(EK and GRIMBERIEUX, editors, 1979) and the proceedings of the Journées de la Spéléologie (QUINIF, editor, 1982).

C. EK

7. PERIGLACIAL PHENOMENA

Recent publications on periglacial processes, deposits and geomorphology may be classified in two different sections. The first concerns studies of present-day periglacial phenomena; the second deals with Quaternary features. We shall present each of these groups of work separately.

PRESENT-DAY PERIGLACIAL PHENOMENA

MICHEL (1978) has measured the rate of gelifraction on a vertical limestone scarp during one winter season. SERET (1979) has shown how the same process has contributed to the development of elongated meanders that exist in several valleys of the Ardennes. All the other works focus on frost processes that occur in the full periglacial environment : in Antarctica, frost wedges (PAEPE and PAULISSEN, 1974); in the Canadian Arctic, pingos (PISSART and FRENCH, 1976, 1977), segregation ice (PISSART, 1975), aeolian deposits near river beds (PISSART et al., 1977), periglacial structures (PISSART, 1975, 1976); in the French Alps at 2800 m above sea level, appearance and evolution of small sorted polygons (PISSART, 1978) and the speed of the stone displacements on slopes (PISSART et al., 1981).
All these investigations permitted a better understanding of periglacial features that were formed in Belgium during cold periods of the Quaternary. Moreover laboratory experiments were conducted to explain the evolution of small sorted polygons and the origin of cryoturbations (PISSART, 1982a). These experiments have shown clearly how small extensions of loess are able to penetrate down into the underlying sands as a result of repeated thawing and freezing without any permafrost (PISSART, 1982b).

FOSSIL PERIGLACIAL PHENOMENA

A general view of periglacial studies in Belgium was presented by PISSART in 1976. All the research completed before 1974 were reported in that paper.
The effects of wind action were very important in the development of the physical landscapes of Belgium during periglacial times. However,

only a few recent studies have focussed on this subject. The determination of the heavy mineral content in loess deposited near the Ourthe river, has enabled JUVIGNE (1977) to demonstrate the operation of aeolian deflation on alluvial plains south of the river Meuse. In the north, ridges of sands, forming continuous borders along the alluvial plains and derived by aeolian deflation from the river beds, have been described along numerous rivers courses by GULLENTOPS (1981). The infilling of the Flemish valley includes both aeolian and fluvio-periglacial sediments of Riss and Würm age (DE MOOR, 1981; DE MOOR and HEYSE, 1978).

In periglacial deposits, mainly on loess sections, a great number of frost structures have been recorded and are in use as stratigraphic markers. Accumulation of additional data has continued during the last ten years. The studies have been principally concerned with different types of cryoturbations and ice wedge casts (DE MOOR and HEYSE, 1978; DE MOOR, 1978, 1981; DE MOOR et al., 1978; PISSART, 1981; GULLENTOPS et al., 1981; HAESAERTS and VAN VLIET-LANOË, 1974, 1981; VANDENBERGHE, 1981). From very careful observations some authors have tried to explain how periglacial structures are formed. For cryoturbation forms, the hypothesis of load cast is defended by GULLENTOPS and PAULISSEN (1978) and VANDENBERGHE and VANDENBROEK (1982). In relation to the supposed origin of these features, the authors try to make palaeoclimatic inferences, mainly for the last glaciation.

Fragipan, as witnessed in a very compact soil surface horizon, is now interpreted as a periglacial structure and very often as a remnant of permafrost (VAN VLIET-LANOË, 1976). These features are used as evidence in attempts at palaeoclimatic reconstructions (HAESAERTS and VAN VLIET-LANOË, 1981). Fragipan horizons are the result of the formation of segregated lenses. Thin sections, studied under the microscope, give very interesting indications of geomorphological processes operating under a cold climate (VAN VLIET-LANOË, 1980; VAN VLIET-LANOË et al., 1981; VAN VLIET-LANOË and FLAGEOLLET, 1981; VAN VLIET-LANOË and LANGHOR, 1981; VAN VLIET-LANOË, 1982).

On the Hautes Fagnes plateau, remnants of periglacial mounds, first described as pingo-remnants, have been re-examined. Sections cut through ramparts of the depressions have yielded new information about the genesis and the age of these features (BASTIN et al., 1974; PISSART, 1974; PISSART and JUVIGNE, 1980). It now seems clear that these features are remnants of mineralogic palsas which were formed during the late Dryas phase.

Periglacial mud-flow deposits, accumulated in the Soor valley near Eupen

during the last glaciation, have been described by various specialists and provide good examples of the kind of periglacial material that occurs in the bottom of the small valleys of the Ardennes (PISSART et al., 1975).
In conjunction with several excavations, fossil periglacial structures near Bastogne have been detected from evidence on aerial photographs. They appear to be large cryoturbations caused by differences in granulometry in the upper part of the ground (DONNAY et al., 1976).

A. PISSART

8. GLACIOLOGY AND GLACIAL MORPHOLOGY

With regard to present-day processes, the main direction of research is the study of mechanisms operating at the ice-bedrock interface.
Field work is performed in two different environments : on one hand, ice is cored at the margin of the base of Canadian Arctic glaciers, on the other hand, sampling is done in Alpine subglacial tunnels or cavities, certain of which are being dug for hydroelectric purposes.
The chemical composition of basal ice is analysed to provide information on the origin of the ice (HALLET et al., 1978; SOUCHEZ and LORRAIN, 1978; SOUCHEZ et al., 1978; LEMMENS et al., 1981). Since basal ice is usually heavily loaded with mineral particles, these studies lead to a better understanding of glacial erosion processes and of how subglacial debris is exported (SOUCHEZ and TISON, 1981 a, b). The chemical analyses are done by atomic absorption spectrophotometry and potentiometric microtitration. The validity of results is guaranteed by carefully elaborated sampling techniques that have been designed to avoid numerous sources of contamination, mainly due to the presence of fine material particles.
The most recently published papers (LORRAIN et al., 1981; JOUZEL and SOUCHEZ, 1982) are still concerned with the same problems of ice-bedrock interface, but these are tackled in a new and original way : relative variations of the isotopic composition in oxygen and hydrogen of basal ice are used to shed light on physical mechanisms of glacial basal flow.
With regard to glacial morphology, the genesis of drumlins has been reconsidered on the basis of field observations in Ireland (SERET, 1979).

R. LORRAIN