

TRAVEL REPORT FORM

출장보고서

결 재	선임연구 원	팀장	부서장	원장직무 대행
	04/23	04/23	04/24	04/24
협 조	이성규	조재필	유진호	유진호
	팀장	팀장	팀장	
협 조	04/23	04/23	04/23	
	문자연	이우섭	윤선권	

I. Travel Overview 출장개요

1. Traveler(s) 출장자

Department 소속	Position 직위(직급)	Name 성명	Note 비고
융합기술팀	팀장	윤선권	조직개편 후 팀변경
융합기술팀	선임연구원	박경원	
융합기술팀	선임연구원	신용희	
융합기술팀	박사후연구원	장상민	
예측기술팀	선임연구원	김광형	
서비스개발팀	선임연구원	이성규	
기후분석팀	연구원	이은정	

2. Travel Period 출장기간

- 2018년 04월 07일 ~ 04월 15일 (9일간)

3. Occasion and destination 행사 및 출장지

- 행사명: European Geosciences Union (EGU) General Assembly 2018
- 출장지: 오스트리아 비엔나

II. Major Activities 주요업무 수행내용

1. Main Contents and Activities 주요내용 및 활동

- 윤선권 팀장, 박경원, 신용희 선임연구원, 장상민 박사후연구원, 김광형, 이성규 선임연구원, 이은정 연구원이 각자 연구 내용으로 발표하였음.
- 개인별 발표제목 및 내용
 - 윤선권 발표 (포스터)
 - 발표 제목: Development of integrated urban discharge forecasting model using global climate prediction data: A case study of the Ui-Cheon basin, South Korea

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- 발표 내용: 초단기 및 단기 강우예측 기법을 이용한 도시유출 모델링 내용을 소개하였으며, 도시하천 유역에서의 적용성을 검증함 (본 연구는 국토부 내외수과제의 일환으로 수행되었으며, 연구단 핵심성파로 활용되었음)

- 발표 세션: HS4.3/AS1.10/NH1.13 – Ensemble hydro-meteorological forecasting and predictive uncertainty estimation (co-organized)

- 발표 일자: 04월 09일 (월) 17:30 – 19:00, Hall A

※ 붙임1. 윤선권 발표자료

○ 박경원 발표 (포스터)

- 발표 제목: Development and Evaluation of Drought Monitoring based on Satellite Rainfall Estimation for Un-gaged Basins

- 발표 내용: APCC에서 수행하고 있는 국토부 수탁과제"국토관측센서 기반 광역 및 지역 수재해 감시평가예측 기술 개발"과제의 일환으로 위성기반 가뭄감시 시스템 개발 및 평가에 대한 한반도 및 태국 지역에 대한 가뭄지수 산정 결과 및 지상관측자료와 비교 평가 결과 발표

- 발표 세션: NH6.1/AS5.21/CR7.3/GI2.17/HS11.33/SM3.12/SSS13.54 – Application of remote sensing and Earth-observation data in natural hazard and risk studies (co-organized)

- 발표 일자: 04월 12일 (수) 17:30 – 19:00, Hall X1

※ 붙임2. 박경원 발표자료

○ 신용희 발표 (포스터)

- 발표 제목: Establish of soil water content monitoring system and development of smart agricultural water management system in the Kingdom of Tonga

- 발표 내용: 통가타푸섬 작물 생산지역에 대한 토양수분 관측센서 설치 및 토양수분함량 추정 모델을 구축하였음. 토양수분함량(SWC)과 토양수분포텐셜(SWP)의 관계를 통해 통가타푸섬의 Vaini farm과 Fua'amotu farm에 대한 토양수분 특성을 분석함으로써 작물 재배 상황에서의 적정 토양수분함량을 추정할 수 있어 스마트 물관리를 실현할 수 있는 기반 기술이 됨. 이 연구는 APEC 기후센터 아태사업 중 “태평양 도서국 기후변화 대응 기술개발” 과제 성과임

- 발표 세션: SSS10.2 – Irrigated agriculture: Natural Resources Management for the sustainability of the terrestrial ecosystem maintaining productivity

- 발표 일자: 04월 13일 (금) 17:30 – 19:00, Hall X3

※ 붙임3. 신용희 발표자료

○ 장상민 발표 (포스터)

- 발표 제목: Development and Verification of Radar-Satellite Blended QPF(Quantitative Precipitation Forecast) for heavy rainfall

- 발표 내용: 국토부 “내외수 연계 도시 침수저감 능력향상 기술 연구”과제의 성과로서 집중호우로 인한 발생할 수 있는 도시침수 피해 감소시키기 위한 목적으로 개발된 Multi-sensor(레이더-위성) 기반 초단기 강우예측 시스템의 개선과 강우 예측성 평가 결과를 제시하였음

- 발표 세션: NH6.1/AS5.21/CR7.3/GI2.17/HS11.33/SM3.12/SSS13.54 – Application of remote sensing and Earth-observation data in natural hazard and risk studies (co-organized)

- 발표 일자: 04월 12일 (목) 17:30 – 19:00, Hall X1

※ 붙임4. 장상민 발표자료

○ 김광형 발표 (포스터)

- 발표 제목: Development of a rice tungro epidemiological model for seasonal pest risk prediction in the Philippines

- 발표 내용: 벼의 주요 바이러스 병해 중 하나인 통그로병을 모의하기 위해 rtdSIM모형을 개발하여 필드자료를 바탕으로 검증을 수행한 내용을 발표함, 이와 함께 rtdSIM모형과 계절기후예측정보를 활용하여 농민 및 지자체 공무원을 대상으로 매월 발간하는 월간 농업기후정보지에 벼 병해충 계절전망을 실어 실질적으로 농업분야에서 농업기후정보를 의사결정에 활용하는 사례를 발표하였음

- 발표 세션: BG2.20 – Agricultural management in ecosystem models for biogeochemical and agricultural assessments

- 발표 일자: 04월 13일 (금) 17:30 – 19:00, Hall A

※ 붙임5. 김광형 발표자료

○ 이성규 발표 (포스터)

- 발표 제목: Development of Climate Data Masking Interface Service based on Spatial Index Using PyWPS

- 발표 내용: 특정 지역 내 기후자료를 정교하게 추출하기 위한 기후자료 마스킹 알고리즘을 공간 인덱스 기법을 이용하여 계산 성능 개선과 개선된 알고리즘을 기반으로 FOSS4G (Free and Open Source Software for Geospatial)인 PyWPS를 이용하여 개발한 기후자료 마스킹 인터페이스 서비스 내용을 발표함. 이 연구는 APEC 기후센터 아태사업의 연구 결과임

- 발표 세션: ESS12.6 – Web-based Exchange and Processing of Environmental Data

- 발표 일자: 04월 11일 (수) 15:30 – 17:00, Hall X3

※ 붙임6. 이성규 발표자료

○ 이은정 발표 (포스터)

- 발표 제목: Comparison and Evaluation of Hydroclimate of CMIP5 Models over East Asia for Climate Application Field

- 발표 내용: 국토부 MME 과제 “AR5 기반 MME 기후 및 고해상도 중장기 수문 시나리오 생산 및 평가기술 개발”의 성과로서 한반도 지역에 대해 구축했던 CMIP5 모형 평가 matrix를 동아시아 지역으로 확대하여 CMIP5 모형을 평가하고 가이드라인을 제시함

- 발표 세션: NH6.1/AS5.21/CR7.3/GI2.17/HS11.33/SM3.12/SSS13.54 – From sub-seasonal forecasting to climate projections: predicting hydrologic extremes and servicing water managers (co-organized)

- 발표 일자: 04월 09일 (월) 17:30 – 19:00, Hall X3

※ 붙임7. 이은정 발표자료

2. Relevance to APEC Climate Center's Activities 결론 및 소감

- EGU (European Geosciences Union) General Assemble 2018 국제학술회의는 106개 국가에서 약 15,000

명이 참석하여 다양한 주제의 연구 및 활용사례가 발표되었음

- 본 국제학술회의를 통해 유럽에 기반을 둔 학교, 연구기관 등의 연구자들의 기후과학 및 응용분야의 국제적인 연구 동향을 파악하고 관련 분야 과학자들과의 교류를 통해 인적 네트워크를 구축함
- 기후응용분야에서는 미래기후 시나리오 자료와 관련하여 큰 관심을 보였으며, 다양한 기후 기후응용 연구를 수행하는 데 필요한 연구라는 평가를 받음. 특히 극한 지수와 관련하여 모형을 평가 및 분석하는 데 있어서 아주 큰 관심을 가지는 것을 알게 되었고, 관련 연구자들과의 지속적인 관계를 통해 연구 관련 논의를 진행할 예정임
- 기존에 활발하게 이루어지던 기후변화 스케일의 영향평가들이 점점 줄어들고, 계절내 및 계절기후에 측정보를 활용하여 농업 및 생태계에 탄력성을 높이고 재난재해에 대비하기 위한 연구개발이 활발하게 수행되고 있었음
- 기후정보 뿐만 아니라 그에 상응하는 농업정보의 중요성이 함께 강조되고 있으며, 이러한 농업정보를 수집하는 다양한 방법이 소개됨
- 원격탐사분야에서는 최근 유럽 ESA에서 발사된 Sentinel 위성들이 계획대로 순차적으로 발사되고 이에 관련한 기후변화에 따른 홍수 및 가뭄 등의 자연피해 저감에 대한 논문이 많이 발표됨
- ESA에서는 연구자 중심의 Sentinel tool을 제공하여 위성자료를 쉽게 접근 및 처리할 수 있도록 하고 있음
- 국내외 연구자들과의 교류를 통해 원격탐사 기반의 강우추정 및 예측, 수문 활용 분야에 대한 최근 연구 동향을 평가하고, 인적 네트워크를 형성할 수 있는 좋은 기회였음
- 도시침수 예경보를 위한 강우예측 정보의 활용은 매우 중요하며, 특히 초단기 예측의 경우 레이더자료와 활용이 필수적임. Multi-Sensing 강우예측 기법과 CFS자료를 이용한 강우예측 시스템에 대한 관심이 많았으며, 향후 이음새 없는 예측 개념에서 생산되는 초단기에서 기후변화까지 다양한 기후예측정보의 활용을 검토할 필요성이 있음
- 기후정보서비스분야에서는 OGC (Open Geospatial Consortium)의 국제표준스펙을 통한 기후정보 분석과 기후자료 시각화 서비스에 활용하기 위한 연구가 활발하게 진행되었음. 특히 DKRZ(German Climate Computing Centre)에서 발표한 CMIP6(Coupled Model Inter-comparison project Phase 6)와 관련된 연구는 우리 센터에서 CMIP6 자료를 기반으로 하는 연구를 준비하는데 기초 정보로 활용될 수 있을 것으로 판단됨

