

Proceedings of the International Ocean Discovery Program

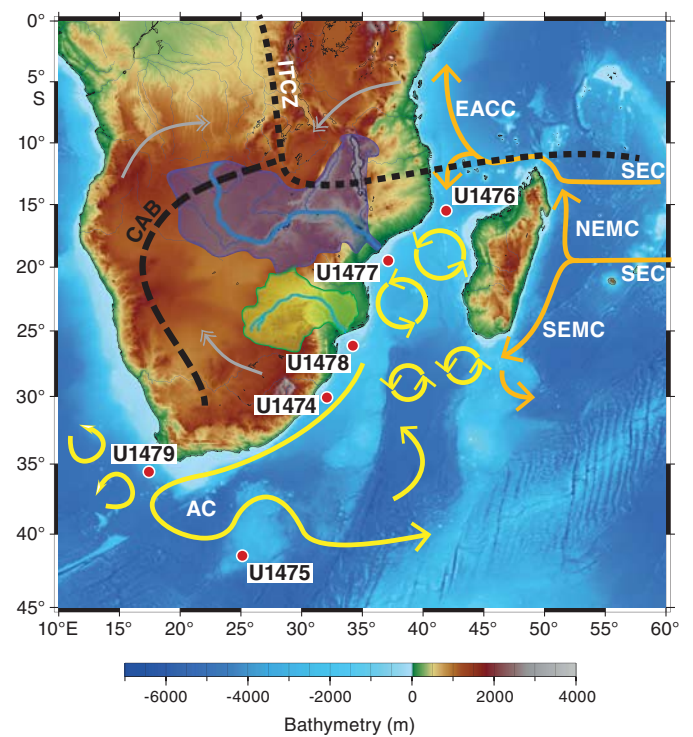
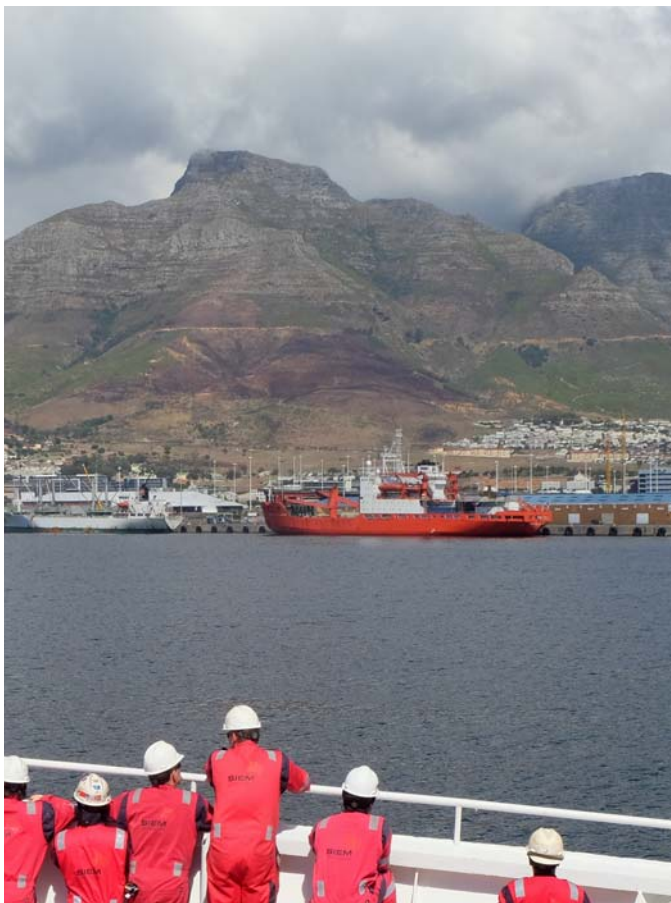
Volume 361

South African Climates (Agulhas LGM Density Profile)

Expedition 361 of the riserless drilling platform
Port Louis, Mauritius, to Cape Town, South Africa
Sites U1474–U1479
30 January–31 March 2016

Volume authorship

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Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the participating agencies, TAMU, or Texas A&M Research Foundation.

The bulk of the shipboard-collected core data from this expedition is accessible at <http://iodp.tamu.edu/database/index.html>. If you cannot access this site or need additional data, please contact Data Librarian, International Ocean Discovery Program *JOIDES Resolution* Science Operator, Texas A&M University, 1000 Discovery Drive, College Station TX 77845-9547, USA. Tel: (979) 845-8495; Fax: (979) 458-1617; Email: database@iodp.tamu.edu.

