Environmental Prediction Science Lab.
- Our Actions in FY2025 -

with many thanks to Kawasaki, Hayashi and Saito-san for arrangements

Shunji Kotsuki

Center for Environmental Remote Sensing, Chiba University

Lab. Kick Off Meeting (April 3rd, 2025)

CHIBA UNIVERSITY

Environmental Prediction Science Laboratory

First of all, let's welcome new members

- Hayashi (D1)
- Muraguchi (B4)
- Ubukata (B4)
- Tateishi-san (admin)
- Yuxi (D1)

Let’s get started!

Why Mission & Vision?

We have grown to be a big group. It seems to be nice.

However, being a big group does not mean a productive and visionary group.
To maximize our outcomes and growth, let me share our mission and vision with you.

Just three years ago (Apr. 2022)

Now (Oct. 2024)

Why Mission & Vision?

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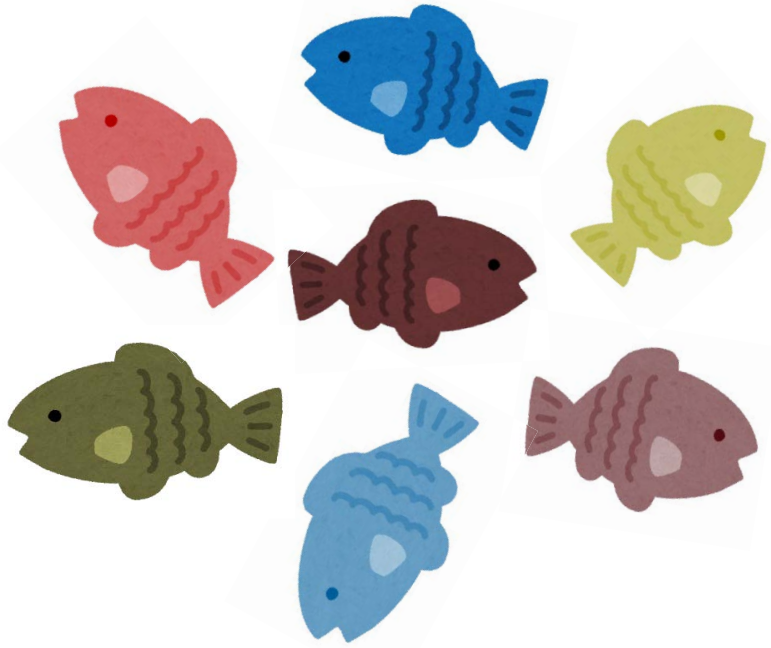
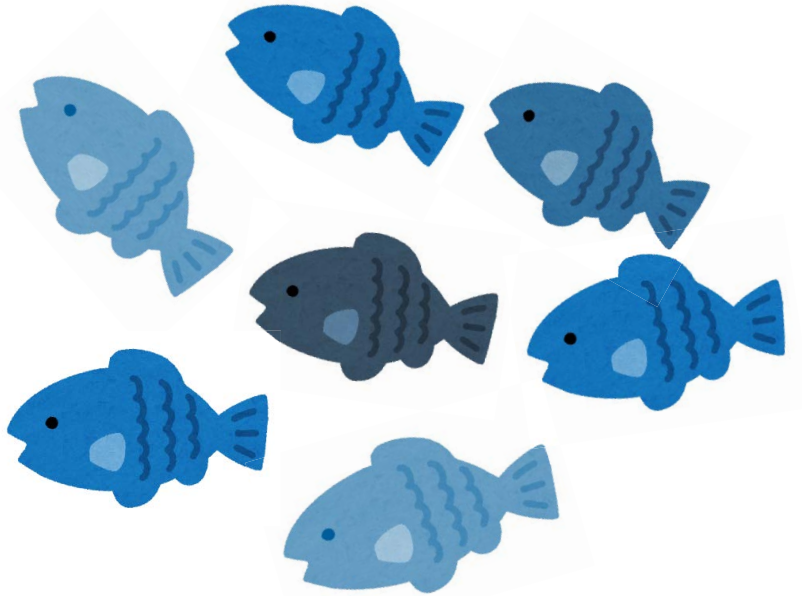
However, being a big group does not mean a productive and visionary group.
To maximize our outcomes and growth, let me share our mission and vision with you.

a group w/o mission



a team w/ mission and vision



If you want to go fast, go alone. If you want to go far, go together. (from African proverb)

What are Mission, Vision, and Value

Our Purpose : Why are we here together?
理念 : 我々は何のために存在するのか？

Our Ambition: What will we achieve/create?
目指すべき姿 : 我々の成し遂げるべきは何か？

Our Value : What are our criteria of decisions?
価値観 : 我々はどんな基準で判断するか？

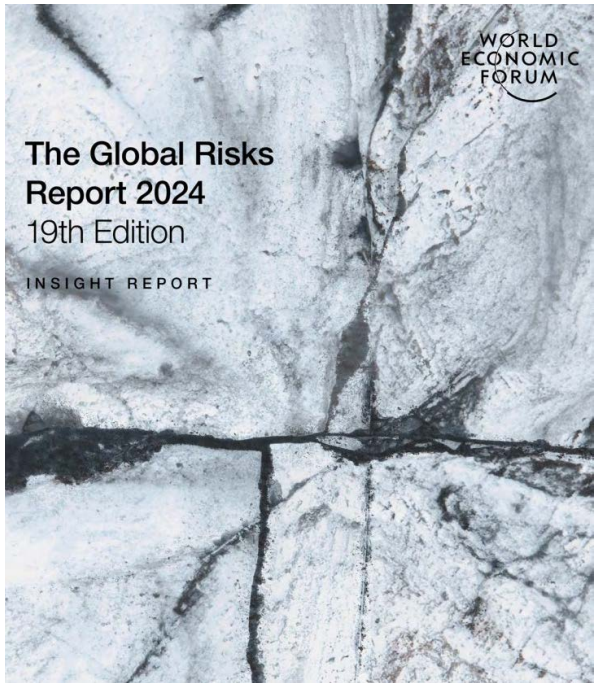
Our Mission:

CHIBA UNIVERSITY

- Science/Research
- Education
- Social implementations

Environmental Prediction Science Laboratory

Background: What are the world's biggest risks today?



Today, the Earth environment imposes the greatest risk to the sustainable development of humankind.

Risk categories

- Economic
- Environmental
- Geopolitical
- Societal
- Technological

2 years

1st	Misinformation and disinformation
2nd	Extreme weather events
3rd	Societal polarization
4th	Cyber insecurity
5th	Interstate armed conflict
6th	Lack of economic opportunity
7th	Inflation
8th	Involuntary migration
9th	Economic downturn
10th	Pollution

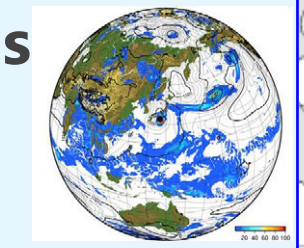
10 years

1st	Extreme weather events
2nd	Critical change to Earth systems
3rd	Biodiversity loss and ecosystem collapse
4th	Natural resource shortages
5th	Misinformation and disinformation
6th	Adverse outcomes of AI technologies
7th	Involuntary migration
8th	Cyber insecurity
9th	Societal polarization
10th	Pollution

Our Scientific Mission

Improving predictions for global environment and disasters is extremely important.
Achieve this requires the integration of global environmental data and data science.

① Process-driven NWP models
➔Employ predictions from initial states



② Data assimilation
➔ Estimate initial states

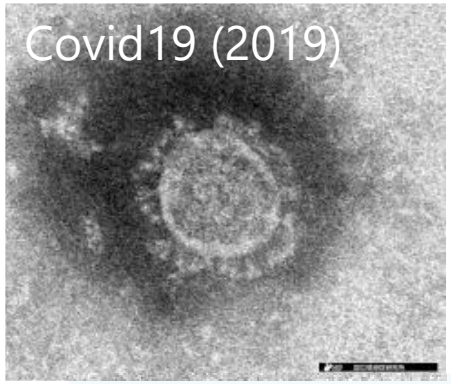
Utilizing sparsity of data to solve underdetermined inverse problems

