**Summary of the Advisory Board's Evaluation for FY2019**

- Advisory Board Members:
  Prof. Brenda Howard (UK Centre for Ecology & Hydrology)
  Prof. Sergey Fesenko (Russian Academy of Sciences, Russian Institute of Radiology and Agroecology)
  Prof. Wolfgang Raskob (Karlsruhe Institute of Technology)
  Dr. Satoshi Yoshida (National Institutes for Quantum and Radiological Science and Technology)
- Evaluation period: April 1, 2019 - March 31, 2020
- Annual Symposium: Scheduled to be held on March 10, 11, 2021, but cancelled due to COVID-19
- Advisory Board meeting: Cancelled due to COVID-19

(Based on the Activity Report FY2019, each ADB member provided a written evaluation and advice. Subsequently, the Activity Report FY2019 was discussed at the FY2020 meeting held on March 24, 2021.)

## Prof. Brenda Howard

Overall, this is an impressive annual report. The activities and outputs of IER have been presented well, and to a high standard. The breadth of scientific activities is impressive and appropriate within the objectives and remit of IER. Collaboration between topic areas is not evident and may be mutually beneficial. For example, it would be potentially of mutual benefit to see collaboration on Kd variability within marine, freshwater and soil scientists to broaden the scope, interpretation and applicability of the data where appropriate. It is good to see replacement of Aoyama sensei with an internationally known productive scientist to ensure that marine science is retained as a discipline with IER.

Publication output is relatively high for the number of staff and more papers are now being published in high ranking journals. Further efforts to increase the number of such papers in each research group would be good. The prominence of international collaboration and attendance at international conferences has increased and there have been a number of awards. The collaborative projects are an important part of the research programme and the ERAN initiative in particular is a significant and timely initiative.

At this early stage of commencing the student courses it is important to identify strengths and weaknesses at regular intervals. Student feedback should be encouraged, evaluated and implemented where appropriate.

The dialogue meetings included a number of researchers in IER which is commendable. The contribution to national and international committees remains largely confined to Tsukada sensei and Wada san. Potential inclusion of other staff should be encouraged where appropriate.

## Prof. Sergey Fesenko

Despite some constraints because of the COVID pandemic, the year from April 2019 to March 2020 was successful for the IER and provided many new achievements. The research programme of the Institute, especially in the area of international collaboration was substantially extended with Japanese-Ukrainian project SATREPS and joint research projects within Russia-Japan and Belgian-Japan cooperation. The local collaboration was also greatly extended with renewal of research agreements with Hirosaki University and a

membership in of the Joint Usage/Research Center on “Environmental Radioactivity Research Network Center (ERAN)”.

The research provided by the IER was based on six major scientific directions (projects), namely, "Oceans", "Rivers and Lakes", "Ecosystems", "Speciation Radiochemistry", "Measurements and Analyses", and "Modeling". In the year April 2019 March2020 all the IER projects provided a lot of new data and many new developments were presented. New biological tests to assess impact of the accident on forest species were examined; the development of the in-situ equipment for monitoring of radionuclides in the environments was continued as well as the basin models to describe transfer of $^{137}$Cs in the watersheds, rivers and lakes. A great success was also achieved in the development of the IER as a high-level educational hub. The establishment of the Environmental Radioactivity Science Master’s Program in the Graduate School of Symbiotic Systems Science and Technology of Fukushima University was a big step forward in the development of the IER. The IER hosted three master’s students from Colorado State University (USA) and a doctoral student from University of Hanover (Germany) and provided them a guidance in field surveys, sample collection, and analysis.

The year 2019-2020 was also successful for the IER in terms of dissemination of the research findings. The institute published 44 articles in the well-known scientific journals and 8 chapters in the books. The staff of the IER delivered 33 presentations at the International and 45 presentations at the domestic conferences. At the same time, there is some room to improve the IER performance. The coordination among research groups could be improved. There are still some duplications between research objectives and results achieved by the different projects. Thus, study on radionuclide transfer in the revers are considered in 3 Projects: Ocean, Rivers and Lakes and Ecosystems. It would be desirable to reconsider how the projects complement each other and to increase synergies in the research. The report largely provides information on what was done and, sometimes, how it was done. It would be desirable to highlight key findings from the research and practical importance of the data achieved for management on affected areas. The practicability of the research and potential applications of the results achieved could be better presented. It is also recommended to make research objectives and goals be related to the management options to mitigate consequences of the Fukushima Daiichi accident.

**Prof. Wolfgang Raskob**

Due to the Covid-19 situation, the IER Annual Symposium and the advisory board meeting in 2020 had to be cancelled. In this respect, the summary is based on the Activity Report from April 2019 to March 2020.

The IER continues work activities in six research areas, performing excellent research in the areas Oceans, Rivers and Lakes, Ecosystems, Speciation Radioactivity, Measurement and Analysis and Modelling. As in former years, the descriptive research performed by experimentalists is of outstanding and was appreciated by the Japanese Government and international organisations. The modelling aspects of the research concentrated in area 6 is important to interpret experimental results in a more comprehensive way. Being partly integrated into work with other areas, this interaction of experimentalists and modellers might be even strengthened in future.

There are two important steps forward to be acknowledged, the intensified work within the SATREPS project with partners in Ukraine and the establishment of the "Joint Usage / Research Center - Environmental Radioactivity Research Network Center (ERAN)" with many national and international collaborators. Both strengthen and deepen national and international collaboration which is extremely important in science.

The start of the Masters' Course in Environmental Radioactivity Science with eight students is a natural expansion of a mature research institute allowing to disseminate the expertise that has been gained in research. Increasing the number of students might be envisaged together with linking the courses with other international universities. This might attract even more students to study and work in the Fukushima area.

