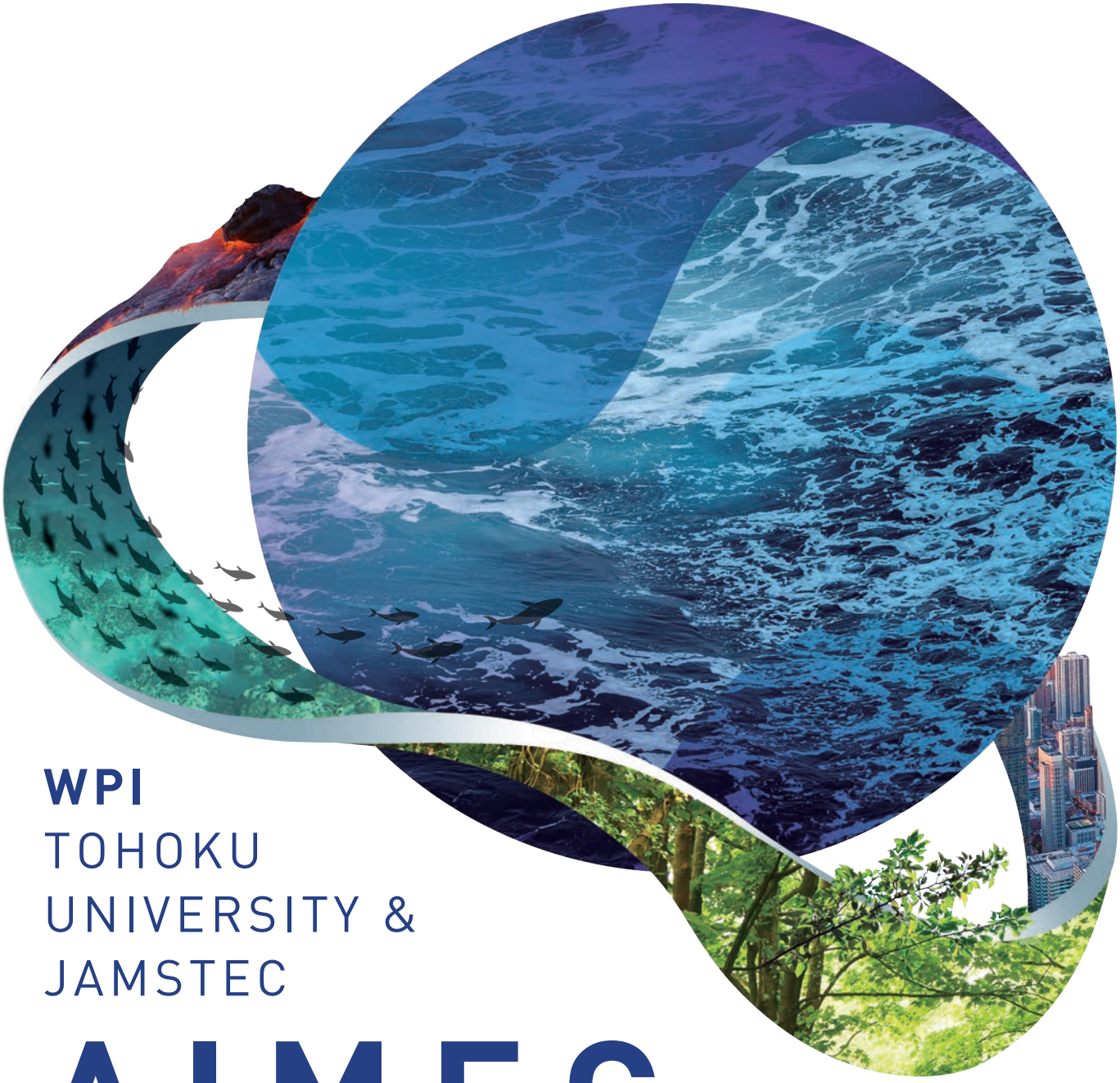
World Premier International Research Center Initiative



**WPI**
TOHOKU
UNIVERSITY &
JAMSTEC

# AIMEC

Advanced Institute for Marine Ecosystem Change

Primary Mission

# *“To understand and forecast the responses and adaptive mechanisms of marine ecosystems to Earth system dynamics”*

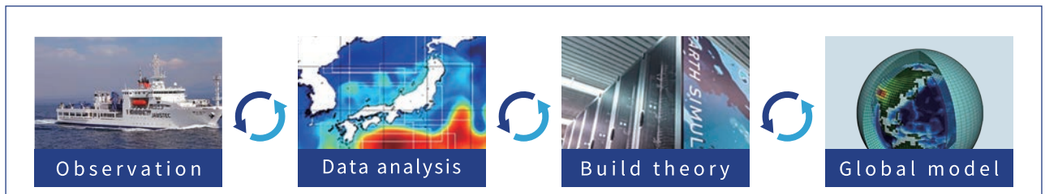
## Director’s Vision

WPI-AIMEC will expound on the response and adaptive mechanisms of marine ecosystems to Earth system dynamics using a fusional approach that integrates marine physics, ecology, and mathematic information science to facilitate systematic forecasting of change.

