The main drilling rig, Rig 18, arrived at the drill site for the JET project at Prees (UK) and is rigged up ready to go next week. The first scientists and PI Steve Hesselbo will be at the site by the end of the week. Last week the installation of the conductor was successfully completed. The conductor supports the upper portion of the borehole where the formation is unconsolidated.

More about the JET project: https://www.icdp-online.org/projects/world/europe/prees-england/

The 2050 Science Framework guides multidisciplinary subseaﬂoor research into the interconnected processes that characterize the complex Earth system and shape our planet’s future. The Framework is supported by Enduring Principles that discuss access to data, the proposal process, planning and safety, diversity and inclusion, and international collaboration.

Lien : https://iodp.org/2050-science-framework?fbclid=IwAR1fCTngW6r7Pd9R6wpByZ2iwwiZx_gPCqkUihhoYRKZvdd-OJfyA

Expeditions schedule updated: The JR Science Operator has updated its operations schedule for 2021 and 2022 in light of decisions by the JR Facility Board and constraints due to COVID-19.

Lien : http://www.iodp.org/expeditions/expeditions-schedule
A new version of the IODP Proposal Submission Guidelines which describes the joint submission and review process for "Land 2 Sea" drilling proposals implementing jointly by IODP and ICDP was approved in July.


**IODP Town Hall:** Join the conversation about the 2050 Science Framework and future planning at the town hall at the AGU Fall Meeting on December 15 at 4pm PST.

Lien : [https://agu.confex.com/agu/fm20/meetingapp.cgi/Session/105256](https://agu.confex.com/agu/fm20/meetingapp.cgi/Session/105256)

**NEW VIDEO: Introduction to ECORD** - ECORD explained in 4 minutes

Lien : [https://www.youtube.com/watch?v=A3ST56j3yJM&t=3s](https://www.youtube.com/watch?v=A3ST56j3yJM&t=3s)
Lien : [https://www.ecord.org/about-ecord/about-us/ecord-explained-in-4-minutes-video/](https://www.ecord.org/about-ecord/about-us/ecord-explained-in-4-minutes-video/)

**Now Sailing: South Atlantic Transect Reentry Installations**

The JOIDES Resolution is installing reentry systems at five sites in advance of future expeditions. The sites form a transect starting near the Mid-Atlantic Ridge and moving away into progressively older basaltic crust. Future expeditions will examine how crustal alteration proceeds over time.

Lien : [http://iodp.tamu.edu/scienceops/expeditions/south_atlantic_transect.html](http://iodp.tamu.edu/scienceops/expeditions/south_atlantic_transect.html)

**Recently Completed (September 2020): JOIDES Resolution Engineering Testing**

Expedition 384 performed engineering testing at sites of opportunity in the North Atlantic. Testing focused on deep (>1 km) drilling and coring in igneous ocean crust, following some recommendations made by the Deep Crustal Drilling Engineering Working Group and the JR Facility Board.


Consensus statements and action items from the August 2020 meeting of the JOIDES Resolution Facility Board have been posted.

Deadlines

ICDP: Call for Proposals

The International Continental Scientific Drilling Program, ICDP coordinates and supports multinational endeavours in continental scientific drilling. The program focuses on themes of global geoscientific importance underpinning socio-economic challenges, including climate & ecosystem evolution, sustainable georesources and natural hazards, as outlined in the new ICDP Science Plan. The ICDP invites Earth scientists to submit pre-proposals, workshop proposals and full proposals in which drilling is required to achieve critical research goals.

Please note that ICDP provides operational support and allocates co-funding for drilling-related costs.

Deadline for submission: **January 15, 2021.**

Link: [https://www.icdp-online.org/proposals/](https://www.icdp-online.org/proposals/)

ECORD/ICDP MagellanPlus: Call for Proposals

The ECORD/ICDP MagellanPlus Workshop Series Programme aims to foster the development of new IODP/ICDP drilling projects, and invites scientists from ECORD/ICDP member countries to propose workshops for the elaboration of compelling drilling proposals. MagellanPlus particularly welcomes proposals for workshops that integrate scientific marine and continental coring with scientific topics such as Earth’s Surface Environmental Change, Processes and Effects, the Deep Biosphere and Sub-Seafloor Ocean, as well as Solid Earth Cycles & Geodynamics, as outlined in the science plans of IODP and ICDP.

