**Correlation between quantitative palynology and physical-chemical detailed data on peat in the Hautes-Fagnes and application to a newly described section in Clefaye peatland**.

Allan M. and Streel M.

The three deepest and most studied ombrotrophic peat-bogs in East Belgium are in Fagne Wallonne, in Fagne de Clefaye and in the Misten (Fig. 1:B) (See Streel et al. 2019). A recent detailed analysis in the Misten peatland compared a new core MIS-08-01 with a former detailed pollen analysis based on a trench named HATTLICH by Persch (1950). The upper part of the core (MIS-08-01a in Streel et al. 2014) demonstrated that this upper part, representing about 2000 yrs (i.e. the historic part of the Subatlantic time) was rather influenced by human activities (Allan et al; 2013). Therefore a newly drilled section in Clefaye peatland (Fig. 1: C, Clefaye CLE-15-01W/b, Allan et al. in preparation and the present paper), intending to study climate variability, focus rather on the prehistoric Atlantic and Subboreal times, met also in the Misten deeper part of core MIS-08-01, i.e. MIS-08-01b (Streel et al. 2018). MIS-08-01b, being accurately dated by 14C, may be considered now as the reference pollen analysis in the Hautes-Fagnes area, allowing to recognize 9 pollen tie-points across the Atlantic-Boreal times (Fig. 2). Additionally, Thecamoebians (*Testate amoebae*) and several physical-chemical data were also determined and calibrated by the pollen tie-points (Fig. 3). The quantitative analysis of the Thecamoebians is of major importance to reconstruct climate variability because they are linked to the water table (WT) near the surface of the peat-bog. In absence of human intervention like drainage, it is admitted that the fluctuation of that water level is directly a consequence of the rain regime. The recorded Thecamoebians in MIS-08-01b are displayed in Fig. 4 where their tolerance between the surface of the peat-bog where they live and the accepted distance between that surface and the water table, below that surface, is emphasized. A stratigraphically constrained cluster analysis resulted in the identification of 5 Thecamoebian biozones (biozones A to E). But inside these biozones, selected taxa demonstrate much more detailed informations which combined with the humification rate and pollen data lead to 18 Time Intervals (Fig. 3).

 However, unfortunately, palynology is not yet available in the new Clefaye section which can be calibrated with the Misten reference section only by using the detailed calendar ages (Fig. 5 and 6). Obviously the ombrotrophic part of the lowest new Clefaye section started late in the Atlantic time (within the Atlantic VIIIb), cover both (IX and X) Subboreal and the lower part (older than 2000 yr) of Subatlantic (XI). Pollen data, even without *Testate amoebae* data, would however probably be useful. The Atlantic to Subboreal times were characterized by a *Quercus - Corylus* forest, *Fagus* becoming more and more abundant to reach more than 40% of the pollen sum in the Subatlantic. But, during the Atlantic, the dominance of *Ulmus* versus *Tilia* was variable and later, in the Subboreal, *Corylus* became temporarily more abundant and can serve as time markers, for instance during Time Intervals 6, 7, 8 within the *Testate amoebae* Biozone D where maxima of *Corylus* (C III and C IV of Persch 1950) is known.

Pollen data were published in the Fagne de Clefaye and the Fagne Wallonne peat lands since Streel (1959) (Figs. 7 to 9) but were much more detailed (Figs. 10 to 13) by Damblon (1969, in the Fagne de Clefaye and 1970, in the Fagne Wallonne). They have no calendar ages and the space between samples are rather wide. However the correlations with the Misten reference profile by pollen data only are interesting. Identifications of Atlantic VIIIb and Subboreal IX are obvious and correspond to the criteria defined in the Misten reference profile (Fig. 14).

Note: *Corylus* = Hazel/Noisetier, *Fagus* = Beech /Hêtre, *Quercus* = Oak /Chêne, *Tilia* = Lime /Tilleul, *Ulmus* = Elm /Orme.

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