3. Suggestions and Remarks 건의사항

III. References (Presented and Collected Materials) 주요 수집자료

(with attachment of any information or report in case of attendance of conferences, workshops and meetings) 학술대회, 워크숍, 회의 등 참석 시 관련 정보 및 문서 첨부

EGU2018 - Letter of Acceptance: 박경원 선임연구원

Dear Kyungwon Park,

We are pleased to inform you about the acceptance of your following Abstract for the EGU General Assembly 2018:

EGU2018-11963

Development and Evaluation of Drought Monitoring based on Satellite Rainfall Estimation for Un-gaged Basins

by Kyungwon Park et al.

accepted in Session NH6.1/AS5.21/CR7.3/GI2.17/HS11.33/SM3.12/SSS13.54 – Application of remote sensing and Earth-observation data in natural hazard and risk studies (co-organized)

The organizers will schedule your contribution and decide about its presentation type by 20 February 2018 and you will be informed accordingly.

Detailed information on the pre-registration, letter of invitation, as well as the hotel booking are provided on the conference webpage at: <https://egu2018.eu/>

In case any questions arise, please do not hesitate to contact us.

Kind regards,
Katja Gänger
Copernicus Meetings
egu2018@copernicus.org

on behalf of the Programme Committee Chair

EGU2018 - Letter of Acceptance: 이우섭 팀장

Dear Woo-Seop Lee,

We are pleased to inform you about the acceptance of your following Abstract for the EGU General Assembly 2018:

EGU2018-11528

The combined effects of the Arctic warming and the ENSO on the Mid-latitude winter temperature anomalies by Woo-Seop Lee et al.

accepted in Session NP2.2/AS1.9/CL2.11 – Dynamical Extremes in Climate Sciences (co-organized)

The organizers will schedule your contribution and decide about its presentation type by 20 February 2018 and you will be informed accordingly.

Detailed information on the pre-registration, letter of invitation, as well as the hotel booking are provided on the conference webpage at: <https://egu2018.eu/>

In case any questions arise, please do not hesitate to contact us.

Kind regards,
Katja Gänger
Copernicus Meetings
egu2018@copernicus.org

on behalf of the Programme Committee Chair

EGU2018 - Letter of Acceptance: 신용희 선임연구원

Dear Yonghee Shin,

We are pleased to inform you about the acceptance of your following Abstract for the EGU General Assembly 2018:

EGU2018-11065

Establishment of soil water content monitoring system and development of smart agricultural water management system in the Kingdom of Tonga

by Yonghee Shin et al.

accepted in Session SSS10.2 – Irrigated agriculture: Natural Resources Management for the sustainability of the terrestrial ecosystem maintaining productivity

The organizers will schedule your contribution and decide about its presentation type by 20 February 2018 and you will be informed accordingly.

Detailed information on the pre-registration, letter of invitation, as well as the hotel booking are provided on the conference webpage at: <https://egu2018.eu/>

In case any questions arise, please do not hesitate to contact us.

Kind regards,
Katja Gänger
Copernicus Meetings
egu2018@copernicus.org

on behalf of the Programme Committee Chair

EGU2018 - Letter of Acceptance 김광형 팀장

Dear Kwang-Hyung Kim,

We are pleased to inform you about the acceptance of your following Abstract for the EGU General Assembly 2018:

EGU2018-11084

Development of a rice tungro epidemiological model for seasonal pest risk prediction in the Philippines

by Kwang-Hyung Kim et al.

accepted in Session BG2.20 – Agricultural management in ecosystem models for biogeochemical and agricultural assessments

The organizers will schedule your contribution and decide about its presentation type by 20 February 2018 and you will be informed accordingly.

Detailed information on the pre-registration, letter of invitation, as well as the hotel booking are provided on the conference webpage at: <https://egu2018.eu/>

In case any questions arise, please do not hesitate to contact us.

Kind regards,
Katja Gänger
Copernicus Meetings
egu2018@copernicus.org

on behalf of the Programme Committee Chair

EGU2018 - Letter of Acceptance: 윤선권 선임연구원

Dear Sunkwon Yoon,

We are pleased to inform you about the acceptance of your following Abstract for the EGU General Assembly 2018:

EGU2018-12720

Development of integrated urban discharge forecasting model using global climate prediction data: A case study of the Ui-Cheon basin, South Korea

by Sunkwon Yoon et al.

accepted in Session HS4.3/AS1.10/NH1.13 – Ensemble hydro-meteorological forecasting and predictive uncertainty estimation (co-organized)

The organizers will schedule your contribution and decide about its presentation type by 20 February 2018 and you will be informed accordingly.

Detailed information on the pre-registration, letter of invitation, as well as the hotel booking are provided on the conference webpage at: <https://egu2018.eu/>

In case any questions arise, please do not hesitate to contact us.

Kind regards,
Katja Gänger
Copernicus Meetings
egu2018@copernicus.org

on behalf of the Programme Committee Chair

EGU2018 - Letter of Acceptance: 이성규 선임연구원

Dear Seongkyu Lee,

We are pleased to inform you about the acceptance of your following Abstract for the EGU General Assembly 2018:

EGU2018-14373

Development of Climate Data Masking Interface Service based on Spatial Index Using PyWPS

by Seongkyu Lee

accepted in Session ESS12.6 – Web-based Exchange and Processing of Environmental Data

The organizers will schedule your contribution and decide about its presentation type by 20 February 2018 and you will be informed accordingly.

Detailed information on the pre-registration, letter of invitation, as well as the hotel booking are provided on the conference webpage at: <https://egu2018.eu/>

In case any questions arise, please do not hesitate to contact us.

Kind regards,
Katja Gänger
Copernicus Meetings
egu2018@copernicus.org

on behalf of the Programme Committee Chair

EGU2018 - Letter of Acceptance 장상민 박사후연구원

Dear Sangmin Jang,

We are pleased to inform you about the acceptance of your following Abstract for the EGU General Assembly 2018:

EGU2018-11722

Development and Verification of Radar-Satellite Blended QPF (Quantitative Precipitation Forecast) for heavy rainfall
by Sangmin Jang et al.

accepted in Session NH6.1/AS5.21/CR7.3/GI2.17/HS11.33/SM3.12/SSS13.54 – Application of remote sensing and Earth-observation data in natural hazard and risk studies (co-organized)

The organizers will schedule your contribution and decide about its presentation type by 20 February 2018 and you will be informed accordingly.

Detailed information on the pre-registration, letter of invitation, as well as the hotel booking are provided on the conference webpage at: <https://egu2018.eu/>

In case any questions arise, please do not hesitate to contact us.

Kind regards,
Katja Gänger
Copernicus Meetings
egu2018@copernicus.org

on behalf of the Programme Committee Chair

EGU2018 - Letter of Acceptance: 이은정 연구원

Dear Eun-Jeong Lee,

We are pleased to inform you about the acceptance of your following Abstract for the EGU General Assembly 2018:

EGU2018-14282

Comparison and Evaluation of Hydroclimate of CMIP5 Models over East Asia for Climate Application Field by Eun-Jeong Lee et al.
accepted in Session HS4.6/CL3.13 – From sub-seasonal forecasting to climate projections: predicting hydrologic extremes and servicing water managers (co-organized)

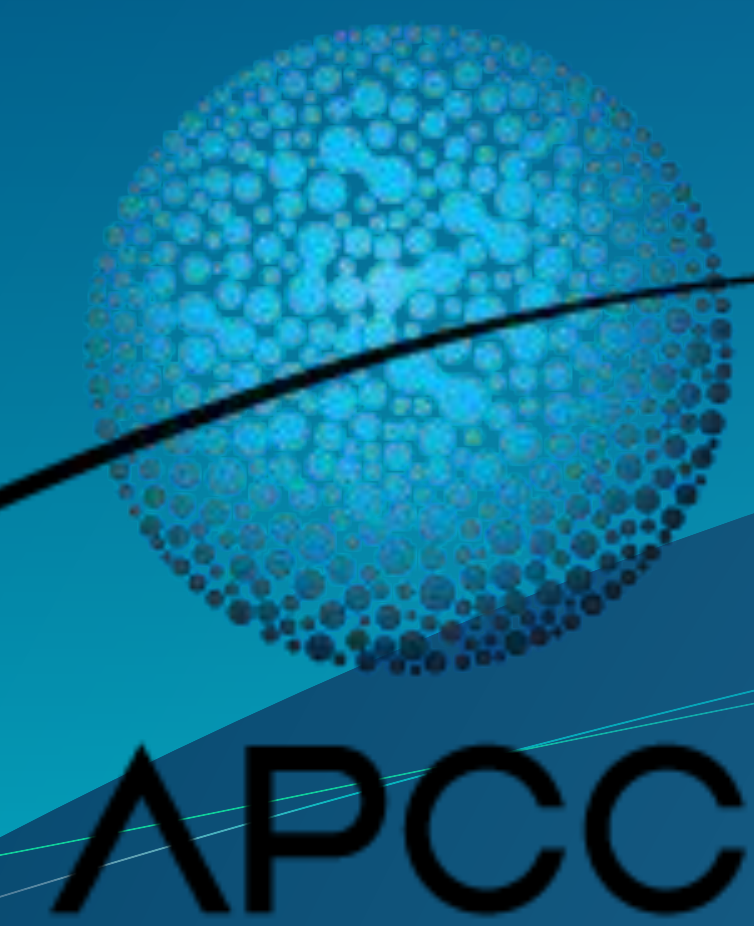
The organizers will schedule your contribution and decide about its presentation type by 20 February 2018 and you will be informed accordingly.

