THE THEORY OF PLATE TECTONICS

TRADITIONALLY, THE CATALAN COMMUNITY OF GEOLOGISTS AND GEOPHYSICISTS HAS ALWAYS STUDIED THE PYRENEES, THE EBRO BASIN AND THE WESTERN MEDITERRANEAN. IN THE LAST FEW YEARS, CATALAN RESEARCH GROUPS HAVE COMBINED THEIR EFFORTS AND MADE IMPORTANT PROGRESS IN THEIR UNDERSTANDING OF THESE GEOLOGICAL STRUCTURES.

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Research work carried out by investigators in the Sciences of the Earth on the formation of mountain chains and sedimentary basins was completely revolutionized in the sixties by the establishment of the Theory of Plate Tectonics (this theory unified concepts such as that of continental drift and oceanic expansion). But the fact is that this theory is difficult to apply in certain geological contexts. It is in these cases that, through the techniques of that part of Geophysics which studies the solid Earth, we can get to know the deep structure of the Earth and contribute results of great importance to our understanding of the evolution of certain geological structures in terms of Plate Tectonics.

Traditionally, the Catalan community of geologists and geophysicists has always studied the Pyrenees, the Ebro Basin and the western Mediterranean. In the last few years, Catalan research groups have combined their efforts and made important progress in their understanding of these geological structures. This has meant that both geological surface studies and geophysical depth studies have helped to change, sometimes radically, the evolutionary models of the areas under study.

As regards the Pyrenees, it was not until geophysical studies of their deep structure were available that our interpretation of their formation was anything more than highly speculative. However, geophysical data are often difficult to interpret and are therefore susceptible to different readings. In the case of the Pyrenees, the most reliable results come from deep echo seismic studies. Although we can only see deep structure in two dimensions, it has been clearly demonstrated that the Iberian crust is dipping under that of Europe. This can only be taken as the result of the north-south compression by which Iberia approached and finally collided with Europe. These and other, more detailed results are being worked on by different research groups and will undoubtedly lead to important developments. But there is still a long way to go, since only isolated data are available at present. A more detailed picture will be made possible through financial effort and the work of researchers.

However, the concept of Plate Tectonics becomes clearer when applied to large structures. In this respect, the Pyreneean chain cannot be considered a large structure when we compare it

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PYRENEES.

with, for example, the Urals, the Himalayas or the Andes. On the other hand, the "smaller structures" are still of considerable importance both in our understanding of the evolution of the Earth and because they also contain natural resources and concealed risks, two factors of special interest to mankind. The Ebro basin is a geological structure which is related to the formation of the Pyreneean range, and the two should therefore be dealt with together. However, what can be mentioned here is that the sedimentary covering has been studied in considerable detail and that the results obtained have been related to phenomena of global tectonics. Geophysics has contributed less here, though recent paleomagnetic research, which studies the magnetism of rocks at the time of their formation, can be of help in the study of the basin.

The western Mediterranean has always been an attractive field of study for the countries that surround it. In spite of the large amount of research into marine Geology and Geophysics, the origin and development of the various basins making up the western Mediterranean is still far from clear. In this context, a number of Catalan teams are studying the Balearic basin (between the peninsula and the islands). Interpretations of this basin in terms of Plate Tectonics have been put forward by different researchers, but, once more, we have to admit that they are highly speculative models which are still in need of further experimental data.

It can be seen, then, that there is considerable activity in geological and geophysical research in Catalonia. Thanks to this activity, we have an appreciable volume of results which, if they are satisfactory today, can only be expected to improve in the near future. ■