International Ocean Discovery Program
Expedition 391 Scientific Prospectus Addendum

Walvis Ridge Hotspot: drilling Walvis Ridge, Southeast Atlantic Ocean, to test models of ridge-hotspot interaction, isotopic zonation, and the hotspot reference frame

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This IODP Scientific Prospectus is based on precruise JOIDES Resolution Facility advisory panel discussions and scientific input from the designated Co-Chief Scientists on behalf of the drilling proponents. During the course of the cruise, actual site operations may indicate to the Co-Chief Scientists, the Expedition Project Manager/Staff Scientist, and the Operations Superintendent that it would be scientifically or operationally advantageous to amend the plan detailed in this prospectus. It should be understood that any substantial changes to the science deliverables outlined in the plan presented here are contingent upon the approval of the IODP JRSO Director and/or JOIDES Resolution Facility Board.

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**Introduction**

This addendum to the International Ocean Discovery Program Expedition 391 *Scientific Prospectus* (Walvis Ridge Hotspot; Sager et al., 2020) incorporates minor coordinate changes to Proposed Sites CT-5A, CT-6A, TT-3A, TT-4A, TT-5A, VB-7A, VB-8A, VB-10A, VB-11A, VB-13A, and VB-14A. The revised site coordinates are documented in Proposal 890-Add2, which is available at [http://iodp.tamu.edu/scienceops/expeditions/walvis_ridge_hotspot.html](http://iodp.tamu.edu/scienceops/expeditions/walvis_ridge_hotspot.html).

In addition, because of adjustments to the R/V JOIDES Resolution operations schedule caused by the COVID-19 pandemic, the expedition was postponed by a year. At the time of publication of this addendum, the expedition is scheduled to start in Cape Town, South Africa, on 6 December 2021 and end in Cape Town, South Africa, on 5 February 2022.

For a detailed description of the geologic background, scientific objectives, drilling and coring strategy, logging strategy, sample and data sharing strategy, and proposed sites, see Tables T1 and T2 in this report and the Expedition 391 *Scientific Prospectus* (Sager et al., 2020).

**Reference**

Sager, W., Hoernle, K., and Petronotis, K., 2020. *Expedition 391 Scientific Prospectus: Walvis Ridge Hotspot*. International Ocean Discovery Program. [https://doi.org/10.14379/iodp.sp.391.2020](https://doi.org/10.14379/iodp.sp.391.2020)
Table T1. Operations plan and time estimates for primary sites, Expedition 391. EPSP = Environmental Protection and Safety Panel, RCB = rotary core barrel, FMS = Formation MicroScanner, FFF = free-fall funnel.

| Proposed site | Location (latitude, longitude) | Seafloor depth (mbsf) | Description of operations | Transit (days) | Coring, drilling (days) | Logging (days) |
|---------------|--------------------------------|------------------------|---------------------------|----------------|------------------------|----------------|
| Cape Town     |                                |                        | Begin Expedition          | 5.0            | port call days         |                |
|               |                                |                        | Transit ~784 nmi to VB-12A at 10.5 knots | 3.1            |                        |                |
| VB-12A        | 25.433078° S                    | 3667                   | Hole A: RCB core to 393 mbsf, Log with triple combo & FMS-sonic | 0              | 5.1                    | 1.0            |
|               | 6.956190° E                     |                        | (sediment thickness: 293 m, basement penetration: 100 m) |                |                        |                |
|               | EPSP approval to 650 mbsf        |                        |                          |                |                        |                |
|               | Subtotal days on site:           |                        |                          |                |                        | 6.1            |
|               | Transit ~215 nmi to FR-1B at 10.5 knots | 0.9                  |                          |                |                        |                |
| FR-1B         | 21.866100° S                    | 3259                   | Hole A: Deploy FFF, RCB core to 421 mbsf, Log with triple combo & FMS-sonic | 0              | 9.8                    | 1.0            |
|               | 6.590600° E                     |                        | (sediment thickness: 171 m, basement penetration: 250 m) |                |                        |                |
|               | EPSP approval to 521 mbsf        |                        |                          |                |                        |                |
|               | Subtotal days on site:           |                        |                          |                |                        | 10.9           |
| VB-14A        | 24.595881° S                    | 3046                   | Hole A: RCB core to 410 mbsf, Log with triple combo & FMS-sonic | 0              | 4.7                    | 1.0            |
|               | 5.121919° E                     |                        | (sediment thickness: 310 m, basement penetration: 100 m) |                |                        |                |
|               | EPSP approval to 650 mbsf        |                        |                          |                |                        |                |
|               | Subtotal days on site:           |                        |                          |                |                        | 5.7            |
|               | Transit ~395 nmi to TT-04A at 10.5 knots | 1.6                  |                          |                |                        |                |
| TT-4A         | 30.169925° S                    | 3465                   | Hole A: RCB core to 252 mbsf, Log with triple combo & FMS-sonic | 0              | 4.4                    | 0.9            |
|               | 1.177510° E                     |                        | (sediment thickness: 152 m, basement penetration: 100 m) |                |                        |                |
|               | EPSP approval to 550 mbsf        |                        |                          |                |                        |                |
|               | Subtotal days on site:           |                        |                          |                |                        | 5.3            |
|               | Transit ~149 nmi to CT-04A at 10.5 knots | 0.6                  |                          |                |                        |                |
| CT-4A         | 32.131000° S                    | 4436                   | Hole A: Deploy FFF, RCB core to 528 mbsf, Log with triple combo & FMS-sonic | 0              | 11.2                   | 1.2            |
|               | 0.592700° W                     |                        | (sediment thickness: 278 m, basement penetration: 250 m) |                |                        |                |
|               | EPSP approval to 650 mbsf        |                        |                          |                |                        |                |
|               | Subtotal days on site:           |                        |                          |                |                        | 12.4           |
|               | Transit ~182 nmi to GT-04A at 10.5 knots | 0.7                  |                          |                |                        |                |
| GT-4A         | 31.344400° S                    | 2370                   | Hole A: RCB core to 402 mbsf, Log with triple combo & FMS-sonic | 0              | 4.9                    | 1.0            |
|               | 2.847000° E                     |                        | (sediment thickness: 302 m, basement penetration: 100 m) |                |                        |                |
|               | EPSP approval to 652 mbsf        |                        |                          |                |                        |                |
|               | Subtotal days on site:           |                        |                          |                |                        | 5.9            |
|               | Transit ~803 nmi to Cape Town at 10.5 knots | 3.2                  |                          |                |                        |                |
|               | Cape Town                       | End Expedition         |                          |                |                        |                |
|               | Subtotal days on site:           |                        |                          |                |                        | 46.2           |