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Kind regards,
Katja Gänger
Copernicus Meetings
egu2018@copernicus.org

on behalf of the Programme Committee Chair



Development of a rice tungro epidemiological model for seasonal pest risk prediction in the Philippines

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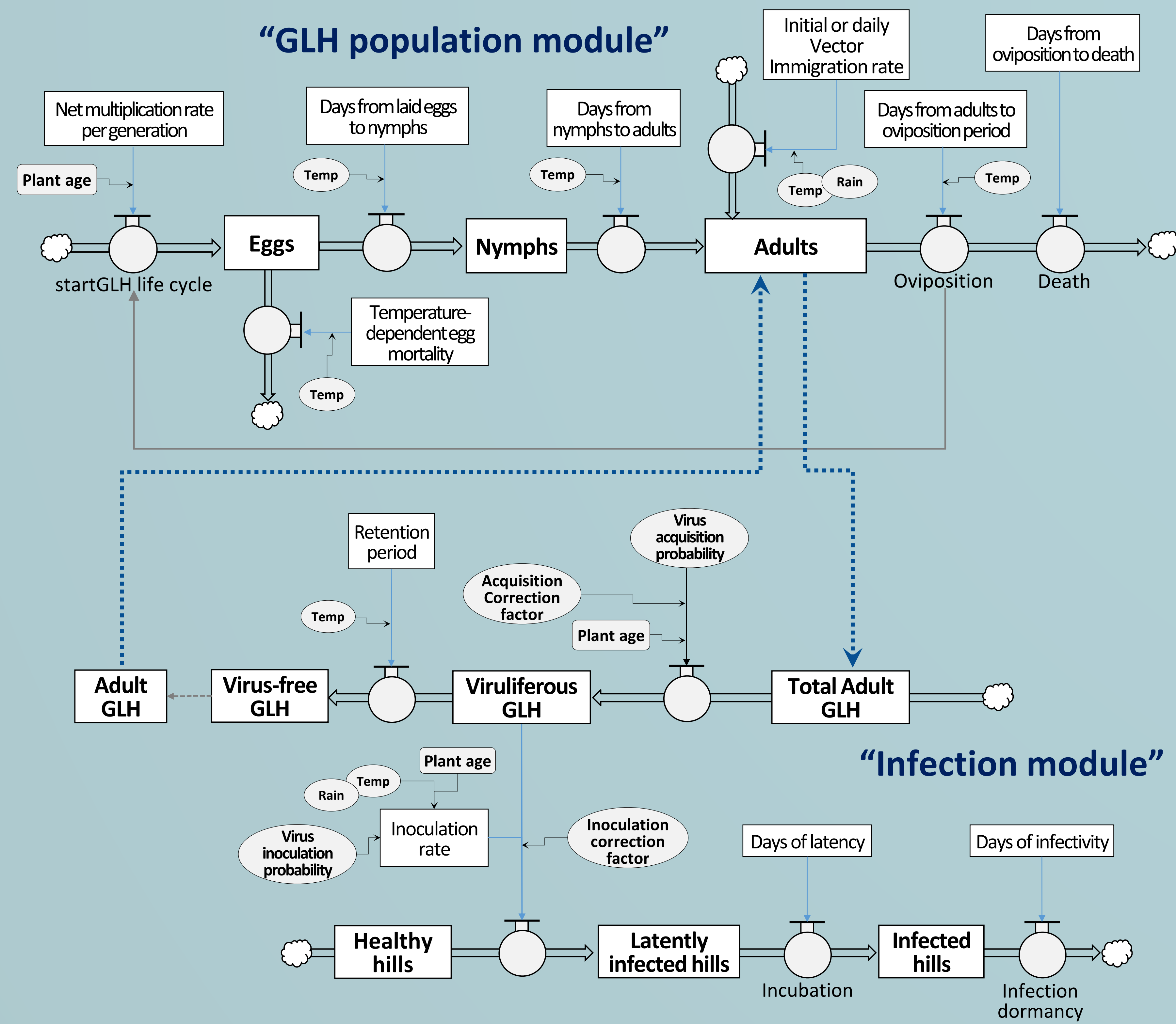
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Background and Objectives

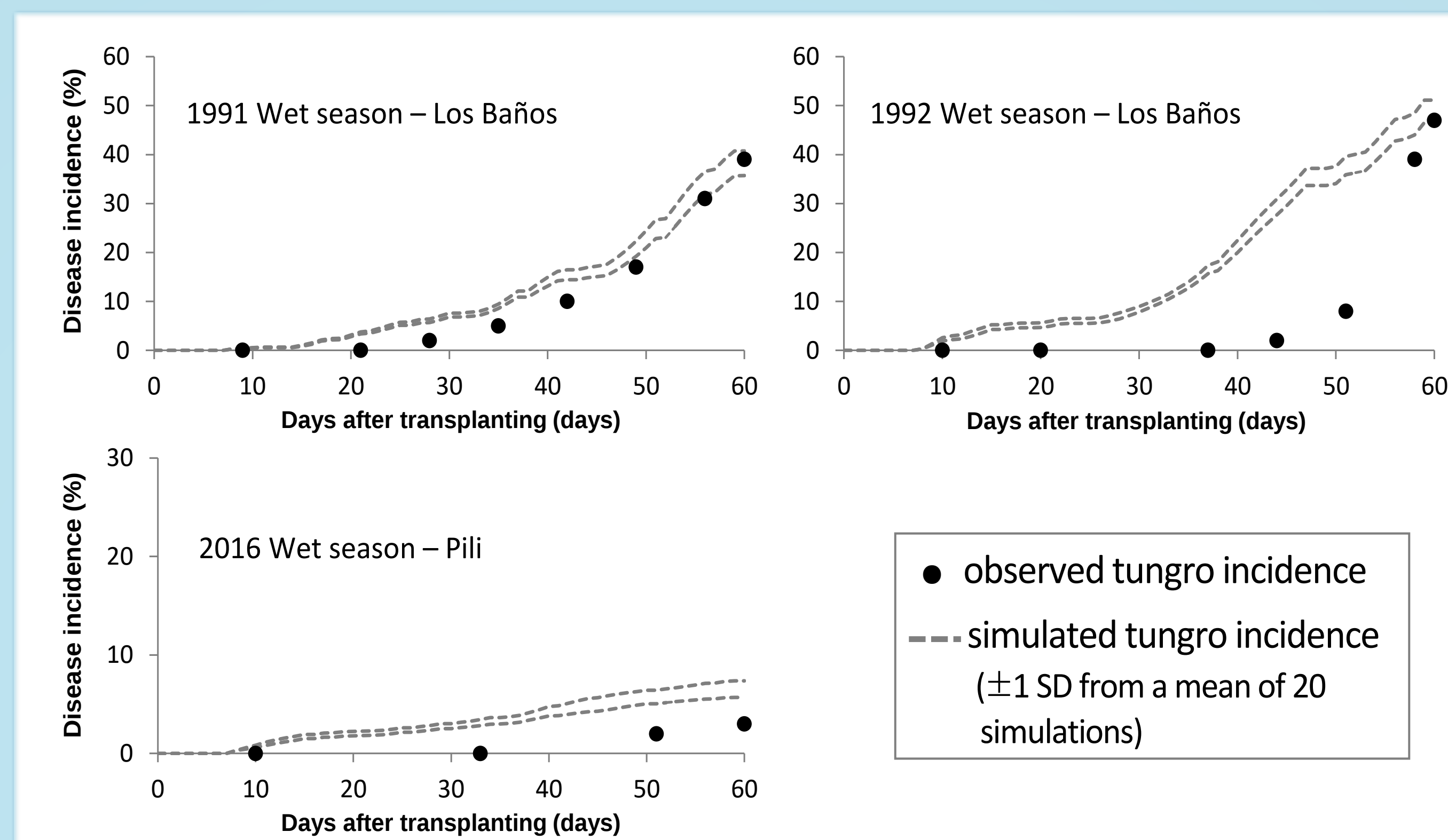
- Through an integration of seasonal climate forecasts and rice pest epidemiological models, a potential risk for rice pest epidemics can be predicted even before a cropping season starts. A seasonal pest risk prediction would allow agricultural stakeholders to proactively assess and manage risk on a seasonal scale
- **The objective of the study** was to develop and evaluate an epidemiological “*rtdSim*” model for tungro, a vector-borne rice disease, aiming at producing a seasonal tungro prediction for the Bicol Region of the Philippines

The *rtdSim* model structure

- The *rtdSim* model is divided into two linked modules. The “GLH population module” simulates green leafhopper (GLH) population dynamics of a complete life cycle from egg to adult stages and immigration movement from near rice paddies, and the “Infection module” simulates virus transmissions from infected rice hills to the GLH vector, and viruliferous GLH to healthy rice hills during rice cropping, determining the daily ratio of total infected hills as a final simulation result



