



**Guidebook of the
Field trip in the Stavelot Massif
4 October 2019**



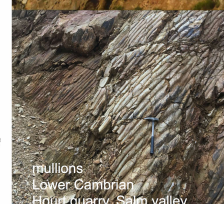
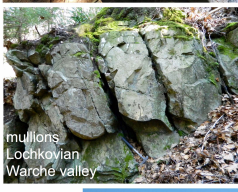
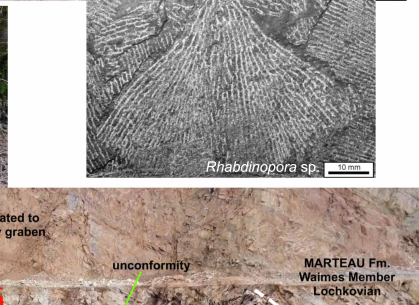
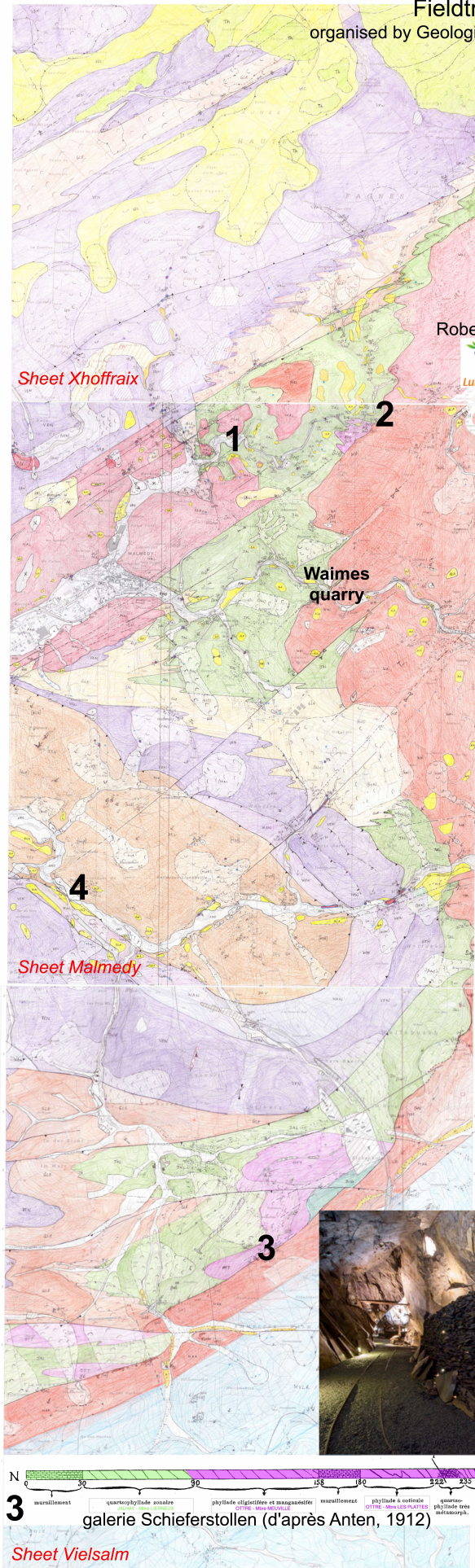
**Field trip organised by Geologica Belgica
at the occasion of the 2019 E. Van den Broeck medal
awarded to the**

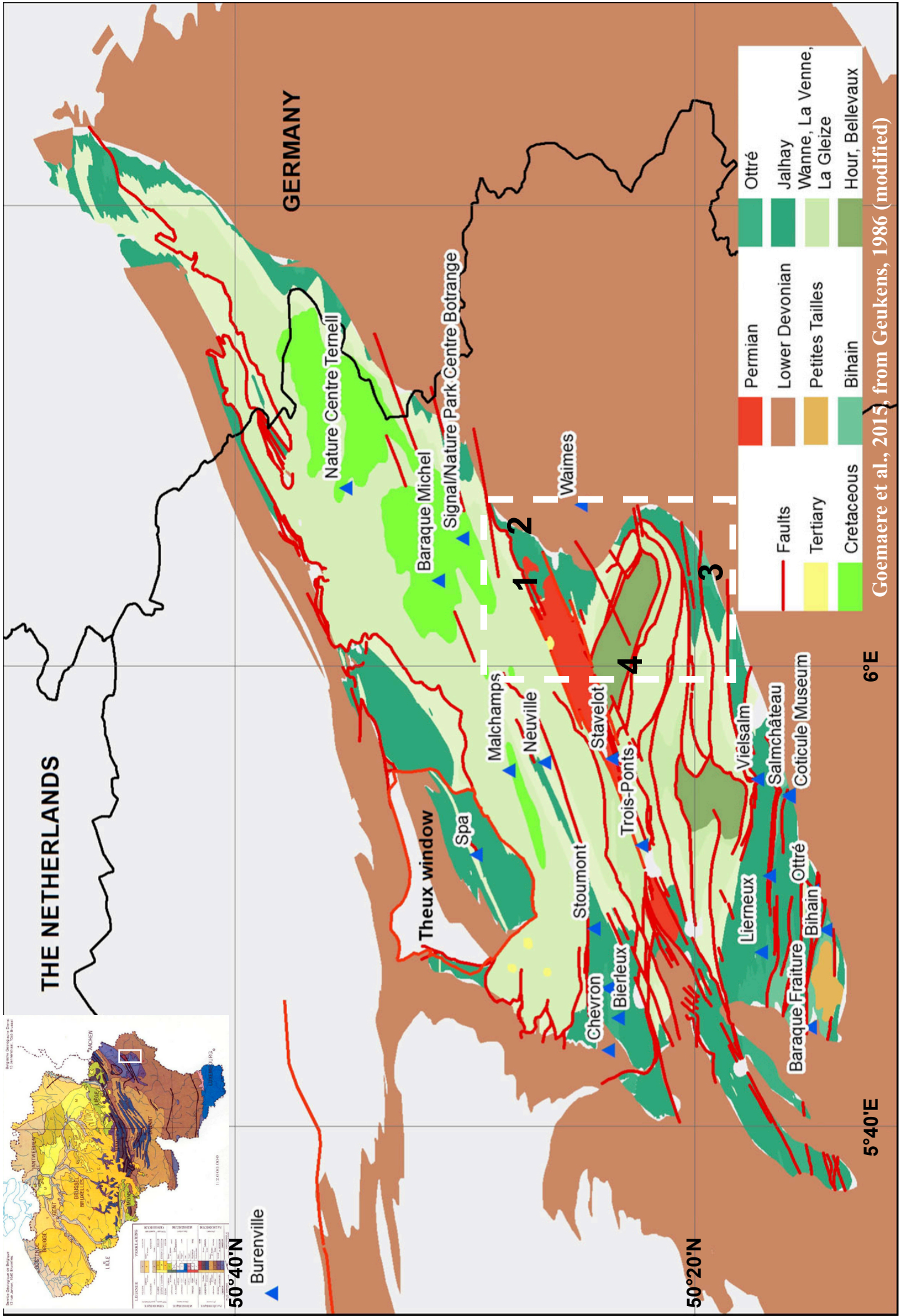
Cartographes de la Région wallonne



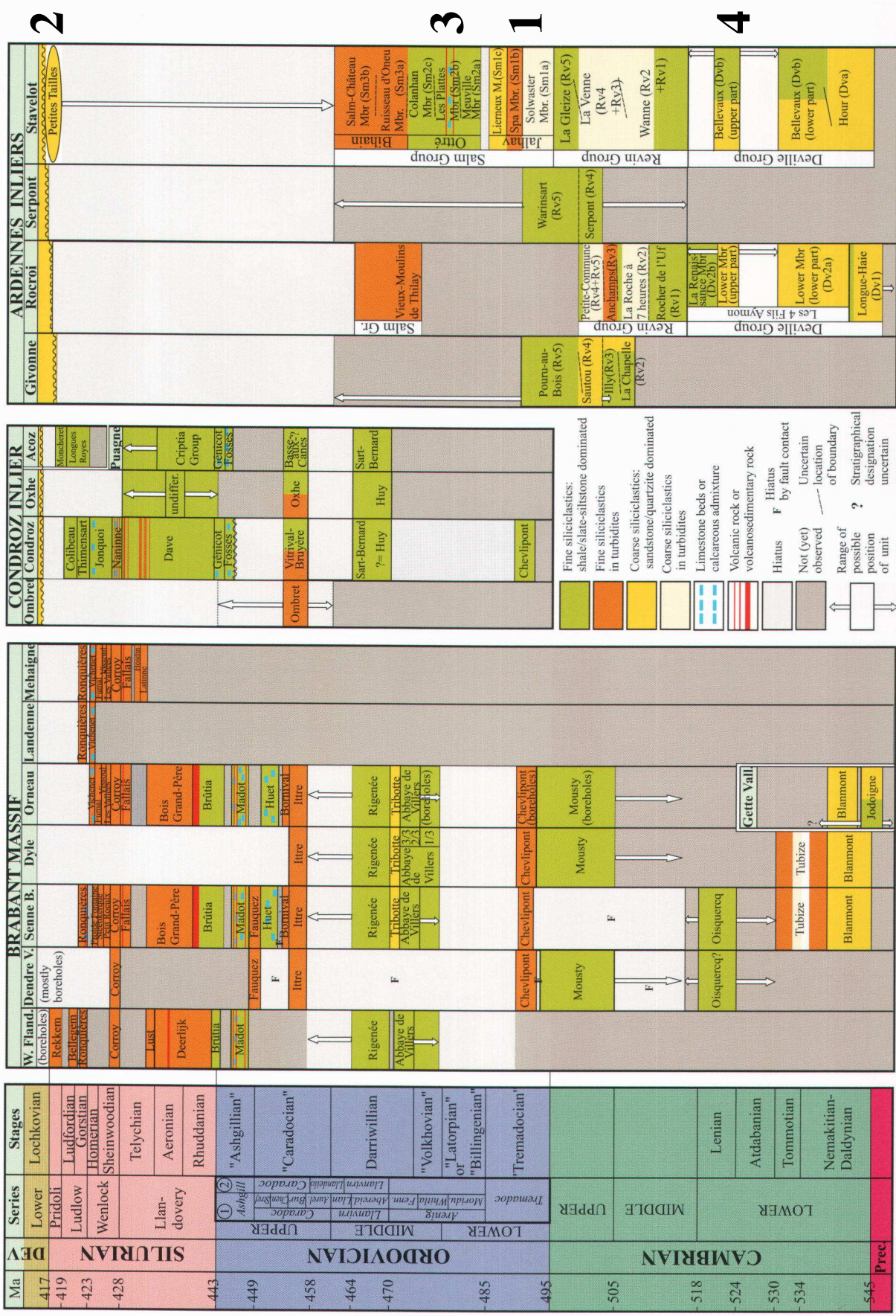
Fieldtrip in the Stavelot Venn Massif, October 4 2019

organised by Geologica Belgica at the occasion of the 2019 E. Van den Broeck medal awarded to the Cartographes de la Région wallonne





Goemaere et al., 2015, from Geukens, 1986 (modified)



Chronostratigraphical position of the Lower Palaeozoic lithostratigraphic units of Belgium. The genesis of the sediments is not studied in the Givonne and the Serpont area and only the lithology is shown. The succession of the two units in the Serpont area is debated (Beugnies, 1960 and Geukens & Richter, 1962). The latter authors consider the succession to be inverted from what is shown in the column. The fat rectangle in the Series column of the chronostratigraphy shows under 1 the British Ordovician chronostratigraphy revised by Fortey et al. 1995 and under 2 the position of the Llanvirm and Llandeilo stages, before the latter was abolished in 1995. Abbreviations: Prec.: Precambrian; Moridu.: Moridunian; Whitla.: Whitlandian; Fenn.: Fennian; Abereid.: Abereiddian; Lan.: Llandeilian; Aurel.: Aurelian; Bur: Burrellian; Chen: Cheney; Stref: Streffordian; Dev: Devonian.

