Earth System: History and Natural Variability theme is a component of Encyclopedia of Natural Resources Policy and Management, in the global Encyclopedia of Life Support Systems (EOLSS), which is an integrated compendium of twenty one Encyclopedias. The Theme on Earth System: History and Natural Variability with contributions from distinguished experts in the field, presents a description of the cosmic environment around our planet influencing the Earth in a number of ways through variation of solar energy or meteorite impacts. The structure of the Earth and its rocks, waters and atmosphere is described. The Theme focuses on geological and evolutionary processes through the history of Earth's epochs and biomes since the Early Earth to the Quaternary. The unifying processes between the Earth's life and its rocks, waters and atmosphere are global natural cycles of carbon, sulfur and other elements that connect and influence the rate of geological processes, climate change, biological evolution and human economy. These five volumes are aimed at the following five major target audiences: University and College students, Educators, Professional practitioners, Research personnel and Policy analysts, managers, and decision makers and NGOs.

Europe provides an outstanding field laboratory for studying lithospheric processes through time, for tracing the tectonic evolution of crust and mantle from the present far back into the early Precambrian. Two things are particularly striking: the importance of plate tectonics during the Phanerozoic and through the Proterozoic into the Archean, and the significance of tectonic inheritance, older structures and rheologies guiding the younger evolution. 'European Lithosphere Dynamics' grew out of a major European Science Foundation programme, EUROPROBE, with participation of many hundreds of Earth scientists from all over Europe. The main research activities focused on specific target areas and involved integration of geological, geophysical and geochemical methods. Defining surface-depth relationships was a prerequisite for interpretation of the processes, present and past, responsible for the formation of the lithosphere.

"Extensive geological and geophysical surveying contribute to understanding of the deep crustal structure and geological history of the Early Precambrian crust of the eastern Fennoscandian Shield and the basement of the East European Platform. The authors present 3D models of the deep crustal structure of the territory, and reconstruct the succession of geological events"--

The Pleistocene epoch or Ice Age, an extended period of advancing and retreating ice sheets, is characterized by striking climatic oscillations and sea level fluctuations. This age saw the rise and spread of humans and a great extinction of large mammals by the end of the epoch; in fact, the world today is essentially the product of dramatic changes that took place in the Pleistocene. This book, a companion to the author's Pleistocene Amphibians and Reptiles in North America, discusses the Pleistocene amphibians and reptiles in Britain and the European continent eastward through present-day Poland, the Czech Republic, Hungary, the Yugoslavian republics, and Greece. The book begins with a general discussion of the Pleistocene in Britain and Europe with an emphasis on regional terms used to define Pleistocene chronological events. Next, a look at the pre-Pleistocene herpetofauna of the study area sets the stage for a discussion of Pleistocene herpetofauna. A significant section of the book consists of a "bestiary," a series of annotated taxonomic accounts of Pleistocene herpetological taxa from the region. Following this is the interpretive section, beginning with a discussion of herpetological species as paleoenvironmental indicators and continuing with an analysis of herpetological population adjustments to Pleistocene events in Britain and Europe, and then with a discussion of extinction patterns in the region. Finally, the author compares Pleistocene herpetological events in Europe with those in North America. This volume and its companion together provide an up-to-date and comprehensive review of Pleistocene herpetofaunas across a significant portion of the Northern Hemisphere.

Proceedings of the NATO Advanced Study Institute, Oslo, Norway, July 27-August 5, 1977

Geological correlations of East Antarctica with adjoining continents have been puzzling geologists ever since the concept of a Gondwana supercontinent surfaced. Despite the paucity of outcrops because of ice cover, difficulty of access and extreme weather, the past 50 years of Japanese Antarctic Research Expeditions (JARE) has successfully revealed vital elements of the geology of East Antarctica. This volume presents reviews and new research from localities across East Antarctica, especially from Dronning Maud Land to Enderby Land, where the geological record preserves a history that spans the Archean and Proterozoic. The reviews include extensive bibliographies of results obtained by geologists who participated in the JARE. Comprehensive geological, petrological and geochemical studies, form a platform for future research on the formation and dispersion of Rodinia in the Mesoproterozoic and subsequent assembly of Gondwana in the Neoproterozoic to Early Palaeozoic.

This book presents a new synthesis of the major metallogenic provinces of Europe and the geodynamic processes involved that can lead to the formation of world-class ore deposits. It represents the culmination of a 5-year research programme, GEODE, set up by the European Science Foundation with participation of many hundreds of Earth scientists from all over Europe. The main research activities focused on specific target areas and involved integration of geological, geophysical and geochemical methods. Defining surface-depth relationships was a prerequisite for interpretation of the processes, present and past, responsible for the formation of the lithosphere.