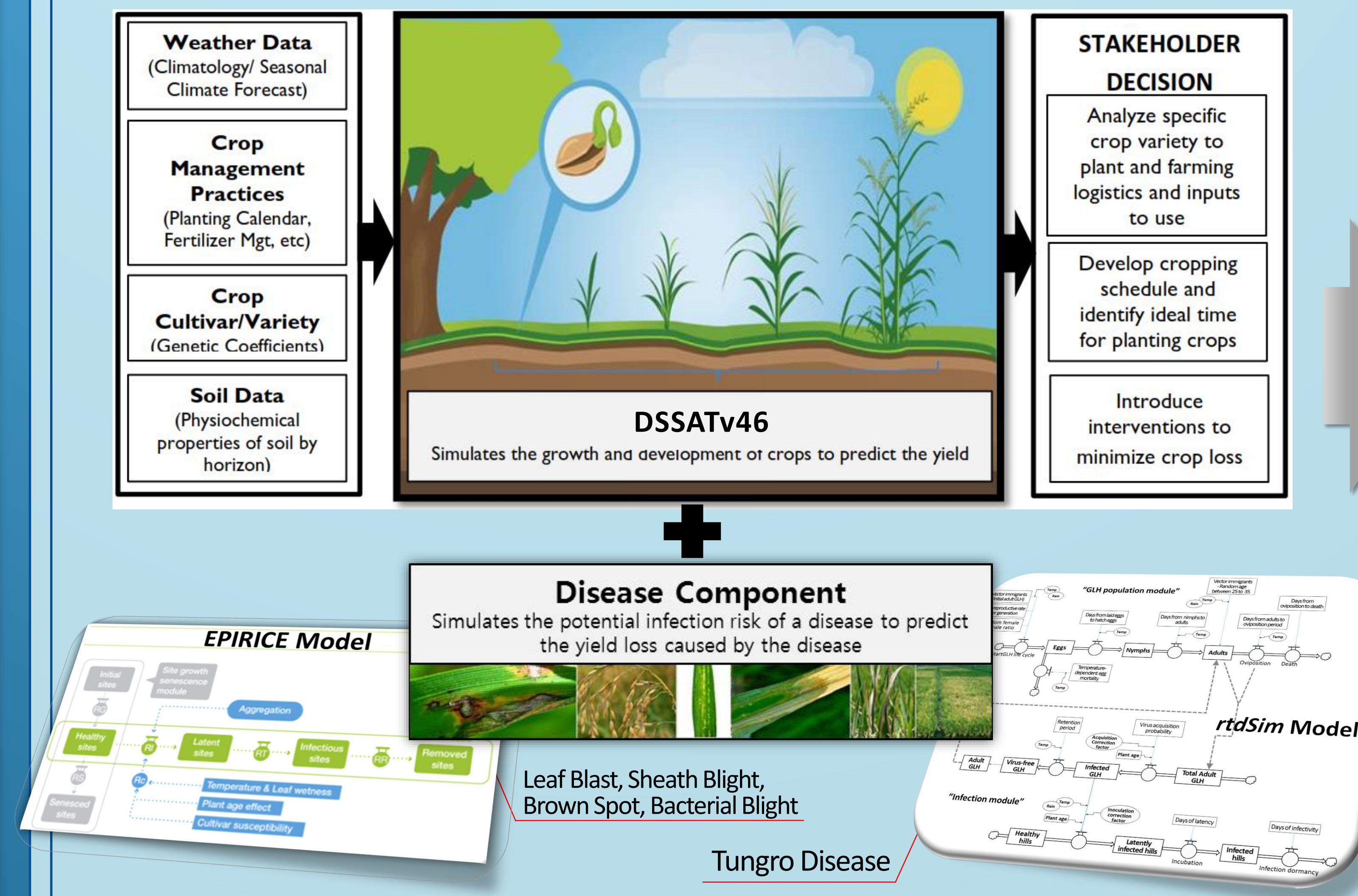
1. Validation of the *rtdSim*



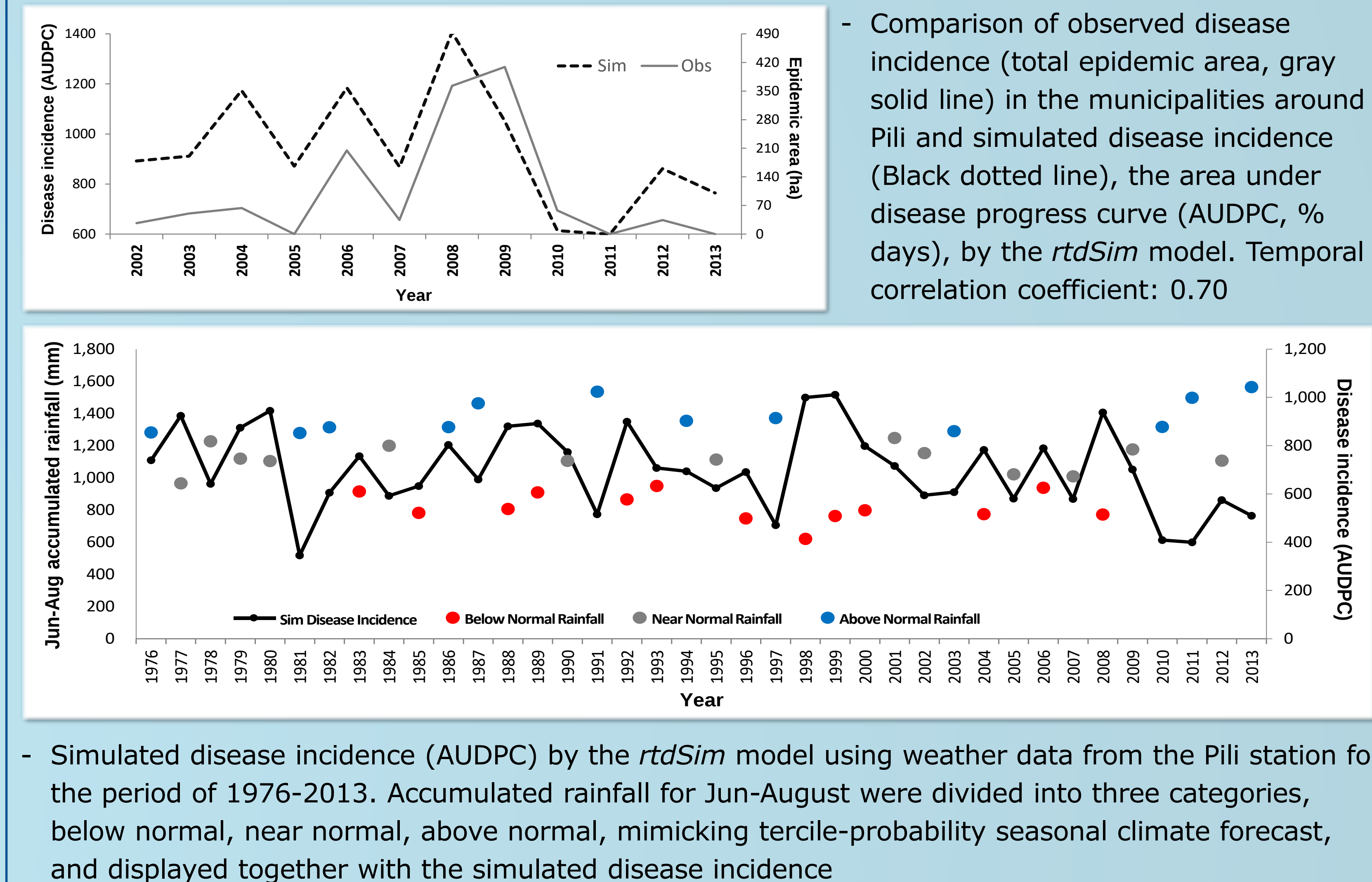
- Simulated disease incidences (gray dotted lines, -- indicates ± 1 SD from a mean of 20 simulations) by the *rtdSim* model, compared with observed disease incidences (black dots) on the IRRI experimental farm in Los Baños in the wet seasons of 1991 and 1992 and on the rice paddies in Pili, Bicol in the wet season of 2016

3. Application of the *rtdSim*

① Integration into the CAMDT-Disease* platform

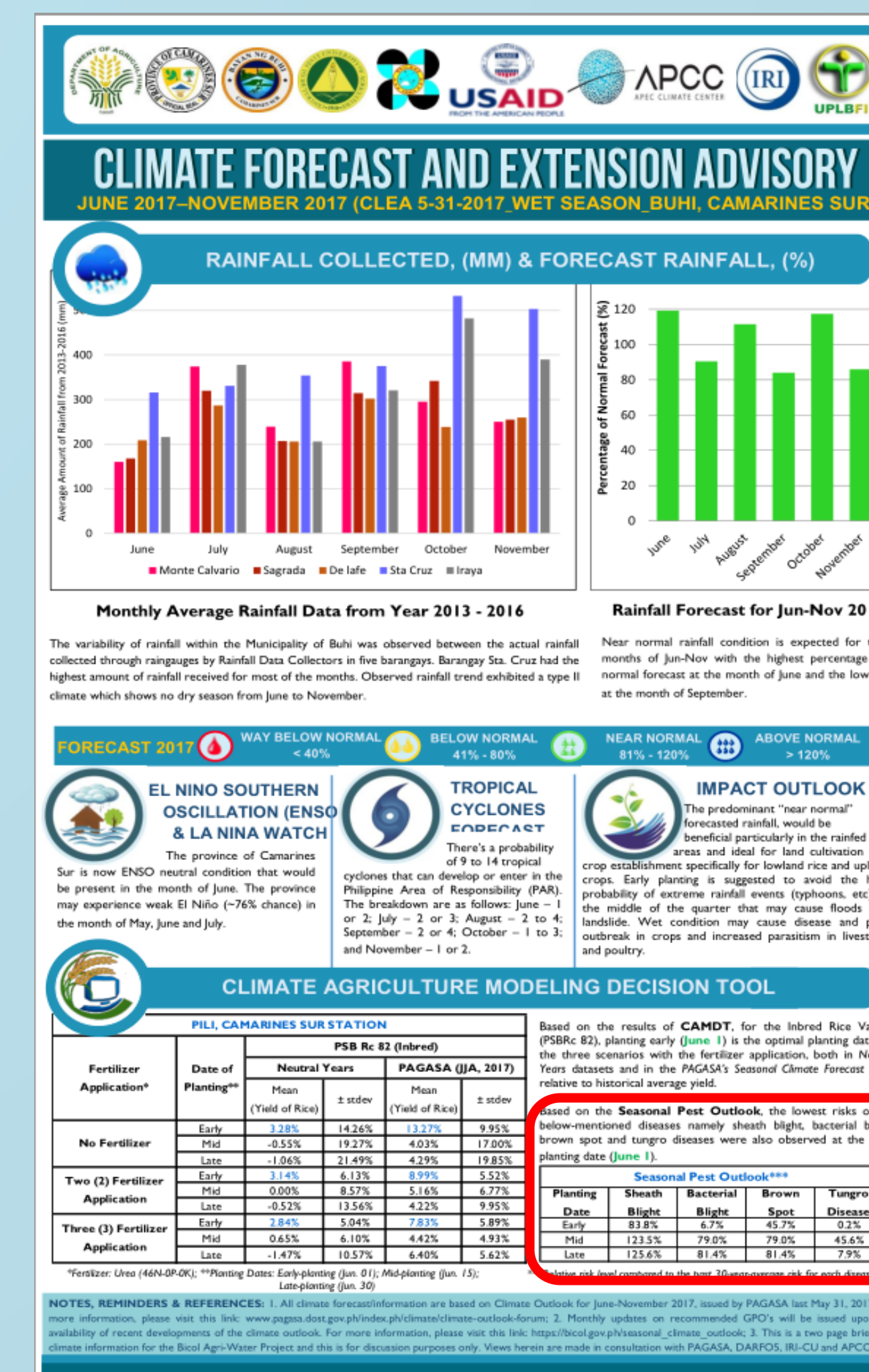


2. Evaluation of the *rtdSim*



- Simulated disease incidence (AUDPC) by the *rtdSim* model using weather data from the Pili station for the period of 1976-2013. Accumulated rainfall for Jun-August were divided into three categories, below normal, near normal, above normal, mimicking tercile-probability seasonal climate forecast, and displayed together with the simulated disease incidence