(from Verniers et al., 2001)

4. STAVELOT MASSIF

4.1. Deville Group - old Dv

Description: Greenish, purplish and grey coloured slate and quartzite group, subdivided into the Bellevaux and the Hour Fms.

4.1.1. Hour Formation - HUR (old: Dva)

Author: After Geukens, 1999.

Description: Thick beds of light coloured to light greenish quartzite and green slate. The white sandstone is locally altered into a reddened sandstone.

Stratotype: Outcrop in the Rocher de Hourt along the road N28 between Trois-Ponts and Vielsalm.

Area: In two anticlinal structures (Grand-Halleux and Ligneuville) in the southern part of the Stavelot Massif.

Thickness: > 150 m.

Age: Due to the absence of macrofossils and acritarchs in the formation, a possible Neoproterozoic to Early Cambrian age is tentatively proposed (Mortelmans, 1977; Vanguetaine, 1992).

4.1.2. Bellevaux Formation - BEL (old: Dvb)

Author: After Geukens, 1999.

Description: Alternation of greenish and purple slate and shale; greenish shale and white quartzite.

Stratotype: Amblève valley east of the city of Stavelot and in the Salm valley north of Rochelival.

Area: In two anticlinal structures (Grand-Halleux and Ligneuville) in the southern part of the Stavelot Massif.

Thickness: 150 m.

Age: The only fossils present are the trace fossils *Oldhamia antiqua* and *O. radiata*. Because the genus *Oldhamia* is present in the Lower and Middle Cambrian only and not below the new GSSP of the Cambrian-Precambrian boundary (Crimes, 1992), an Early Cambrian age was proposed by Verniers and De Vos (1995). According to new observations by A. Seilacher (pers. comm., 1998) *Oldhamia* is more restricted in time and only present in the Tommotian or Nemakitian-Daldynian (early Early Cambrian), which would be the age of the formation. Acritarchs are recorded in the uppermost part of the formation, above the *Oldhamia* occurrences. They are assigned to the Zone 0 (Vanguetaine, 1974) indicating a mid or late Early Cambrian to early Mid Cambrian age (Vanguetaine, 1974, 1992).

4.2. Revin Group - old Rv

Description: Dark to light grey coloured slate and quartzite group, subdivided into the Wanne, La Venne and La Gleize Fms.

4.2.1. Wanne Formation Rv1-2 or WAN

Author: Geukens, 1999.

Description: Dark green-blue fine slate and green-greyish quartzite, alternating with dark slaty quartzite; some rare 10-15 cm thick conglomerate beds with slaty, quartzitic and sometimes phosphatic pebbles. The lower part comprises black silty slate (called "quartzophyllade" in the older literature), sometimes slate and black finely stratified quartzite. Some interstratified volcanic lavas or tuffs are present.

Stratotype: Not yet defined; type area in the outcrops of the Salm valley south of the village Trois Ponts.

Area: Stavelot Massif.

Thickness: 550-650 m.

Age: The presence of the inarticulate brachiopod *Acrothele cf. bergeroni* indicates a Mid Cambrian age (Vanguetaine & Rushton, 1979); the acritarchs belong to the biozones 1, 2 and 3, dated as Early (?) to Mid Cambrian (Vanguetaine, 1974, 1992; Vanguetaine & Van Looy, 1983).

4.2.2. La Venne Formation - Rv3-4 or VEN

Author: Geukens, 1999.

Description: Heterogeneous unit characterised by the alternation of black slate and dark quartzite. The quartzite is sometimes very clayey and micaceous. In the middle part very thick beds occur of grey-bluish quartzite which can contain thin gravel layers. The lower part is characterised by a rhythmic sedimentation with units consisting of, from base to top, coarse sandstone, fine sandstone, siltstone and slate, and also by well-stratified blue quartzite and by micaceous sandstone beds. Volcanic intrusions are present, mostly acid in composition.

Stratotype: Not yet defined; type area in the Amblève valley, along the railway sections between La Gleize and Coö.

Area: Stavelot Massif.

Thickness: 500 m.

Age: Mid to Late Cambrian based on acritarchs (Vanguetaine & Van Looy, 1983; Ribecai & Vanguetaine, 1993).

4.2.3. La Gleize Formation - Rv5 or GLE

Author: Geukens, 1999.

Description: In the north: black slate and silty slate (called “quartzophyllade” in the older literature); the upper part contains sometimes dolomite nodules with cone-in-cone structures; the lower part bluish-black slate with thick laminations. Some acid intrusions and lava flows can occur. In the south: graphitic slate occurs at Hebronval.

Stratotype: Not yet defined; type area in the Amblève valley, along the railway section east of the abandoned station of La Gleize.

Area: Stavelot Massif.

Thickness: In the north: 300 m; in the south: unknown.

Age: Late Cambrian based on acritarchs (Vanguetaine, 1974).

4.3. Salm Group - old Sm

Description: The group consists of three formations: from base to top: the Jalhay, Otrré and Bihain Fms.

4.3.1. Jalhay Formation – JAL (old: Sm1)

Author: Geukens, 1999.

Description: Blue-green slate, sandstone and silty slate (called “quartzophyllade” in the older literature) subdivided into three members.

The Solwaster Mbr – (SLW, old: Sm1a): dark green-blue “quartzophyllade”, black or green-blue slate, with at the base sandstone beds containing black shale fragments; occurrence of flattened nodules encircled by cone-in-cone structures, and of dendroid graptolite levels. Locally at the transition with the underlying Revin-Deville Group homogeneous graphitic black slate can occur.

The Spa Mbr – (SPA, old: Sm1b): dark bluish grey and greenish grey sandy “quartzophyllade”. Many sandstone beds have characteristic sedimentary structures (slumping, convoluted bedding and oblique stratification).

The Lierneux Mbr – (LIE, old: Sm1c): North of the Xhoris fault, olive green clayey “quartzophyllade”; south of the fault: greyish “quartzophyllade”, green sandy slate with reddish patches, magnetite-bearing slate. White sandstone levels in the Lierneux-Vielsalm-Bihain area; light green “quartzophylladic” slate; traces of bioturbation.

Stratotype: Not yet defined; type area of the formation around the village of Jalhay, more precisely around the Gileppe dam; type area of the Solwaster Mbr: around Solwaster, in the section along the forestry track south of the Gospinal Farm; type area of the Spa Mbr: outcrops in the Wayai valley around the city of Spa, more precisely the section along the road to the mineral water factory; type area of the Lierneux Mbr: section along the road from Lierneux to Sart, just south of Lierneux.

Area: See description above.

Thickness: Jalhay Fm: > 400 m (Laloux *et al.*, 1996); Lierneux Mbr: 80 m; Spa Mbr: not estimated; Solwaster Mbr: 60-150 m.

Age: The early Tremadoc age is proven by the presence of the dendroid graptolite *Rhabdinopora flabelliformis* in the lower two members of the formation; the subspecies *flabelliformis* is dominating in the lower part of the Solwaster Mbr, while the subspecies *anglica* and *norvegica* are occurring in the upper part of the Solwaster Mbr and in the Spa Mbr (Malaise, 1874a; Geukens, 1950, 1954; Bulman & Geukens, 1970). Vanguetaine (1974, 1992) confirmed this age on the base of acritarchs. He could also on the base of acritarchs, assign the uppermost part of the formation, without graptolites, to the late Tremadoc.

4.3.2. Otrré Formation - Sm2 or OTT

Author: Geukens, 1999.

Description: Purplish slate and silty slate (called “quartzophyllade” in the older literature) subdivided into 3 members.

The Meuville Mbr – (MEU, old: Sm2a), in the north: red or purple slate and “quartzophyllade”, purple slate with calcareous nodules, garnet bearing slate. In the north a gradual transition exists between the green “quartzophyllade” of the Lierneux Mbr and the purple “quartzophyllade” of the Meuville Mbr.

The Les Plattes Mbr – (PLA, old: Sm2b), in the north: purplish slate and sandy “quartzophyllade”, calcareous levels with iron and manganese nodules. In the south: “quartzophyllade”, purple or with purple patches containing levels with interstratified coticule, andalusite, garnet and volcanic rocks. The base is formed by a slaty sandstone, light green, with coarse otrelite crystals.

The Colanhan Mbr – (COL, old: Sm2c), in the north: purple coloured slate with a few levels of green slate; in the south: purple and green compact layered slates, containing otrelite.

Stratotype: Not yet defined; type area in the syncline south of Otrré; type area of the Meuville Mbr: outcrops in the Lienne valley north of Chevron; type area of the Les Plattes Mbr: abandoned or active quarries for the “coticule” between Hébronval and Bihain; type area of the Colanhan Mbr: the hill south of Lierneux between the villages of Verleumont and Hébronval and the northern flank of the crest south-west of Vielsalm.

Area: See description.

Thickness: Colanhan Mbr: 50 m; Les Plattes Mbr: 30 m; Meuville Mbr: 70 m; total thickness: 150 m.

Age: Neither micro- nor macrofossils observed; by geometry supposedly between Late Tremadoc (Early Ordovician) and Mid Ordovician.

4.3.3. Bihain Formation - Sm3 or BIH

Author: Geukens, 1999.

Description: Black silty slate (called “quartzophyllade” in the older literature) and greenish sandstone. The Salm-Château Mbr – (SCH, old: Sm3b): cleaved “quartzophyllade”, with thick bands of slates, often rich in pyrite, with many bioturbations. The Ruisseau d’Oneu Mbr – (ONE, old: Sm3a): greenish sandy slates with thin beds (5 cm) of sandstone with current bedding (convolute bedding and slumping).

Stratotype: Not yet defined; type area in the Bihain syncline; type area of the Salm-Château Mbr in the “cluse” of the Salm valley between Vielsalm and Salm-Château; type area of the Ruisseau d’Oneu Mbr in the tributaries of the ruisseau de Groumont, south-east of Lierneux.

Area: In the southern part of the Stavelot Massif; in the metamorphic zone the slate contains small crystals of a particular chloritoid (ottrelite).

Thickness: Salm-Château Mbr: > 150 m; Ruisseau d’Oneu Mbr: 30 m; total thickness: > 180 m.

Age: Mid and/or Late Ordovician based on acritarchs and chitinozoans (Vanguetaine, 1974, 1986) in the Salm-Château Mbr.

4.3.4. Petites Tailles Formation - PET

Author: Geukens, 1965, 1986, 1999.

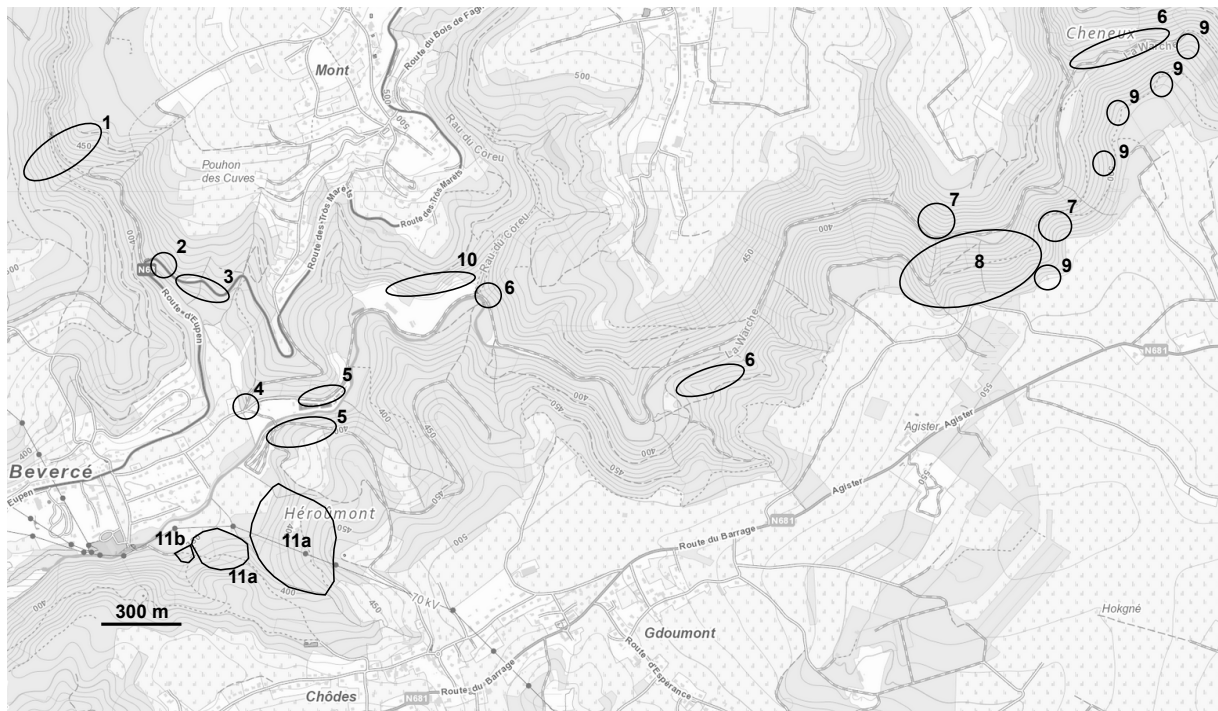
Description: Whitish quartzitic sandstone, often breccia, compact bedded chloritic slate and conglomeratic sandstone with greenish shale pebbles.