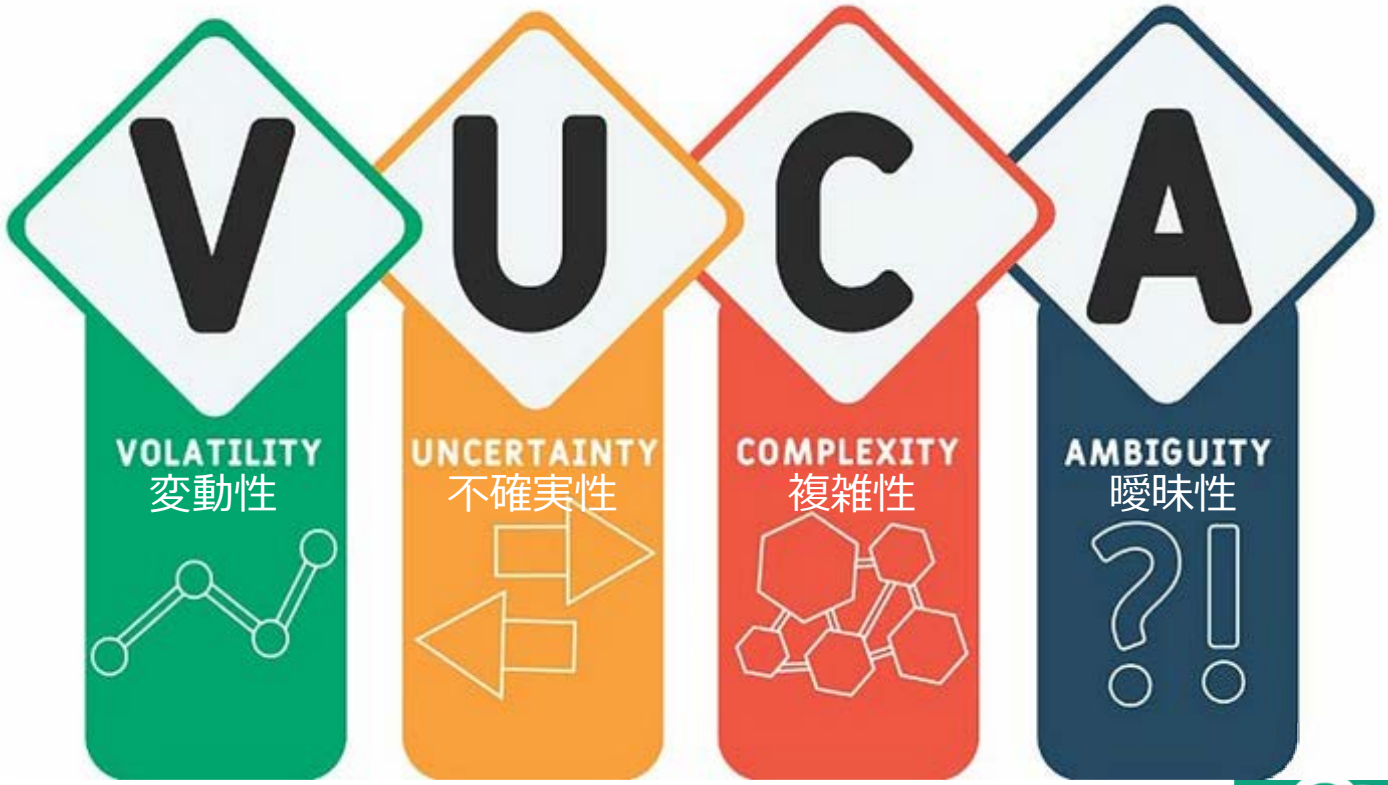
—: Reference
—: Single Forecast
—: Ensemble Forecast

From JMA

Background: We are living in the VUCA era.

We are facing an extremely challenging era.
We must encourage talent who can not only survive but also lead society.





US election (2024)

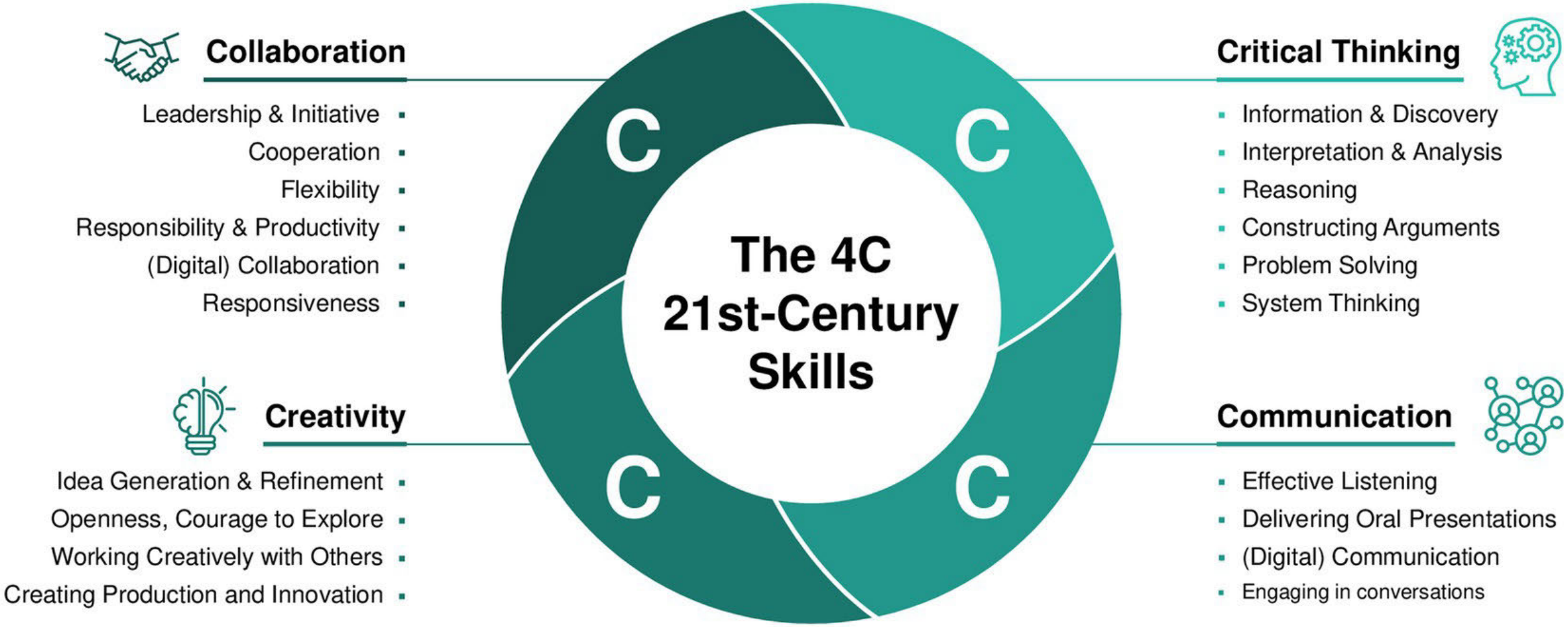
AIs

ChatGPT

https://ifm-business-solutions.com/

Our Educational Mission

We must encourage talent who can not only survive but also lead society.
Lab will impose research experiences/responsibility to enrich 4C skills.



Salybekova et al. (2023)

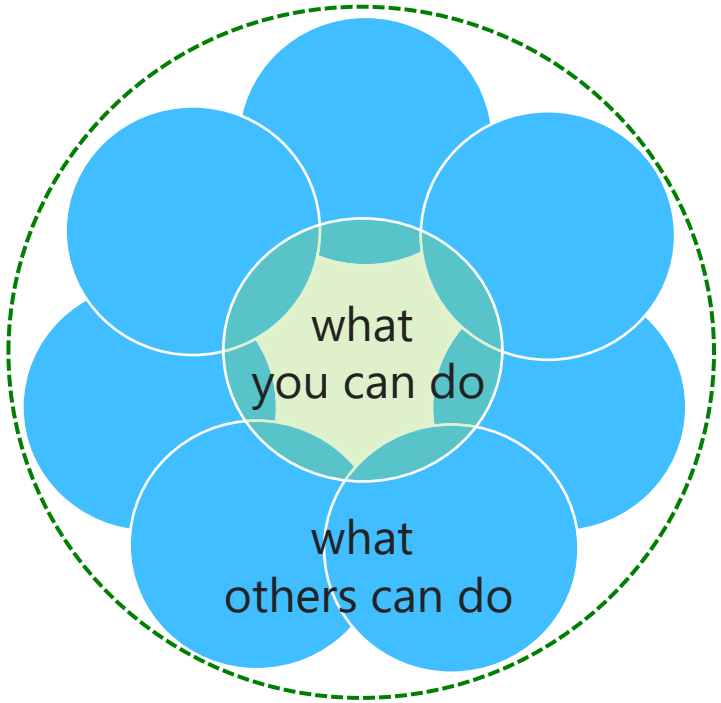
Our Educational Mission

We must encourage talent who can not only survive but also lead society.
Lab will impose research experiences/responsibility to enrich 4C skills.

