White paper 作成の意図と背景

現行IODPは2023年に終了し，2023年以降の新しい海洋科学掘削計画へと移行する．各国・地域ごとに Workshop が開催され，次期プログラムの Science Plan策定に向けた本格的な検討が始まっている．Workshopでの議論をもとに作成される各国の White paper が IODP Forum会議（9月、大阪）において議論され，New Science Plan の執筆が開始される予定である．

現行プログラムの Science Plan は非常によく練り上げられた科学計画文書であるが，プログラムの更新にあたり，これまでの達成度を精査した上で，Science Plan を再構築することが求められる．また，JOIDES Resolution の後継船を建造する必要がある米国では，Funding Agency に向けた新造船の運用費獲得の説明のために New Science Plan の刷新が急務となっている．

以上のような背景から，2019年4月に行われた J-DESC Workshop "Beyond 2023" での議論をもとに，日本側の白書をまとめる「まとめCommittee」が2019年6月に発足し，このほど White Paper の草案を作成した．この草案では，現行 Science Plan と異なる新しい New Science Plan の章立てを考案した．重要な科学分野をCategorizeしたものを「Theme」として整理し，その中で特にJ-DESCのコミュニティーが重要視している課題を「Flagship Goals」として抽出した．

Theme: **Resilient Society on Dynamic Earth** （必要に応じてタイトル変更の可能性あり）
Aim: *Learning from Earth's past and present to support sustainable future*
Main topics:
Geohazards (earthquakes, landslides, tsunamis, volcanic eruptions (+extreme climate events, hurricanes…?))
Ocean, climate & life (past & present climate change, ocean acidification, biosphere response)
Natural resources (gas hydrates, ore deposits, fisheries, potential for carbon capture & storage (geoengineering))

Theme: **Terrestrial to Extraterrestrial**
Aim: *Understanding Earth as an example of a planetary body capable of sustaining life*
Main topics:
Plate tectonics (seafloor spreading, subduction zones, global geochemical cycles, origin of continental crust)
Planetary structure (deep drilling: mantle drilling, LIPs (also info for Mars/Moon/etc), New Caledonian ophiolite)
Origins & limits to life (physical & chemical limits to life, quantifying the deep biosphere)

Theme: **Frontier Technologies** （必要に応じてタイトル変更の可能性あり）
 (Explorations and Discoveries backed up by New Technologies) + Education Outreach
Aim: *Advancing science and society by pursuing technological innovations*
Main topics:
Subseafloor observatories (in situ measurements, real time onshore monitoring)
Drilling technology (improved recovery of hard rock & sandy sediments, extreme conditions (mantle drilling))
Data analysis & distribution ('big data' science, AI, commitment to open access data & samples, science outreach)

Flagship Goals

A. Exploring the deep interior and material cycling of the planet
    --- Deep drilling to the active Mantle (utilization of deep hole)
Constrain the architecture of oceanic crust and mantle in diverse tectonic settings and spreading rate. Characterize processes and extent of hydration in the oceanic plate and links to biogeochemical processes. Perform monitoring of active lithospheric processes and conditions, and create in-situ laboratory)

B. Understanding mega and slow earthquakes in subduction zone
    --- Long-term Monitoring and Rapid response drilling ---
Understanding
(1) fluid, heat, strain, and stress states through earthquake cycle;
(2) global (whole) perspective of mega and slow earthquakes;
(3) link between mega and slow earthquakes

C. Profiling dynamic biosphere
    --- Transitions and Interactions ---
Evaluating geodynamic constraints on the origin and fate of the deep biosphere. Understanding the linkage between subseafloor biogeochemical cycles and surface ecosystems and their variability through time.

D. Uncovering climate mystery: past variability and future sensitivity
    --- Multi-transect drilling ---
Constraining variability, instability, amplitude, sensitivity and rate of change of the climate system at each climatic "mode". Obtaining paleoclimatic data by "multi-transect" drilling at some key time intervals for better integration to climate modelling. Examining the influence of solid Earth processes on Earth's climate and vice versa.

E. Constraining subseafloor processes in real-time
  (borehole observatory/laboratory and in-situ experiment)
Promote new scientific idea that can only be implemented by in-situ borehole experiments. Develop collocated experimental instruments for in-situ geophysical, biological, and geochemical studies. Create long-term and remotely controlled laboratories in borehole environments.

F. Holistic understanding of the Earth system through data science
(data mining, data integration, and AI)
Apply new data science methods to the full dataset produced by drilling operations, material analysis, and experimental monitoring, for comprehensive, integrated and multi-disciplinary understanding of the earth system.

- 2-3rd April: J-DESC workshop 'Beyond2023'

- May: WS report presented at the JpGU2019 meeting

- 13th June: First draft of WS Report Document

- June 14-15th: Summarizing Comm

    --- Community survey--- Free style comments 6/30

    --- Illustration and Manga ---

    --- English editing ---

- 10th July: Finishing the J-DESC White Paper

- 23-24th July: New York Meeting (Morono, Michibayashi & Iona)

    --- 2-3 page "road map" ---

- 11-13th Sept: Forum at Osaka