A complete set of the logging data collected during the expedition is available at <http://brg.ldeo.columbia.edu/logdb>. If you have problems downloading the data, wish to receive additional logging data, or have questions regarding the data, please contact Database Administrator, Borehole Research Group, Lamont-Doherty Earth Observatory of Columbia University, PO Box 1000, 61 Route 9W, Palisades NY 10964, USA. Tel: (845) 365-8343; Fax: (845) 365-3182; Email: logdb@ldeo.columbia.edu.

Supplemental data were provided by the authors and may not conform to IODP publication formats.

JRSO expedition photos are the property of IODP and are public access.

Some core photographs have been tonally enhanced to better illustrate particular features of interest. High-resolution images are available upon request.

Cover photograph shows Tabletop Mountain, Cape Town, South Africa, with Siem crew in the foreground. Photo credit: Jens Gruetzner and IODP JRSO.

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Core descriptions

Visual core descriptions (VCDs) are presented in PDF files for each site. Smear slides and/or thin sections are presented in PDF and/or CSV files for each site and/or hole (CSV files are available in the CORES directory). The entire set of core images in PDF is available in the IMAGES directory.

Site U1474

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Site U1475

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Site U1476

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Dedication

The IODP Expedition 361 shipboard scientists dedicate this volume to Harry Elderfield for his contribution to advancing paleoceanography.

Acknowledgments

We are indebted to the captain, operations superintendent, offshore installation manager, shipboard personnel, laboratory officers, and laboratory technicians who sailed on the R/V *JOIDES Resolution* during IODP Expedition 361 for their dedication, “can do” attitude, and assistance with all aspects of coring, sampling, and shipboard laboratory measurements. Expedition 361 would not have happened without the vision, dedication, and enthusiasm of Professor Rainer Zahn, a lead proponent and driving force behind the scientific effort to drill in the challenging environment of the greater Agulhas Current system. Several research cruises to collect and analyze marine geophysical data and paleoceanographic samples have supported this project and have been funded through Natural Environment Research Council (NERC; RRS *Charles Darwin*, Cruise 154), EU Improving Human Potential Access to Major Research Infrastructures Programme (R/V *Marion Dufrenoyse*, Cruise SWAF), Deutsche Forschungsgemeinschaft (DFG; R/V *Meteor*, Cruises M63/1 and M75/3; R/V *Petr Kottsov*, Cruise SETARAP), and EU Marie Curie Initial Training Network marine integrated studies in rapid climate and ocean change (GATEWAYS). We sincerely thank Professor Volkhard Spieß, Professor Gabriele Uenzelmann-Neben, and Dr. Benedict Preu for their invaluable help in the interpretation of the presite multichannel seismic survey data. The Publications staff at the IODP *JOIDES Resolution* Science Operator at TAMU are thanked for help with publication of this document. Finally, we thank the Science Evaluation Panel and the Environmental Protection and Safety Evaluation Panel for their support and advice in bringing the proposal to a successful completion.

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Supplementary material

Supplementary material for the Volume 361 expedition reports includes DESClogik workbooks in Microsoft Excel and *P*-wave logger technical report in Microsoft Word. A full list of directories can be found in SUPP_MAT in the volume zip folder or on the [Supplementary material for Volume 361 expedition reports](#) web page.

Expedition research results

Data reports

Titles are available in [HTML](#).

Syntheses

Titles are available in [HTML](#).

Drilling location maps

A site map showing the drilling locations for this expedition and maps showing the drilling locations of all International Ocean Discovery Program (IODP) expeditions, produced using QGIS (<http://www.qgis.org>), and all Integrated Ocean Drilling Program, Ocean Drilling Program (ODP), and Deep Sea Drilling Project (DSDP) expeditions, produced using Generic Mapping Tools (GMT) of Paul Wessel and Walter H.F. Smith (<http://gmt.soest.hawaii.edu>), are available in PDF.