A final remark as follow-on from the last advisory board meeting. There, a vision paper was proposed describing the research needs of IER in the long term. This vision paper would support long-term funding requests. As one can see from the report, in at least one area, only one researcher is participating to the work. This should be revisited and if this area is important, the number of co-workers increased. This is a typical objective of such a vision paper.

**Dr. Satoshi Yoshida** (Japanese Only)

研究スタッフの変化などに対応しながら、着実に研究を重ねて、学術的な成果を生み出すとともに、福島の住民への還元と人材育成に関する取り組みを積極的に進めている。特に、長年の構想が実を結んで大学院が開設されて修士課程の学生 8 名を受け入れたことは特出すべき大きな成果である。また、国内外の研究機関との連携は IER 設立当初から大きな特色の一つであり、当該分野にインパクトを与える優れた研究成果を継続的に生み出すと同時に、人材育成のための重要な役割を果たしている。継続中の SATREPS プロジェクトに加えて、新たに開始された「放射能環境動態・影響評価ネットワーク共同研究拠点」ではサンプルアーカイブ事業も開始しており、IER らしい事業の一つとして今後の活動の活性化が期待される。

6 つのプロジェクトは、外部資金や国際共同研究などを活用しつつ着実な成果を上げている。「海洋」では、河川懸濁粒子からの放射線セシウムの溶脱プロセスの解明につながる知見を得たこと、「河川・湖沼」では、河川や湖沼・ダム貯水池における放射性物質の動きとそのメカニズムに関する研究を着実に進めたこと、「生態系」では、森林の樹木や淡水生物中の放射性セシウムの長期的な傾向が明らかになってきたこと、「存在形態」では、住民と連携した農作物中の放射性セシウムの分析と線量評価を実施したこと、「計測・分析」では、水中ロボットの開発や平面上の放射性物質の分布を正確に計測するための深層学習手法の開発など独創的な研究を進めたこと、「モデリング」では、国外との共同研究などを活用しつつ、福島の環境での放射性物質移行モデルの開発を着実に進めていることなどが評価できる。

残念ながら成果報告会は新型コロナの影響で中止となったが、原著論文の発表や学会発表によって質・量ともに優れた研究成果を発信しており、研究活動懇談会や公開シンポジウムなど、福島の住民などに研究成果をわかりやすく還元するための活動も実施されており評価できる。

引き続き、透明性のある学術データを収集しつつ、長期的な観点での情報を発信していくことが、IER の信頼と存在意義をより高めることにつながり、そのためには長期的にブレない軸を持ち、そのための体制の最適化を計画的かつ機動的に行っていくことが重要である。

**Major points raised by the Advisory Board (ADB) and**
**the proposed response by the Environmental Radioactivity Research Institute**

1. Research activities

   ADB : Collaboration between projects is recommended to be strengthened to create synergies where appropriate.

   → We are already conducting some research and studies based on cross-project interactions, such as sampling cooperation and sharing of samples and data. We will strive to further strengthen this relationship.

   ADB : The number of publications is good for all groups. Involvement in international initiatives has also occurred but is not given appropriate prominence in the report.

   → We will consider calling on the IER members to get more involved in international scientific organizations and activities.

   ADB : Duplication of work between projects may need to be coordinated or explained.

   → We will clearly explain about overwrapping of works and subjects between projects.

   ADB : Recommend to re-edit and harmonize presentation of the goals and the research objectives of the research projects.

   → We will harmonize presentation of each project in our Activity Report, the official version for FY2020, because the Activity Report 2019 has already finalized and submitted to the FU management as the final version.

2. Education

   ADB : Student feedback should be encouraged, evaluated and implemented where appropriate.

   → Class surveys are conducted throughout the university. We will continue the evaluation for improvement.

   ADB : It could be desirable to extend the thematic areas for the graduate program with some issues related to environmental remediation and emergency response.

   → We are well aware of the importance of the recommended fields. We will consider extending the areas, including joint research with other institutions and human resources in these specialized fields toward the future.

   ADB : Dissemination/promotion to attract even more students to study and work in the Fukushima area

   → We have continued the "Summer Program" to accept students from the US (CSU, UDA) and other countries. We hope to resume the program once COVID situation is settled.

   ADB : It is advised that grants might be establish to support foreign students.

   → We are now preparing to post scholarship information on the IER website.

3. Dissemination

   ADB : The group might consider reporting on their experience to the wider international scientific community to better inform other scientists about successes and also negative outcomes (which can be as useful as successes). The recommendation is to make such seminars as virtual events, giving a chance for other scientists or students to participate in such events on-line.

   → We are already having this online. We will consider dissemination to scientist and students from overseas.

4. Others

ADB：A vision paper is proposed describing the research needs of IER in the short/mid/long term. ADB will give further advice with reviewing a draft version. Discussion before drafting is very important. There are many cases where a vision paper is only created and not put to practical use, so it is important to set an externally attractive vision.

→ It is not immediately feasible, but we will look into making a draft.

ADB：To escape misunderstanding in the project perception it is recommended, to develop performance indicators for assessment of the success in the project implementation. (Specific examples will be provided soon.)

→ Future applications will be considered based on the specific examples presented.

ADB：From the perspective of safety management and risk assessment, it is recommended to set an item on safety issues and keep records of any notable safety issues or improvements.

→ Radiation dose reports and safety patrols by university industrial physicians are conducted. We will set the item in our report from this fiscal year.

ADB：It is recommended to introduce QA/QC system. It is also important from the perspective of sample and data collection. See ALMERA System, etc.

→ We are aware of the importance of this, but we know from my past experience that it is not easy to implement, as it requires trained and qualified personnel. As a serious issue, we would like to find ways to realize it in the future, and would like to ask the ADB for continuous advice.