Stratotype: Not yet defined; type area in the vicinity of Baraque de Fraiture and the hamlet Petites Tailles.

Area: Southern part of the Stavelot Massif.

Thickness: (>75 m).

Age: Without macrofossils and only long-ranging acritarchs present (Vanguetaine, unpublished); by its stratigraphical position supposedly between Mid or Late Ordovician (age of the underlying Bihain Fm) and the late Lochkovian (age of covering Fozz Fm, Hance *et al.*, 1992). Geukens (1999) accepts for at least part of the formation an equivalence with the Colanhan Mbr of the Ottré Fm.



Vallée de la Warche, à l'amont de Bévercé. Proposition d'affleurements remarquables des formations de : 1, La Venne; 2, contact VEN/GLE; 3, La Gleize; 4, contact GLE/JAL; 5, Jalhay-Mbre Solwaster; 6, Jalhay-Mbre Spa; 7, Jalhay-Mbre Lierneux; 8, Otrré;. 9, Discordance WAI/JAL; 10, discordance MAL/JAL; 11a, glissements récents et actuels de Bévercé, découverts à l'occasion des travaux de révision de la carte géologique de Wallonie en 2015; 11b, glissement découvert par Ozer (1967).

Formation de Malmedy (MAL)

Origine du nom: ville de Malmedy, en Province de Liège (Dumont, 1832).

Connue naguère sous le nom de «Poudingue de Malmedy», la Formation de Malmedy, inclut essentiellement des conglomérats à matrice ferrugineuse et argileuse à argilo-calcaireuse, voire franchement calcaire. Ces dépôts se disposent en couches monoclinales inclinant au maximum d'une dizaine de degrés vers le NNO et reposent en discordance sur le socle plissé cambro-ordovicien du Massif de Stavelot. La formation est essentiellement préservée dans le graben de Malmedy, un fossé d'effondrement bordé par des failles normales subverticales disposées en gradin. Les dépôts conglomératiques se développent ainsi dans une direction SW-NE sur 22 km, et sur une largeur de 3 à 4 km (figure ci-dessous). Renier (1902) a divisé ces dépôts en 3 membres :

- le **membre inférieur** est constitué d'un conglomérat à matrice argilo-ferrugineuse de teinte rouge jaunâtre alternant avec des bancs lenticulaires de schistes, de grès et de microconglomérats (rudite dénommée «pséphite» par Omalius d'Halloy (1841) ;
- le conglomérat du **membre moyen** révèle une matrice argilo-calcaireuse de teinte rouge violacé. Ce membre est le mieux représenté à l'affleurement, en raison de son ciment carbonaté qui lui confère une plus grande cohérence (Renier, 1902; Antun, 1954). Notons également l'occurrence de bancs calcaire-gréseux lenticulaires de taille pluridécimétrique à métrique intercalés entre les bancs de conglomérat, auxquels s'ajoutent des éléments calcaires fossilifères

(coraux, brachiopodes, etc.) du Dévonien moyen et supérieur, et aussi du Carbonifère (e.g. Dumont, 1832; Dewalque, 1868; Renier, 1902; Maillieux, 1931). Selon Smolderen (1987), l'âge de ces éléments carbonatés est compris entre l'Emsien supérieur et le Tournaisien, d'après la faune qu'ils renferment; ils proviendraient de sources multiples, notamment du Synclinorium de Neufchâteau - Eifel. La taille des éléments diminue du nord-est vers le sud-ouest, ainsi que le pourcentage d'éléments calcaires (pour des localités de la carte Stavelot-Malmedy [Lamberty *et al.*, ss presse b]): 60% à Malmedy, 58% à Burnenville, 38% à Stavelot et 32% à Parfondruy (Renier, 1902) ;

- quant au **membre supérieur**, sa matrice est argileuse et il se présente sous forme d'un conglomérat à petits éléments mal arrondis, offrant des ressemblances avec le membre inférieur (Renier, 1902; Antun, 1954). Parmi les éléments constitutifs des bancs conglomératiques figurent des débris résultant du démantèlement du socle cambro-ordovicien et des roches du Dévonien inférieur (quartz, quartzite, grès, etc.).

Les épaisseurs sont les suivantes : membre inférieur: 60 m à Malmedy ; membre moyen: 150 m à Malmedy (Renier, 1902); membre supérieur: supérieur à 30 m à Malmedy (Antun, 1954). Souvent discuté sur base des éléments constitutifs du conglomérat, l'âge de ces dépôts est Permien, sur base de mesures paléomagnétiques (de Magnée et Nairn, 1962).

ESPÈCE 4^e. **PSÉPHITE.**

Roche conglomérée, composée d'une pâte schisteuse, renfermant des fragments de diverse nature, mais le plus communément schisteux.

Formant des couches, des amas et des filons, à texture poudingiforme et bréchiforme.

Souvent friable, quelquefois meuble ou tenace.

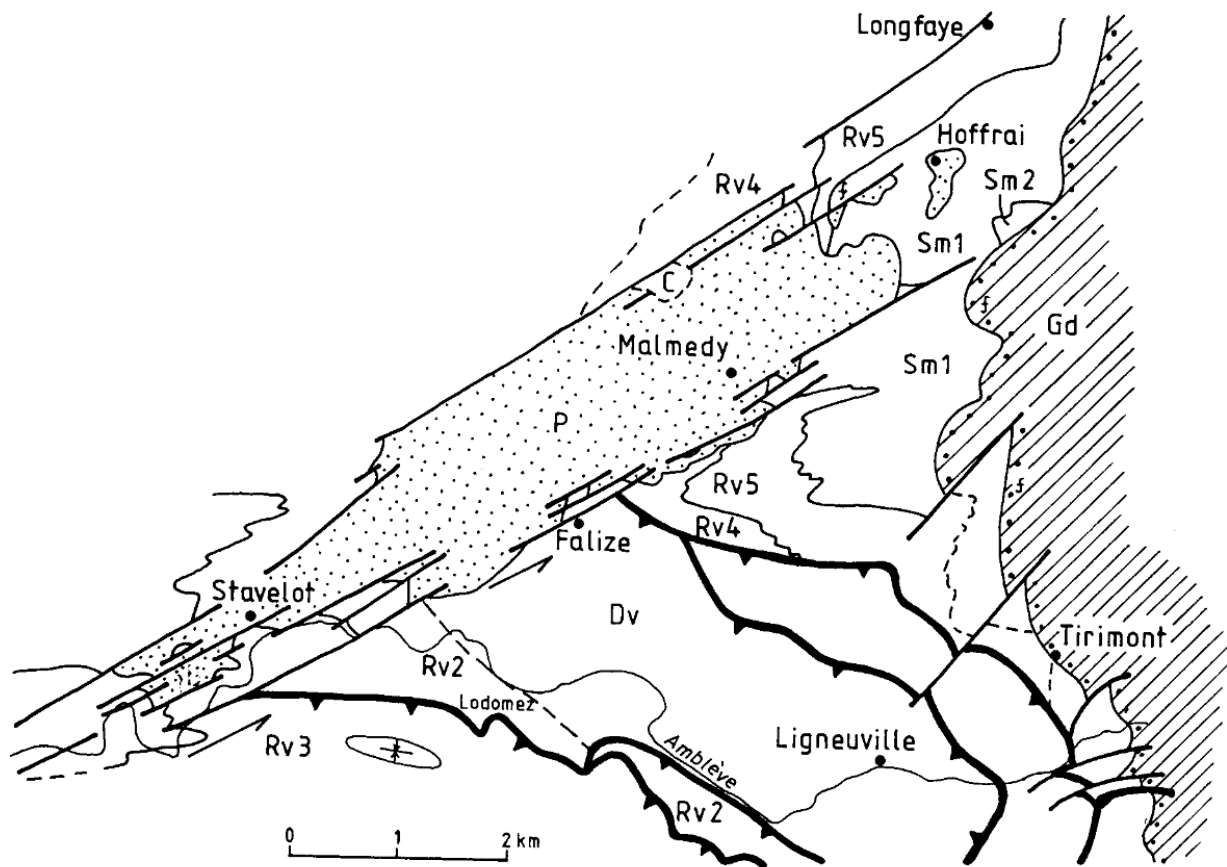
Couleur ordinairement rougeâtre ou verdâtre, souvent tachetée.

Les pséphites accompagnent fréquemment les poudingues, avec lesquels ils se lient intimement, ainsi qu'avec les porphyres rouges. Le pséphite rouge se trouve principalement dans la partie inférieure des terrains pénécens. Le pséphite verdâtre se rencontre plus souvent dans les terrains hémilysiens.

Strike-slip deformation des deux côtés du graben de Malmedy (Geukens, 1995, Abstract)