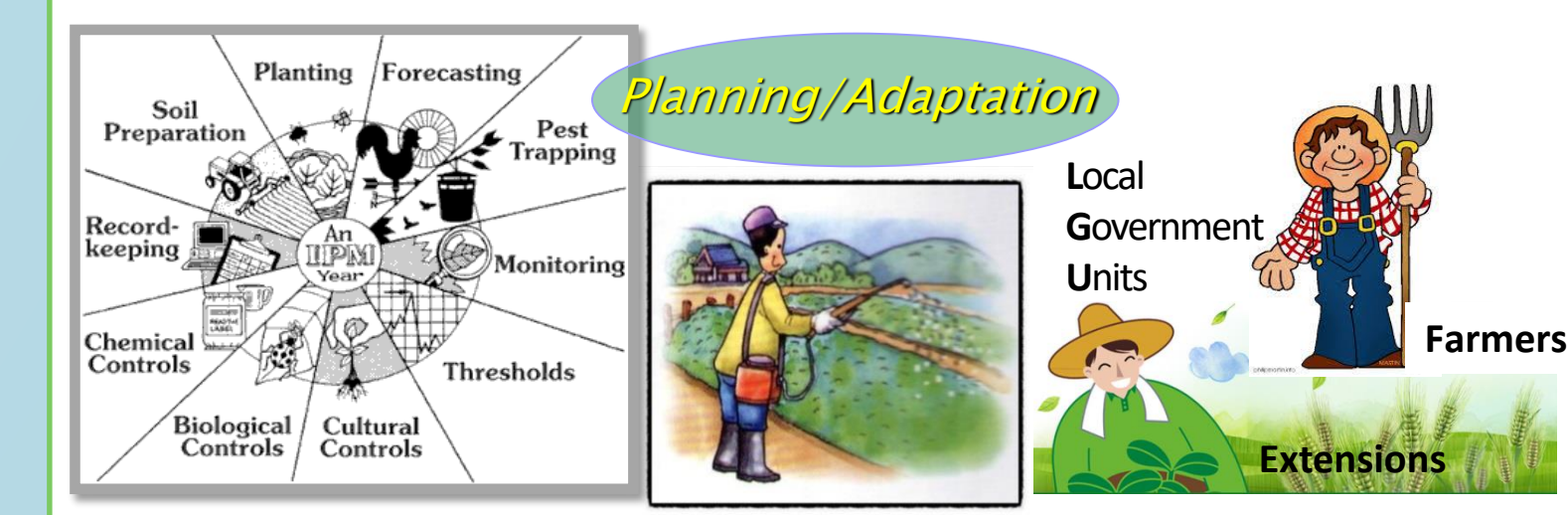
② Generation of monthly agro-climate advisories



Agricultural decision-making support

The **Seasonal Climate Forecast and Extension Advisory or CLEA** is a two-page agro-climate advisory bulletin containing the following:

- 1) climate information including seasonal climate forecast, tropical cyclone forecast, and the El Niño Southern Oscillation (ENSO) provided by the PAGASA;
- 2) the results of crop and disease simulation runs using CAMDT and CAMDT-Disease;
- 3) the Extension Advisory and Good Practice Options and advisories on ideal times for planting and harvesting, crops or varieties to plant, and crop and water management practices suitable for climate outlook.



Based on the **Seasonal Pest Outlook**, the lowest risks of the below-mentioned diseases namely sheath blight, bacterial blight, brown spot and tungro diseases were also observed at the early planting date (**June 1**).

Seasonal Pest Outlook**				
Planting Date	Sheath Blight	Bacterial Blight	Brown Spot	Tungro Disease
Early	-35.6%	-10.4%	-5.8%	10.4%
Mid	-20.1%	-17.8%	20.4%	36.8%
Late	50.1%	-5.1%	15.6%	89.7%

**Relative risk level compared to the past 30-year-average risk for each disease

* Climate-Agriculture-Modeling and Decision Tool for Disease

Establishment of soil water content monitoring system and development of smart agricultural water management system in the Kingdom of Tonga

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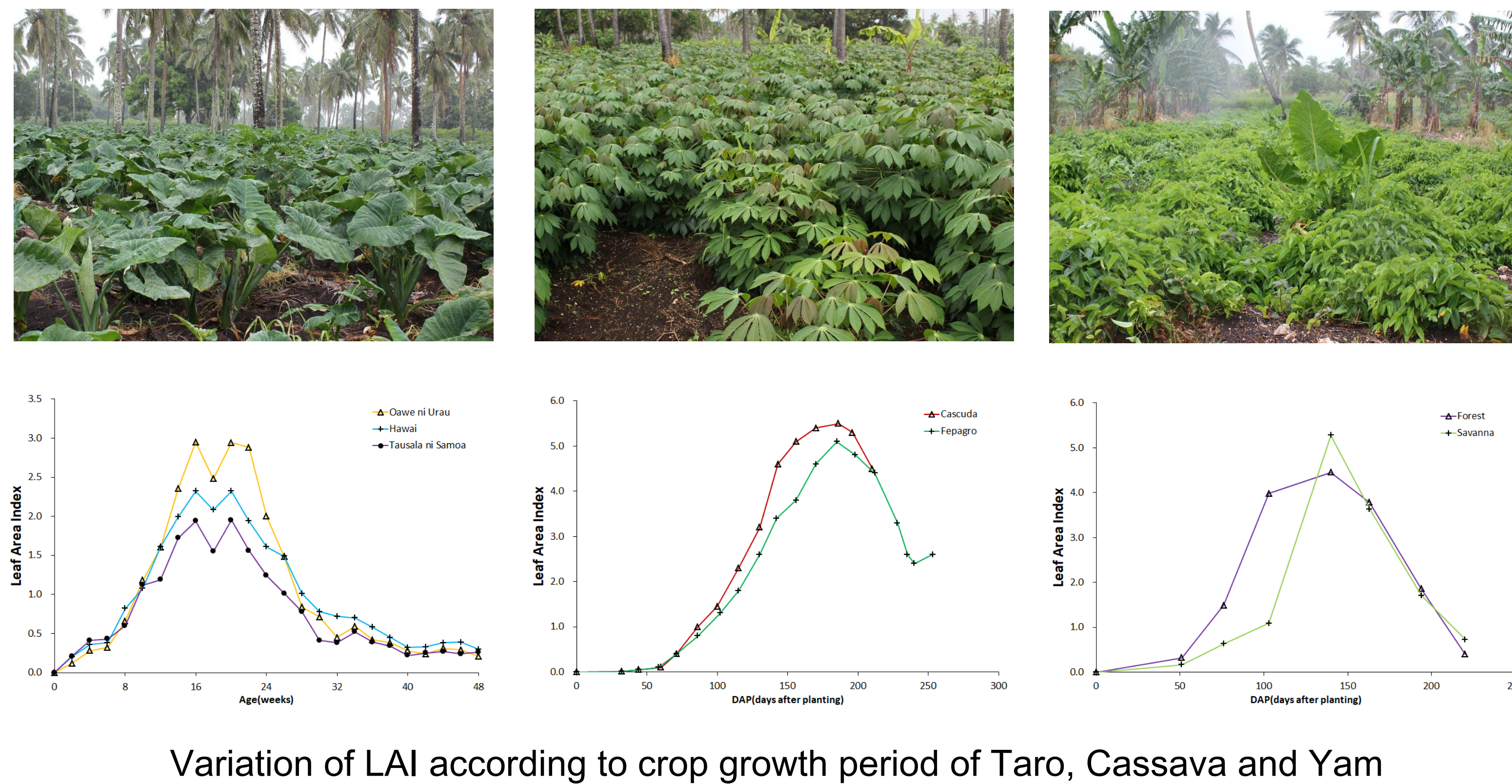
Introduction

Due to recent climate change and adverse climatic effects, the frequency and intensity of extreme events are increasing in various regions of the world. It is difficult for the Pacific Islands to secure sustainable water resources due to climate change, sea level rise, and El Niño / La Niña.