Collaboration

- Leadership & Initiative
- Cooperation
- Flexibility
- Responsibility & Productivity
- (Digital) Collaboration
- Responsiveness

what you can do alone



what you can do through collaborations

Summary: Our Mission

- **Research/Science**
  - to explore environmental predictions by integrating Earth data and data science
  - 地球観測と情報科学で、地球環境・災害リスクを予測・低減する技術を創造する。

- **Education**
  - to encourage 4C talent who will lead society in the next era.
  - 教育: 研究を通して日本・世界で活躍する能動的な4C人材を育成する。

- **Social Implementation**
  - to contribute SDGs thought social implementation and education
  - 社会実装・人材育成を通して人類社会の安全と持続可能性に貢献する

Our Vision:

Kotsuki Group.
- to transform environmental prediction through data science

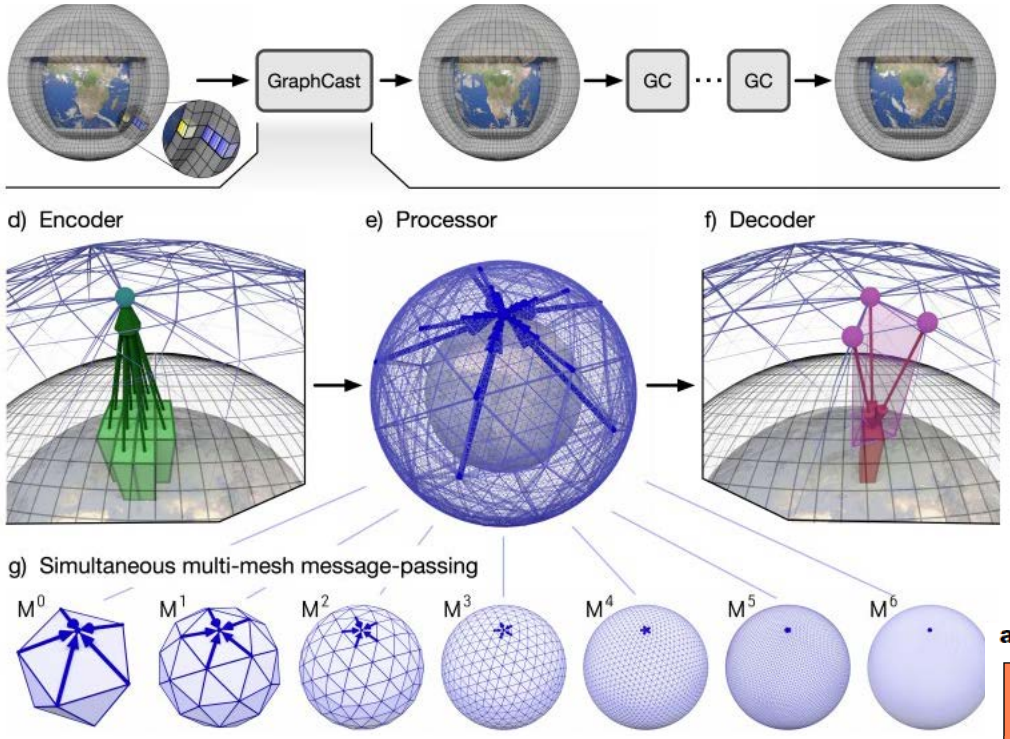
Environmental Prediction Science Laboratory

Background: Rapid growth of AIs in Earth Sci.

AI-based surrogate models (≧ 30 models)

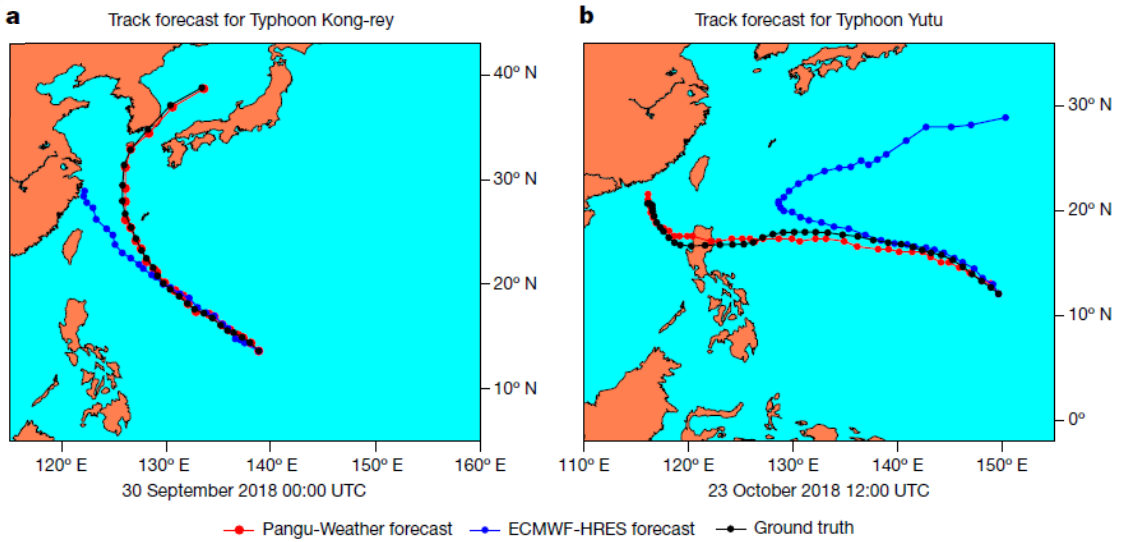
issued by Microsoft, NVIDIA, Google/Deepmind, Huawei,,,,

big wave!



Google/Deepmind's GraphCast (Lam et al. 2023)

Huawei's PanguWeather (Vision Transformer; Bi et al. 2023)



(1) To Transform Satellite Precipitation

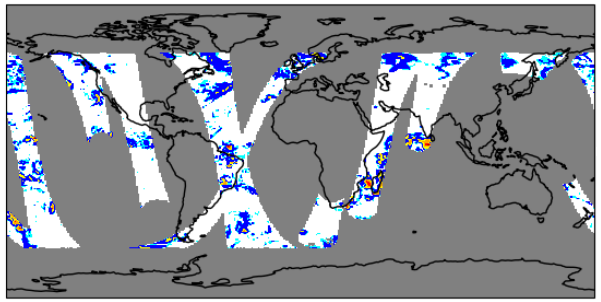


Global Precipitation

data-driven

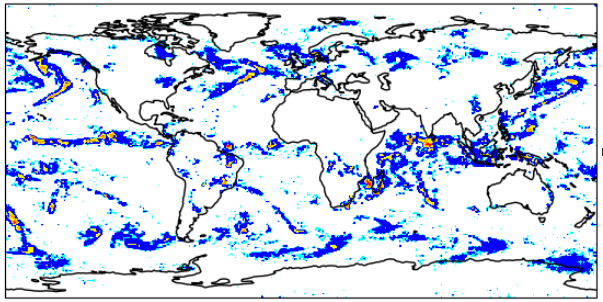
MWR
IR

GSMaP_MWR

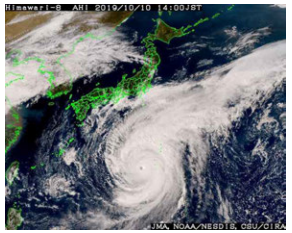


Gauge

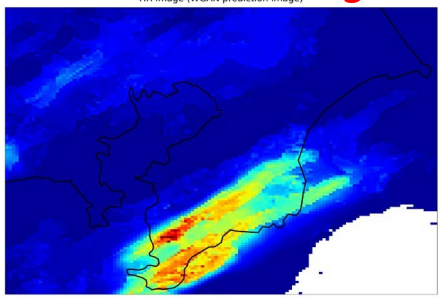
GSMaP_Integrated

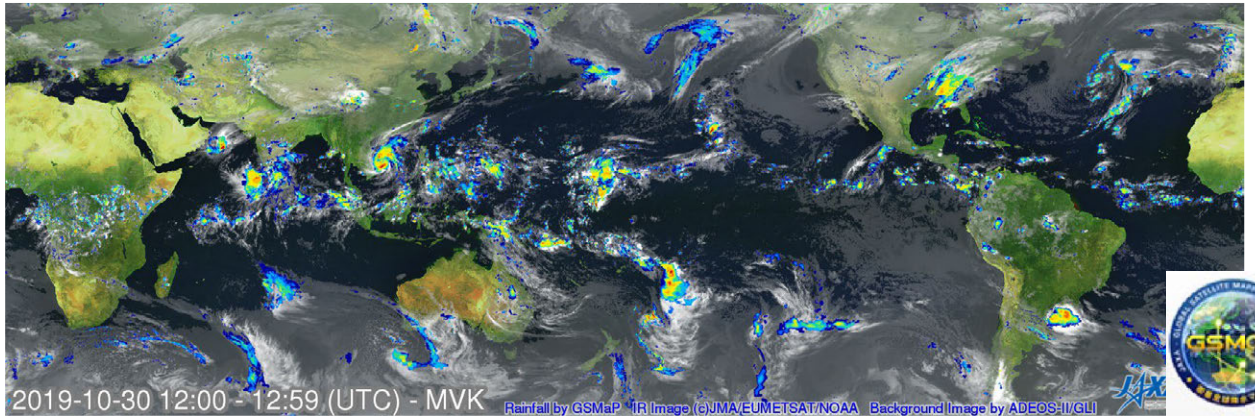


IR



AI downscaling



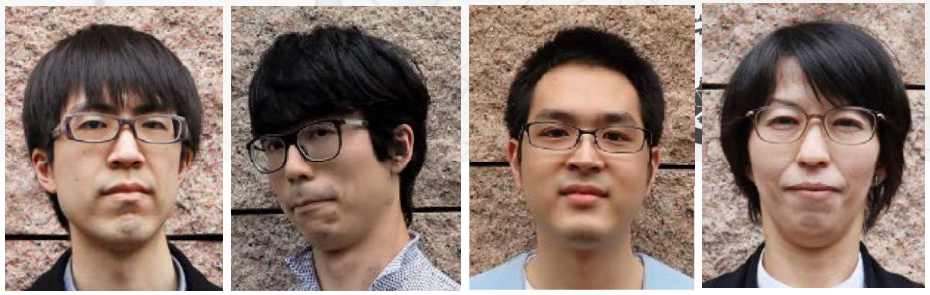


We will push our outcomes
to operational products
in the JAXA-funded project.

