

Proceedings of the International Ocean Discovery Program

Volume 371

Tasman Frontier Subduction Initiation and Paleogene Climate

Expedition 371 of the R/V *JOIDES Resolution*

Townsville, Australia, to Hobart, Australia

Sites U1506–U1511

27 July–26 September 2017

Volume authorship

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Publisher's notes

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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://mlp.ldeo.columbia.edu/logdb/scientific_ocean_drilling. 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 the R/V *JOIDES Resolution* from a drone on 4 August 2017 at Site U1506 on northern Lord Howe Rise, Zealandia. Photo credit: Adam Kurtz 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.

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Supplementary material

Supplementary material for the Volume 371 expedition reports includes age models and DESClogik workbooks in Microsoft Excel format, cleaned track data in CSV format, and Rig Instrumentation System files in ASC format. A full list of directories can be found in SUPP_MAT in the volume zip folder or on the [Supplementary material for Volume 371 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 371 site map](#)

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Acknowledgments

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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.

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JOIDES Resolution Science Operator

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Expedition-related bibliography*

IODP publications

Scientific Prospectus

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Preliminary Report

Sutherland, R., Dickens, G.R., Blum, P., and the Expedition 371 Scientists, 2018. *Expedition 371 Preliminary Report: Tasman Frontier Subduction Initiation and Paleogene Climate*. International Ocean Discovery Program. <https://doi.org/10.14379/iodp.pr.371.2018>

Proceedings volume

Sutherland, R., Dickens, G.R., Blum, P., and the Expedition 371 Scientists, 2019. *Tasman Frontier Subduction Initiation and Paleogene Climate*. Proceedings of the International Ocean Discovery Program, 371: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.371.2019>

Expedition reports

Sutherland, R., Dickens, G.R., Blum, P., Agnini, C., Alegret, L., Asatryan, G., Bhattacharya, J., Bordenave, A., Chang, L., Collot, J., Cramwinckel, M.J., Dallanave, E., Drake, M.K., Etienne, S.J.G., Giorgioni, M., Gurnis, M., Harper, D.T., Huang, H.-H.M., Keller, A.L., Lam, A.R., Li, H., Matsui, H., Morgans, H.E.G., Newsam, C., Park, Y.-H., Pascher, K.M., Pekar, S.F., Penman, D.E., Saito, S., Stratford, W.R., Westerhold, T., and Zhou, X., 2019. Expedition 371 summary. In Sutherland, R., Dickens, G.R., Blum, P., and the Expedition 371 Scientists, *Tasman Frontier Subduction Initiation and Paleogene Climate*. Proceedings of the International Ocean Discovery Program, 371: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.371.101.2019>

Sutherland, R., Dickens, G.R., Blum, P., Agnini, C., Alegret, L., Asatryan, G., Bhattacharya, J., Bordenave, A., Chang, L., Collot, J., Cramwinckel, M.J., Dallanave, E., Drake, M.K., Etienne, S.J.G., Giorgioni, M., Gurnis, M., Harper, D.T., Huang, H.-H.M., Keller, A.L., Lam, A.R., Li, H., Matsui, H., Morgans, H.E.G., Newsam, C., Park, Y.-H., Pascher, K.M., Pekar, S.F., Penman, D.E., Saito, S., Stratford, W.R., Westerhold, T., and Zhou, X., 2019. Expedition 371 methods. In Sutherland, R., Dickens, G.R., Blum, P., and the Expedition 371 Scientists, *Tasman Frontier Subduction Initiation and Paleogene Climate*. Proceedings of the International Ocean Discovery Program, 371: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.371.102.2019>

Sutherland, R., Dickens, G.R., Blum, P., Agnini, C., Alegret, L., Asatryan, G., Bhattacharya, J., Bordenave, A., Chang, L., Collot, J., Cramwinckel, M.J., Dallanave, E., Drake, M.K., Etienne, S.J.G., Giorgioni, M., Gurnis, M., Harper, D.T., Huang, H.-H.M., Keller, A.L., Lam, A.R., Li, H., Matsui, H., Morgans, H.E.G., Newsam, C., Park, Y.-H., Pascher, K.M., Pekar, S.F., Penman, D.E., Saito, S., Stratford, W.R., Westerhold, T., and Zhou, X., 2019. Site U1506. In Sutherland, R., Dickens, G.R., Blum, P., and the Expedition 371 Scientists, *Tasman Frontier Subduction Initiation and Paleogene Climate*. Proceedings of the International Ocean Discovery Program, 371: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.371.103.2019>