A typical workshop is expected to take place over 2-4 days, and have 20-35 participants. Funding/participation: The contribution will not exceed 15,000 € per workshop. Priority is given to ECORD and ICDP member countries. The participation of young scientists is particularly encouraged.

Proposals must be submitted as a single, combined pdf-document and email attachment to Lucas Lourens – magellan.plus@uu.nl and to the ECORD Managing Agency – ema@cerege.fr

Deadline for submission: **January 15, 2021.**

Link: [https://www.ecord.org/science/magellanplus/](https://www.ecord.org/science/magellanplus/)

Soumettre un Projet de forage - IODP:


Date limite pour candidater: **1er avril 2020, 23:59 UTC**

- Science Evaluation Panel, **January 12-14, 2021**, La Jolla CA, USA - virtual meeting
- Environmental Protection and Safety Panel, **February 2021 (dates TBD)**, College Station, Texas, USA
- JOIDES Resolution Facility Board, **May 24-26, 2021**, La Jolla CA, USA
- Chikyu IODP Board, **June 25-26, 2020**, Kobe, Japan **POSTPONED** until further notice

⚠️ Multiple expeditions postponed! Many expeditions have been postponed due to platform repairs, complications of drill sites in international waters, and the global health emergency. For more information see the Expedition Schedule or contact the platform science operator.


Lien: [http://www.iodp.org/expeditions/expeditions-schedule](http://www.iodp.org/expeditions/expeditions-schedule)
Expedition postponed: The ECORD Council has decided to postpone X389 "Hawaiian Drowned Reef". The JR Science Operator has pulled Expedition 387 - 388 from the schedule due to an unforeseen repair that has been done in dry dock in early May. The JR Facility Board will consider rescheduling this expedition. The MSP Expedition 386 "Japan Trench Paleoseismology" is postponed to 2021.

Read the update from the JR Science Operator on ship repairs and the outlook for a return to operations.

Modified from https://mailchi.mp/ldeo/new-science-plan-structure-road-map-open-for-comments-742640?e=e91ffd4115
Expéditions IODP et scientifiques français sélectionnés :

- **Expédition 395** – Reykjanes Mantle Convection and Climate (26 June to 26 August 2020) (6 June to 6 August 2021)
  
  Lien internet : [http://www.ecord.org/expedition386/](http://www.ecord.org/expedition386/)
  
  - Anne Briais (Co-Chief Scientist) - GET Toulouse
  - Gabriel T. Pasquet (Petrologist) - University of Pau and Pays de l'Adour

- **Expédition 391** – Walvis Ridge Hotspot (5 December 2020 to 4 February 2021) (6 December 2021 to 6 February 2022)
  
  Lien internet : [http://iodp.tamu.edu/scienceops/expeditions/walvis_ridge_hotspot.html](http://iodp.tamu.edu/scienceops/expeditions/walvis_ridge_hotspot.html)
  
  - Claire A. Carvallo (Paleomagnetist) - *Institut de Minéralogie, de Physique des Matériaux et de Cosmochimie* Sorbonne Université, Paris
  - Mark S. Zindorf (Inorganic/Organic Geochemist) - IFREMER, Plouzané

- **Expédition 392** – Agulhas Plateau Cretaceous Climate (4 February to 6 April 2021) (5 February–7 April 2022)
  
  Lien internet : [http://iodp.tamu.edu/scienceops/expeditions/agulhas_plateau_climate.html](http://iodp.tamu.edu/scienceops/expeditions/agulhas_plateau_climate.html)
  
  - Sietske J. Batenburg (Physical Properties Specialist/Stratigraphic Correlator) - Géosciences Rennes
  - Sidonie Revillon (Igneous Petrologist) - SEDISOR / Laboratoire Géosciences Océan / IUEM, Brest

- **Expédition 390** – South Atlantic Transect #1 (5 October to 5 December 2020) (7 April–7 June 2022)
  
  Lien internet : [http://iodp.tamu.edu/scienceops/expeditions/south_atlantic_transect.html](http://iodp.tamu.edu/scienceops/expeditions/south_atlantic_transect.html)
  
  - pas de français sélectionnés

- **Expédition 393** – South Atlantic Transect #2 (6 April to 6 June 2021) (7 June–7 August 2022)
  
