Editorial Preface

Dear Reader:

Earth in Motion is one of the four main topics of the new science plan for scientific ocean drilling 2013–2023 (see p. 55). Shortly before the plan's completion, a mega-earthquake and related tsunami hit eastern Japan on 11 March 2011. The effects were devastating to infrastructure and the Japanese people, and the event calls for increased efforts to understand the mechanisms and potential locations and magnitudes of such geohazards. Sampling seismogenic faults and installing observatories in boreholes in their vicinity is therefore a long-term and high priority for scientific ocean drilling. IODP is also preparing a rapid effort (see p. 61) to get a glimpse of the ephemeral properties at the east Japan earthquake fault zone as close as possible to conditions during rupture.

Other research topics of high societal importance include how climate and environment have changed over time and under conditions that vastly differ from those of the present time. These issues offer two unique research perspectives on climate history with the high latitude expedition to investigate Antarctic glaciation (p. 15) and the expedition to study environmental change through coring already fossilized coral from the Great Barrier Reef (p. 32). IODP research provides access to sampling of marine sediments that record ocean and climate change reaching back 100 million years or more, and it allows present-day climate change to be seen in a geologically significant context. Scientists are realizing that the high rate of anthropogenic forcing of some fundamental climate regulating factors, such as the amount of carbon and other greenhouse gases in the atmosphere, could push the 'climate clock' millions to tens of millions of years back to times of radically different climate. The new IODP science plan therefore seeks to provide long-term records of the past that will augment predictive modeling of the climate for future generations. It also targets to improvements in the public's understanding of Earth's dynamic climate and ocean system by reaching out to both the public and new generations of scientists about vital research findings made possible only by scientific ocean drilling.

The discovery during past scientific drilling of living microbes deep below the seafloor, and in environments that fundamentally differ from those of surface life fueled by photosynthesis, is still in an exploratory stage of trying to understand the distribution, genomics, metabolic processes, and, if possible, greater implications for possible life in the universe. All of these critical scientific questions will be examined on the basis of the fundamental planetary dynamics that form the integrated framework for understanding our planet. One highly ambitious goal in this regard is to finally penetrate the entire ocean crust and reach into Earth's mantle. To achieve this once elusive goal, IODP has started to assess its technological feasibility (p.46).

The new IODP 2013–2023 will continue to partner with other research programs, not the least being the International Scientific Continental Program. In this volume ICDP reports on geohazards including anthropogenic earthquakes (see p. 53) and natural arsenic water contamination (see p. 49) that will be addressed by future continental drilling projects, proving that both scientific drilling programs are solidly connected to the problems facing global society, now and in the future.

Hans Christian Larsen
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Editor

Front cover: Enjoying the sun while it lasts during the IODP Expedition 318. (Photo: John Beck, IODP-TAMU)
Left inset: Labels placed on core pieces to identify samples from the IODP Expedition 324. (Photo: John Beck, IODP-TAMU)

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IODP is an international marine research drilling program dedicated to advancing scientific understanding of the Earth by monitoring and sampling subsea-floor environments. Through multiple drilling platforms, IODP scientists explore the program's principal themes: the deep biosphere, environmental change, and solid Earth cycles.

ICDP is a multi-national program designed to promote and coordinate continental drilling projects with a variety of scientific targets at drilling sites of global significance.

Publication Office
IODP-MI, Tokyo University of Marine Science and Technology,
Office of Liaison and Cooperative Research 3rd Floor,
2-1-6, Etchujima, Koto-ku, Tokyo
135-8533, JAPAN
Tel: +81-3-6701-3180
Fax: +81-3-6701-3189
e-mail: journal@iodp.org
url: www.iodp.org/scientific-drilling/

Editorial Board
Editor-in-Chief Hans Christian Larsen
Editors Ulrich Harms, Jamus Collier, and Kevin Johnson
Send comments to:
journal@iodp.org

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Copy Editing
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Layout, Production and Printing
Mika Saido (IODP-MI), and
SOHOKKAI, Co. Ltd., Tokyo, Japan

IODP-MI
Tokyo, Japan
www.iodp.org
Program Contact: Miyuki Otomo
motomo@iodp.org

ICDP
GFZ German Research Center For Geosciences
www.icdp-online.org
Program Contact: Ulrich Harms
ulrich.harms@gfz-potsdam.de

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