From François-Léopold Cornet and Alphonse Briart to Alfred Wegener and Emile Argand: from the notion of horizontal translation to the emerging plate tectonics theory

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During the 19th century, exploration of the Franco-Belgian coalfield was boosted by the development of the coal industry. Progressively, the southern boundary of the coalfield was recognised, both in the Liège district (Dumont, 1832) and in the Valenciennes and Hainaut regions (Dufrenoy & Elie de Beaumont, 1841). Finally, this boundary was attributed to a single major discontinuity along the southern edge of the Franco-Belgian coal basin (Godwin-Austen, 1856; Gosselet, 1860). At this time the discontinuity was considered to be a vertical fault, where Upper Carboniferous coalfields meet Devonian sandstones and shales. Depending on where this abnormal contact was identified, it was called *Grande Faille* from Liège to Mons (Gosselet, 1860) or *(Grande) Faille du Midi* in the Hainaut (Cornet & Briart, 1863, 1877) and *Faille eifélienne* nearby Liège (Malherbe, 1873).

However, in Hainaut, around Dour, colliery shafts began crossing this fault in the 1830s, revealing the coal measures beneath the Devonian formations. This situation, where the *Faille du Midi* is now recognised as having a gentle dip southward, is rapidly represented on several synthetic cross-sections of the western part of the Walloon coalfield, i.e. Plumat (1849) and Cavenaille (1853), while it was although still considered vertical by some geologists (e.g. Gosselet, 1860). Cornet & Briart (1863) were the first to correctly show that this main discontinuity results from a horizontal translation. This original concept, developed later in Cornet & Briart (1877), was at the origin of the theory of thrust sheets explaining mountain ranges formation. Indeed, several geologists studying the formation of the Alps rapidly reproduce the concept of Briart & Cornet, like Suess (1883), giving to them a large audience in the German-speaking world.

After the erroneous interpretation of the Glarus Alps by Heim (1878), Bertrand (1884) compared the structure of the Glarus Alps with that of the Franco-Belgian coalfield. At this time, he had not worked on the coalfield and had not yet visited the Alps. On the basis of the bibliography alone, he applied the concept published for the Franco-Belgian basin, i.e. Cornet & Briart (1863, 1877). However, Bertrand was beaten by Rothpletz (1883), who had already reinterpreted the Glarus Alps with a huge overthrust.

Outside the Alps, the application of the thrust sheet theory continued to be extended to other geographical areas, such as north-west Scotland (Lapworth, 1883, 1885), the Scandinavian Caledonides (Törnebohm, 1888, 1896), etc. Later, the continental drift theory of Wegener (1912, 1915), which is at the origin of modern plate tectonics, invoked the achievements of Alpine geologists (who had studied the thrust sheets) to show that the distance between Africa and the northwestern European continent had decreased significantly. Argand (1924) used Wegener's theory to propose that the origin of the thrust sheets was the result of the collision of drifting continents. He gave a masterly demonstration of this at

the 13th session of the International Geological Congress held in Liège in 1922 and published the final text in the same city in 1924. One hundred years ago!