  Lien internet : [http://iodp.tamu.edu/scienceops/expeditions/south_atlantic_transect.html](http://iodp.tamu.edu/scienceops/expeditions/south_atlantic_transect.html)
  
  - pas de français sélectionnés

  
  Lien internet : [http://www.ecord.org/expedition386/](http://www.ecord.org/expedition386/)
  
  - Morgane Brunet (Sedimentologist and XCT specialist) - Geosciences Rennes
  - Antonio Cattaneo (Sedimentologist) - IFREMER, Plouzané
  - Chloé Seibert (Physical Properties Specialist) - Institut de Physique du Globe de Paris
  - Jean Noël Proust (Sedimentologist) - Geosciences Rennes
Expédition 387 – Amazon Margin (26 April to 26 June 2020)
Lien internet: http://iodp.tamu.edu/scienceops/expeditions/amazon_margin.html
- Germain Bayon (Inorganic Geochemist) - IFREMER, Plouzané
- Florent J. Hodel (Paleomagnetist) - GET, Toulouse
- Alberto Machado Cruz (Stratigraphic Correlator/Physical Properties Specialist) - ISTeP, Paris
- Marina Rabineau (Physical Properties Specialist/Downhole Measurements) - IUEM, Brest

Expédition 388 – Equatorial Atlantic Gateway (June 26 - Aug 26, 2020)
Lien internet: http://iodp.tamu.edu/scienceops/expeditions/equatorial_atlantic_gateway.html
- Marie Laugié (Physical Properties Specialist/Stratigraphic Correlator) - CEREGE, Aix-en-Provence

Soutiens financiers IODP-France :

Appel d'offres au fil de l'eau “Soutien Financier Post-Campagne” IODP-France

Cet appel d'offres est destiné spécifiquement au financement de l’exploitation des données et échantillons prélevés au cours des expéditions de forage scientifique IODP. Les projets portant sur des expéditions venant de s'achever seront financés en priorité. Les demandes portant sur l'exploitation d'expéditions anciennes (programmes DSDP, ODP et IODP ≥ 2 ans) seront également considérées.
Contacts :
iodp-france@get.omp.eu
stephanie.cuven@get.omp.eu

“Sample Request” = valorisation des expéditions anciennes

Vous pouvez à tout moment faire une demande de rééchantillonnage auprès des 3 carothèques IODP afin d'initier de nouvelles études sur des expéditions passées. Une aide financière pour réaliser votre projet scientifique pourra vous être attribuée par le Bureau IODP-France dans le cadre d'un "Soutien financier Post-Cruise - campagnes anciennes", ceci après évaluation de votre projet par le comité IODP-France.
Lien “sample access” : https://www.iodp.org/resources/access-data-and-samples
Lien “Demande de soutien financier Post-Cruise IODP-France” :

Journées d’information “Porteurs de projet IODP” :

Le bureau IODP-France organise actuellement des séminaires d’information dans toute la France sur le thème: “Historique et Fonctionnement du Programme IODP, comment participer, comment monter un projet d’expédition IODP ?”. Les scientifiques impliqués dans IODP en tant qu'embarquant seront invités à présenter leurs résultats et les scientifiques impliqués dans IODP en tant que porteur de projet ayant abouti à une expédition seront les bienvenus pour expliquer la procédure à suivre, donner des conseils sur le contenu et le format d’une demande “idéale”, sur les pièges rédactionnels à éviter, etc...
En attendant de nous recevoir pour un séminaire, voici le lien pour télécharger le guide pour soumettre un projet de forage : https://www.iodp.org/iodp-proposal-submission-guidelines-8-2016/file

Si votre laboratoire est intéressé pour nous recevoir, veuillez nous contacter aux adresses suivantes :
iodp-france@get.omp.eu
stephanie.cuven@get.omp.eu
Workshops / Publications / Annonces diverses

Workshops ou congrès en rapport avec les programmes IODP et ICDP

**IODP Town Hall:** Join the conversation about the 2050 Science Framework and future planning at the town hall at the AGU Fall Meeting on December 15 at 4pm PST.
Infos : [https://agu.confex.com/agu/fm20/meetingapp.cgi/Session/105256](https://agu.confex.com/agu/fm20/meetingapp.cgi/Session/105256)