Sutherland, R., Dickens, G.R., Blum, P., Agnini, C., Alegret, L., Asatryan, G., Bhattacharya, J., Bordenave, A., Chang, L., Collot, J., Cramwinckel, M.J., Dallanave, E., Drake, M.K., Etienne, S.J.G., Giorgioni, M., Gurnis, M., Harper, D.T., Huang, H.-H.M., Keller, A.L., Lam, A.R., Li, H., Matsui, H., Morgans, H.E.G., Newsam, C., Park, Y.-H., Pascher, K.M., Pekar, S.F., Penman, D.E., Saito, S., Stratford, W.R., Westerhold, T., and Zhou, X., 2019.

Site U1507. In Sutherland, R., Dickens, G.R., Blum, P., and the Expedition 371 Scientists, *Tasman Frontier Subduction Initiation and Paleogene Climate*. Proceedings of the International Ocean Discovery Program, 371: College Station, TX (International Ocean Discovery Program).

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Sutherland, R., Dickens, G.R., Blum, P., Agnini, C., Alegret, L., Bhattacharya, J., Bordenave, A., Chang, L., Collot, J., Cramwinckel, M.J., Dallanave, E., Drake, M.K., Etienne, S.J.G., Giorgioni, M., Gurnis, M., Harper, D.T., Huang, H.-H.M., Keller, A.L., Lam, A.R., Li, H., Matsui, H., Morgans, H.E.G., Newsam, C., Park, Y.-H., Pascher, K.M., Pekar, S.F., Penman, D.E., Saito, S., Stratford, W.R., Westerhold, T., and Zhou, X., 2019. Site U1509. In Sutherland, R., Dickens, G.R., Blum, P., and the Expedition 371 Scientists, *Tasman Frontier Subduction Initiation and Paleogene Climate*. Proceedings of the International Ocean Discovery Program, 371: College Station, TX (International Ocean Discovery Program).

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Sutherland, R., Dickens, G.R., Blum, P., Agnini, C., Alegret, L., Bhattacharya, J., Bordenave, A., Chang, L., Collot, J., Cramwinckel, M.J., Dallanave, E., Drake, M.K., Etienne, S.J.G., Giorgioni, M., Gurnis, M., Harper, D.T., Huang, H.-H.M., Keller, A.L., Lam, A.R., Li, H., Matsui, H., Morgans, H.E.G., Newsam, C., Park, Y.-H., Pascher, K.M., Pekar, S.F., Penman, D.E., Saito, S., Stratford, W.R., Westerhold, T., and Zhou, X., 2019. Site U1510. In Sutherland, R., Dickens, G.R., Blum, P., and the Expedition 371 Scientists, *Tasman Frontier Subduction Initiation and Paleogene Climate*. Proceedings of the International Ocean Discovery Program, 371: College Station, TX (International Ocean Discovery Program).

<https://doi.org/10.14379/iodp.proc.371.107.2019>

Sutherland, R., Dickens, G.R., Blum, P., Agnini, C., Alegret, L., Bhattacharya, J., Bordenave, A., Chang, L., Collot, J., Cramwinckel, M.J., Dallanave, E., Drake, M.K., Etienne, S.J.G., Giorgioni, M., Gurnis, M., Harper, D.T., Huang, H.-H.M., Keller, A.L., Lam, A.R., Li, H., Matsui, H., Morgans, H.E.G., Newsam, C., Park, Y.-H., Pascher, K.M., Pekar, S.F., Penman, D.E., Saito, S., Stratford, W.R., Westerhold, T., and Zhou, X., 2019. Site U1511. In Sutherland, R., Dickens, G.R., Blum, P., and the Expedition 371 Scientists, *Tasman Frontier Subduction Initiation and Paleogene Climate*. Proceedings of the International Ocean Discovery Program, 371: College Station, TX (International Ocean Discovery Program).

<https://doi.org/10.14379/iodp.proc.371.108.2019>

Supplementary material

Sutherland, R., Dickens, G.R., Blum, P., and the Expedition 371 Scientists, 2019. Supplementary material, <https://doi.org/10.14379/iodp.proc.371supp.2019>. Supplement to Sutherland, R., Dickens, G.R., Blum, P., and the Expedition 371 Scientists, *Tasman Frontier Subduction Initiation and Paleogene Climate*. Proceedings of the International Ocean Discovery Program, 371: College Station, TX (International Ocean Discovery Program). <https://doi.org/10.14379/iodp.proc.371.2019>

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