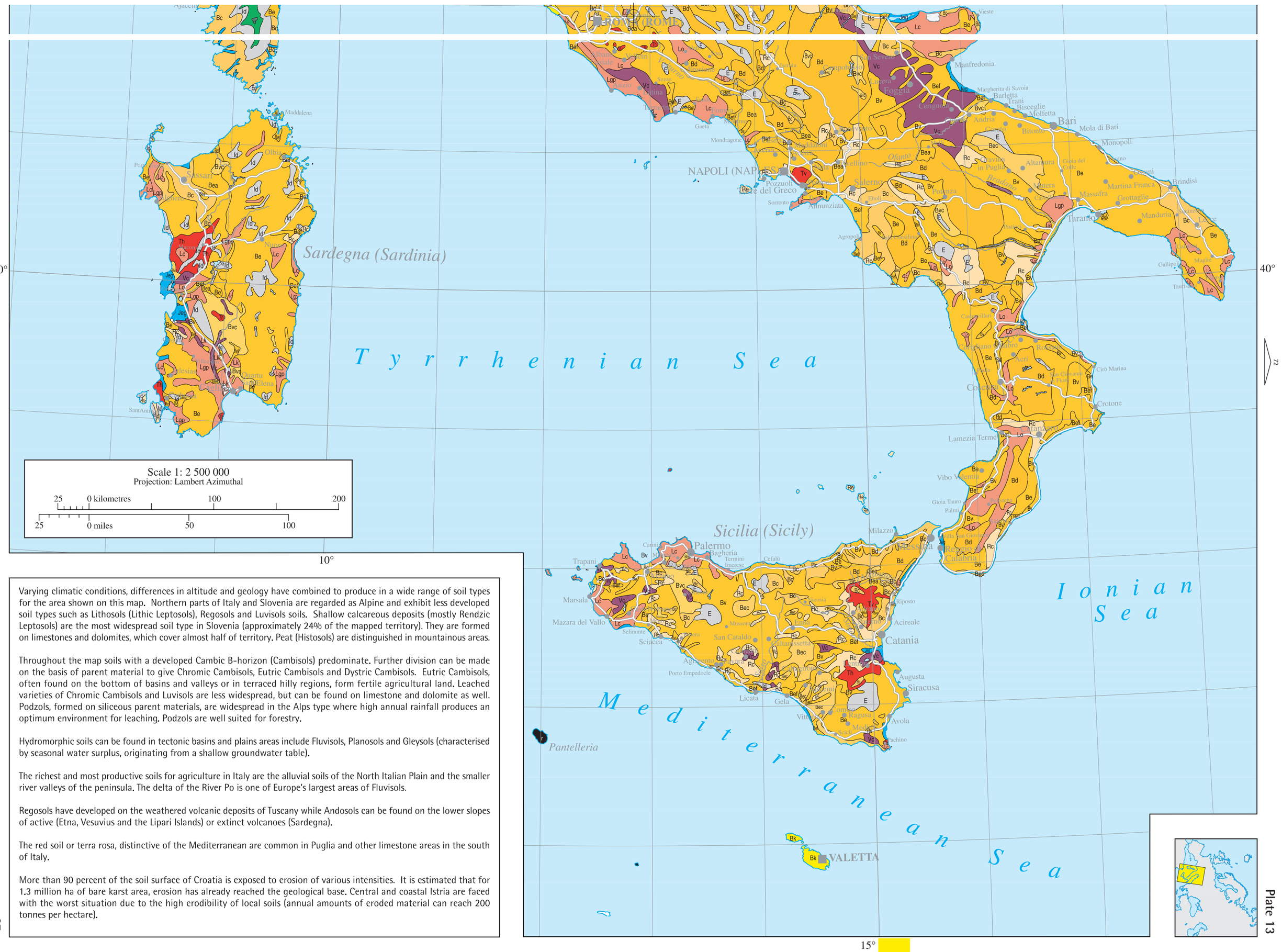
The Iberian Peninsula, approximately 600,000 sq km in size, is separated from the rest of Europe by the Pyrenees mountain range. Comprising Spain and Portugal, the Iberian Peninsula is surrounded on the north and west by the Atlantic Ocean and on the south and east by the Mediterranean Sea. The Strait of Gibraltar separates Iberia, and Europe, from Africa. The Iberian Peninsula is dominated by the Meseta (central plateau), a great uplifted fault block with an average elevation of 600 m that is crossed by mountain ranges. It covers about two thirds of the peninsula. Coastal lowlands, the site of the major industrial cities, surround the primarily agrarian-oriented Meseta. Climatically, the Iberian Peninsula has hot summers, cold winters, and limited precipitation. Anyone travelling through the central and southern parts of the Iberian Peninsula quickly realises the colour displayed by the soils is a key element of the landscape, ranging from striking reds (Luvisols) to pale yellows or white (Calcisols, Gypsisols).