**Workshop "DriMMLOC Drilling the Mantle, Moho, and Lower Crust"** Postponed to this fall due to Covid-19 situation
Lieu : Tongji University, Shanghai, China
Infos : [http://www.iodp-china.org/DriMMLOC](http://www.iodp-china.org/DriMMLOC)

**MagellanPlus Workshop COSNICA : "The life cycle of a microplate at a convergent margin"**
Dates et lieu : 29-30 Juin 2020, Graz, Austria. Postponed due Covid-19 situation
Infos : [http://cosnica.uni-graz.at/](http://cosnica.uni-graz.at/)

**MagellanPlus SCYLLA Workshop " Serpentinite diapir in the Calabrian subduction system return Lower plate mantle from Earth's oldest ocean"**
Dates et lieu : 27-29 October 2020, Bologna, Italy Postponed due to Covid-19 situation
Infos : [https://www.ecord.org/science/magellanplus/](https://www.ecord.org/science/magellanplus/)

**MagellanPlus "Belize Barrier Reef "**
Dates et lieu : 2021 Frankfurt/Main, Germany - Postponed due to Covid-19 situation
Infos : [https://www.ecord.org/science/magellanplus/](https://www.ecord.org/science/magellanplus/)

**MagellanPlus "Mechanisms of rifting of large continental blocks – a case study at the Baltic Sea "**
Dates et lieu : 5-7 May 2021, Helsinki, Finland -
Infos : [https://www.ecord.org/science/magellanplus/](https://www.ecord.org/science/magellanplus/)

**36th International Geological Congress**
Dates et lieu : August 16-21 2021 - Delhi, India
Infos : [https://www.36igc.org/](https://www.36igc.org/)

**GeoUtrecht 2020 online conference** posted May 25, 2020 from August 24-26, 2020
Infos : free registration
Infos : [https://www.geo utrecht2020.org/](https://www.geo utrecht2020.org/)
**Annonces ECORD & ICDP**

**IODP :**

- **New Policy:** The IODP Code of Conduct and Anti-Harrassment Policy has been approved by IODP’s Program Member Organizations and is now posted with other IODP-wide policy documents.
  

- **Welcome:** Charna Meth has been selected as the new Executive Director of the IODP Science Support Office at Scripps Institution of Oceanography. We thank Holly Given for her service and commitment to the IODP, and congratulate her on her retirement.
  
  Lien : [http://iodp.org/program-organization/science-support-office](http://iodp.org/program-organization/science-support-office)

- **About Sample Requests:** IODP sample requests are being accepted but completion and shipment of requests may be delayed due to Covid-19. For the current status of each IODP core repository, contact the repository curator.
  
  Lien : [http://www.iodp.org/resources/core-repositories](http://www.iodp.org/resources/core-repositories)

**ICDP :** In 2020, there are about 6 projects where work is ongoing, or where fieldwork is scheduled.

- 1. Europe - Czechia (EGER): Drilling the Eger Rift: Crust, mantle, and deep biosphere processes in an active continental rift
- 4. Europe - United Kingdom (JET): Integrated Understanding of the Early Jurassic Earth System and Timescale (JET)
- 5. South America - Brazil (TransAmazon): Trans-Amazon Drilling Project
- 6. Europe - Italy (STAR): A Strainmeter Array Along the Alto Tiberina Fault System, Central Italy

**Nouvelles publications IODP-France / ECORD / IODP**

A fully designed, complete draft version of the **2050 Science Framework** entitled **“Exploring Earth by Scientific Ocean Drilling”** is now available online on [IODP.org](http://iodp.org) and ready for community review and your comments.

Download : [https://iodp.org/2050-science-framework?fbclid=IwAR1fCTngW6r7Pd9R6vup8yZ2iiwwZg0qyUJhONR2d7LO9A](https://iodp.org/2050-science-framework?fbclid=IwAR1fCTngW6r7Pd9R6vup8yZ2iiwwZg0qyUJhONR2d7LO9A)

**ICDP Science Plan 2020-2030**

Video : [https://www.icdp-online.org/fileadmin/icdp/media/IscICDP_Science_Plan_Video.mp4](https://www.icdp-online.org/fileadmin/icdp/media/IscICDP_Science_Plan_Video.mp4)
ICDP Newsletter Summer 2020


14 proposals were submitted by January 15 and were timely assessed by the panels. So far, 2 Full Proposals have been readily approved: PVOLC and NamCore, 3 Workshop Proposals: USA Margin, PlioWest, and Add-on. 2 further Full Proposals are awaiting final approval after addenda submission.

