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Foreword

Invited contributions of 2013 geoscience laureates of the French Academy of Sciences

Each year, the French Academy of Sciences gives out a number of prizes and medals to recognize the contributions and achievements of outstanding colleagues in all fields of Science. In 2013, for the first time, laureates have been invited to make short presentations at the Academy. This resulted in a special session that generated enthusiasm from participants, including many members of the Academy. The editorial team of *Comptes rendus Geoscience* has felt that it could be of interest to the scientific community to have access to presentations by these scientists in the geoscience series of the *Comptes rendus*. Six laureates of the 2013 Academy Awards responded positively to the invitation. Because these were invited papers, an Associate Editor and the Chief Editor played the role normally attributed to reviewers, in addition to their normal editorial duties. In some cases, external reviewers were also involved upon invitation by the Editors. We are thankful to the authors and happy to present readers of *Comptes rendus Geoscience* with this first series that, if successful, could be followed by others in the coming years.

The first paper, by Vincent Deparis (laureate of the 2013 Paul Doistau–Émile Blutet Prize for Scientific Information), summarizes the main phases through which our present-day views of the Earth's interior came to be shaped over the past centuries. He retraces this evolution over seven main periods and 2000 years, from the pre-1450 to the post-1950 understanding of our planet. Deparis illustrates how some important ideas first appear, then sometimes disappear only to reappear again with improvements. He shows how the opposed views of Descartes (spherical, stratified, static Earth; few links between surface and depth) and Kirsher (heterogeneous, dynamic Earth; significant links between surface and depth) have in a way come to be reconciled in the second half of the twentieth century.

In the second paper, Paul Tréguer (laureate of the 2013 Georges Millot Medal) gives what could be the first quantitative overview of the cycle of silica in the Southern Ocean. He evaluates the balance between input fluxes from the upwelling of the Circumpolar Deep Water and exported fluxes through the SubAntarctic Mode Water and the Antarctic Intermediate and Bottom Waters. Tréguer shows that the Southern Ocean is a source of dissolved silica for the rest of the world ocean.

Patrick De Wever (2013 laureate of the Léon Lutaud Prize) and co-authors review the distribution of radiolarite facies (radiolarian rich cherts) around the former Tethys Ocean. They argue that the deposition of these sediments is a consequence of high productivity, rather than depth as previously thought. They show that this implies a strong role of monsoons, which have varied considerably in amplitude as a function of the evolving geography of continents (see cover illustration).

The fourth paper, by Benjamin Rotenberg (laureate of the 2013 Michel Gouilloud–Schlumberger Prize) and colleagues, reports recent multiscale modelling of transport in clay minerals, starting from the molecular scale. They address the physicochemical processes that underlie the geochemical behaviour of fluids as they percolate and are transported in pore networks and at the surface. Upscaling all the way up to sample scale allows Rotenberg et al. to capture phenomena such as electrokinetic coupling. This may allow one in the future to attack problems such as the modelling of hydrocarbons in oil and gas shales.

The fifth paper, by Andrea Colombi and co-authors, led by Michel Campillo (laureate of the 2013 Great Scientific Prize of the Simone and Cino Del Duca Foundation of the Institut de France), is concerned with the temporal stability of the correlations of the coda of ambient seismic noise. The Grenoble team extend their previous remarkable work on how seismic noise can be used to reconstruct coda waves (hence build high-resolution tomographic images of the Earth's interior at all space and depth scales), in the presence of anisotropy in the incident field. They

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develop a novel theoretical approach and apply it with success to the Erebus volcano in Antarctica. The method can be used to monitor volcanic activity at depth in quasi-real time and in realistic field conditions.

Pascal Richet (laureate of the 2013 Yvan Peychès Prize for Applications of Science to Industry) concludes this thematic issue by taking us down to the atomic scale of mantle minerals, emphasizing that major features of the Earth can be understood as a consequence of the differences in rigidity of the silicon–oxygen bonds with respect to the silicon–oxygen–silicon linkages. This scale requires the use of quantum-mechanical concepts. Richet and Ottonello argue that this provides a rationale to understand why SiO_2 is enriched during magmatic differentiation. They end the paper with illustrations of their view of the Earth as a multiscale quantum-mechanical system, with the effects of including alkalis, aluminium or noble gases in the atomic structures of silicates.

Let me conclude by recalling that *Comptes rendus Geoscience* welcomes not only highly innovative papers, but also sound and timely reviews of subjects that appear ripe for the exercise, and also proposals for thematic issues on topics that may be of interest to a wide readership.

Finally, in closing, I, together with the whole Editorial team, would like to acknowledge the remarkable work done by Associate Editor Amaëlle Landais, who was until this month in charge of papers concerned with the Earth's fluid envelopes and who has wished to move on to other exciting scientific tasks. The Editorial team welcomes Didier Roche who succeeds Amaëlle as of this issue of *Comptes rendus Geoscience*.

Further reading

Colombi, A., Chaput, J., Brenguier, F., Hillers, G., Roux, P., Campillo, M., 2014. On the temporal stability of the coda of ambient noise correlations. C. R. Geoscience 346 (11–12), 307–316.
Deparis, V., 2014. A history of the global understanding of the Earth. C. R. Geoscience 346 (11–12), 275–278.
De Wever, P., O'Dogherty, L., Goričan, Š., 2014. Monsoon as a cause of radiolarite realm. C.R. Geoscience 346 (11–12), 287–297.
Richet, P., Ottonello, G., 2014. The Earth as a multiscale quantum-mechanical system. C. R. Geoscience 346 (11–12), 317–325.
Rotenberg, B., Marry, V., Salanne, M., Jardat, M., 2014. Multiscale modelling of transport in clays from the molecular to sample scale. C. R. Geoscience 346 (11–12), 298–306.
Tréguer, P., 2014. The Southern Ocean silica cycle. C. R. Geoscience 346 (11–12), 279–286.

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