Most of the Iberian Peninsula was not covered by ice in Quaternary times and experienced little influence from glaciations and neo-tectonics, developing areas with stable landscape where exceptionally old soils may be found (the Acrisols "rañas" of Central Spain). In such stable areas surfaces from different geological ages are widespread having Chromic and Petric Luvisols and Petric Calcisols. Calcareous rocks are dominant, especially in the eastern part. Because the climate is rather dry, calcium carbonate is not leached from the soil and almost all soil types are calcareous. Igneous and metamorphic rocks are dominant in western Iberia, especially in the north (Pyrenees, Guadarrama and in other high mountains). In such areas, the soil is acidic and liming is required and (coarse) Regosols, Umbrisols, Dystric Cambisols are dominant.

Man has made, and still makes, a very intensive use of the fragile Iberian soil and this can be seen easily. Agriculture exists from pre-roman times and erosion, assisted by the arid climate, has taken place in areas affected by deforestation, overgrazing and forest fires. This has lead to an overriding extension of Leptosols and Regosols, as well as Fluvisols in the footslopes and valleys. Sustainable land use systems have developed through the irrigation of valleys (Fluvisols) and river terraces (deep Calcisols and Cambisols); terracing of land (Regosols, Lithosols) in many cases has taken place up to more than 1700 m in order to grow Mediterranean trees (vineyards, olive, almonds) as well as cereals, forming a very complex water conservation system because terracing has been done also in lower parts of the landscape (Fluvisols, Cambisols, Calcisols).

The Iberian soilscapes have an extreme diversity of soil types with Calcisols being dominant and showing a large variety of morphologies. To the ones mentioned above we have to add the southernmost Podzols of Europe, the Kastanozems specially over limestones in middle altitude Mediterranean areas, but also in the bajadas and other areas close to the Mediterranean. Gypsisols merits a special mention by their extent, unique characteristics and because are almost exclusive of Spain in Europe; they occur in large areas in the Ebro Valley under arid to sub-humid climate as well as in the more arid South East.

Natural saline areas are present in many parts of the Peninsula when the climate is drier, both inland as well as near the sea. Cultivation and especially irrigation have changed the original pattern and under present land use conditions Solonchaks appear scattered in large areas. Volcanic (Andisols) soils are dominant in Canary, Azores and Madeira Islands; in such islands also saline soils (Solonchak) are found the flat areas, with Leptosols in the limestone mountains, hills and plateaux. Anthrosols are restricted to the very intensive horticultural areas of southeast Spain or near industrial and urban areas, specially in the Mediterranean coast fringe.



Varying climatic conditions, differences in altitude and geology have combined to produce in a wide range of soil types for the area shown on this map. Northern parts of Italy and Slovenia are regarded as Alpine and exhibit less developed soil types such as Lithosols (Lithic Leptosols), Regosols and Luvisols soils. Shallow calcareous deposits (mostly Rendzic Leptosols) are the most widespread soil type in Slovenia (approximately 24% of the mapped territory). They are formed on limestones and dolomites, which cover almost half of territory. Peat (Histosols) are distinguished in mountainous areas.

Throughout the map soils with a developed Cambic B-horizon (Cambisols) predominate. Further division can be made on the basis of parent material to give Chromic Cambisols, Eutric Cambisols and Dystric Cambisols. Eutric Cambisols, often found on the bottom of basins and valleys or in terraced hilly regions, form fertile agricultural land. Leached varieties of Chromic Cambisols and Luvisols are less widespread, but can be found on limestone and dolomite as well. Podzols, formed on siliceous parent materials, are widespread in the Alps type where high annual rainfall produces an optimum environment for leaching. Podzols are well suited for forestry.

Hydromorphic soils can be found in tectonic basins and plains areas include Fluvisols, Planosols and Gleysols (characterised by seasonal water surplus, originating from a shallow groundwater table).

The richest and most productive soils for agriculture in Italy are the alluvial soils of the North Italian Plain and the smaller river valleys of the peninsula. The delta of the River Po is one of Europe's largest areas of Fluvisols.

Regosols have developed on the weathered volcanic deposits of Tuscany while Andosols can be found on the lower slopes of active (Etna, Vesuvius and the Lipari Islands) or extinct volcanoes (Sardegna).

The red soil or terra rosa, distinctive of the Mediterranean are common in Puglia and other limestone areas in the south of Italy.