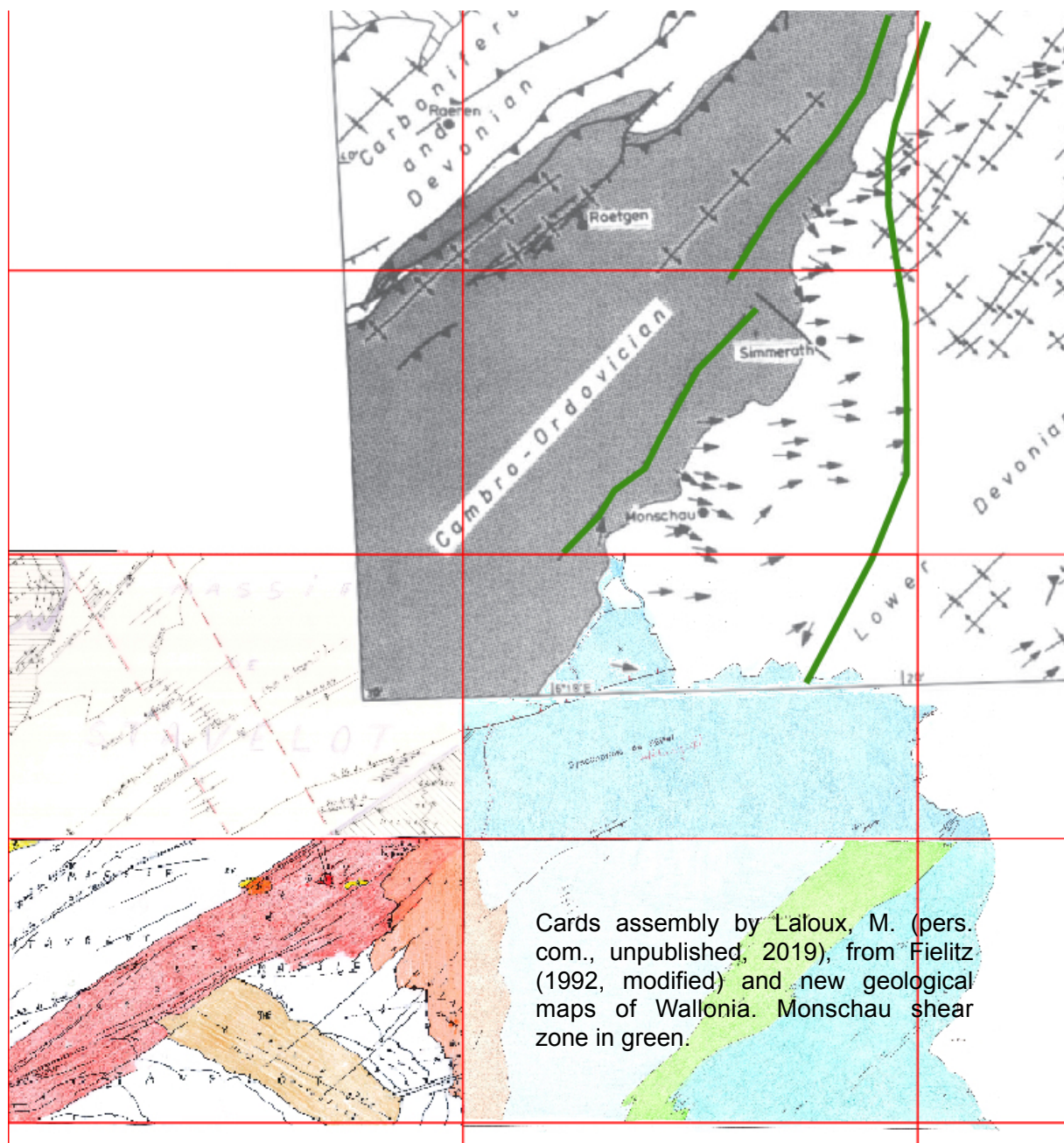
The Stavelot Massif can be divided in two different parts. The northern part is characterised by a general NE-SW strike, parallel to the Hercynian direction. Both the faults and the fold axes have this strike direction. The southern part is characterised by an W-E strike parallel to the Caledonian direction. Between these two parts exists a graben (Malmedy) filled with conglomeratic beds of Permian age. North as well as south of the Malmedy graben exists a strike slip fault system (dir. N50-60°E). The strike slip movements along this fault system are indicated north of the graben by the overthrust near Bra (the Ordovician thrust over the Gedinnian), near Les Villettes (Rv4 (Cambrian) thrust over the Ordovician)) near Haute-Bodeux (Rv4-Rv3 thrust over the Ordovician) and in the forest Derrière le Tige (Rv2 thrust over the Rv3-Rv4). The tectonic structure south of the graben is also dominated by strike slip movements. Strike-slip faults are often associated with stepovers. In this model the two Permian basins (Stavelot-Malmedy and Basse-Bodeux) can be explained as pull-apart basins formed in

connection with overstep structures. Steppers as well as pull-apart basins are ascertained in many places along strike-slip deformations. Old Caledonian as well as Hercynian structures may have had an influence on the location of the Permian basins.



From Geukens (1995)

The sinister shear zone of Monschau was recognized by Fielitz (1992) in a wide area of 4 to 5 km straddling the Massif de Stavelot and its eastern Eodevonian border. It is the site of significant macroscopic and microscopic structural deformations (modification of the orientation of the axes of small folds (WE), double cleavage, shear bands, kink bands, deformed quartz beds or stretching lineations), in a context of higher degree of metamorphism. Fielitz (*ibid.*) interprets it as the result of the tectonic inversion of a normal Eodevonian synsedimentary fault. Based on the seismic profiles, he suggests his connection with the Xhoris fault located to the west.

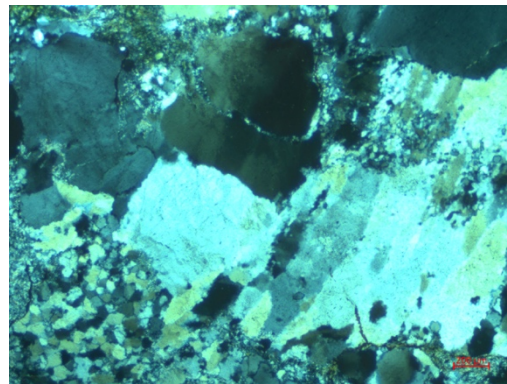
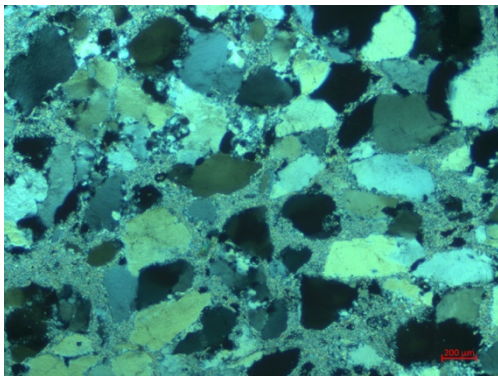


Formation de Marteau (MAR)

Origine du nom: localité de Marteau dans la vallée du Wayai. La coupe est à cheval sur la limite des communes de Theux et Spa (Gosselet, 1888). Nombreuses carrières et affleurements sur le territoire de la commune de Waimes, sur le flanc SE du massif de Stavelot (Vandenvén, 1990). Sur le flanc SE du massif de Stavelot, la Formation de Marteau repose en discordance sur les formations cambro-ordoviciennes, par l'intermédiaire d'un conglomérat «de base» de 3 à 10 mètres d'épaisseur, qui est composé de gros éléments (Asselberghs, 1946); c'est le **Membre de Quareux** *sensu* Hance *et al.* (1992). Sa composition, qui subit d'ailleurs de rapides variations, est immédiatement liée à sa situation sur la roche-mère représentée par le socle cambro-ordovicien. Ceci implique des conditions de dépôt pratiquement *in situ*, sans guère de déplacement*, ainsi qu'en atteste le faible émousé de certains éléments (*par exemple, ces dépôts ne contiennent des éléments de la Formation d'Otré que lorsqu'ils reposent sur celle-ci). Ce membre de base est surmonté par un ensemble pluridécamétrique de dépôts formés de

bancs pluridécimétriques de microconglomérat et de grès grenu blanc ou vert clair, souvent straticulés de lits de gravillons de quartz et de lithoclastes arrachés au socle calédonien. Il s'agit du **Membre de Waimes**, qui est particulièrement épais au méridien de la localité éponyme. Ces grès ont également été dénommés sous le terme d'«arkoses» mais, de manière erronée, car les feldspaths sont absents, comme le révèle l'examen de lames minces réalisées dans les matériaux de la carrière de la Warchenne (Bodarwé), à Waimes. Les enduits pulvérulents blancs, en proportion souvent importante, qui ont conduit à cette dénomination erronée résultent de l'altération de minéraux argileux (Eric Goemaere, *com. pers.*, voir photos ci-dessous) ; les micas sont parfois abondants dans les grosses veines de quartz à l'affleurement. Les bancs de grès sont généralement séparés par de minces strates pluricentimétriques de siltites et shales (schistes) vert clair et localement violets. Le Membre de Quareux et le Membre de Waimes sont ensuite surmontés par un ensemble de dépôts plus caractéristiques de la Formation de Marteau, telle qu'elle est décrite dans le stratotype, sur la carte voisine Louveigné - Spa (Marion *et al*, ss presse), à savoir une alternance de grès argileux, de siltites et de shales de teinte verte à violacée, voir bigarrée et parfois, de teinte bleue, dans lesquels la schistosité est bien développée. Les siltites et les shales peuvent également présenter un aspect cellulaire lié à la dissolution de concrétions argilo-carbonatées (Asselberghs, 1921; Vandenven, 1990).

Les grès grossiers de la base («Arkose» de G'doumont) sont fossilifères et contiennent des moules internes de brachiopodes, coraux, crinoïdes, etc. (voir de Koninck [1876] et Asselberghs [1930, 1943] pour la description), mais ne fournissent que des moules internes, en raison de l'état d'altération/diagenèse des roches (Geukens, 1963). Un test à l'acide confirme l'absence de carbonates.

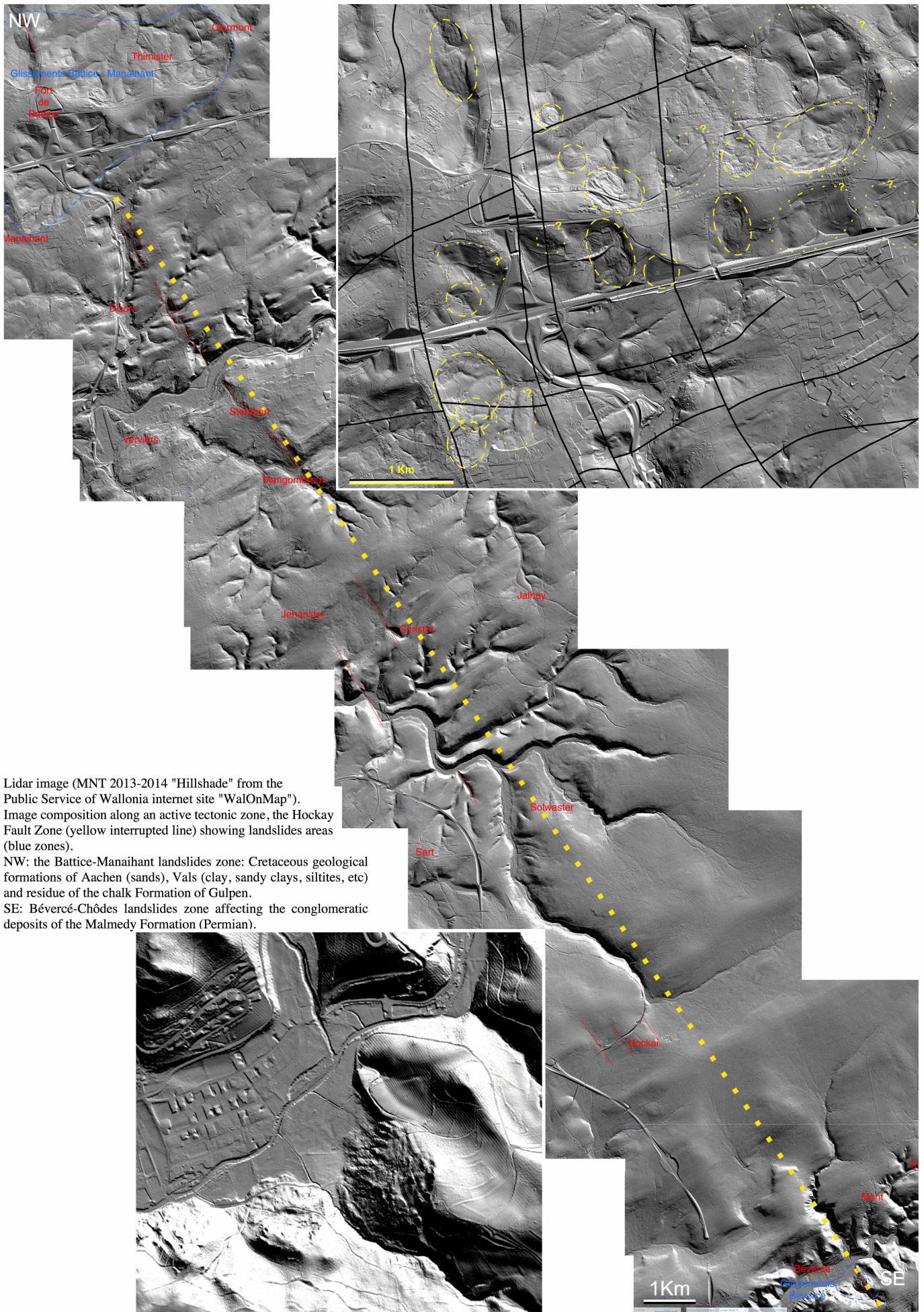


Cette description de la Formation de Marteau, augmentée d'un membre sur le flanc SE du massif de Stavelot et particulièrement épaissie au méridien de Waimes, correspond en tous points à la Formation de Kalltal (*Kalltal Formation* de la *Deutsche Stratigraphische Kommission*), telle que décrite par Ribbert (2006):