Consequently, a new academic field **“Ocean-Ecosystem Change Systematics (OECS)”** will be established.


Toshio Suga

Director
Advanced Institute for Marine Ecosystem Change (WPI-AIMEC)
Tohoku University & Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

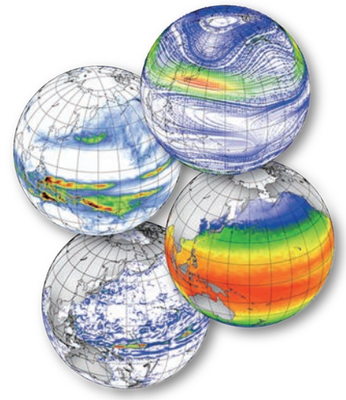

Ocean-Ecosystem Change Systematics (OECS)

## 1 Clarifying interactions among the ocean, ecosystems and climate

Global warming, a phenomenon tied to human activities, is a major factor of climate change that effectively alters climate variability and drives ecosystem degradation and biodiversity loss.

***“How is the ocean-ecosystems-climate complex linked and what is its driving force?”***

**WPI-AIMEC** aims to achieve an integrated understanding of relationships among marine ecosystem regime shifts, physical and biogeochemical ocean environments, and climate variability towards realizing regeneration and recovery of the ocean and ecosystems.



## Predicting marine ecosystem changes 3

Forming a quantitative perspective of the relationships encompassing ocean environmental change and productivity has become increasingly important.

***“Challenging the prediction of non-linear marine ecosystem changes”***

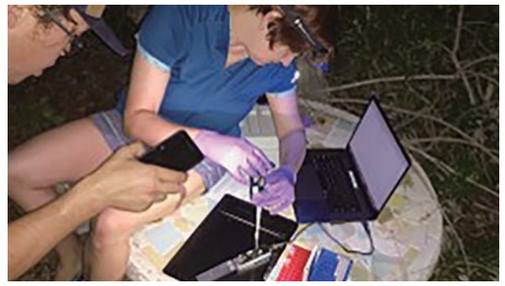
**WPI-AIMEC** will employ AI machine learning approaches for integrative computational analysis of big data on ocean physics and ecosystems to build a model of marine ecosystem change of global relevance.

## Describing environmental responses and associated adaptive mechanisms of marine ecosystems 2

Integrating data collected using marine environmental molecular techniques (eDNA/eRNA) with open-ocean Argo-float based networks provides a tractable method for oceanographic monitoring and deciphering interconnections and emerging patterns of the ocean-ecosystems-climate complex.

***“Linking fluctuating interactive networks to community level dynamics”***

**WPI-AIMEC** will fuse data from genomic and ecological studies at various levels (species to community) to facilitate discovery of interdependencies between marine communities and their physiochemical parameters.



## Scientific Objectives

## Open Research Environment

Under one roof, WPI-AIMEC will leverage the world class basic academics and higher education capacities of Tohoku University and the advanced technological and computational platforms of JAMSTEC to promote leading-edge, trans-disciplinary research that augments global resource competencies.

### Accelerating World-class Science and Collaboration

**Tohoku University**

**Educational advancements**

- International graduate degree opportunities
- Study at a world class institute for academic and research

Cross-appointment opportunities

**JAMSTEC**

**World-class research facilities**

- Direct inter-governmental contribution opportunities
- Leveraging world-class facilities for fusion science

**Planetary Stewardship**

## Knowledge Sharing and Co-production with Society

- Promoting international brain circulation and higher education through global collaboration and partnership
- Co-creating knowledge through research mobility with domestic and international stakeholders for planetary stewardship

**ACTIONS**

1. Identify the issues and transdisciplinary interests
2. Perform fusion research across domains and data integration
3. Share scientific knowledge with multiple stakeholders and promote co-production (e.g., scientists, policymakers, business and public)

WPI TOHOKU UNIVERSITY & JAMSTEC AIMEC

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