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Editorial

Earth's inner core

Foreword

Thirty years ago, Georges Poupinet, Robert Pillet and Annie Souriau published a paper in *Nature* revealing a geographical variation of the time propagation of compressional seismic waves in the inner core (Rbib0005Poupinet et al., 1983). This exciting observation, known today as inner core anisotropy, has since then been confirmed and refined in multiple studies. Physical origins of inner core anisotropy remain debated, but geoscientists believe that it may provide important constraints on the texture and structure of the inner core. It may hence help us to better understand its growth and formation mechanism. As such, inner core anisotropy is a key in revealing the dynamics and history of our planet as the structure of the inner core is related to various stages of core formation, core dynamics and probably core dynamo.

In October 2013, we organized a workshop at the University of Grenoble, France, to celebrate the 30th anniversary of this discovery. This was an opportunity to bring forty of the best world experts in the field to discuss recent advances and discoveries. The attendance, the high level of discussions at the workshop, as well as the general interest from the scientific community encouraged us to edit this thematic issue of the *Compte rendus Geoscience* with both contributions from the workshop participants and complementary papers from noted scientists in the field.

Core studies remain a very active field of research, as demonstrated by the contributions in this issue. As a final word, let us hypothesize our hopes for future lines of research in the field. First, seismic studies should enlarge the geographical coverage of their analysis in order to ensure the generality of their results. These new data should contribute to enhance the cartography of inner core attenuation and anisotropy. Second, mineral physicists should pursue their quest in understanding the behavior of iron alloys at inner core conditions, including fundamentals, such as phase diagrams and equations of state, but also other parameters, such as thermal conductivity or plastic behavior. Finally, geodynamicists should pursue inventing plausible new models, but also invest efforts in introducing realistic comparisons with seismic observations with input from mineral physics.

We hope that this thematic issue of the *Compte rendus Geoscience* will open new doors in the future and look forward seeing you in 2033, for the 50th anniversary of this important discovery.

Reference

Poupinet, G., Pillet, R., Souriau, A., 1983. Possible heterogeneity of the Earth's core deduced from PKIKP travel-times. Nature 305, 204–206.

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