JAXA

GSMaP
衛星全球降水マップ
GSMaP
GLOBAL SATELLITE MAPPING OF PRECIPITATION

(2) To Transform AI Weather Prediction



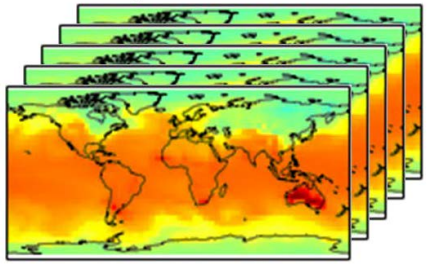
AI model (ViT)
(Cyber Space)

Obs
(Real Word)

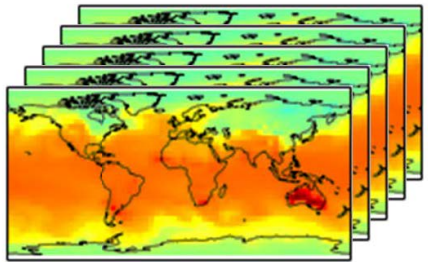
Observation

Data Assimilation
(LETKF)

Analysis Ensemble

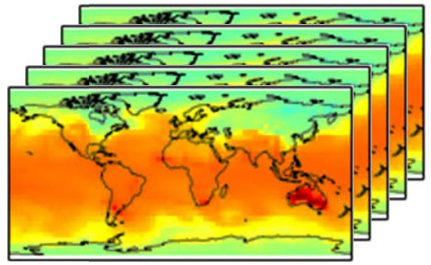


Background Ensemble

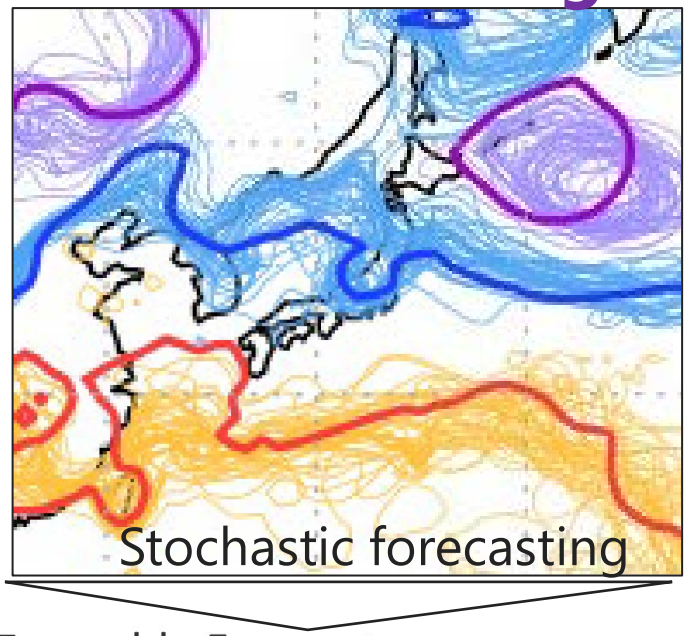


AI Weather Model
(ClimaX)

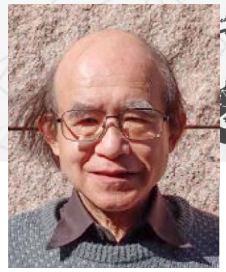
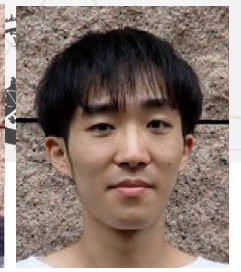
Ensemble Forecasts



AI downscaling



(3) To Transform Ensemble DA and FCSTs

feature extraction

L2/L1 regularization

DNN

diffusion

dimensional reduction

frontiers

Quantum DA

Inver

Probl

M/ADJ

todiff

ervoir Comp.

Experim

Desig

haos

MPC

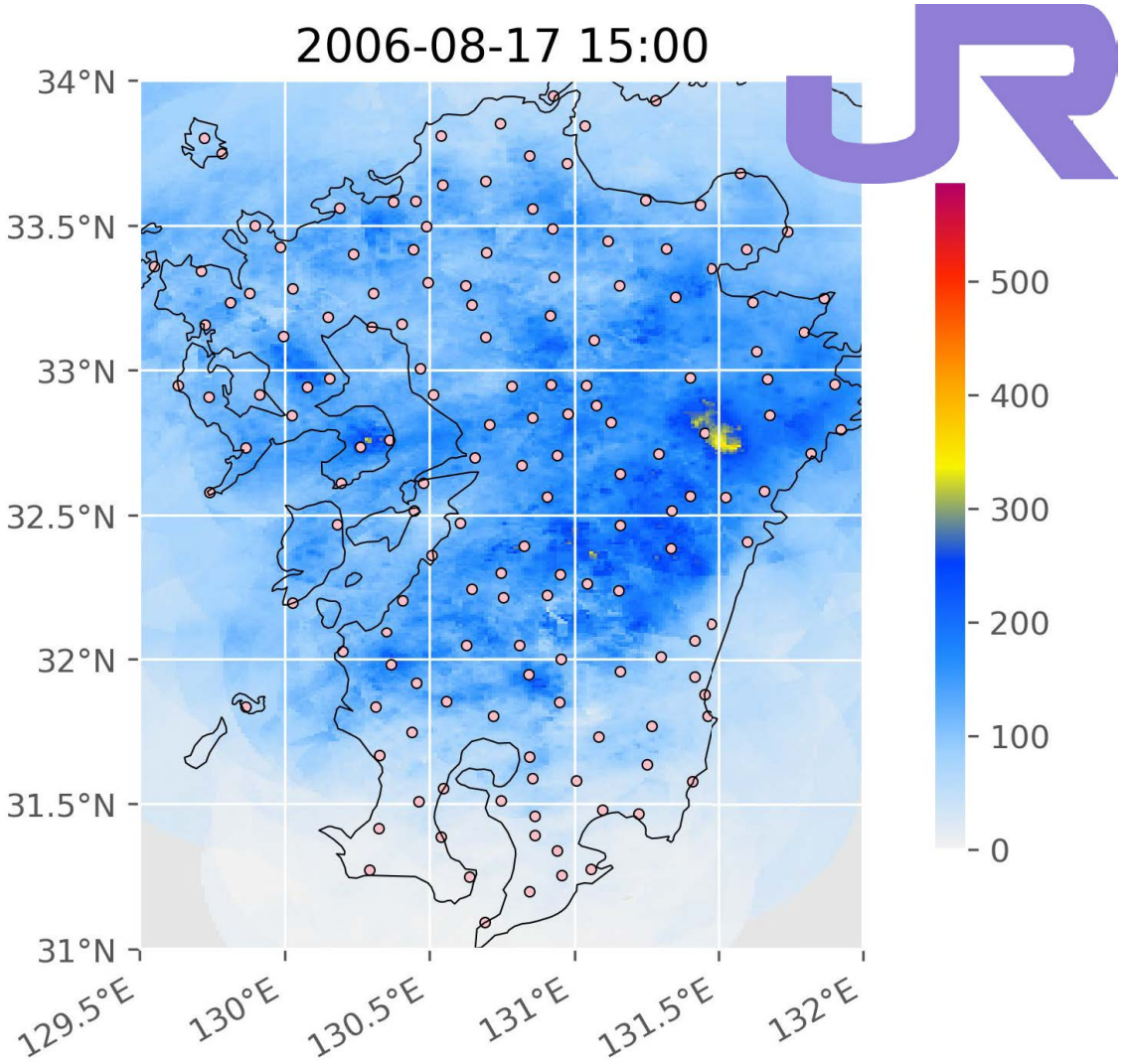
manifold

Embedding/
Lyapunov dims.