Port call days: 5.0
Total operating days: 57.0
Total days on site: 46.2
Total expedition days: 62.0
Table T2. Time estimates for alternate sites, Expedition 391. EPSP = Environmental Protection and Safety Panel, FFF = free-fall funnel, RCB = rotary core barrel, FMS = Formation MicroScanner. (Continued on next two pages.)

| Proposed site | Location (latitude, longitude) | Seafloor depth (mbrf) | Description of operations | Coring, drilling (days) | Logging (days) |
|---------------|--------------------------------|-----------------------|---------------------------|------------------------|---------------|
| CT-1B         | 32.491200° S 1845              |                       | Hole A: Deploy FFF; RCB core to 577 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 327 m, basement penetration: 250 m) | 8.8                    | 1.1           |
| EPSP approval to 613 mbsf |                      |                       |                           |                        |               |
|               |                                |                       |                           | Subtotal days on site: 9.9 |               |
| CT-5A         | 32.328059° S 3806              |                       | Hole A: Deploy FFF; RCB core to 417 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 167 m, basement penetration: 250 m) | 9.6                    | 1.0           |
| EPSP approval to 550 mbsf |                      |                       |                           |                        |               |
|               |                                |                       |                           | Subtotal days on site: 10.6 |               |
| CT-6A         | 32.418906° S 2768              |                       | Hole A: Deploy FFF; RCB core to 447 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 197 m, basement penetration: 250 m) | 8.9                    | 1.0           |
| EPSP approval to 550 mbsf |                      |                       |                           |                        |               |
|               |                                |                       |                           | Subtotal days on site: 9.9 |               |
| FR-2B         | 21.707300° S 3019              |                       | Hole A: Deploy FFF; RCB core to 693 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 443 m, basement penetration: 250 m) | 11.4                   | 1.2           |
| EPSP approval to 812 mbsf |                      |                       |                           |                        |               |
|               |                                |                       |                           | Subtotal days on site: 12.6 |               |
| GT-5A         | 31.467100° S 4901              |                       | Hole A: RCB core to 362 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 262 m, basement penetration: 100 m) | 5.5                    | 1.1           |
| EPSP approval to 612 mbsf |                      |                       |                           |                        |               |
|               |                                |                       |                           | Subtotal days on site: 6.6 |               |
| TT-1A         | 30.380800° S 1875              |                       | Hole A: RCB core to 272 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 162 m, basement penetration: 100 m) | 3.7                    | 0.8           |
| EPSP approval to 498 mbsf |                      |                       |                           |                        |               |
|               |                                |                       |                           | Subtotal days on site: 4.5 |               |
| TT-2A         | 30.246700° S 2367              |                       | Hole A: RCB core to 489 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 389 m, basement penetration: 100 m) | 5.1                    | 1.1           |
| EPSP approval to 739 mbsf |                      |                       |                           |                        |               |
|               |                                |                       |                           | Subtotal days on site: 6.2 |               |
| TT-3A         | 30.368460° S 1882              |                       | Hole A: RCB core to 235 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 135 m, basement penetration: 100 m) | 3.6                    | 0.8           |
| EPSP approval to 550 mbsf |                      |                       |                           |                        |               |
|               |                                |                       |                           | Subtotal days on site: 4.4 |               |
| TT-5A         | 30.606835° S 2843              |                       | Hole A: RCB core to 244 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 144 m, basement penetration: 100 m) | 4.0                    | 0.9           |
| EPSP approval to 550 mbsf |                      |                       |                           |                        |               |
|               |                                |                       |                           | Subtotal days on site: 4.9 |               |
| VB-1B         | 23.417600° S 2842              |                       | Hole A: RCB core to 222 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 122 m, basement penetration: 100 m) | 4.0                    | 0.8           |