Selected conference papers from the European Mantle Workshop, EMAW, held Ferrara, 2007.

Volcanoes release gases to the atmosphere both during and between eruptive phases. Primary and secondary processes occurring within the mantle and crust control the gases' chemical and isotopic compositions as well as their emission rates. Therefore by measuring these gases a wealth of scientific information concerning the source and fate of these fluids is provided. Fluid geochemistry has been highly useful in advancing both our fundamental scientific understanding and procedures for operational volcano monitoring and eruption forecasting.

Gases from low-to-high temperature fumaroles and those diffusively released through the soils of volcanic flanks are investigated using various sampling and measurement techniques. Furthermore, a variety of remote sensing methods are applied at relatively great distances from the source to gather major gas composition and flux data for volcanic plumes using ground based, airborne (including UAV) and space borne platforms. The acquired data have advanced science in a number of key ways: • firstly, with parallel thermodynamical modelling to advance our capacity to interpret acquired degassing data; • secondly, through improved constraints on budgets for volcanically mediated
geochemical cycling, particularly via regional subduction processes; • thirdly, through improved constraints on the effects of volcanic gases on atmospheric composition, chemistry and radiative transfer, particularly in terms of halogen chemistry, volcanogenic climate change and impacts on human health; • fourthly, there has been a growing body of work focused on combining degassing data with contemporaneous geophysical data and studies on conduit fluid dynamics to advance our understanding of how subterranean gas flow mediates activity at the surface; • and fifthly, there have been considerable advances in the methods themselves, used to make the gas measurements, in particular in terms of extractive sampling (e.g., using MultiGAS units, mass spectrometry, spectroscopic isotope measurement approaches and diffusive denuder sampling) and remote sensing approaches (e.g., DOAS, UV cameras and other imaging techniques, LIDAR and FT).

A concise introduction to the mineralogy and petrology of igneous and metamorphic rocks for all Earth Science students.

Cristian Bigioli, Elena Bonaccorsi, Yves Moëlo and Paolo Orlando Mercury-arsenic sulfosalts from the Apuan Alps (Tuscany, Italy). Ill. Aktashite, CuH6Hg3As4S12, and laffitlithe, AgHgAsS3, from the Monte Ariscoio mine: occurrence and crystal structure Gabriele Cruciani, Dario Fancello, Marcello Franceschelli, Massimo Scodina and Maria Elena Sano Geothermobarometry of Al-silicate-bearing migmatites from the Variscan chain of NE Sardinia, Italy: a P-T pseudosection approach Paolo Balirano Dependence of structural data from sin? extension in Rietveld refinement of virtually texture-free laboratory X-ray powder-diffraction data Kamal Siahcheshm, Ali Asghar Calagari, Ali Abdedini and Sven Sindem Elementarry mass changes during alteration in the Maher-Abad porphyry Cu–Au deposit, SW Birjand, Eastern Iran Ozlem Akgul, Nil Baran Acarali, Nurcan Tugrul, Emek Moroydor Derun and Sabriye Piskin X-Ray, Thermal, FT-IR and morphological studies of zinc borate in presence of boric acid synthesized by ulexite Giuseppe Montana, Luciana Randazzo, Cristina Maria Belfiore, Mauro Francesco La Russa, Silvestro Antonio Ruffolo, Anna Maria De Francesco, Antonino Pezzino, Rosalda Puntero and Vincenzo Di Stefano An original experimental approach to study the alteration and/or contamination of archaeological ceramics originated by seawater burial Shanke Liu, He Li and Jianming Liu Reliability of the structural data for calcite and dolomite extracted from X-ray powder diffraction by Rietveld refinement

In this book, the first dedicated entirely to the petrology of lamproites and their relationships to other potassium-rich rocks, the objective of the authors is to provide a comprehensive critical review of the occurrence, mineralogy, geochemistry, and petrogenesis of the clan. Although lamproites represent one of the rarest of all rock types, they are both economically and scientifically important and we believe the time is ripe for a review of the advances made in their petrology over the past two decades. Many of these advances stem from the recognition of diamond-bearing lamproites in Western Australia and the reclassification of several anomalous diamond-bearing kimberlites as lamproites. Consequently lamproites, previously of interest only to a small number of mineralogists specializing in exotica outside the mainsteam of igneous petrology, have become prime targets for diamond exploration on a worldwide basis. Contemporaneously with these developments, petrologists realized that lamproites possess isotopic signatures complementary to those of midoceanic ridge basalts, alkali basalts, kimberlites, and other mantle-derived melts. These isotopic studies provided new insights into the long-term development of the mantle by suggesting that the source regions of lamproites were metasomatically enriched in light rare earth and other incompatible elements up to 1-2 Ga prior to the melting events leading to generation of the magma.