Sparse
Sensing Placement

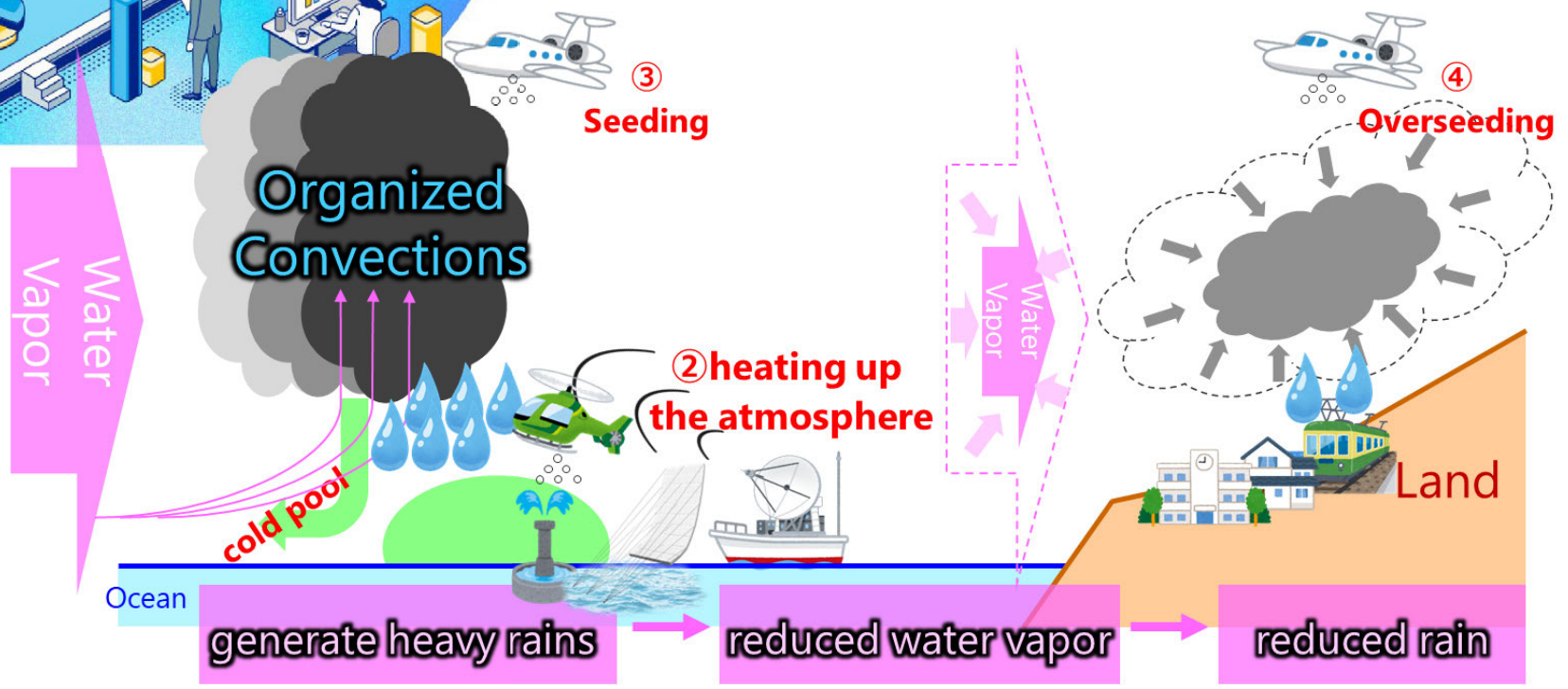
Control

(4) To Transform Practical Disaster Preventions



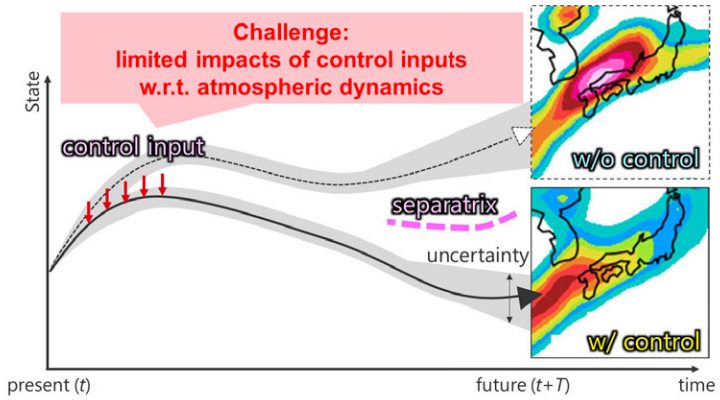
(5) To Transform Weather Forecast → Control

too many!

