Deep-time Digital Earth Research Center of Excellence, Zhejiang
Workshop Project

Section I: Project Background

The "Deep-time Digital Earth" (DDE) initiative, recognized as the first big science program by the International Union of Geological Sciences (IUGS), sets its core goal to integrate and share deep-time data from the global Earth evolution process, to foster data-driven scientific discoveries and interdisciplinary collaboration. DDE will rely on the physical research environment and digital platform resources of the Deep-time Digital Earth Research Center of Excellence, Zhejiang (RCE (Hangzhou)) to plan and organize impactful and diverse workshops. These workshops aim to enhance interaction and exchange among global scholars in related fields, cultivate professional talent, in particular among early career scientists in the geosciences, and promote academic development in DDE projects and associated initiatives. Workshops will be guided by RCE (Hangzhou), and typically, last no more than three weeks, and participating scientists will

gather at RCE (Hangzhou) to complete projects through collaborative and immersive methods.

Section II: Project Objectives

1. Foster Innovation and Knowledge Exchange: By holding a series of workshops, we aim to spark innovative thinking in the field of earth sciences and facilitate deep exchanges of advanced concepts, research findings, and practical experience among scholars worldwide. Participants are encouraged to share the latest research progress and jointly discuss and solve key issues in earth sciences.
2. Accelerate Research Project Progress: Utilizing the workshop platform, we support the initiation, implementation, and completion stages of DDE funded and partnership projects, accelerating the research process. Expert guidance, peer review, and team collaboration will push further development of research projects supported by DDE.
3. Provide Resources through DDE Digital Research Facilities: By leveraging resources from the coordinated research platform Deep-time.org, we offer a superior research environment for data collection, processing, and analysis. Additionally, the process and outcomes of the workshops continually enhance and promote the progress of Deep-time.org.
4. Promote Interdisciplinary Cooperation: Each workshop will revolve around a specific theme, designing sessions that intersect different disciplines to break down academic barriers, enhance interaction and

integration between Geology and other related fields (such as Informatics, Remote Sensing Science, Geography, etc.), and achieve interdisciplinary collaboration for innovation.

5. Encourage Ongoing Participation in DDE Activities: Through regularly scheduled workshops, we foster and maintain long-term attention and active participation of the global scientific community in the IUGS DDE big science initiative, ensuring their continued in-depth research, sharing of results, and co-creation of resources within the DDE framework. These workshops are also intended to serve as a bridge to attract new partners and expand the DDE research and international cooperation network.

By fulfilling these objectives, the RCE (Hangzhou) has the potential to emerge as a preeminent center for geoscientific research and interdisciplinary collaboration. Our vision is to foster a vibrant and inclusive community that champions innovation, collaboration, and the integration of big data in geoscientific research. We envision a situation where the RCE (Hangzhou) would be regarded as an analogue to the Dartmouth Conference in the realm of computer science, serving as a catalyst for significant advancements in our understanding of the Earth and its evolution.

Section III: Support Provided for Workshop Organization and Participants

1. Physical Site

(1) RCE (Hangzhou) located in Hangzhou city, Zhejiang Province, spans 14,500 square meters, serving as the first platform-based research institution for DDE, offering ample physical space and various office facilities, digital laboratory equipment, and a professional technical support team to provide comprehensive services for scientists' research. The technical support team includes experts in various geoscience disciplines from the DDE cooperative network, as well as informatics experts, data engineers, algorithm engineers, product designers, interaction designers, R&D engineers, database engineers, geological mapping engineers, operations engineers, and others to help scientists quickly transform innovative ideas into tangible outcomes.

(2) DDE Scientists Support Team helps DDE cooperative scientists to effectively translate research inspirations into outcomes. Team members include a diverse array of experts from disciplines within the DDE cooperative network, such as geoscience and informatics experts, data engineers, algorithm engineers, product designers, interaction designers, R&D engineers, database engineers, geological mapping engineers, operations engineers, etc.

2. Digital Site

The Deep-time.org research collaboration platform is dedicated to building a globally interconnected, cooperative, and shared scientific research platform.