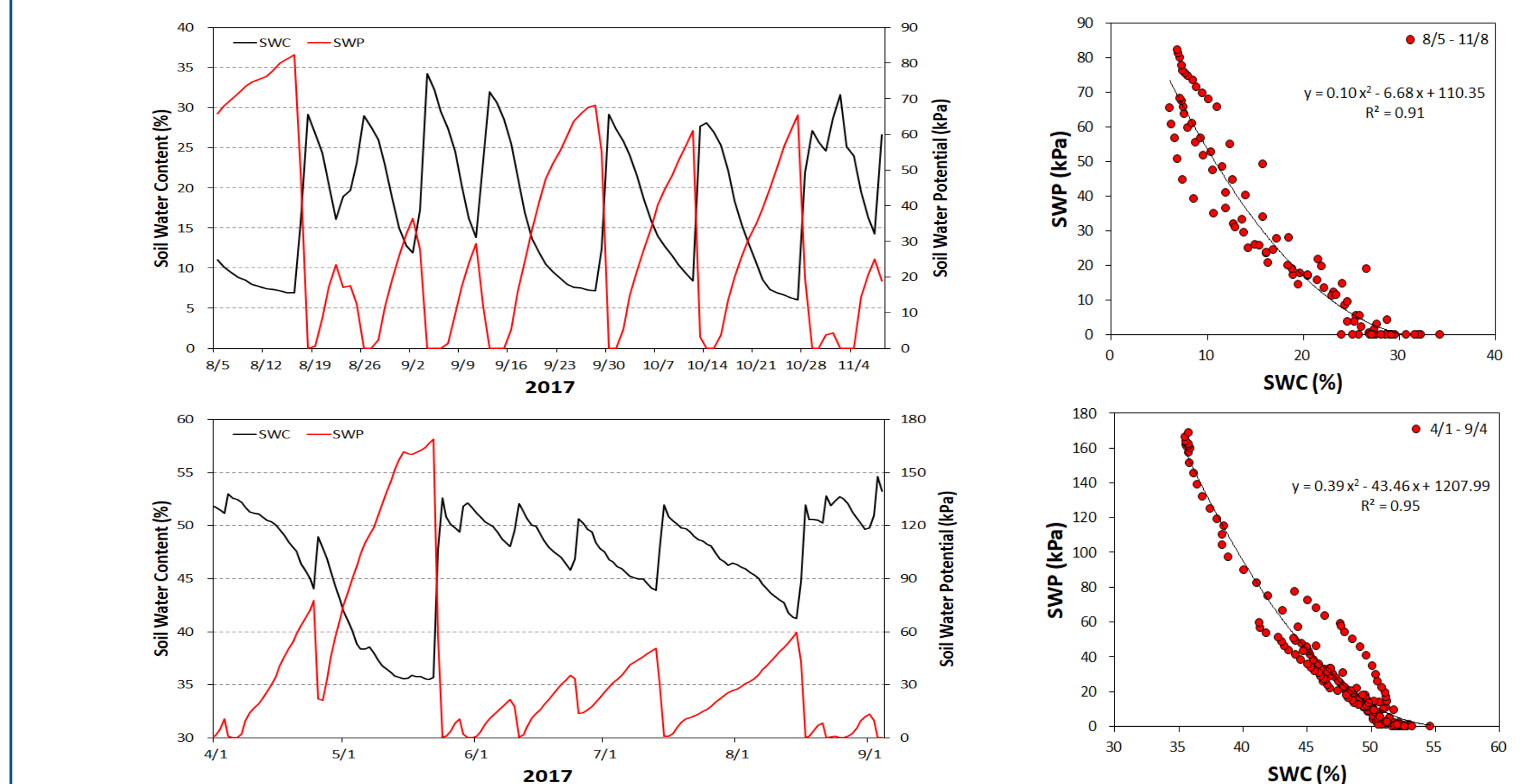
Because agriculture in Tonga is cultivating crops on the heavily cultivated land in almost all farms except for some commercial farmers, long-term drought will cause severe crop damage in most farms where irrigation facilities are not available.

Due to the actual El Niño impact from 2014 to 2015, severe droughts have occurred throughout Tongatapu Island and have severely damaged overall agricultural production. The Ministry of agriculture in the Kingdom of Tonga actively participated in and collaborated with APCC during the project.

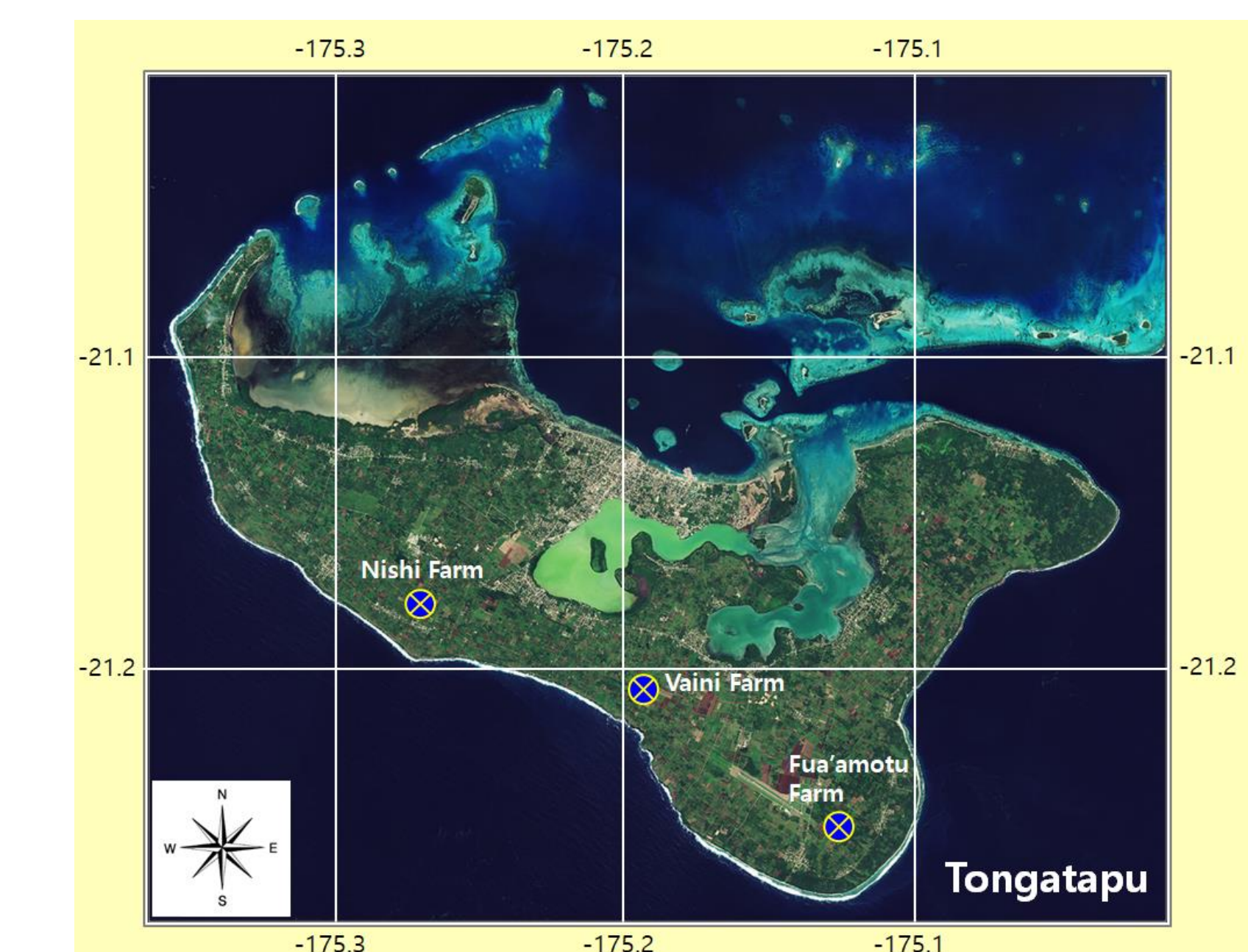
The soil water content(SWC) and soil water potential(SWP) sensors were installed in the crop cultivation area (Vaini Farm, Fua'amotu Farm) to monitor changes in soil moisture. And the Soil-Water-Atmosphere-Plant (SWAP) model has been used to assess the SWC at the observation sites.



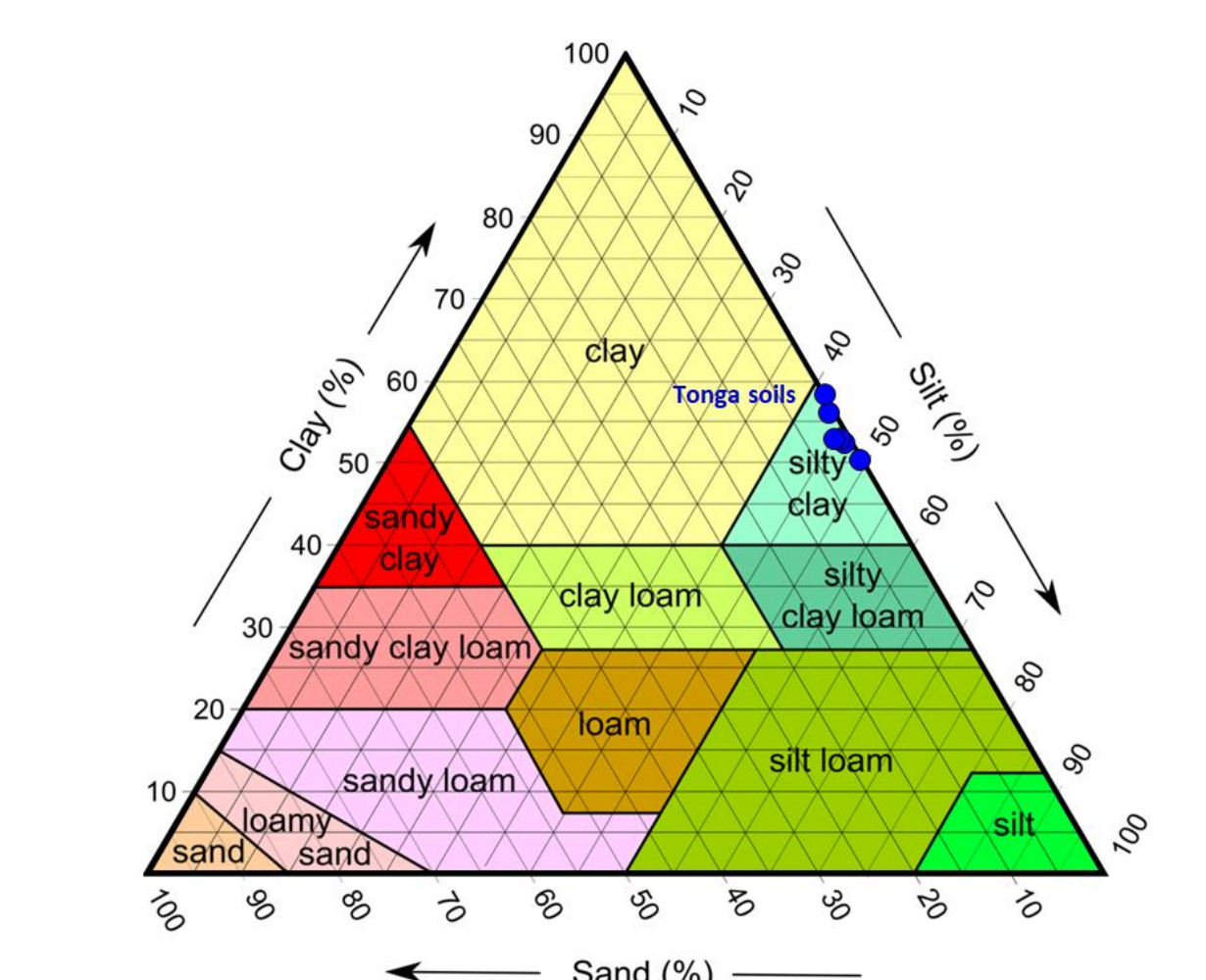
Results



Data (Soil-Weather-Crop)