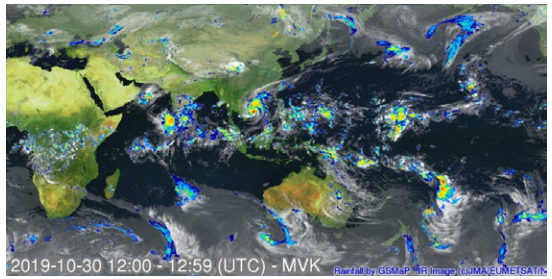


To transform Environmental Prediction by Data Science

Environmental Prediction Science Laboratory

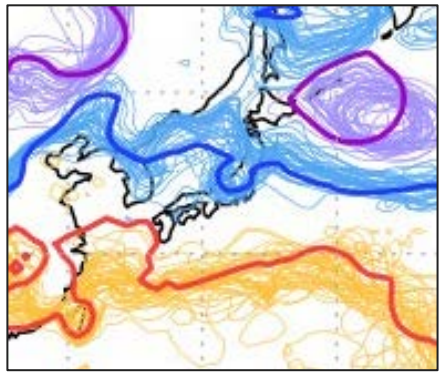


Global Precipitation



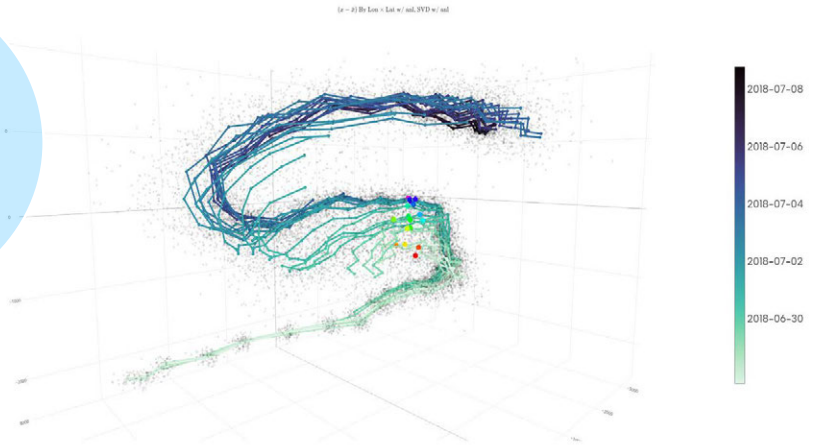
Weather Control

AI Weather Prediction



Social Implementation

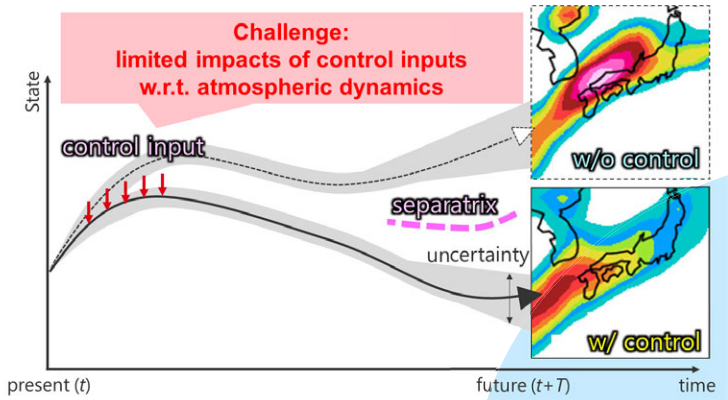
Ensemble DA/FCSTs

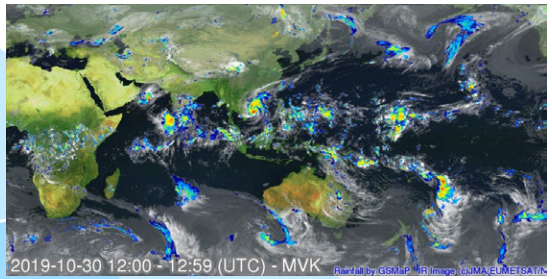


Weather X powered by 日本気象協会

To transform Environmental Prediction by Data Science

Environmental Prediction Science Laboratory

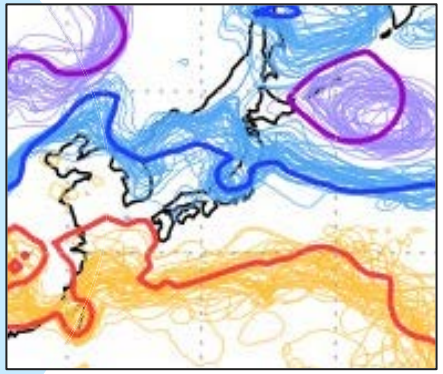




Global Precipitation

Weather Control

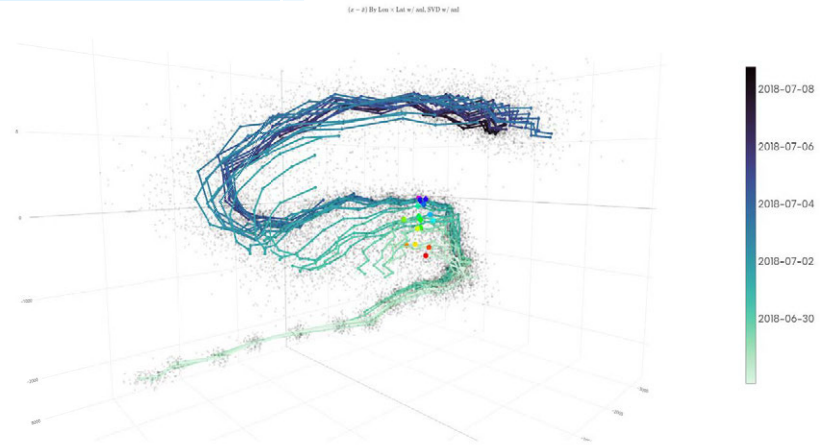
AI Weather Prediction



We can achieve the world-leading outcomes!

Social Implementation

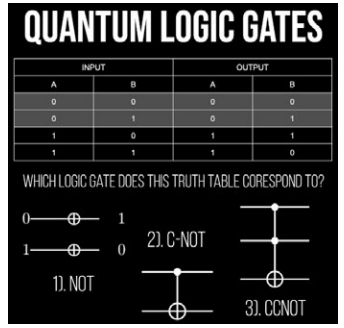
Ensemble DA/FCSTs



Weather X powered by 日本気象協会

Our Value

- **Challenge**
  - to keep exploring new horizons
  - 新しい分野に挑戦し続ける



- **Collaboration**
  - to achieve outcomes that cannot be accomplished alone
  - 一人では成し遂げられない成果を挙げる

- **Opportunity**
  - to provide opportunities for members
  - メンバーにチャンス・環境を提供する

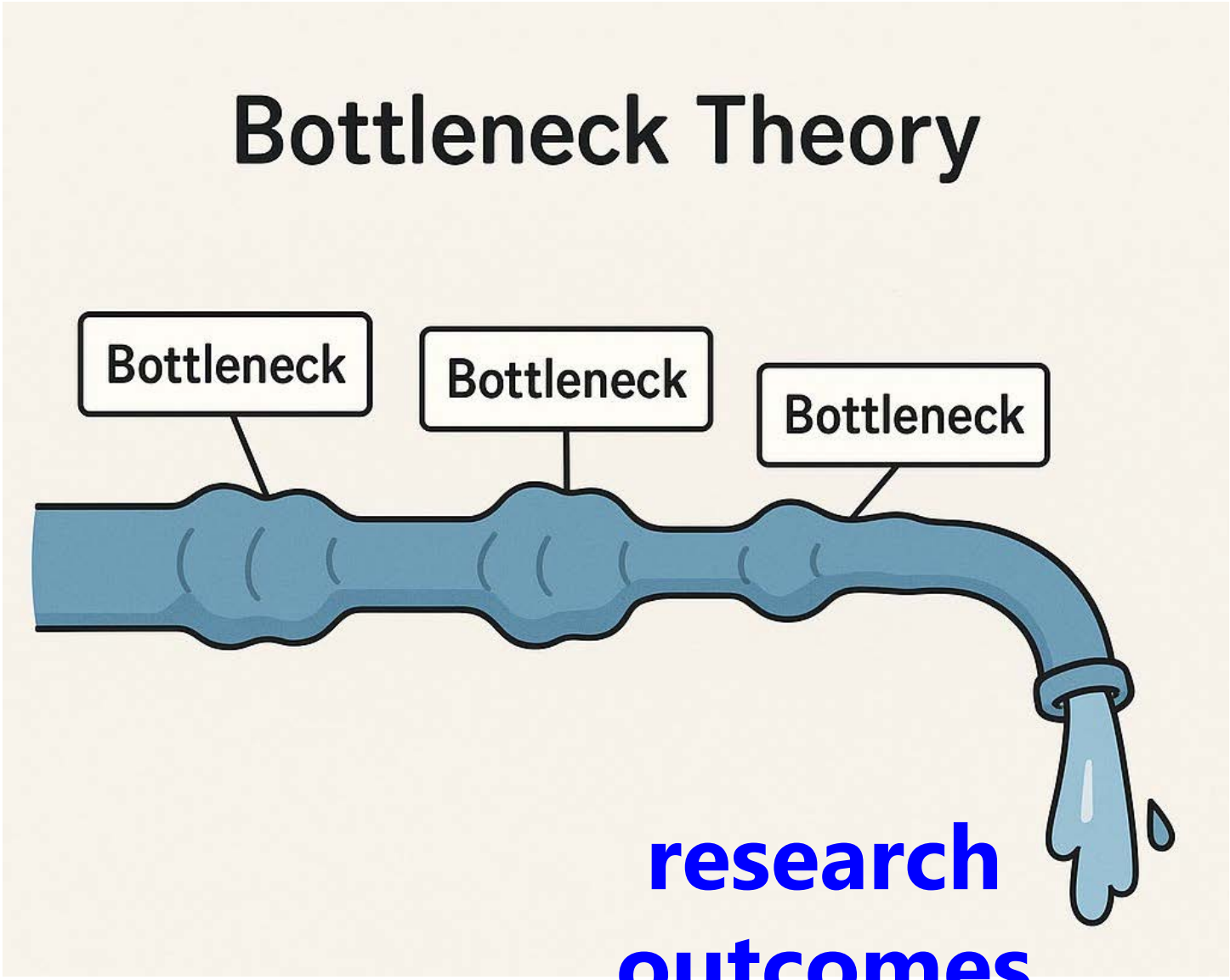
日本気象協会

Our Actions in FY2024:

Environmental Prediction Science Laboratory

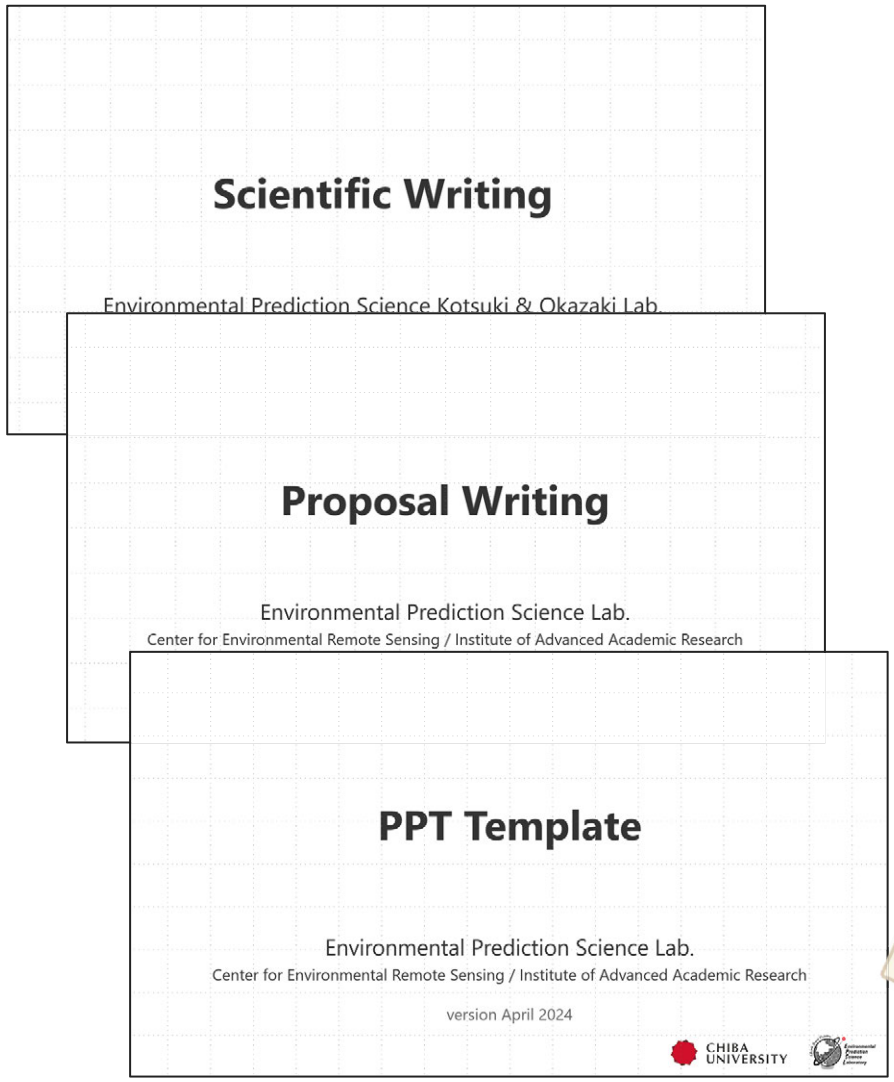
Annual Direction

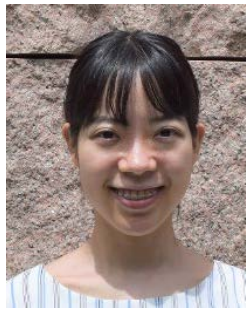
Date	Direction
2020 /04	Foundation (土台固め)
2021 /04	Standardization (幹・文化の形成)
2022 /04	Start Integration (融合の開始)
2023 /04	Deepening (深める)
2024 /04	Reproducible Success (再現可能な成功)
2025 /04	?