- conglomérat de base: 0 à 10 m;
- arkose Weismes: 150 m à Weismes;
- schistes colorés avec conglomérat: 150m;
- schistes colorés avec nodules calcaires: 200 m

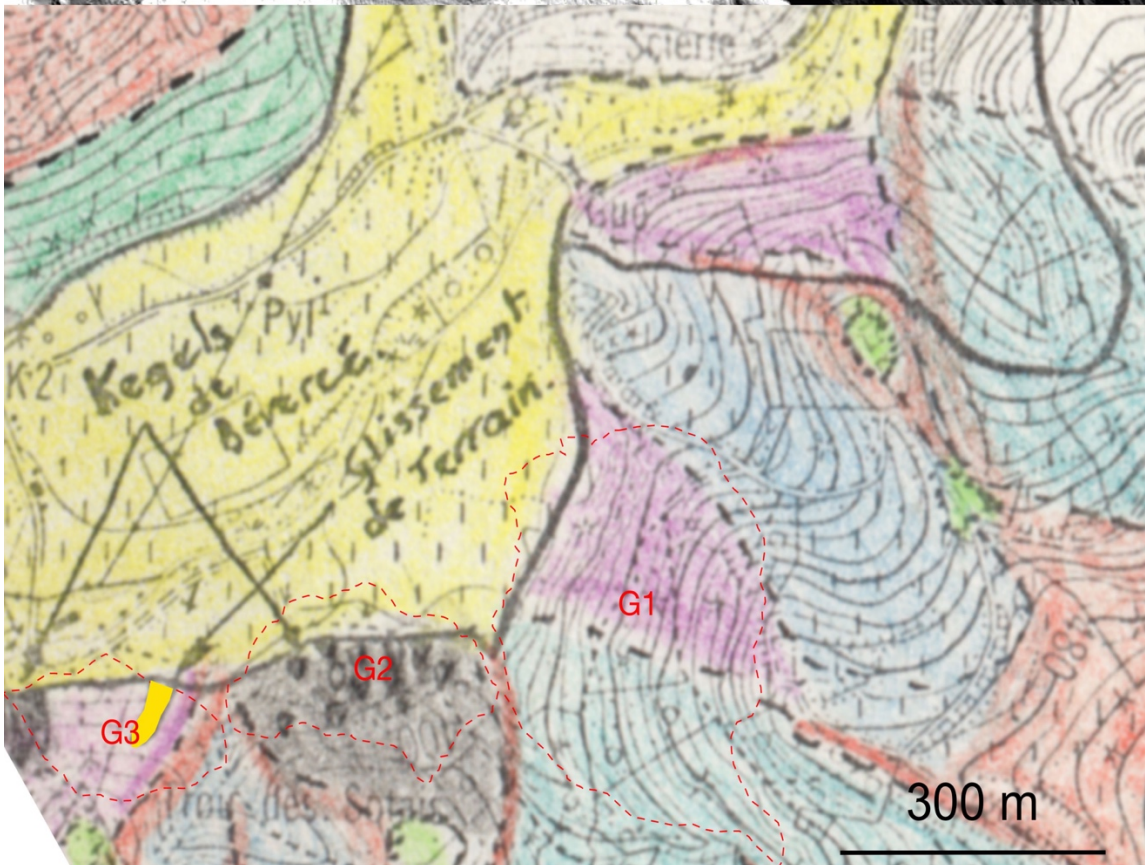
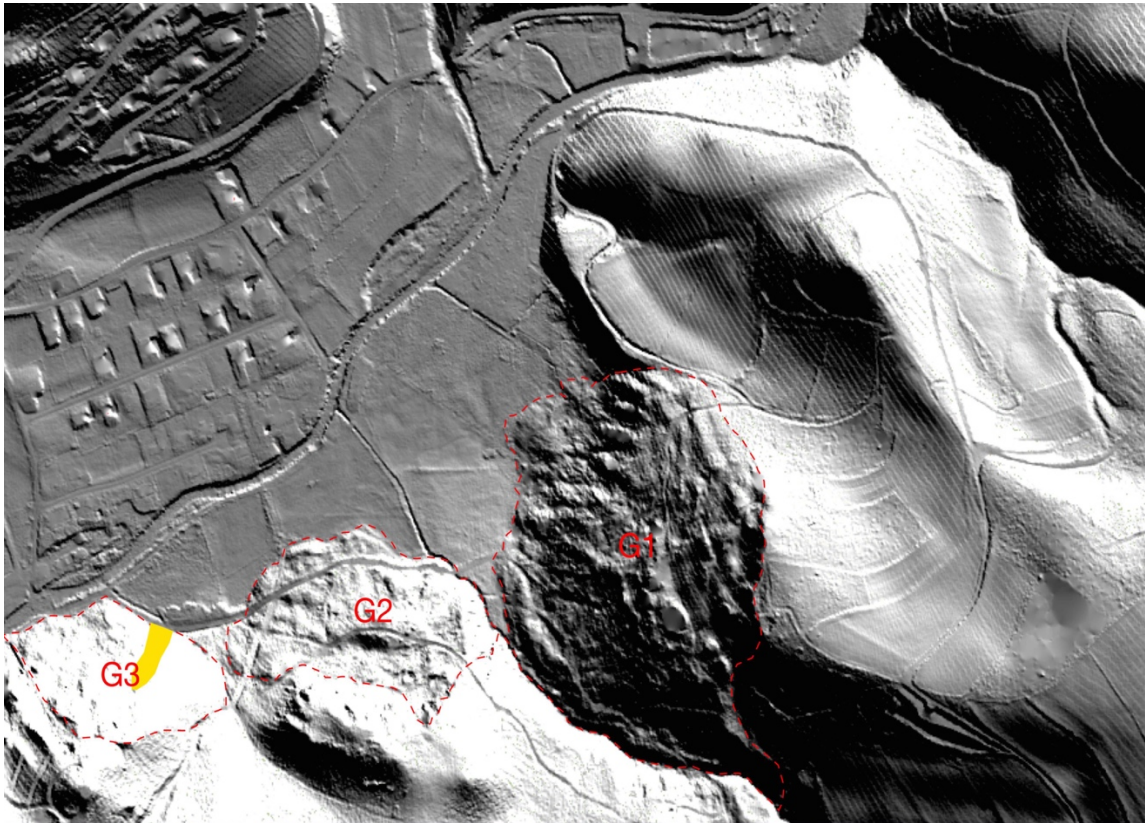
L'épaisseur est variable, elle atteint environ 450 m sur la bordure orientale du Massif de Stavelot, sauf aux endroits où affleurent les quartzites de G'doumont ou de Samrée (Asselberghs, 1946).

L'âge de la formation est Lochkovien, mais le conglomérat de base est Pridoli (Mottequin et Denayer, 2015).



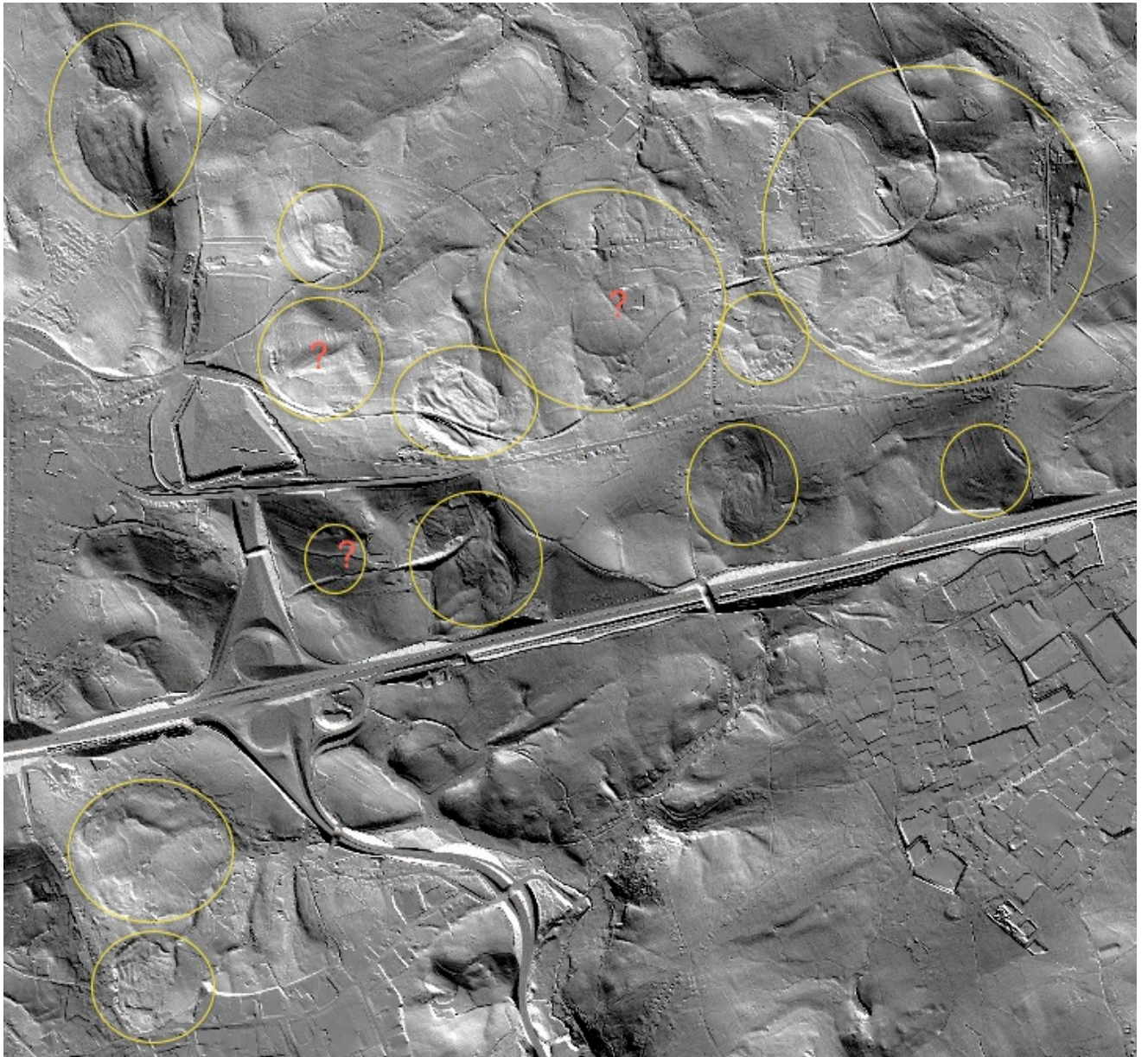
Lidar image (MNT 2013-2014 "Hillshade" from the Public Service of Wallonia internet site "WalOnMap"). Image composition along an active tectonic zone, the Hockay Fault Zone (yellow interrupted line) showing landslides areas (blue zones).

NW: the Battice-Manahant landslides zone: Cretaceous geological formations of Aachen (sands), Vals (clay, sandy clays, siltites, etc) and residue of the chalk Formation of Gulpen.
 SE: Bévécé-Chôdes landslides zone affecting the conglomeratic deposits of the Malmédy Formation (Permian).



G1, G2: glissements de Bévercé découverts en février 2015 à l'occasion des travaux de levé pour la révision de la carte Stavelot-Malmedy; G3 observé par Ozer (1967). Les «Kegels» (Ozer, *ibid.*) de Bévercé sont situés à l'ouest du glissement G3. Des «Kegels» avaient été décrits par erreur à l'E de G3; il s'agit en fait de l'un des 2 glissements majeurs découverts en 2015.

