GEOLOGICA BELGICA (2016) 19/3-4: 305-306

BOOK REVIEWS

Gerhard LEHRBERGER & Esther VON PLEHWE-LEISE (eds), 2015. ***Barrois Oolithe. Vorkommen, Verwendung, Verwitterung und Erhaltung von Kalksteinen aus der Umgebung von Savonnières-en-Perthois und Morley im Departement Meuse in Frankreich***. München, Verlag Dr. Fr. Pfeil. Münchner Geowissenschaftliche Abhandlungen, Reihe B, Ingenieurgeologie, Hydrogeologie, Geothermie, 22, 428 p. – ISBN 978-3-89937-197-0. Price € 90.00.

Cet ouvrage monumental (428 p. richement illustrées), auquel ont contribué pas moins de 10 auteurs principaux et de 24 collaborateurs, constitue indéniablement une somme sur un sujet assez limité mais intéressant, traité dans le moindre détail : les calcaires oolithiques du Jurassique du Nord-Est de la Lorraine. Beaucoup d'entre eux ont été largement utilisés comme la pierre de Savonnières ou celles de Brauvilliers et de Morley, mais d'autres sont également traitées comme les pierres de Jaumont, de la région de Commercy (Euville et Lérouville), de Reffroy et Saint-Joire. Bref, c'est quasiment tous les calcaires lorrains qui sont ici étudiés. Le point de départ de cette vaste entreprise, qui a constitué un programme spécifique de recherche de la DBU (*Deutsches Bundesstiftung Umwelt*, Fondation allemande pour l'environnement, www.dbu.de), est la restauration de deux objets patrimoniaux : le grand portail de l'église de l'abbaye de Tepla en Tchéquie et le monument funéraire du pasteur de la ville (le Bon Berger, *der Gute Hirte*) dans le cimetière des Melaten à Cologne, deux œuvres du XIX^{e} siècle qui avaient subi les outrages du temps et ont fait l'objet d'une approche très documentée et d'une restauration approfondie. La première partie du livre est consacrée à ces projets. Après une brève description du contexte de la publication, les différents gisements sont passés en revue et leurs contextes géologiques décrits en détail, ainsi que l'histoire de leur exploitation. Ensuite viennent les analyses pétrographiques et les mesures de leurs performances (caractéristiques mécaniques classiques), avec une attention particulière d'une part à la porosité et à la capillarité, d'autre part aux méthodes non destructives de propagation des ondes. Les processus d'altération sont alors étudiés, en particulier sur les deux monuments cités, et les traitements de conservation et de restauration sont décrits de façon détaillée. Une contribution sur la sculpture en Savonnières du Dom de Cologne, particulièrement emblématique, clôture cette première partie. Dans la seconde partie sont rassemblés des recensements de l'utilisation de ces pierres dans différents pays ou régions (France, Allemagne, dont plus spécifiquement Berlin et Potsdam, Ulm et la Saxe, les Pays-Bas et la Belgique), ainsi qu'une approche de l'œuvre de deux sculpteurs tchèques des XIX^{e} et XX^{e} siècles. La contribution belge, sous les plumes de M. DUSAR, R. DREESEN et M. DE CEUKELAIRE, termine le volume en beauté. On sait que l'étude des pierres françaises de construction a fait l'objet, il y a plus d'un demi-siècle, des travaux fouillés de Carl CAMERMAN, toujours appréciés. Il trouve ici de dignes successeurs, qui renouvellent l'approche des matériaux, notamment dans l'inventaire exhaustif des types de pierres dans les bâtiments de Leuven. Pour la plupart, les textes sont en allemand, sauf ceux sur les Pays-Bas et la Belgique, rédigés en anglais. En bref, un ouvrage définitif, indispensable pour tout qui s'intéresse aux pierres comme matériaux de construction et au patrimoine lithique en général, et donc très recommandable !

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Daniël VAN UYTVEN & Roland DREESEN, 2014. **Geologische fietsroute Hoge Kempen**. Provincie Limburg, Provinciaal Natuur Centrum Genk – Bokrijk. 144 p., 177 figs, ISBN 789074605540. Price 10 € via http://www.provinciaalnatuurcentrum.be.

This pocket book (in Dutch) invites the reader to enjoy three bike circuits in the Hoge Kempen ('High Campine) National Park where altitudes vary between 60 and 90 m: 39 or 45 km in the As - Opglabbeek area; 35 km in the Genk area; 22 km in the Zutendaal area. In combination with open air sport, leisure and cultural interest, the purpose of the writers is to document the geological history of this scenic part of the Belgian province of Limburg, largely dominated by green landscapes of which the core now forms a National park. Quarries provide windows to the underlying Cenozoic fluvio-marine formations (the Bolderberg formation to the south and the Diest formation to the north; both mainly made up of sands but containing lignite and sandstones), covered by fluviatile Middle-Pleistocene (Cromerian) gravels, all blanketed by aeolian rocks of Late-Pleistocene age deposited during the Weichselian glaciation with some reworking associated with human occupation of the territory. This book of 144 pages provides very detailed descriptions not only of the outcropping rocks, but also of historical landuse changes, geomorphosites, historical building materials used in houses, chapels and monuments encountered along the circuits, and even etymological referencess with natural phenomena and traditional land use. Descriptions are illustrated by numerous photos, figures, sketches and maps in colour. Moreover, reference is made to the effects and still visible signs of former underground coal mining, particularly to the Waterschei colliery located south-west of the As - Opglabbeek circuit.