What we did in FY2024 (Research)

to prepare templates

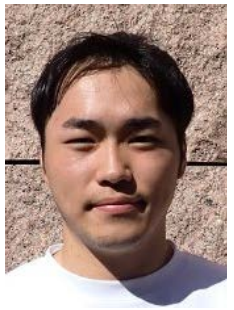




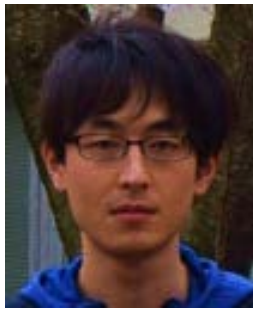
HESS

NPG

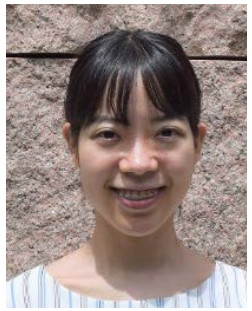
JGR



JSCE



AI/DS



Wakate B

JSPS/DC2

Master

Bachelor

We are ready to accelerate our outcomes!

Of course, these achievements are primarily the result of the members' efforts!

What we did in FY2024 (Admins)

wiki first

README.md Edit

更新日：2024/10/16
※これまでの「README」はアーカイブしました。

🔍 記事の探し方

- 画面**左側**の**HOME**からカテゴリーをクリック。カテゴリー内の記事一覧から探す。
- 画面**上部**の**検索窓**から、キーワードで検索。※連想検索はされません
  （詳しいwiki（esa）の使い方は**こちら**）

pickup

- 最初に読む記事リスト（01.チームへようこそ！）研究室に入ったら、Step1から順に読んでください
- 交通費などを立て替えるときの手続きが知りたい
- ポスターを印刷したい
- 休暇を取りたい・勤務日の振替をしたい
- 学外から学内ネットワークに接続したい（VPN）
- wiki（esa）で記事を書きたい

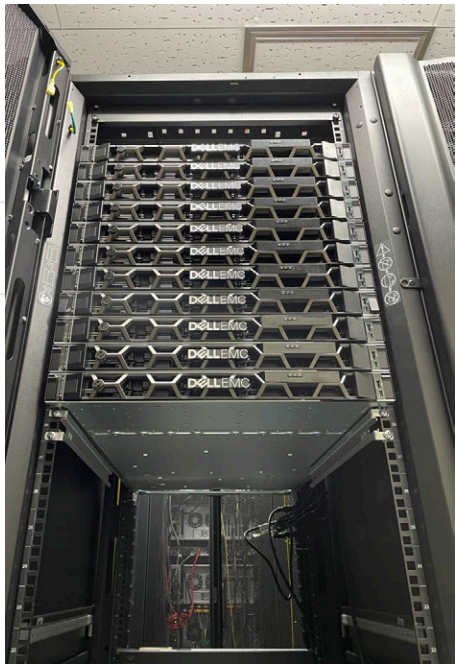


server manuals

#323 06.Sever_Users /

サーバーの利用手順

Star 0 | Watch 3 | Comments 0



サーバーの利用手順

1. サーバーに接続する。
2. ★アカウントのパスワードを変更する。
3. ★公開鍵・秘密鍵の作成
4. ★公開鍵の設定
5. 計算を行う

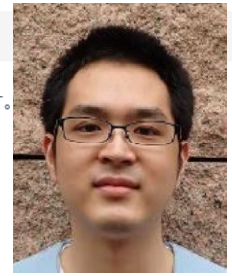
★は初回のみ

1. ログインサーバ"fuji"に接続する

PC（Windowsやmac）のコンソールからコマンド"ssh"を使い、管理者から与えられたusername（アカウント）と初期パスワードで、fujiに接続します。
WinSCPやFileZillaのようなFTPクライアントを利用しても、PuttyやPowershellなどのターミナルソフトを用いても構いません。

```
ssh username@fuji.cr.chiba-u.jp
```

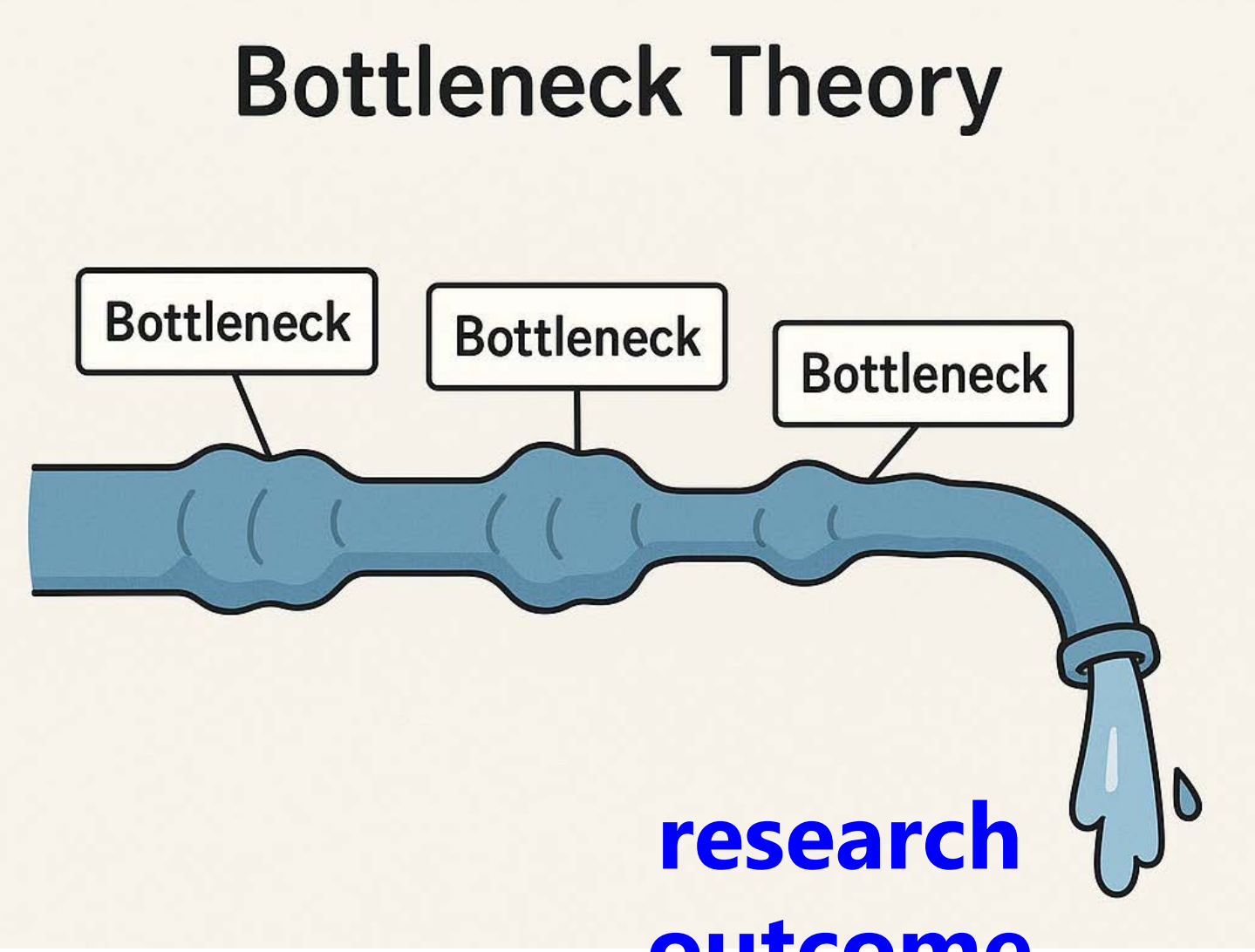
ターミナルに`[username@fuji ~]$`と表示されていれば成功です。



Our Actions in FY2025:

Environmental Prediction Science Laboratory

What are the bottlenecks in our laboratory?