ECORD Annual Report 2019
Download : http://www.ecord.org/resources/reports/activities/

ICDP Annual Report 2019

New Issue of Scientific Drilling, a multidisciplinary ICDP-IODP program journal delivering peer-reviewed science reports from recently completed and ongoing international scientific drilling projects. Issue number 26 is available online.
Lien internet : http://www.scientific-drilling.net/index.html
https://www.sci-dril.net/26/index.html

Parution des derniers Proceedings IODP
Lien internet : http://iodp.tamu.edu/publications/proceedings.html


Expedition 374: Ross Sea West Antarctic Ice Sheet History - 10 August 2019

Expédition 376: Brothers Arc Flux - 5 July 2019

The Oceanography special issue "Scientific Drilling: Looking to the Future"

A new book "A Memory of Ice" - the story of DSDP Leg 28 to the Antarctic margin - is downloadable from ANU Press.
Liens pour télécharger le rapport IODP-France 2003-2016

Vous y trouverez les dernières statistiques sur la participation française au Programme IODP et les résultats majeurs des expéditions récentes.

Liens pour télécharger le Science Plan IODP 2013-2023 :


Liens pour télécharger le Science Plan ICDP 2014-2019 :

Avancées scientifiques : " Western Pacific Warm Pool " - Exp. IODP 363

Participant français : Luc Beaufort (CEREGE);

Données : IODP Expedition 363 (Western Pacific Warm Pool), holes U1483 and U1488

Financement : IODP-France « Expédition anciennes » (Expédition 363 « Western Pacific Warm Pool »); CNRS-INSU

A new automated radiolarian image acquisition, stacking, processing, segmentation, and identification workflow

Auteurs : M. Tetard*, R. Marchand1,2, G Cortese3, Y. Gally1, T. de Garidel-Thoron1, L. Beaufort1

*: tetard@cerege.fr
1: Aix Marseille Univ, CNRS, IRD, Coll France, INRAE, CEREGE, Aix-en-Provence, France.
1 2: School of Electrical Engineering and Robotics, Queensland University of Technology, Brisbane, Australia.
3: GNS Science, Lower Hutt, New Zealand.

This work is a shorter version of the work submitted to the Climate of the Past journal


(available at: https://cp.copernicus.org/preprints/cp-2020-76/)

Radiolarians are planktonic marine micro-organisms whose shell is made of silica and are relatively well preserved in the fossil record. Their delicate siliceous remains have been proved important for decades in micropalaeontological studies focussing on biostratigraphy and palaeoenvironmental reconstructions from various oceanic areas such as marine productivity (e.g., Lazarus, 2002; Lazarus et al., 2006; Hernández-Almeida et al., 2013; Matsuzaki et al., 2019), sea surface temperature (e.g., Lazarus, 2002; Cortese and Abelmann, 2002; Kamikuri and Moore, 2017; Hernández-Almeida et al., 2017; Matsuzaki et al., 2019).

Figure 1: a. Upper view of the new 3D-printed decanter, showing 8 tanks. b. Cross-section of a single tank of the new 3D-printed decanter. c. Upper view of the slide guide.
Identification of microfossils is usually done by expert taxonomists and requires time and a significant amount of systematic knowledge developed over many years. These studies require manual identification of numerous specimens in many samples under a microscope, which is very tedious and time consuming. Furthermore, identification may differ between operators, biasing reproducibility. Recent technological advances in image acquisition, processing, and recognition now enable automated procedures for this process, from microscope image acquisition to taxonomic identification. For more than 20 years now, the CEREGE laboratory has been a pioneer in automated image acquisition and recognition for several microfossil groups such as coccoliths (Dollfus and Beaufort, 1999; Beaufort et al., 2001; Beaufort and Dollfus, 2004), planktonic and benthic foraminifera (Marchant et al. accepted), and pollens (Bourel et al., 2020).

A new workflow was developed for automated radiolarian image acquisition, stacking, processing, segmentation, and identification. The protocol includes a newly proposed methodology for preparing radiolarian microscopic slides. We mount 8 samples per slide, using 12x12 mm cover slides (adapted from Beaufort et al., 2014) on which radiolarians are randomly and uniformly decanted using a new 3D-printed decanter (Fig. 1a-b) that minimises the loss of material. The 3D file for this new decanter is available for free at https://github.com/microfossil/Decanter.