G1, G2: Bévercé landslides discovered in February 2015 during field works for the revision of the geological map Stavelot-Malmedy; G3 observed by Ozer (1967). «Kegels» were unfortunately described to the east of G3, but it's one of the 2 landslides site discovered in 2015.



Les glissements de terrain de Battice -Manaihan, découverts en 1996 à l'occasion des levés de terrain pour la révision de la carte Dalhem - Herve et localisés sur la partie nord de la Hockey Fault Zone (zone sismique active).

Battice - Manaihan landslides discovered in 1996, during field works for the revision of the geological map Dalhem - Herve, localised on the northern sector of the Hockey Fault Zone (active seismic zone).

Pridolian–Lochkovian macrofaunas from southern Belgium and northern France: de Koninck (1876) revisited

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In southern Belgium and northern France, the essentially siliciclastic rocks unconformably lying on the Caledonian basement were formerly included in the Gedinnian (from Gedinne, a small village of the Namur Province, Belgium). As rightly stressed by Steemans (in Dejonghe *et al.*, 2006), the Gedinnian, in its historical type area, mainly corresponds to a lithostratigraphical unit delimited at its base by a major discordance and its boundaries are strongly diachronous as demonstrated by the miospores (Steemans, 1989). Thus, its use as a regional stage has to be avoided, but it is briefly used here for convenience as a local expression of the Lochkovian *pro parte*. The lower part of the Gedinnian is known for a long time for its diverse invertebrate faunas (*e.g.*, Hébert, 1855; de Koninck, 1876).

Based on Dewalque and Malaise's collections, de Koninck (1876) was the first to illustrate and describe the macrofaunas occurring within the basal "Gedinnian" at Gdumont on the south-east flank of the Stavelot Massif (Belgium) and at Mondrepuis (northern France) on the southern border of the Dinant Synclinorium. Although these macrofaunas have been revised notably by Leriche (1912), Asselberghs (1930), Boucot (1960), Godefroid (1995) and Godefroid & Cravatte (1999), de Koninck's (1876) material has never been re-illustrated so far. As it has recently been retraced in the historical collections of the Liège University (Dewalque's collection), it is now possible to provide the first photographic illustrations of some type specimens of the species erected by de Koninck (1876), who strongly idealised and embellished the line drawings of his specimens. This discovery is therefore of some interest as is also the case of the recent recovery of almost all the invertebrates (*e.g.*, brachiopods, pelecypods) described by Kayser (1895) from the Pépinster Formation (Eifelian–Givetian). However, the specimens that were part of Malaise's collections have not been found yet in spite of our efforts, but may be housed at the Royal Belgian Institute of Natural Sciences.

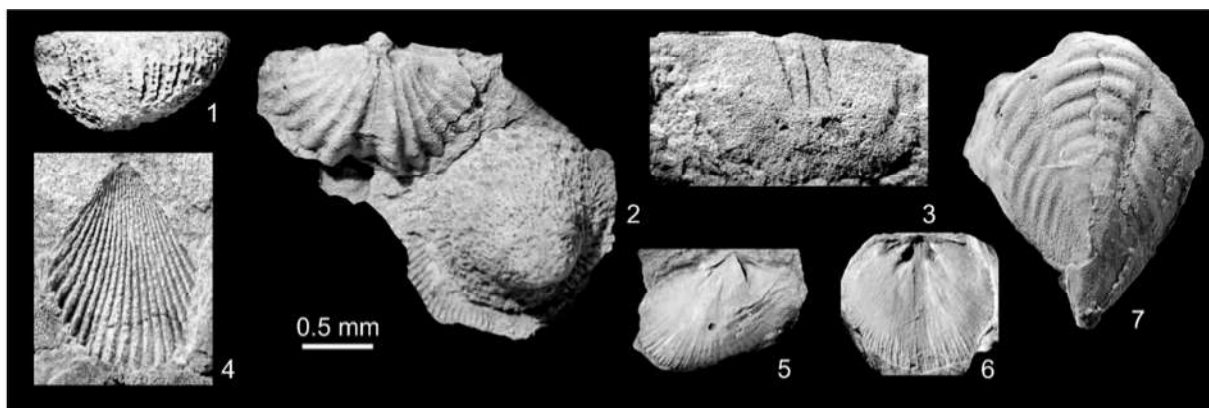


Fig. 1: Some specimens of the Dewalque collection housed at the University of Liège and identified by de Koninck (1876). The specimens no. 1–4 and 5–7 are from the Waimeses (Gdumont) and the Mondrepuis (Mondrepuis) formations, respectively. (1) "*Cyathophyllum binum* Lonsdale" (= de Koninck, 1876: pl. 1, fig. 2). (2) *Quadrifarium dumontianus* (= de Koninck, 1876: pl. 1, fig. 9a-9b) and *Cystiphyllum profundum* (= de Koninck, 1876: pl. 1, fig. 1-1a). (3) *Shaleria rigida* (= de Koninck, 1876: pl. 1, fig. 5?). (4) "*Camarotoechia*" *aequicostata* (= de Koninck, 1876: pl. 1, fig. 7?). (5-6) *Platyorthis verneuili* (de Koninck, 1876). (7) *Digonos roemeri* (= de Koninck, 1876, pl. 1, fig. 15b-15c?).

The material from Gdumont, which mainly consists of brachiopods, solitary rugose and colonial tabulate corals, has been recovered from the lowermost part of the Waimeses (Weimeses in German) Formation defined by Vandeven (1991), the age of which is considered as Pridolian at least for the fossiliferous levels (see discussion in Godefroid & Cravatte, 1999). The material only consists of poorly preserved internal moulds

and this feature may explain the embellishment of de Koninck's line drawings (e.g., compare the idealized representation of "*Cyatophyllum binum*" with the original specimen (Fig. 1.1)). It includes the following species erected by de Koninck (1876) (their original generic assignment has been modified wherever possible): "*Cystiphyllum profundum*", "*Chonetes omaliana*", "*Shaleria rigida*", "*Camarotoechia aequicostata*", "*Quadrifarius dumontianus*".

Most of the species described and/or reported by de Koninck are from the Mondrepuis Formation, in the eponym locality. In this area, the base of the formation is early Lochkovian in age (Stemans, 1989). The Mondrepuis Formation yields a diverse fauna including notably brachiopods, ostracods, pelecypods, tentaculites and trilobites. The species erected by de Koninck (1876) are the following (see remarks above): *Primitia jonesii*, *Beyrichia richteri*, *Digonus roemeri*, *Platyorthis verneuili*, *Grammysia deornata*, *Avicula subcrenata*, *Pterinea ovalis*, *Tentaculites irregularis*. The specimen illustrated by de Koninck (1876: pl. 1, fig. 1) was selected (but not figured) as the lectotype of *Digonus roemeri* (de Koninck, 1876) by Richter & Richter (1932) (see also Richter & Richter, 1954). Only one specimen identified as such has been traced in the Dewalque collection. Its general outline is in accordance with de Koninck's illustrations but, as it is smaller, it cannot be definitely considered as the specimen figured by de Koninck.

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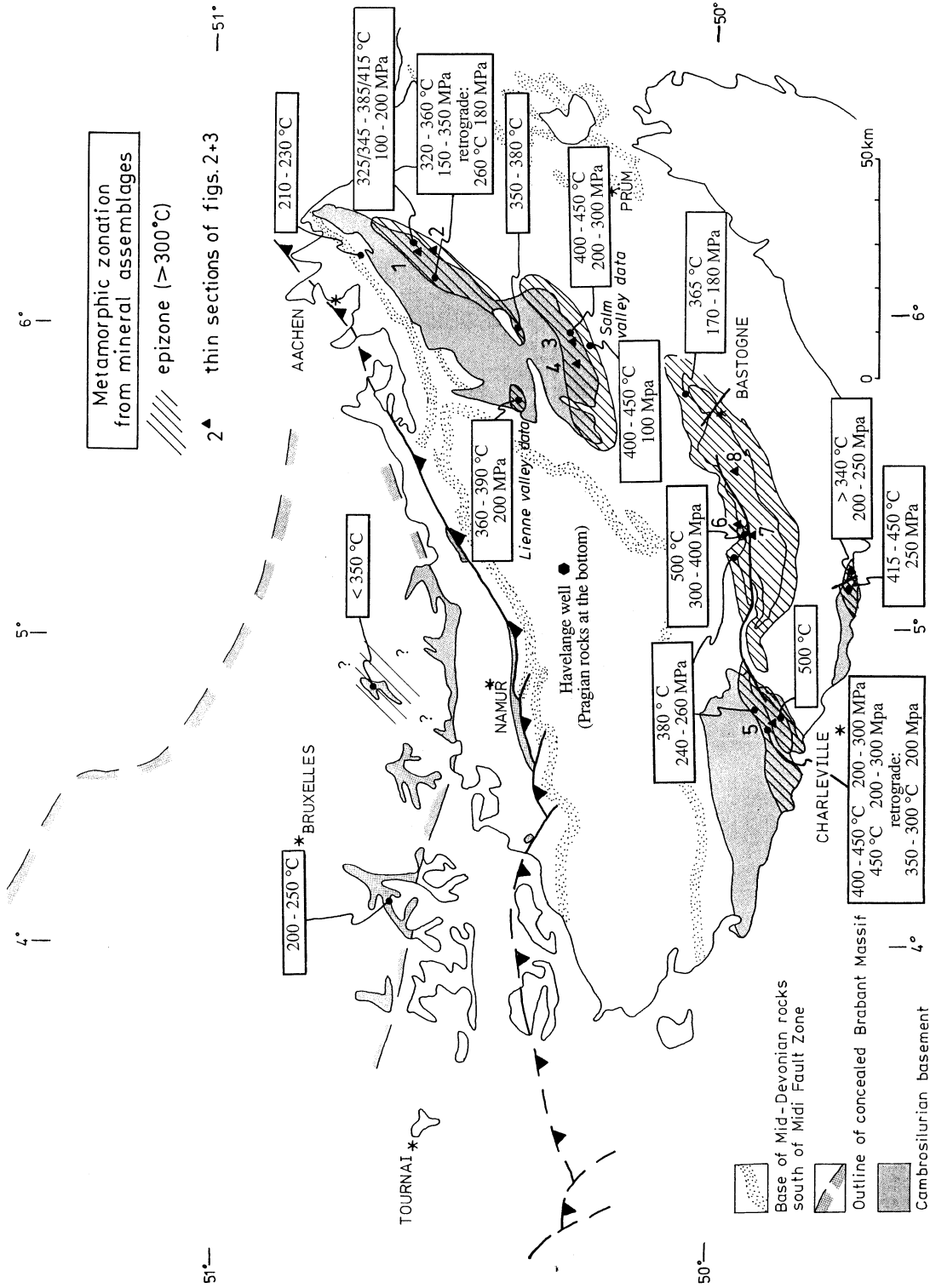


Fig. 4. Metamorphic zonation and metamorphic PT-conditions of the Ardennes/Eifel/Brabant area. The epizone is defined by macroscopic mineral assemblages. Inner and outer zonation in the Rocroi, Serpont, and Givonne area after Beugnot (1986, 1988). Data from many sources. For references see the text. Numbers refer to the location of the thin sections in Figs. 2 and 3.