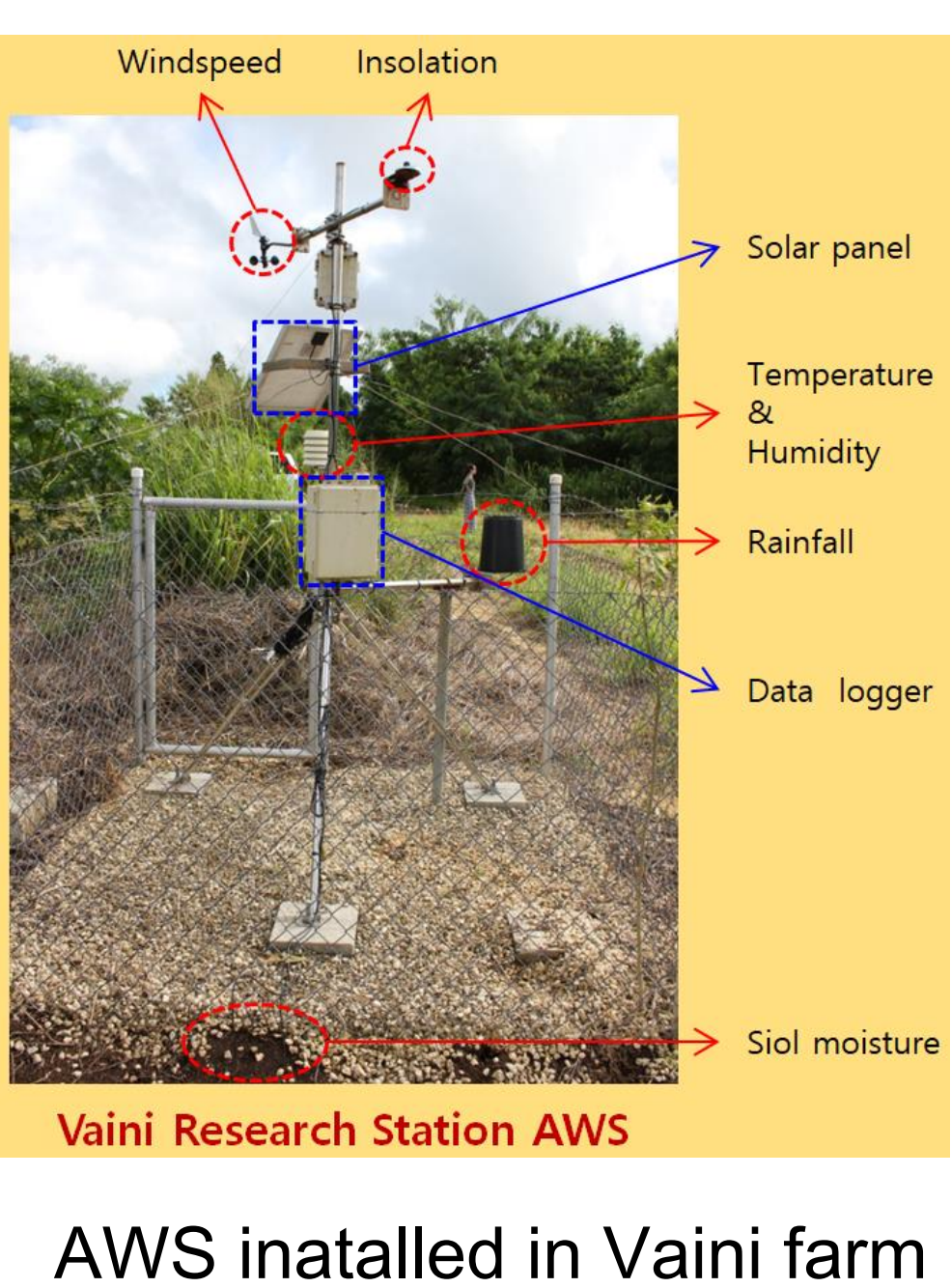
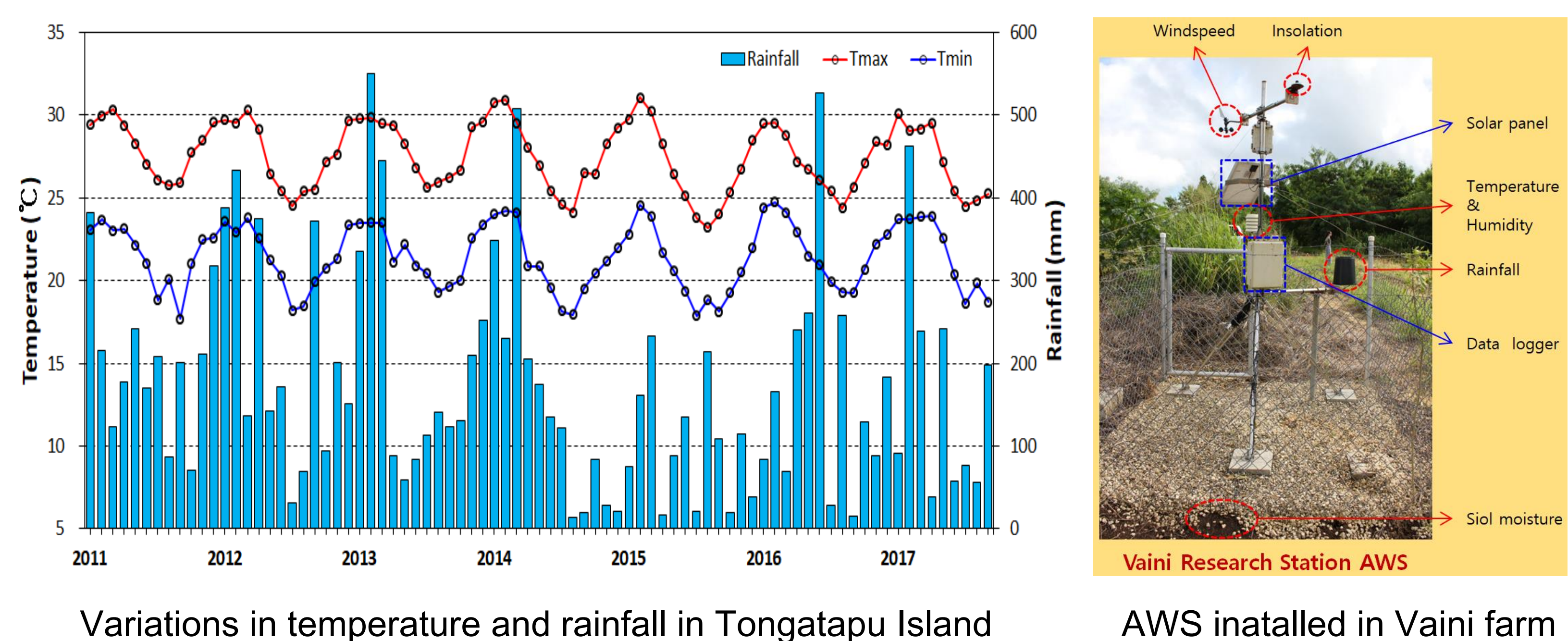


Installation points of soil moisture sensor



Soil type	Soil depth (cm)	Soil Texture (%)		
		Sand	Silt	Clay
Vaini	10-15	0.8	46.7	52.5
Fuaamotu	10-15	0.6	43.3	56.1
Nishi	10-15	0	41.7	58.3