Once ready, the 8 samples of each slide are automatically and consecutively imaged using an automated transmitted light microscope. For each sample, 324 fields of view (FOVs) are imaged using a multi-focal technique. For each FOV, 15 images are acquired by incrementally stepping the Z focus position through the microscopic slide (step size: 10 µm) to cover a total focal distance of 150 µm, which corresponds to the thickness of most radiolarian species. For each FOV, the batch of 15 images is automatically stacked using Helicon Focus 7 (Helicon Soft) to improve their focus and sharpness. Every stacked FOV image is then processed (contrast, luminosity, background) and segmented to create a vignette for each individual specimen, using a custom plugin (AutoRadio_Segmenter.ijm) developed for the ImageJ / Fiji software (V1.52n, Schneider et al., 2012). Each sample results in approximately 1,000 to 3,000 individual segmented vignettes.

Figure 2: Examples of radiolarian thumbnails generated by the automated acquisition, processing and recognition workflow. (a) Lamprocyclas maritilis. (b) Lamprocyclis hannai. (c) Theoecorythium trachelium. (d) Pterocanium trilobum. (e) Pterocanium praetextum. (f) Eucryphiuls sestrodiscus. (g) Eucrytldium acuminatum / hexagonatum (h) Acrophaera spinosa. (i) Solenosphaera chierchiae. (j) Collosphaera tuberosa. (k) Didymocyrtis tetrathalamus tetrathalamus. (l) Hexacontium spp. (m) Stylatractus neptunus. (n) Helodiscus asteriscus. (o) Tetrapyle octacantha group. Scale bar 100 µm.
after the automated image processing and segmentation step.

In order to train a convolutional neural network (CNN) that can be used for automated image recognition, it is necessary to create a large database of images covering the most common species (about 100 out of 400 to 500 modern living species; Boltovskoy, 1998). Most of the samples (about 150 Middle Miocene to Quaternary samples) used for recovering radiolarian specimens to build the database originate from the West Pacific Warm Pool Hole U1488 (IODP Expedition 363; Rosenthal et al., 2018). A few samples (about 22 Miocene to Quaternary samples) originate from Hole U1483 (IODP Expedition 363), Core MD97-2138, and Core MD97-2140 (Marion Dufresne IMAGES III-IPHIS cruise in 1997; Beaufort et al., 1997).

The AutoRadio (Automated Radiolarian) database that results from all the images acquired from these samples is available for online consultation at https://autoradio.cerege.fr. It is currently composed of 17,065 images (Fig. 2), corresponding to 112 morphoclasses (of all these classes, 104 belong to Neogene to Quaternary radiolarian species or groups of species, and 8 to non-radiolarian classes such as “broken” specimens, air “bubble”, or event siliceous “particles”). Using this database, a CNN was trained using the custom software developed at CEREGE, ParticleTrieur (Marchant et al., accepted). This trained CNN can then be integrated into the radiolarian images acquisition, processing and recognition workflow. Using this CNN, individual vignettes of radiolarian specimens that are generated and saved during the ImageJ processing and segmentation step of new samples can now be automatically assigned to a class. This fully automated

**Figure 3:** Confusion matrix showing the overall and individual accuracy, precision and recall for the 84 trained classes.
Figures 4: Identification indices evaluated on 8 random samples recovered from cores MD97-2138 and MD97-2140.

In order to assess the efficiency of the CNN its confusion matrix is generated (Fig. 3). Right before the training step, the dataset is automatically split into two subsets: one being the training set, and the second one the test set. Several indices can be calculated to test the efficiency of the neural network: (1) the accuracy (number of images correctly classified / total number of images); (2) the precision (number of images that were classified as class N and actually belong to class N / total number of images classified as class N); and (3) the recall (number of images in class N that were correctly classified / total number of images in class N). Individual recall scores for each class are visible in the confusion matrix (Fig. 3) as the % of class N (in row) that was identified as various classes (in column).

