Preface

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This 1st International Congress on Stratigraphy provides an excellent opportunity for presenting an inventory of our discipline more than 200 years after its birth and one century after the publication of the first treatise on Stratigraphy (Grabau, 1913) which established this subject as an entity in its own right in the area of geosciences. The state of the art presented by the authors of the plenary conferences and by the coordinators of the different topics makes it possible to highlight the main trends and prospects.

To begin with, it should be remembered that stratigraphy is not an abstract science or simply the fruit of computer modelling. It is an observation science that must, as a priority, be based on field data followed by analysis in the laboratory, and on regional studies that may combine a very great variety of analytical methods. Those are the essential references – after having eliminated the local contingencies – for more global interpretations.

Four major features can be recognized in the development of our science over the last few decades, driven in particular by oil exploration and the study of the oceans: diversification of methods, putting into question, multidisciplinarity, extension of the fields of application.

Diversification of methods. Besides biostratigraphy which historically was the first approach used for dating and correlations, many other approaches are now used such as: genetic stratigraphies, chemiostratigraphy, magnetostratigraphy (mainly geomagnetic field reversals), cyclostratigraphy, clays mineralogy, isotope geochronology, tephrochronology….

Putting into question by objective and critical analysis of the different techniques and thanks to the intersecting perspectives of researchers using different tools. Biostratigraphy has thus grown stronger through a multiplication of index fossils (particularly in micropaleontology) and has been enriched by fruitful exchanges with other approaches (palaeoecology, taphonomy, sedimentology, palaeogeography, molecular biology, isotope geochronology, magnetostratigraphy) which have made it possible to understand better the signification of the appearance and disappearance of taxa, evaluate any diachronism of FAD and LAD and, inversely, to contribute effectively to the reconstitution of palaeoenvironments on various scales and to constraint timetrees. In chemiostratigraphy, it has been possible to evidence the contradictory signification of various signals or the different durations of negative and positive carbon isotope spikes. Although cyclostratigraphy may provide incomparable metronomes, it would seem that the durations of the various orbital parameters are not constant because of the chaotic behaviour of the solar system. Only, the 405Kyr eccentricity is stable at least over the last 250 Ma and can be used for astronomical calibration of Mesozoic and Palaeozoic.

Multidisciplinarity. Its growing importance, in a spirit of integrated stratigraphy, has three favourable consequences:

– greater dating and correlation accuracy, by means of an iterative process of exchanges between the results of various stratigraphic methods, for instance by coupling the results of isotopic chronotratigraphy with cyclostratigraphic sequences;

– perfecting of the Geological Time Scale which provides the temporal framework for the geosciences. The GSSPs put in place gradually since 1977 must provide stratotype boundaries materializing the base of each stage by using the most varied tools to propose real time lines identifiable on the scale of the globe. *A contrario*, experience shows that an insufficient diversity of the specific markers is currently calling into question certain limits that must be reviewed. Furthermore, various GSSPs must still be determined and validated, in particular for the Carboniferous, Permian and Cretaceous. As for the Quaternary, must the Anthropocene – attempt to recognize formally the substantial acceleration in human deduced changes to our planet during historical times – be treated as a formal chronostratigraphic unit with a golden spike?
– the research of causes for planetary changes. The major tendency of stratigraphy is now to try building unitary models in the organization of geological objects which are likely to show and explain the existence of logical relations between stratigraphic signals. But it must be borne in mind that nothing is ever definitively acquired: "a geologist, like any detective, must always work with multiple hypotheses and as many tools as possible to help narrow the possibilities and to discover the fascinating history of our world" (Deconinck and Oggg, *this volume*).

Extension of the fields of application. The utilization of stratigraphic approaches is not limited simply to sedimentary entities and our planet. Volcanic formations are also concerned, whether for elaborating a Time Scale of Volcanic Processes or for mapping volcanic regions involving the use of information provided by lithostratigraphy, chemiostratigraphy, isotope geochronology and even sequence stratigraphy. And now, various stratigraphic methods are also being used to study planets (Moon, Mars, Venus, etc.) in order to establish a Planetary Time Scale comparable to the Geological Time Scale for Earth.

The great success of this Congress – which can be seen not only in the number of contributors and the quality of their works, but also in the great diversity of nationalities present – bears witness to the vitality of our science and to the need to organize such forums periodically, making it possible to confront concepts, methods and results. So, you should count on a sequel to this ….