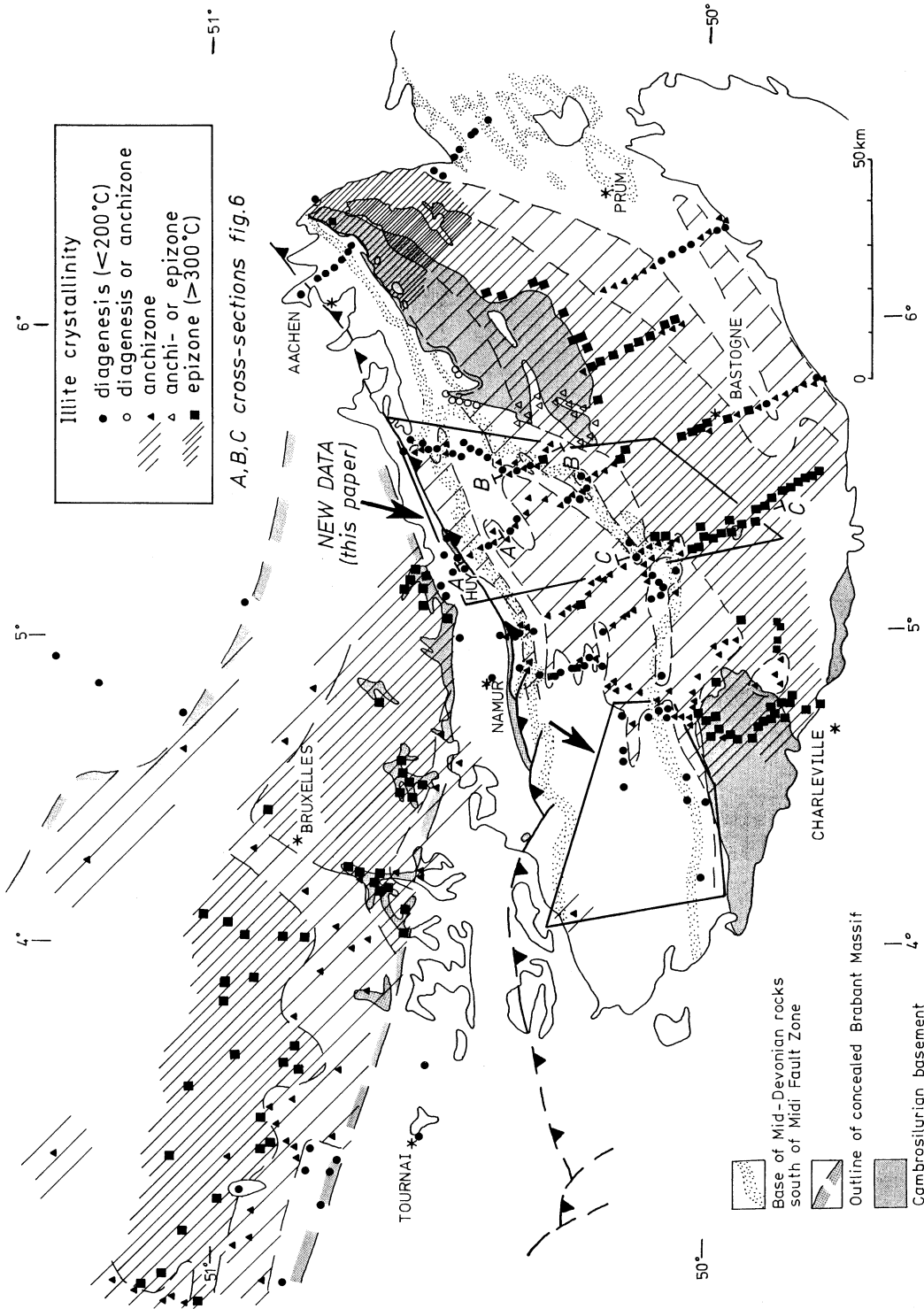
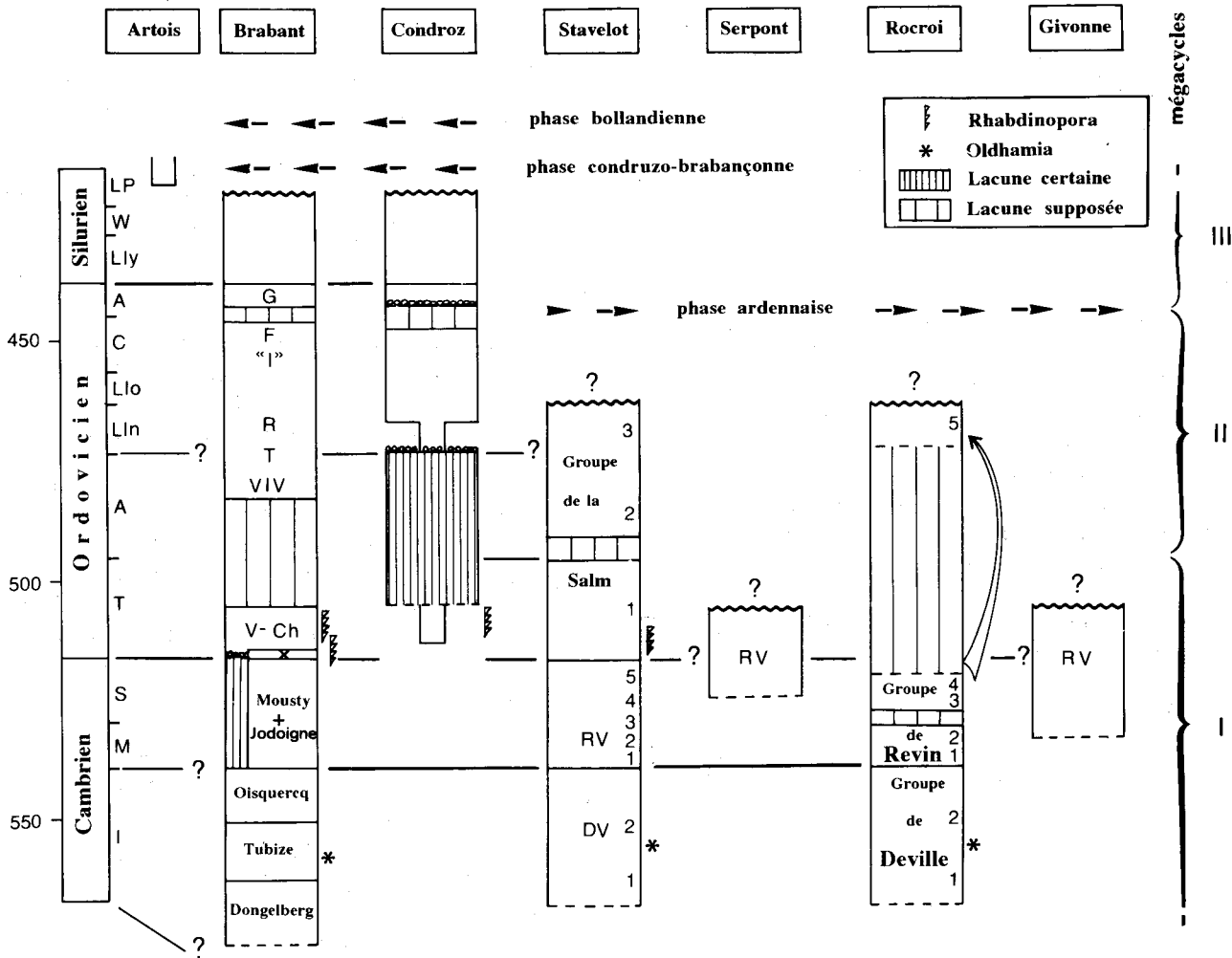
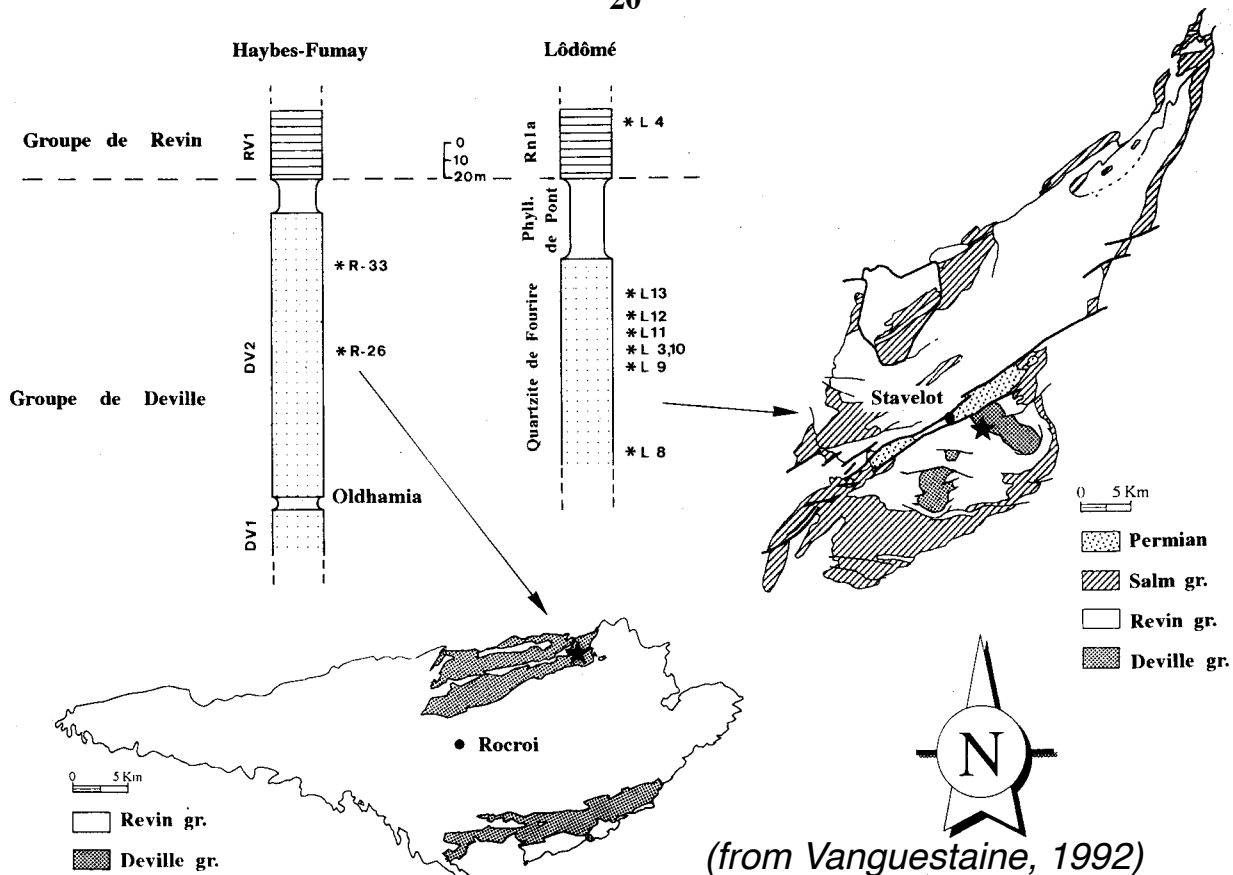


Fig. 5. New illite crystallinity data and compilation of already published illite data of the Ardennes/Eifel/Brabant/Campine area. In the northeastern Stavelot Massif area only zones of isocrystallinity are indicated due to very dense data sets. Data from many sources. For references see the text. The metamorphic zonation was deduced from the presented data set. Because of the limitations in comparing illite crystallinity data from different sources, the values and limits on the map presented here should not be regarded as an exact outline of the metamorphic zones, but as a representation of the general metamorphic trend in the given areas. A, B, and C are the locations of the sections from Fig. 6.