This book is devoted to different aspects of tectonic researches, especially to modern geodynamic processes. Syntheses of recent and earlier works, combined with new results and interpretations, are presented here for diverse tectonic settings. Most of chapters include up-to-date materials of detailed geological-geophysical investigations, which can help more clearly understand the essence of mechanisms of different tectonic processes. Among general problems of tectonics are discussed processes in axes of slow-spreading mid-ocean ridges on example of central part of Mid-Atlantic Ridge and in continental collision zones. Formation of sedimentary basins are considered on examples of Niger Delta, Triassic Cuyana Basin (Argentina), and Mesozoic and Cenozoic basins of the Alpine margin (Tunisia); neotectonic processes examined in Turkey and Morocco; tectonic evolution of the southern margin of Laurasia in the Paleozoic discussed as well as interrelations of western Troms-Lofoten and the Lewesian complexes in the Midle Paleoproterozoic. This volume summarizes the state of the art of Variscan geology from Iberia to the Bohemian Massif. The European Variscan belt consists of two orogens: the older, northern and the younger, southern. The northern Variscan realm was dominated by Late Devonian–Carboniferous rifting, subduction and collisional events as defined by sedimentary records, crustal growth, recycling of continental crust and large-scale deformations. In contrast, the southern European crust was reworked by major Late Carboniferous collision followed by Permian wrenching. The Late Carboniferous–Permian orogeny overprinted the previously accreted system in the north, but with much lower intensity, resulting in magmatic recycling and extensional tectonics. These two main orogenic cycles do not reflect episodic evolution of a single orogenic system but a complete change in orientation of stress field, thermal regime, degree of reworking and recycling of European crust, reflecting a major switch in plate configurations at the Early–Late Carboniferous boundary. The Eleventh International Conference on Basement Tectonics was held at the GeoForschungsZentrum Potsdam in Germany 25-29 July 1994. It was the first time that a meeting of this series took place in the centre of Europe and the first such meeting in this area after the recent political changes in eastern Europe. Consequently, the main theme of the meeting focussed on the structure and history of the entire European continent. Further themes were grouped around topics of current interest. Keynote lectures on these topics were given by A. Berthelsen, St. Mueller, A. Green, and D. Fountain. The technical sessions were arranged with support of the Scientific Committee on the following topics: 1. Continental scale features of basement rocks of phanerozoic cratons - with emphasis on Europe 2. Extrapolation and correlation of geological and geophysical data from basement rocks: an assessment 3. Mechanisms of basement exhumation in the evolution of orogenic belts 4. Structure and intraplate deformation of the North-American craton Papers submitted to this volume have however all been collected in one part since all of them deal with different aspects of deformation of the continental basement. A second part contains a complete list of all papers and posters presented at the meeting. Field trips to study some of the above mentioned aspects in the Harz mountains, the Granulite Massif, and the Erzgebirge were organized by P. Bankwitz, P. Frischbutter, 1. Rotzler, K. Rotzler, and B. Mingram. Their assistance is gratefully acknowledged.

Petrological Evolution of the European Lithospheric Mantle Geologcal Society of London Twenty years have passed since Menzies & Hawkesworth extended the concept of metasomatism to mantle processes. The aim of this book is to gather together progress made on this topic since then. Most of the 14 papers reported in the volume rely on situ major and trace element analyses of minerals and glasses in mantle xenoliths, and deal with
different kinds of metasomatic agents at variable fluid/rock ratios in tectonic settings as different as intra-plate, mid-ocean ridge (ophiolites) and supra-subduction. The book contributes to the wide debate on the nature of the fluids migrating into the mantle wedge, as well as on the different residential times of the subduction signature. In addition papers on intra-plate settings deal with the problem of relating various metasomatic signatures to one single metasomatic event through an infiltration-reaction process.

Volume 2 provides an overview of the Mesozoic and Cenozoic evolution of Central Europe. This period commenced with the destruction of Pangaea and ended with the formation of the Alps and Carpathians and the subsequent Ice Ages. Separate summary chapters on the Permian to Cretaceous tectonics and the Alpine evolution are also included. The final chapter provides an overview of the fossils fuels, ore and industrial minerals in the region.

The scientific achievements of the European Geotraverse Committee (EGT) are presented in this unique study of the tectonic evolution of the continent of Europe and the first comprehensive cross section of the continental lithosphere. Geological evolution of middle to late Paleozoic rocks in the Avalon terrane of northern mainland Nova Scotia, Canadian Appalachians: a record of tectono-thermal activity along the northern margin of the Rheic Ocean in the Appalachian-Caledonide orogen.

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