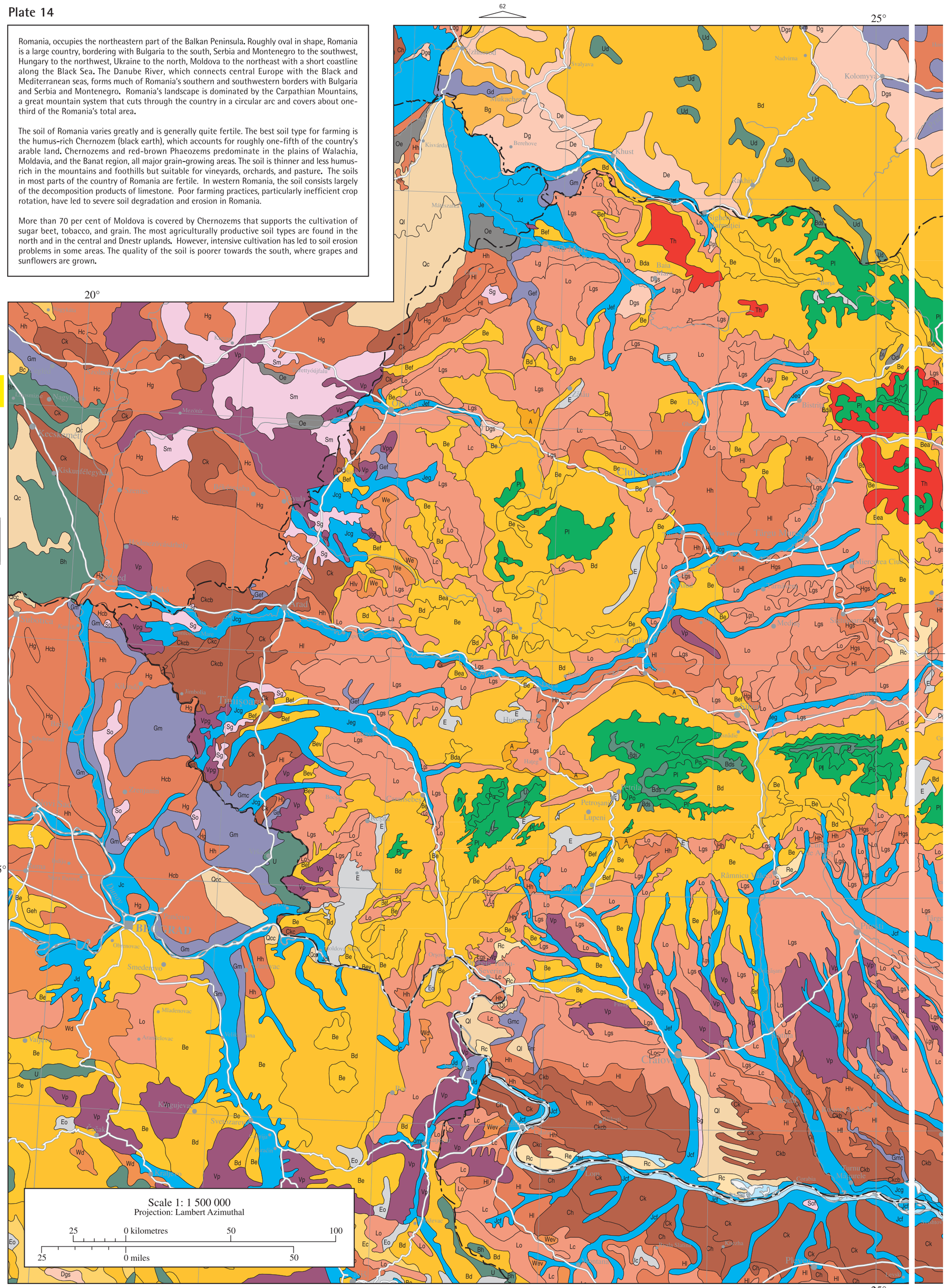
More than 90 percent of the soil surface of Croatia is exposed to erosion of various intensities. It is estimated that for 1.3 million ha of bare karst area, erosion has already reached the geological base. Central and coastal Istria are faced with the worst situation due to the high erodibility of local soils (annual amounts of eroded material can reach 200 tonnes per hectare).

Plate 14

Romania, occupies the northeastern part of the Balkan Peninsula. Roughly oval in shape, Romania is a large country, bordering with Bulgaria to the south, Serbia and Montenegro to the southwest, Hungary to the northwest, Ukraine to the north, Moldova to the northeast with a short coastline along the Black Sea. The Danube River, which connects central Europe with the Black and Mediterranean seas, forms much of Romania's southern and southwestern borders with Bulgaria and Serbia and Montenegro. Romania's landscape is dominated by the Carpathian Mountains, a great mountain system that cuts through the country in a circular arc and covers about one-third of the Romania's total area.