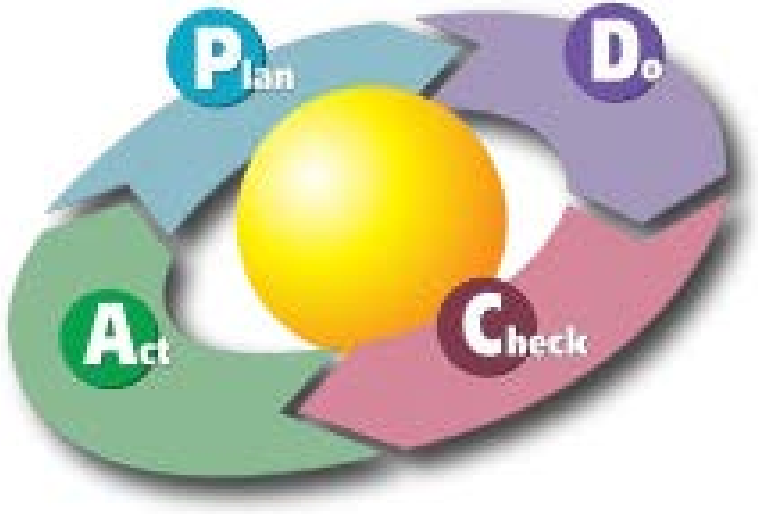
Your Action: To Cycle Small PDCAs (Hypothetical Thinki

Inspired by AOGAKU

Long-term goal
(e.g. dissertation)

NO mid-term goal

Short-term goal
(bi-weekly mtgs)



We will start Monthly Self Review (MSR).
It is not mandatory
If you are interested in, let's start together.

目標設定管理シート案：1カ月単位で作成

みんなの興味から、研究室全体の大義が見えてくると面白いかも！

- **1. 研究の興味 (〜を解決したい、仮説)**
  - 〜〜に興味がある。 〜〜を解決したい。

- **2. 1を達成するために何が必要か (ロードマップ、マイルストーン、ネックとなりそうな部分)**
  - あああああ
  - あああああ

2は研究進捗によって、更新されるもの

マイルストーン
- 水工（最終提出締切: 5月末）
  - スケルトンの作成
  - あああ
  - あああ
- 修論中間発表

- **3. 1カ月のアクションプラン (優先度A,B,C)**
  - A: あああ
  - B: あああ
  - あああ
  - あああ

- **4. フィードバック/フォワード**
  - あああ
  - あああ
  - あああ

(コメント) 先生との1on1とか、
グループでの話し合い(360度フィードバック)など

To triger Positive Feedback Loops

monthly self review

Achievements

individual feedback

Skill up

Collaboration

large feedback

bigger achievements

your/our competence

Good Information

Summary

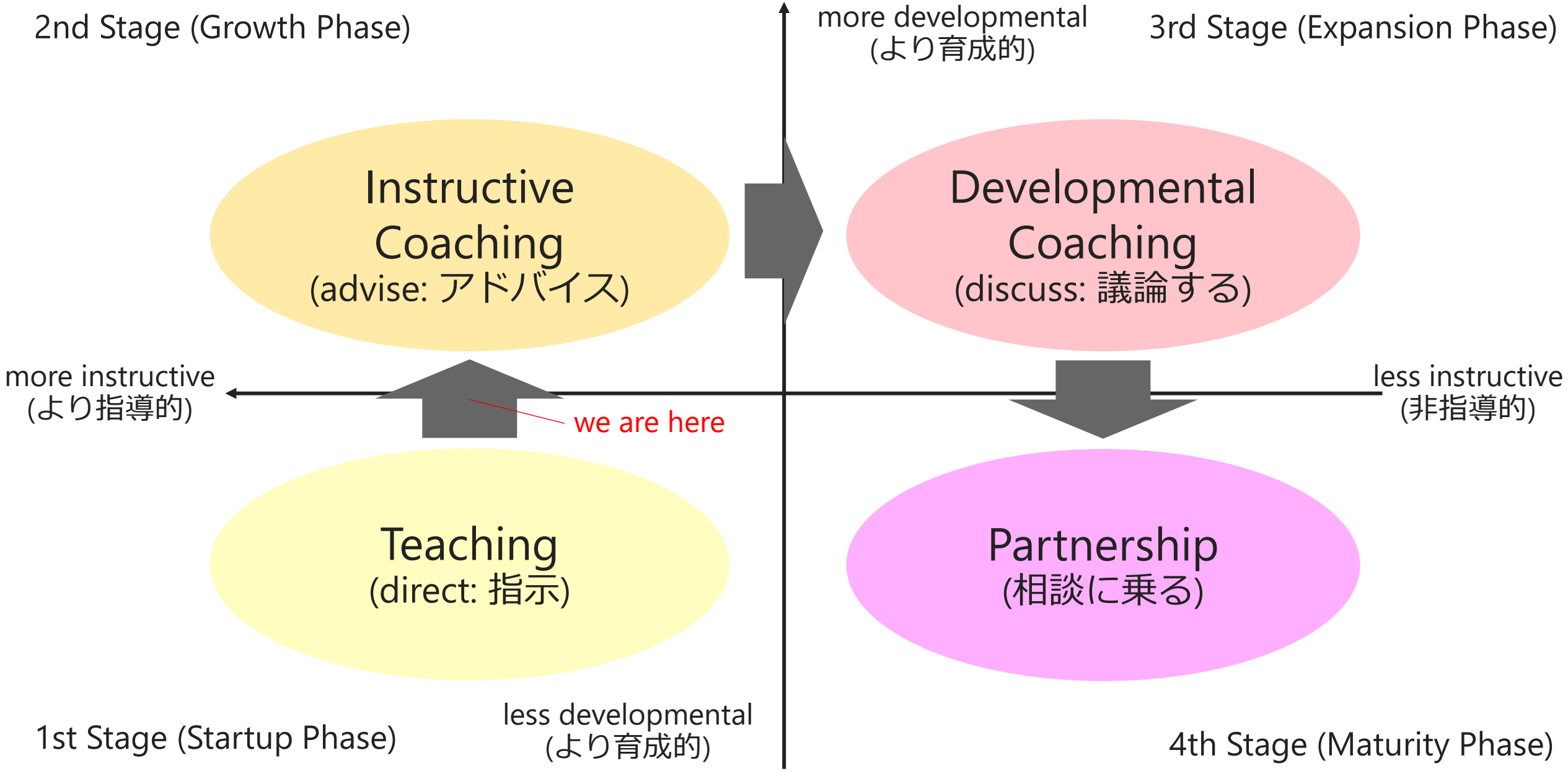
Annual Direction

Date	Direction
2020 /04	Foundation (土台固め)
2021 /04	Standardization (幹・文化の形成)
2022 /04	Start Integration (融合の開始)
2023 /04	Deepening (深める)
2024 /04	Reproducible Success (再現可能な成功)
2025 /04	**Reinforce Positive Feedback** (ポジティブフィードバック)

Let’s make FY2025 a year of reinforce positive feedback!

Appendix

My Action: From Teaching to Coaching (PM Theory)

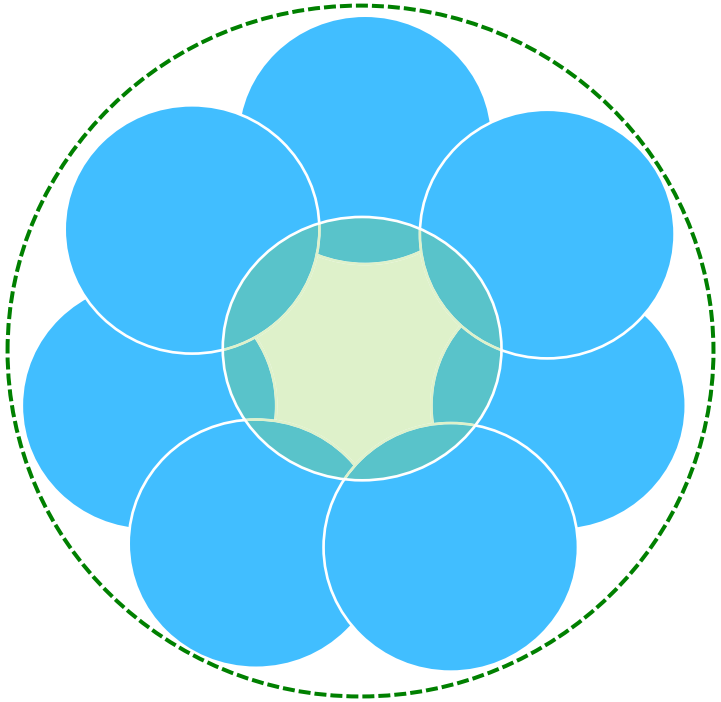


Still Thinking: Communication for Collaborations?

Environmental Prediction Science Laboratory

Imposter Syndrome
(underestimated)

Reality



what you can do
through collaborations

Dunning–Kruger effect
(overconfident)