In this study, the results of the CNN training shows satisfying results with a current overall precision of about 90% (89.6%) over every class. The average precision is above 83% (83.1%) and the average recall is above 80% (80.2%). A closer look at the matrix shows that classes with a low recall score usually correspond to classes containing an insufficient number of images. In order to test the reliability and reproducibility of our trained CNN on actual samples, a slide on which 8 random samples with variable radiolarian abundances from cores MD97-2138 and MD97-2140 was prepared, automatically imaged, FOV pictures were automatically segment-
ed and individual vignettes were automatically identified using the trained CNN. After a manual verification of every automated identification, 6 indices were computed: (1) the % of radiolarian images recognised as radiolarians (Fig. 4a); (2) the % of radiolarian images recognised as the correct radiolarian taxa (Fig. 4c); (3) the % of non-radiolarian images recognised as non-radiolarian particles (Fig. 4b); (4) the % of non-radiolarian images recognised as the correct particle class (Fig. 4d); (5) the % of non-radiolarian images recognised as radiolarian (non-radiolarian false positive; Fig. 4e); and (6) the % of radiolarian recognised as non-radiolarian (radiolarian false positive; Fig. 4f).

In this test, 10,288 vignettes were automatically generated, identified, and manually checked among the 8 samples. In average, the proportion of radiolarians recognised as radiolarian is very high, about 98 % (Fig. 4a) and the proportion of radiolarians identified as the correct radiolarian taxa is about 90% (Fig. 4b). Almost all radiolarian images are thus recognised as radiolarian with a 10 % error regarding their species identification. Regarding the non-radiolarian images, more than 99 % are recognised as non-radiolarian (Fig. 4c) and about 98 % are assigned to the correct class (Fig. 4d). False positive identifications were also investigated and are relatively low. Among all the images identified as non-radiolarians, only 0.34 % should be assigned to radiolarians, and among all the images automatically recognised as radiolarians, about 4 % are non-radiolarian images.

In conclusion, a new automated radiolarian workflow was developed and consists of a sequence of six steps: (1) a new microscopic slide preparation protocol to enable an efficient automated image acquisition on transmitted light microscopes and decrease the loss of material; (2) the automated microscope image acquisition; (3) the automated FOV images stacking; (4) the automated image processing and segmentation to generate individual images for every radiolarian specimen; (5) the automated radiolarian recognition using a CNN; and (6) the automated export of census data and morphometric measurements for each sample. The trained CNN has an overall accuracy of about 90 %. This new workflow paves the way for the analysis of long-term, about 4 % are non-radiolarian images.

Acknowledgements: We thanks IODP-France for financial support for this project. This work was also supported by the French National Research Agency (ANR) as part of the French platform called Nano-ID (EQUIPEX project ANR-10-EQPX-39-01) and the ANR project FIRST (ANR-15-CE4-0006-01). We also thanks the program Ocean Acidification from the french Foundation for Research on Biodiversity (FRB), and the Ministry for the Ecological and Inclusive Transition (MTES) in supporting the project COCCACE.

References


**Videos**

**Videos : ECORD TV**
Lien : [http://www.ecord.org/resources/gallery/ecord-tv/](http://www.ecord.org/resources/gallery/ecord-tv/)

**Introduction to ECORD** - ECORD explained in 4 minutes
Lien : [https://www.youtube.com/watch?v=A3ST56j3yJM&t=35](https://www.youtube.com/watch?v=A3ST56j3yJM&t=35)
Lien : [https://www.ecord.org/about-ecord/about-us/ecord-explained-in-4-minutes-video/](https://www.ecord.org/about-ecord/about-us/ecord-explained-in-4-minutes-video/)

**Youtube channel : The JOIDES Resolution**
Lien : [https://www.youtube.com/user/theJOIDESResolution](https://www.youtube.com/user/theJOIDESResolution)

**Videos on the CHIKYU**
The process of deep sea drilling vessel "CHIKYU"
Lien : [https://www.youtube.com/watch?v=2B8VcQhvkPQ](https://www.youtube.com/watch?v=2B8VcQhvkPQ)

Chikyu: the IODP Riser Drilling Platform
Lien : [https://www.youtube.com/watch?v=7fc_Z9_3Osg](https://www.youtube.com/watch?v=7fc_Z9_3Osg)

**ICDP program** - How ICDP works
Lien : [https://www.youtube.com/watch?v=v3-gkSsxkrU](https://www.youtube.com/watch?v=v3-gkSsxkrU)