The soil of Romania varies greatly and is generally quite fertile. The best soil type for farming is the humus-rich Chernozem (black earth), which accounts for roughly one-fifth of the country's arable land. Chernozems and red-brown Phaeozems predominate in the plains of Walachia, Moldavia, and the Banat region, all major grain-growing areas. The soil is thinner and less humus-rich in the mountains and foothills but suitable for vineyards, orchards, and pasture. The soils in most parts of the country of Romania are fertile. In western Romania, the soil consists largely of the decomposition products of limestone. Poor farming practices, particularly inefficient crop rotation, have led to severe soil degradation and erosion in Romania.

More than 70 per cent of Moldova is covered by Chernozems that supports the cultivation of sugar beet, tobacco, and grain. The most agriculturally productive soil types are found in the north and in the central and Dnestr uplands. However, intensive cultivation has led to soil erosion problems in some areas. The quality of the soil is poorer towards the south, where grapes and sunflowers are grown.



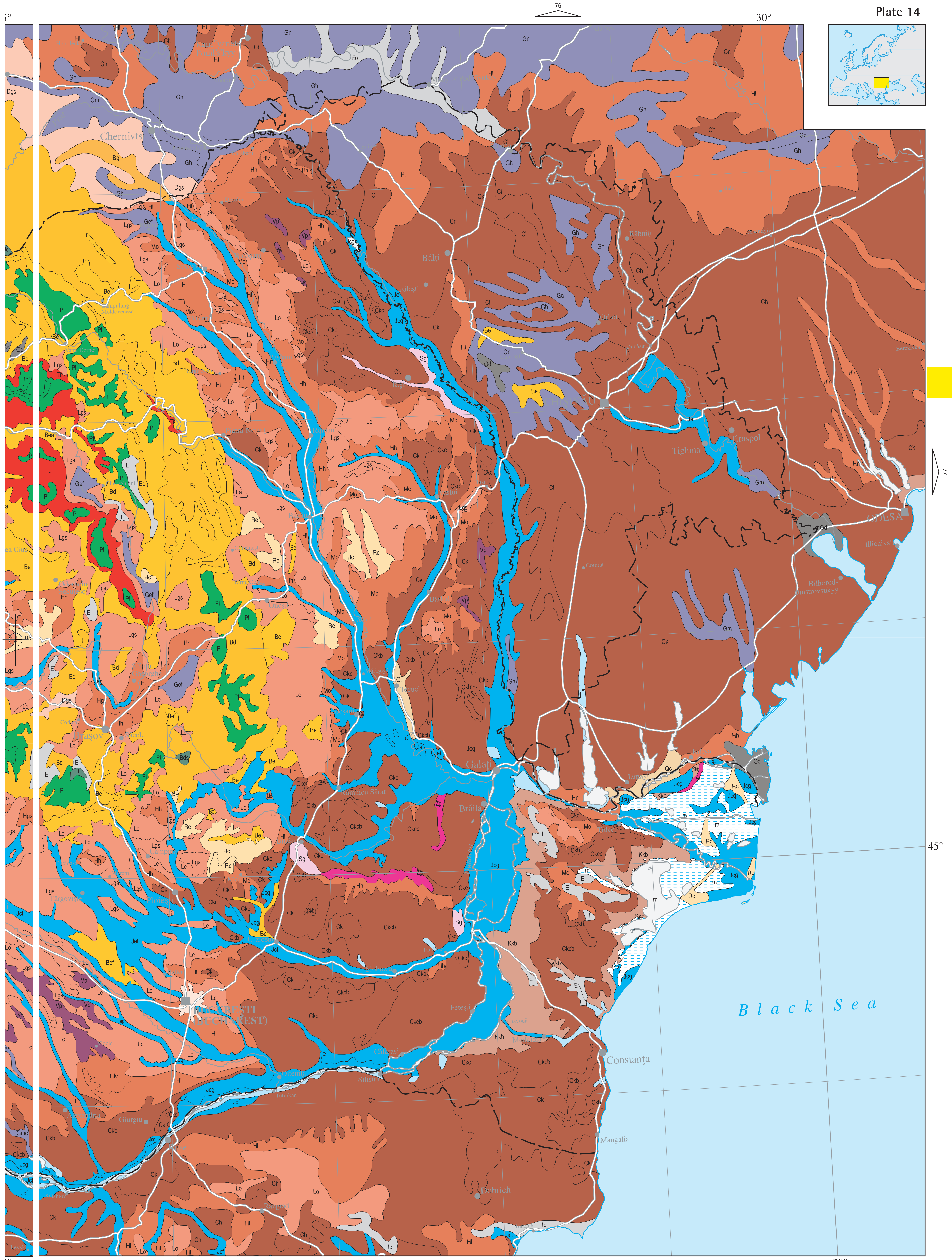


Plate 15