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Colin P. SUMMERHAYES, 2015. **Earth's Climate Evolution**. Wiley-Blackwell, October 2015. ISBN: 978-1-118-89739-3. 416 p. Hardcover price £ 60.00; € 81.00; E-book € 72.99.

This magnum opus is composed in 16 chapters each of which can be read as a separate publication, but these can be grouped in two parts. After an introduction justifying the line of thought elaborated throughout the book, the first ten chapters develop the methodology and achievements of the different geoscientific disciplines necessary to decipher the climate signals of the System Earth. The next five chapters intend to explain the climate evolution and variability during the Quaternary up to the Present. The final chapter brings it all together, summarises the palaeoclimatic evolution of the Earth in relation to the major events supposed to drive climate change, and reflects on what we know and do about climate change as a suitable epilogue to a convincing story.

This book is quite unique, compiled out of a geological perspective independent of the IPCC programme, focussing on palaeoclimates as a key element to understand the future evolution of the Earth. The underlying reason is that the author consistently tries to answer the fundamental questions of why there is climate change and how the scientific insight in climate change has evolved ('knowledge of the climate system unfolds through time'). The climate story is described as part of the endeavour of scientific discoveries and technical advancement of mankind. On the human side the author goes back 200 years, staying within the realm of enlightenment and real natural science, advancing step by step in the development of new ideas and technical breakthroughs (e.g. in dating rocks more precisely), up to the current body of knowledge

on the climate system. Among the many scientists whose personal contribution to better understanding of past climates are highlighted in this book are the climate modellers from the Université catholique de Louvain, André Berger and his team members, Michel Crucifix, Hugues Goosse and Marie-France Loutre. The author gives tribute to persons who did original research but were subsequently ignored, such as Jacques Joseph Ebelmen, professor at Ecole des Mines and director of the Royal Manufactory of Porcelain in Sèvres, as the inventor – in 1845 - of the geochemical carbon and sulphur cycles and the process of chemical weathering balancing these cyles. His groundbreaking work may have been ignored but 'his ideas were in the air'.

For the story of the System Earth, the author goes back about 450 million years, to the emergence of land plants leading to the start of a continuous and undeniable interaction between Life and the Planet Earth. Indeed, past climates much warmer or colder than today's allow to test the robustness of the numerical models predicting ongoing and future climate change and the dire consequences of fossil fuel burning. Apparently, few textbooks take the geoscientific perspective on climate change, a gap that has been thoroughly filled with this work. This means that e.g. the orbital variations of the Sun receive rather modest attention, among the many other variables, which may have caused more fundamental changes in the evolutionary path of the Earth, of its carbon cycle and hence of its climate. The 'primacy of plate tectonic processes as the ultimate drivers of climate change' is demonstrated, particularly for the Cretaceous and Caenozoic. Anyhow, the key words are palaeoclimatology and palaeoceanography. The author explains e.g. the relation between see floor spreading, greenhouse gas forcing, surface temperatures, oxygen depletion of subsurface sea waters, ocean currents, their impact on black shale deposits and the resulting consequences on the palaeoclimate. The ambitious objective of describing the System Earth has as a minor inconvenience that the wealth of data, produced by the many researchers studying in great detail the stratigraphical successions, is overlooked, e.g. the Frasnian/Famennian mass extinction is explained by a meteorite impact but recent research has failed to find proof of such a global event and instead focuses on a rapid but not sudden modification of the biogeochemical cycles. On the other hand, the Palaeocene-Eocene Thermal Maximum and the Pliocene warming receive a more balanced treatment. The author gives fair attention to the complex, even contradictory interactions and uncertainties, reflecting how a single tectonic event such as the closure of the Central American isthmus in Panama can provoke initial warming and subsequent cooling of the North Atlantic by influencing ocean currents and salinity. The author describes how orbital changes in insolation as well as variations in solar activity are responsible for climatic oscillations but interference with internal and external dynamics of the System Earth lead to seesaw dissociation of climate events and ultimately to climate drift. Special attention is given to the Little Ice Age and the causes for it end, for its was bound to continue and deepen into a neoglacial Holocene: greenhouse gas forcing has taken over from solar activity in driving global temperature, albeit superimposed on many more natural variables. Divergence between temperature and solar signals since 1940 is demonstrated to be the result of anthropogenic impact. A the author says, the pattern of warming induced by greenhouse gas forcing should be 'blatantly obvious'. Although climate change during the next decades is expected to be incremental, with positive feedbacks such as destabilisation and melting of large ice sheets unlikely but not to be excluded, it is anyhow leading to a 'creeping catastrophe'. Moreover, return to a pre-industrial level of atmospheric and oceanic greenhouse gases I impossible to achieve in short notice. Rather it should be compared to the lifetime of high level radioactive waste. Needless to say, the future does not look bright.

What makes this book of 394 pages densely packed with scientific breakthroughs and evolving theories truly impressive is that it represents the works and reflections of just a single author. Colin Summerhayes can claim to cover the whole domain of Earth's climate evolution, based on rock, water, ice and air interactions, and was so privileged as to witness many of the scientific events. Moreover, it is obvious that this book has been written out of commitment for the climate cause, confronting a community that feels less concerned about the future of humanity. This book is extremely well written, while maintaining a high scientific and editorial standard, flavoured by anecdotes on the peculiar characters of the scientists involved and encounters between the different egos. As a reader you get the sense to be a privileged spectator of a thriller coming to a dramatic end in this century. I recommend this book as an invaluable reference for the wider scientific and engineering community, teachers, policy makers, and environmental NGOs. It will also be of particular interest to historians of the natural sciences, in retrospect of our current dealings with climate change.

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