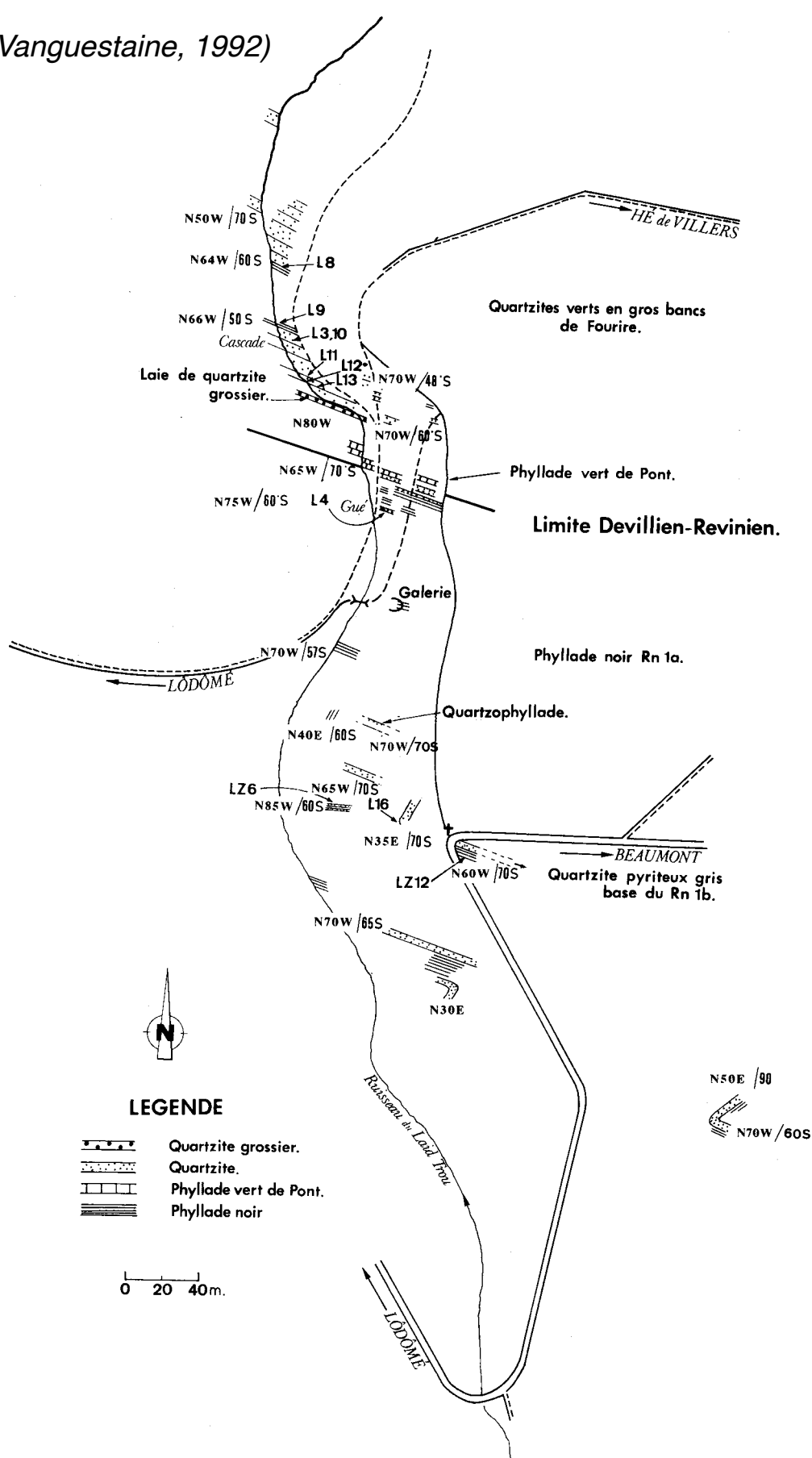


Position stratigraphique par région des unités lithologiques du Paléozoïque Inférieur de Belgique et des régions limitrophes et leur subdivision en trois mégacycles. Echelle des temps d'après Woodcock (1990). Notes : colonne du Brabant : X, V, Ch, VIV, T, R, I, F et G : formations «X», de Virginal, de Chevipont, de l'Abbaye de Villers-la-Ville, de Tribotte, de Rigenée, d'Iltre, de Fauquez, de Gembloux; colonne du Condroz composée des couches connues en affleurement et de celles, sous-jacentes aux précédentes, recoupées par le sondage de Wépion (colonne étroite).

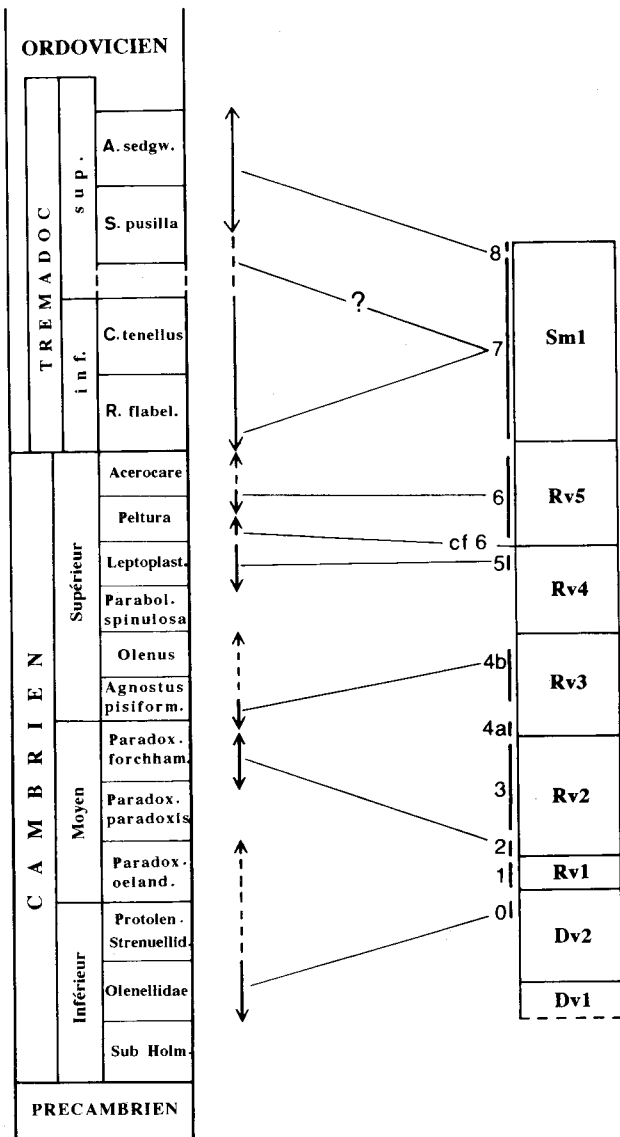


Localisation approximative des échantillons fossilifères dans le groupe de Deville : coupe du ravin du Laid Trou à l'Est de Lôdômé dans le Massif de Stavelot et échelle stratigraphique partielle de la région d'Haybes-Fumay dans la partie septentrionale du Massif de Rocroi (d'après Beugnies, 1960). La figure 3 donne avec plus de détails la localisation des échantillons du ravin de Lôdômé.

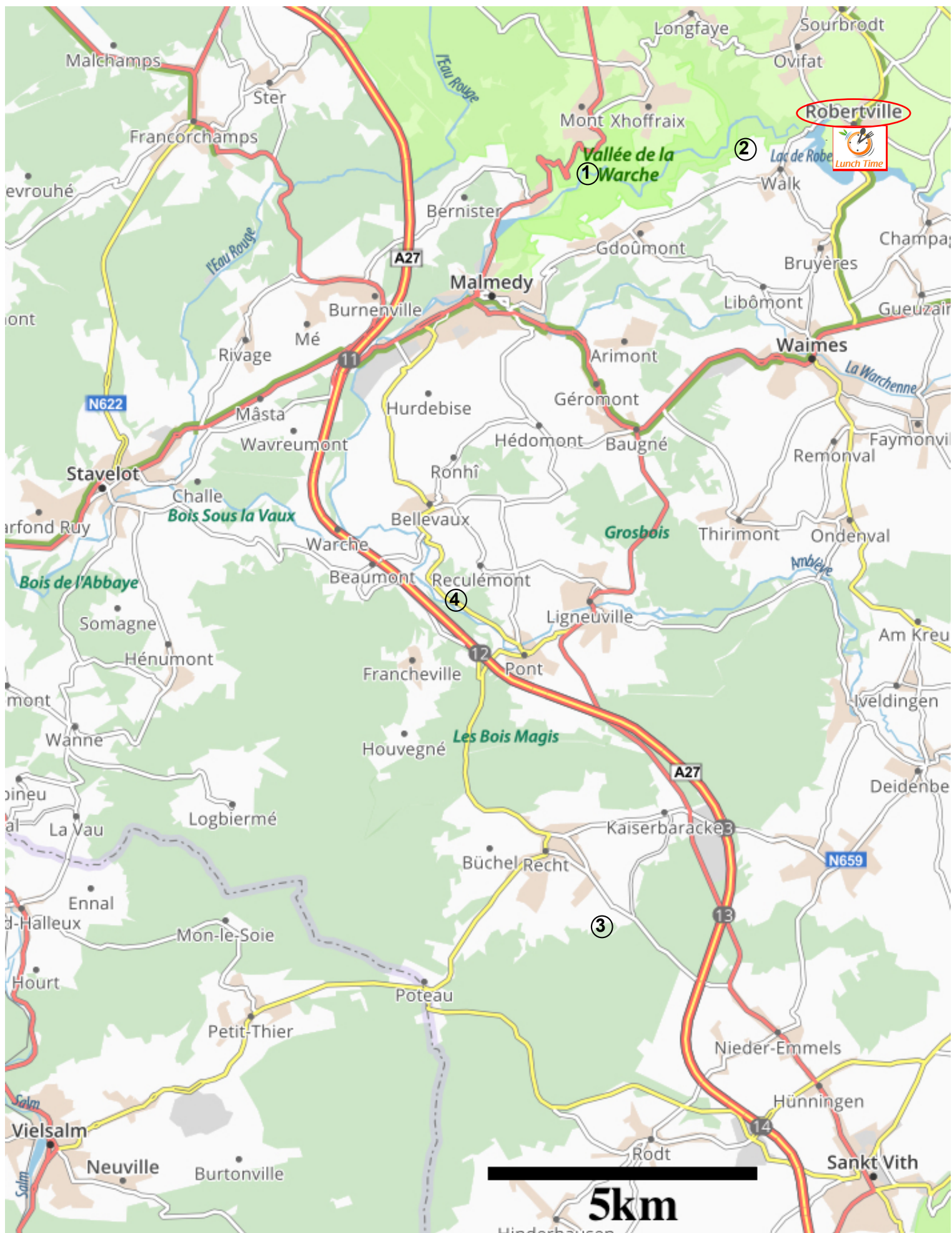
(from Vanguetstaine, 1992)



Cartographie de la coupe du Laid Trou à l'Est de Lôdômé, Massif de Stavelot, et localisation des échantillons fossilifères L3 à L13 du groupe de Deville; L4 du Rn1a, L16, LZ6 et LZ12 du Rn1b, parties inférieures du groupe de Revin. La composition palynologique de ces échantillons, à l'exception de LZ6, est donnée dans Vanguetstaine (1978b, p. 250, 251 et fig. 3).



Datation des groupes de Deville, de Revin et de la Salm d'après Vanguestaine, ce travail (zone 0), Martin & Dean, 1988, Ribecai & Vanguestaine, 1992 (zone 2, 4b, 5 et 6), Rasul, 1979, Molyneux & Rushton, 1988 (zones 7 et 8). La zone dénommée cf6, correspond à un niveau de Hockay, Vanguestaine *in* Bless & Felder, 1989, que nous corrélons avec la zone de même nom dans le Massif de Rocroi (Meilliez & Vanguestaine, 1983; Vanguestaine, 1986).



Morning: 1: Mont-Xhoffraix (quarry) $50^{\circ}26'48''\text{N}-06^{\circ}03'11''\text{E}$; 2. Walk: $50^{\circ}27'02''\text{N}-6^{\circ}05'33''\text{E}$;

Lunch: at Robertville, "Chez Phil", rue Centrale 32 à Robertville: $50^{\circ}27'16''\text{N}-6^{\circ}07'20.75''\text{E}$

Afternoon: View stop (depending timing): *Waimes (quarry)* : $50^{\circ}25'07.67''-06^{\circ}04'53.43''$.

3. Recht (Schieferstollen): $50^{\circ}19'20.16''-06^{\circ}03'26.07''$; 4. Lasneville (quarry): $50^{\circ}22'41.01''-06^{\circ}00'53.59''$.