| EPSP approval to 485 mbsf |                      |                       |                           |                        |               |
|               |                                |                       |                           | Subtotal days on site: 4.8 |               |
| Proposed site | Location (latitude, longitude) | Seafloor depth (mbsf) | Description of operations | Coring, drilling (days) | Logging (days) |
|---------------|--------------------------------|-----------------------|---------------------------|------------------------|---------------|
| **VB-2B**     | 23.28120° S 5.057300° E       | 2829                  | Hole A: RCB core to 226 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 126 m, basement penetration: 100 m) | 3.5 | 0.8 |
|               | to 812 mbsf                      |                       |                           | Subtotal days on site: 4.3 |
| **VB-3B**     | 24.60270° S 4.667600° E       | 4061                  | Hole A: RCB core to 293 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 193 m, basement penetration: 100 m) | 4.5 | 1.0 |
|               | to 543 mbsf                       |                       |                           | Subtotal days on site: 5.5 |
| **VB-4B**     | 24.58480° S 4.666000° E       | 3970                  | Hole A: RCB core to 399 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 299 m, basement penetration: 100 m) | 5.9 | 1.0 |
|               | to 631 mbsf                       |                       |                           | Subtotal days on site: 6.9 |
| **VB-5A**     | 23.37190° S 4.957900° E       | 2820                  | Hole A: RCB core to 265 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 165 m, basement penetration: 100 m) | 3.7 | 0.9 |
|               | to 515 mbsf                       |                       |                           | Subtotal days on site: 4.6 |
| **VB-6A**     | 23.17670° S 5.170300° E       | 2621                  | Hole A: RCB core to 552 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 452 m, basement penetration: 100 m) | 5.4 | 1.1 |
|               | to 813 mbsf                       |                       |                           | Subtotal days on site: 6.5 |
| **VB-7A**     | 26.29578° S 4.973920° E       | 1898                  | Hole A: RCB core to 408 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 308 m, basement penetration: 100 m) | 3.9 | 0.9 |
|               | to 650 mbsf                       |                       |                           | Subtotal days on site: 4.8 |
| **VB-8A**     | 26.26915° S 4.958304° E       | 2077                  | Hole A: RCB core to 371 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 271 m, basement penetration: 100 m) | 3.9 | 0.9 |
|               | to 650 mbsf                       |                       |                           | Subtotal days on site: 4.8 |
| **VB-9A**     | 26.19448° S 5.108462° E       | 2154                  | Hole A: RCB core to 384 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 284 m, basement penetration: 100 m) | 4.0 | 0.9 |
|               | to 650 mbsf                       |                       |                           | Subtotal days on site: 4.9 |
| **VB-10A**    | 26.00781° S 4.812774° E       | 2897                  | Hole A: RCB core to 502 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 402 m, basement penetration: 100 m) | 5.2 | 1.1 |
|               | to 750 mbsf                       |                       |                           | Subtotal days on site: 6.3 |
| **VB-11A**    | 26.125066° S 4.998272° E      | 2618                  | Hole A: RCB core to 280 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 180 m, basement penetration: 100 m) | 3.8 | 0.9 |
|               | to 550 mbsf                       |                       |                           | Subtotal days on site: 4.7 |
Table T2 (continued).

| Proposed site | Location (latitude, longitude) | Seafloor depth (mbrf) | Description of operations | Coring, drilling (days) | Logging (days) |
|---------------|--------------------------------|-----------------------|--------------------------|------------------------|---------------|
| **VB-13A**    | 25.202772° S 3954              |                       | Hole A: RCB core to 233 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 133 m, basement penetration: 100 m) | 4.1                    | 0.8           |
| **EPSP approval to 500 mbsf** |                        |                       |                          |                        |               |
|               |                                |                       |                         |                        |               |
|               |                                |                       | Subtotal days on site: 4.9 |                        |               |
| **VB-15A**    | 23.827388° S 2006              | 5.570439° E          | Hole A: RCB core to 447 mbsf; Log with triple combo & FMS-sonic (sediment thickness: 347 m, basement penetration: 100 m) | 4.3                    | 1.0           |
| **EPSP approval to 700 mbsf** |                        |                       |                          |                        |               |
|               |                                |                       |                         |                        |               |
|               |                                |                       | Subtotal days on site: 5.3 |                        |               |