(1) Deep-time.org facilitates the discovery and seamless use of high-quality geoscience data, global computational resources, and diverse geoscience analysis models: the Deep-time.org link to open geoscience data services, including top databases like EarthChem, Macrostrat, PBDB, as well as over 100,000+ long-tail data services, covering comprehensive geoscience data on fields such as Paleogeography, Tectonics, Sedimentology, Geophysics, and Geochemistry. Relying on Deep-time.org's computational nodes in Asia, North America, and Europe, as well as the platform's preset hundreds of typical scenario analysis models, users can precisely search, freely browse, and efficiently process massive volumes of geoscience data, conveniently utilizing cutting-edge technologies such as big data analytics, cloud computing, and artificial intelligence for scientific analysis and exploration.

(2) DDE series of software tools aid in accelerating and enhancing the research process: Based on the platform's data, models, knowledge, and computational service capabilities, Deep-time.org provides a variety of powerful professional software tools that cover all stages of scientific research, including data collection, processing, analysis, and visualization. This includes tools like DDE Scholar, specialized for geoscience literature search; DeepShovel for extracting data from geoscience literature; Earth Explorer for four-dimensional deep-time data visual analysis; GlobalLayer for online collaborative geological mapping; and MyDDE, an all-in-one "data-algorithm-knowledge-computation" solution for online geoscience

analysis. These tools lower the technical barriers for data exploration and increase the efficiency of research output.

(3) DDE's open ecosystem supports the rapid global dissemination of research findings: Deep-time.org practices the open science philosophy, and under the guidance of FAIR principles, all research resources on the platform are open to the global community. Leveraging the platform's open capabilities, scientists can build public service platforms, such as paleogeography platforms, digital outcrop platforms, mineral resource prediction platforms, etc., which are widely disseminated through DDE's global cooperation network to promote community exchange and cooperation, incubate new scientific innovations, and foster international collaborative opportunities.

3. Financial Support

Based on the applications for workshops and the DDE budget, financial support for the workshops will be provided by RCE (Hangzhou).

Section IV: Call for 2024

Overview: This call for proposals seeks to provide seed funding to 3-4 projects every year in support of data-driven scientific discoveries and interdisciplinary collaboration in the field of earth sciences.

Application procedure: Once the application form has been completed, the proposer must submit the application to the RCE(Hangzhou) (hangzhou@ddeworld.org). The proposers will then receive an e-mail

notification from the RCE(Hangzhou). Proposals will be reviewed on a regular basis, and the results will be notified within two months.

Application evaluation: RCE (Hangzhou) will be organizing a review committee and inviting DDE Science Committee to examine and evaluate applicants' proposals. Final decision will be made by RCE (Hangzhou). All successful applications will be announced publicly on the DDE website. For any queries, please feel free to contact us at hangzhou@ddeworld.org.

Section V: Workshop Organization and Process

Each workshop lasts 7 days to three weeks and includes multiple segments such as opening speeches, keynote reports, group discussions, practical operation workshops, poster presentations, and closing summaries etc.

We invite renowned experts and scholars worldwide to chair the workshops and encourage the participation of graduate students, post-doctoral fellows, and young scientists, with awards for outstanding contributions.

Section VI: Expected Outcomes and Outputs

1. Publish collections of reports, journal papers, standards from each workshop, with selected works recommended for publication in high-impact journals.
2. Establish a dedicated Workshop Results Database and create relevant algorithms, tools, and models to upload the original research findings and data resources of the participants to the DDE platform for resource sharing.

3. Compile detailed manuals and textbooks based on the training course content, which can serve as references for subsequent offline and online training activities.
4. Promote the proposal and implementation of substantial joint research projects through the extensive exchange and cooperation during the Workshop period.
5. Other meaningful achievements.
6. Special Note: During the project implementation period, all outcomes arising from Workshop activities (including but not limited to research reports, data sets, meeting records, training materials, etc.) will adhere to the principles of open science and be fully disclosed and shared globally, aiming to promote knowledge dissemination and academic exchange in the field of earth sciences.

Section VII: Evaluation and Feedback Mechanism

After each workshop, RCE (Hangzhou) will collect feedbacks, comprehensively evaluate the effectiveness of the activities, and accordingly adjust the themes and content planning for the subsequent year's workshops.

At the end of the year, a summary of the annual work will be compiled. Based on the changing needs of participants and industry development trends, the structure and format of the workshops will be flexibly optimized to ensure that the activities remain cutting-edge and appropriately targeted. In addition, strategic cooperation with relevant institutions will be

strengthened to continuously expand the influence and contributions of DDE in the global geoscience community.