[IODP Expedition 361 site map](#)

[IODP map](#) (Expeditions 349–357 and 359–361)

[Integrated Ocean Drilling Program map](#) (Expeditions 301–348)

[ODP map](#) (Legs 100–210)

[DSDP map](#) (Legs 1–96)

Foreword

The International Ocean Discovery Program (IODP) represents the latest incarnation of almost five decades of scientific ocean drilling excellence and is generally accepted as the most successful international collaboration in the history of the Earth sciences. IODP builds seamlessly on the accomplishments of previous phases: the Deep Sea Drilling Project, Ocean Drilling Program, and Integrated Ocean Drilling Program. The 2013–2023 IODP Science Plan (*Illuminating Earth's Past, Present, and Future*) defines four themes and thirteen challenges for this decade of scientific ocean drilling that are both of fundamental importance in understanding how the Earth works and of significant relevance to society as the Earth changes, at least in part in response to anthropogenic forcing. This phase of IODP represents a renewed level of international collaboration in bringing diverse drilling platforms and strategies to increasing our understanding of climate and ocean change, the deep biosphere and evolution of ecosystems, connections between Earth's deep processes and surface manifestations, and geologically induced hazards on human timeframes.

The *Proceedings of the International Ocean Discovery Program* presents the scientific and engineering results of IODP drilling projects, expedition by expedition. As in the preceding Integrated Ocean Drilling Program, expeditions in the new IODP are conducted by three implementing organizations, each providing a different drilling capability. These are the US Implementing Organization (USIO; through September 2014) and the *JOIDES Resolution* Science Operator (JRSO; as of October 2014), providing the leased commercial vessel *JOIDES Resolution* for riserless drilling operations; JAMSTEC's Center for Deep Earth Exploration (CDEX), providing the drillship *Chikyu* for riser and occasional riserless operations; and the European Consortium for Ocean Research Drilling (ECORD) Science Operator (ESO), providing "mission-specific" platforms (MSPs) for expeditions that extend the IODP operational range where neither drillship is suitable, for example, in polar environments and in shallow waters. Scheduling decisions for each capability are made by three independent Facility Boards, each of which includes scientists, operators, and platform funding partners: the *JOIDES Resolution* Facility Board (JRFB), *Chikyu* IODP Board (CIB), and ECORD Facility Board (EFB). At the beginning of the new IODP, the three Facility Boards agreed to utilize Publication Services at the USIO and now the JRSO for production of all expedition *Proceedings* volumes and reports.

The new IODP differs from prior scientific ocean drilling programs in that it has neither a central management organization nor commingled funding for program-wide activities. Yet this phase of IODP retains a fundamental integrative structural element: a "bottom-up" evaluation of all proposals for drilling expeditions by a single advisory structure composed of scientists representing all international program partners. International scientists may submit drilling proposals to the Science Support Office; all submitted proposals are then evaluated by a Science Evaluation Panel in the context of the Science Plan.

The new IODP also has a second internationally integrative level for high-level discussion and consensus-building: the IODP Forum. The Forum is charged with assessing program-wide progress toward achieving the Science Plan. At present, IODP involves 26 international financial partners, including the United States, Japan, an Australia/New Zealand consortium (ANZIC), Brazil, China, India, South Korea, and the eighteen members of ECORD (Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Israel, Italy, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, and the United Kingdom). This enhanced membership in the new IODP represents a remarkable level of international collaboration that remains one of the greatest ongoing strengths of scientific ocean drilling.

James A. Austin Jr.
Chair, IODP Forum

International Ocean Discovery Program

JOIDES Resolution Science Operator

Website: <http://iodp.tamu.edu>

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Expedition-related bibliography*

IODP publications

Scientific Prospectus

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<http://dx.doi.org/10.14379/iodp.sp.361.2015>

Preliminary Report

Hall, I.R., Hemming, S.R., LeVay, L.J., and the Expedition 361 Scientists, 2016. *Expedition 361 Preliminary Report: South African Climates (Agulhas LGM Density Profile)*. International Ocean Discovery Program.
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Expedition reports

Hall, I.R., Hemming, S.R., LeVay, L.J., Barker, S., Berke, M.A., Brentegani, L., Caley, T., Cartagena-Sierra, A., Charles, C.D., Coenen, J.J., Crespín, J.G., Franzese, A.M., Gruetzner, J., Han, X., Hines, S.K.V., Jimenez Espejo, F.J., Just, J., Koutsodendris, A., Kubota, K., Lathika, N., Norris, R.D., Periera dos Santos, T., Robinson, R., Rolinson, J.M., Simon, M.H., Tanguan, D., van der Lubbe, J.J.L., Yamane, M., and Zhang, H., 2017. Expedition 361 summary. In Hall, I.R., Hemming, S.R., LeVay, L.J., and the Expedition 361 Scientists, *South African Climates (Agulhas LGM Density Profile)*. Proceedings of the International Ocean Discovery Program, 361: College Station, TX (International Ocean Discovery Program).
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Supplementary material

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