---

**Social Networks**

**Twitter**
ECORD: [https://twitter.com/ECORD_IODP](https://twitter.com/ECORD_IODP)
JRSO-IODP: [https://twitter.com/JRSO_IODP](https://twitter.com/JRSO_IODP)
Chikyu: [https://twitter.com/Chikyu_JAMSTEC](https://twitter.com/Chikyu_JAMSTEC)

ICDP: [https://twitter.com/icdpDrilling](https://twitter.com/icdpDrilling)

**Facebook**
ECORD-IODP: [https://www.facebook.com/ECORD.ORG/](https://www.facebook.com/ECORD.ORG/)
J-DESC : [https://www.facebook.com/JapanDrillingEarthScienceConsortium](https://www.facebook.com/JapanDrillingEarthScienceConsortium)

ICDP : [https://www.facebook.com/ICDPDrilling](https://www.facebook.com/ICDPDrilling)

**Youtube**
ECORD_IODP: [https://www.youtube.com/user/ECORDESO](https://www.youtube.com/user/ECORDESO)
JRSO-IODP : [https://www.youtube.com/user/theJOIDESResolution](https://www.youtube.com/user/theJOIDESResolution)

ICDP : [https://www.youtube.com/watch?v=v3-gkSsxkrU](https://www.youtube.com/watch?v=v3-gkSsxkrU)
[https://www.youtube.com/channel/UCRXy7d9gLqavaxKIpqnaTg](https://www.youtube.com/channel/UCRXy7d9gLqavaxKIpqnaTg)
Récemment dans les News

ODP Leg 201; IODP Exps. 301, 307, 308, 315, 316, 329, 346, 347, 353, 354; ••• Global diversity of microbial communities in marine sediment


http://iodp.tamu.edu/outreach/expeditions/guaymas_basin_tectonics_biosphere.html

REMINDER: Compiled 2050 Science Framework for Internal Review

Lien : https://edition.cnn.com/2020/02/04/world/modern-explorers-ocean-drilling-iodp/index.html?fbclid=IwAR0at-BhJgCaHjajBFZfnGN6BZGcjogoLG2jMKnN6yOtxtBc91Ng

Lien : https://www.nature.com/articles/d41586-019-02551-2

Médias - Exp. 385 :


http://iodp.tamu.edu/outreach/expeditions/guaymas_basin_tectonics_biosphere.html


http://iodp.tamu.edu/outreach/expeditions/guaymas_basin_tectonics_biosphere.html


http://iodp.tamu.edu/outreach/expeditions/guaymas_basin_tectonics_biosphere.html

https://www.nature.com/articles/d41586-019-02551-2
**IODP 360 *** Keep Digging, BBC radio

Lien : [www.bbc.co.uk/programmes/b08kv3y6](http://www.bbc.co.uk/programmes/b08kv3y6)

**IODP Exp. 376 *** Digging for gold inside a submarine volcano, Earth Magazine


**IODP 358 *** "Terres Extrêmes" : limite de plaque dans la zone subduction de Nankai (zone sismogène), France 5


**IODP *** This deep-sea mystery is changing our understanding of life, TED talk

Lien : [https://www.ted.com/talks/karen_lloyd_this_deep_sea_mystery_is_changing_our_understanding_of_life#t-760565](https://www.ted.com/talks/karen_lloyd_this_deep_sea_mystery_is_changing_our_understanding_of_life#t-760565)

**IODP Exp. 371 *** Scientists reveal secrets of lost continent Zealandia, EarthSky.org


**IODP Exp. 364 *** Drilling into the Chicxulub crater, Ground Zero of the dinosaur extinction, New York Times


**IODP *** Climate change: Drilling in ‘Iceberg Alley’, BBC News

Asteroid strike made ‘instant Himalayas,’


Some like it hot: scientists drill off Japan for sizzling life, Reuters


Deep-sea drilling expedition to look for life’s limits in scalding environment, Science


Floating lab drills 1.5km below sea floor to study megaquakes, New Scientist.

Lien: https://www.newscientist.com/article/2102382-floating-lab-drills-1-5km-below-sea-floor-to-study-megaquakes/

Scientists hit pay dirt in drilling of dinosaur-killing impact crater, Science.


A Decades-Long Quest to Drill Into Earth’s Mantle, Smithsonian.com.