Soil texture by particle size analysis

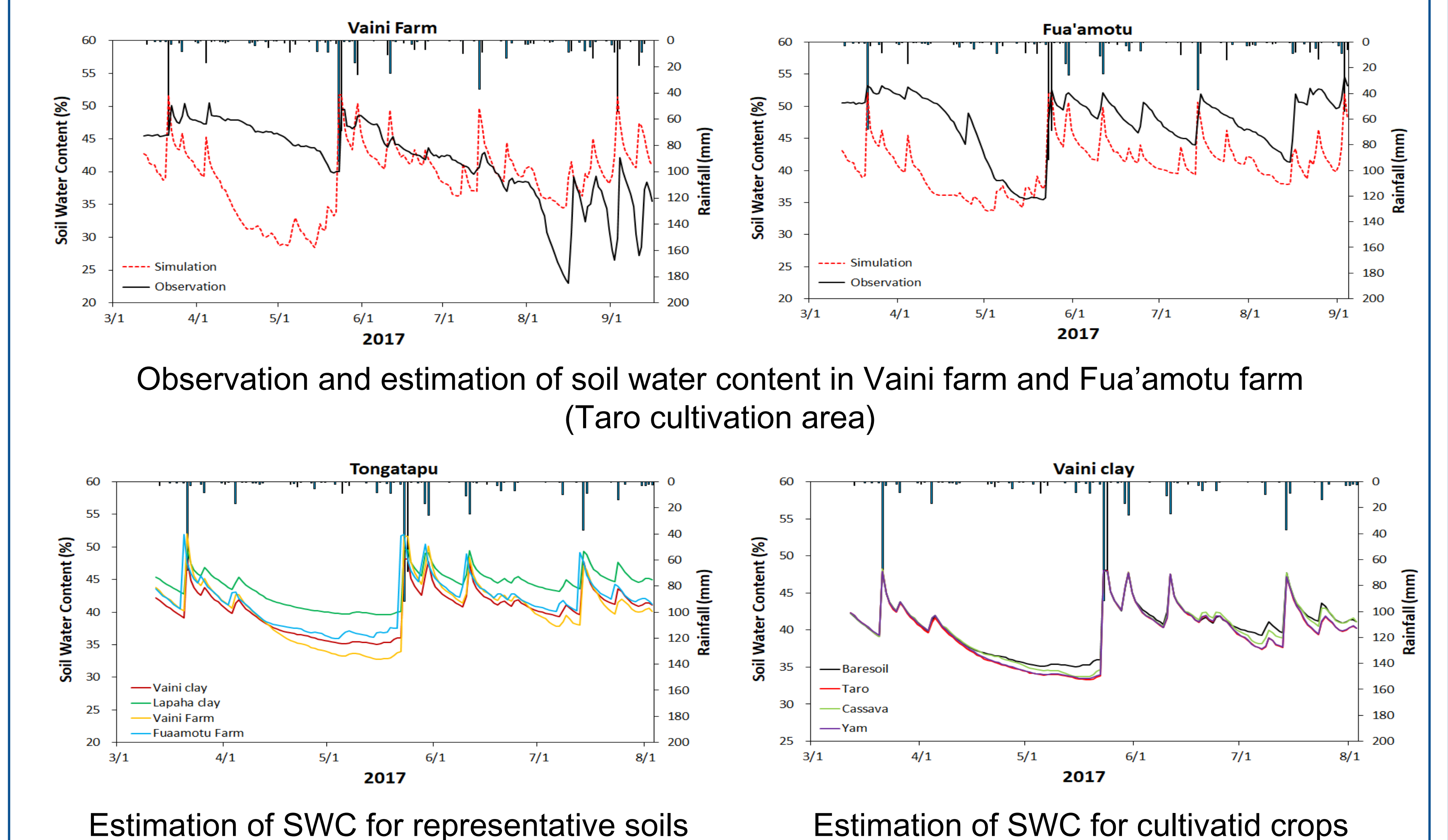
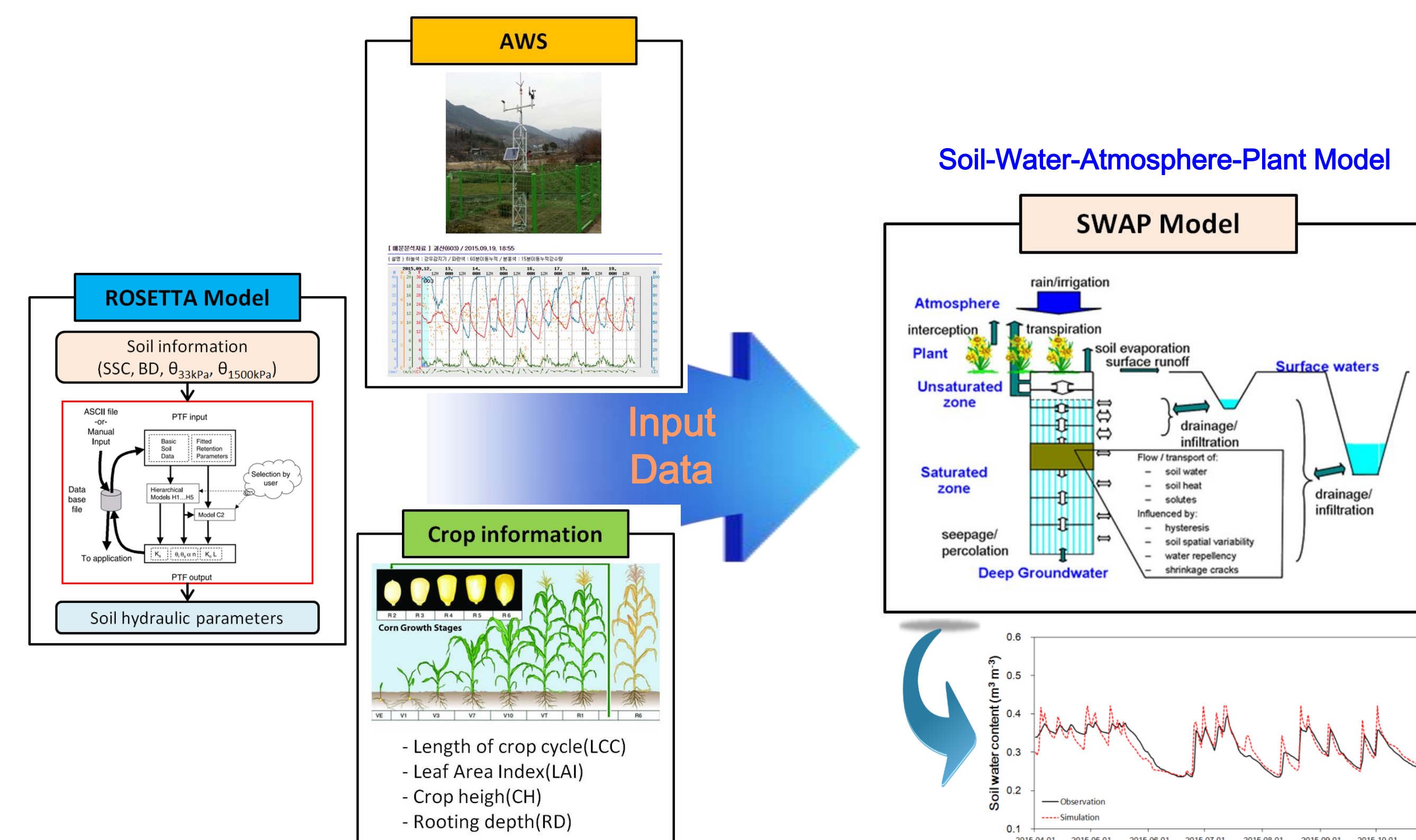


Methodology

Installation of soil moisture sensors in the Tongatapu Island



Simulation of soil water content



Summary

- The correlation between SWC and SWP in each cultivation area during the low rainfall period was linearly correlated with $R^2 = 0.9$ or more.
- Soil samples were collected and analyzed by sieve and hydrometric analysis tests and the results were input to the ROSETTA model to estimate the hydraulic parameters. Based on the physical characteristics of representing Tongatapu Island, and the growth information of Taro, Cassava and Yam, we constructed a soil water content model.
- Finally, we plan to build a smart water management system to prepare for the drought situation in Tongatapu Island.

Development of Climate Data Masking Interface Service based on Spatial Index Using PyWPS

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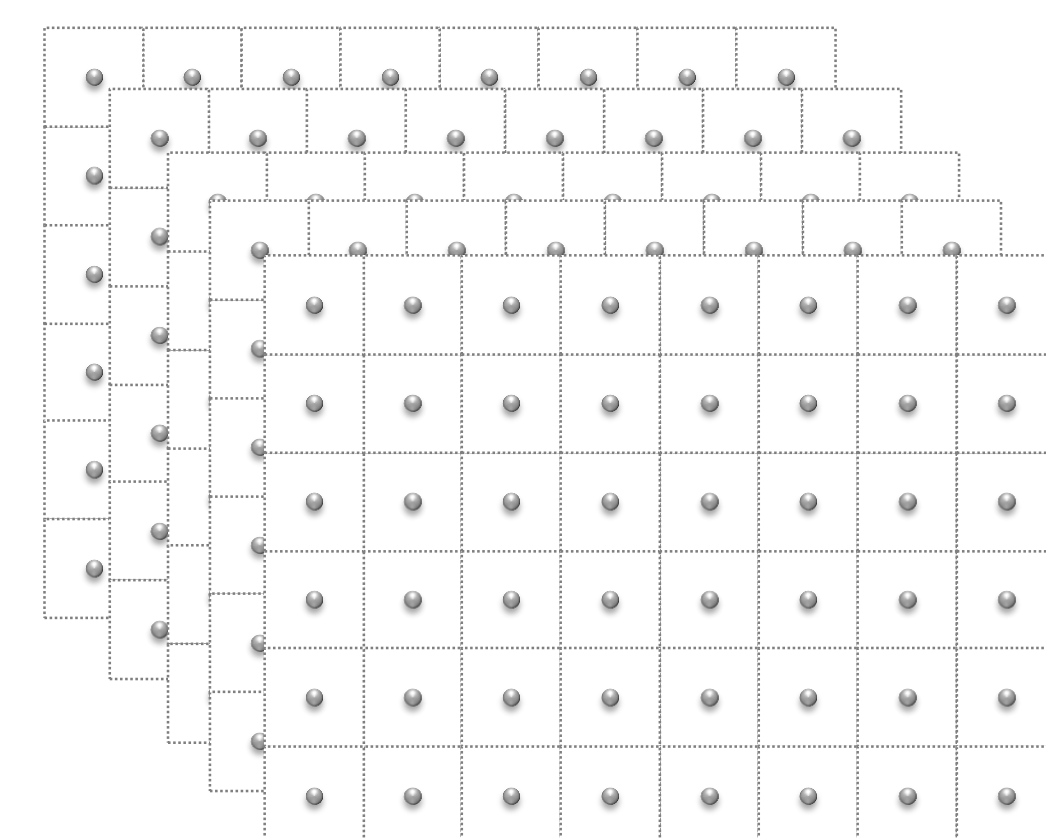
Introduction

- ✓ Recently, the use of global and regional climate data created by CF-NetCDF (climate and forecast – network common data form) is increasing to analyze and predict unusual climate events due to climate change
- ✓ CF-NetCDF is an OGC (Open Geospatial Consortium) standard and its metadata is written according to CF conventions
- ✓ The representative climate data written in CF-NetCDF format is CMIP5 (Coupled Model Inter-comparison Project Phase 5)
- ✓ Researchers generally use climate data extracted in the form of a rectangle that covers the study area
- ✓ The point-in-polygon algorithm is mainly used as a data extraction method. However, to extract elaborately climate data in a study area where has slightly indented terrain, such as national boundaries and rivers, is time-consuming, depending on the spatial resolution of the data, the extent of the study area, and the number of data
- ✓ Therefore, it is necessary to develop a new algorithm that can reduce computation time

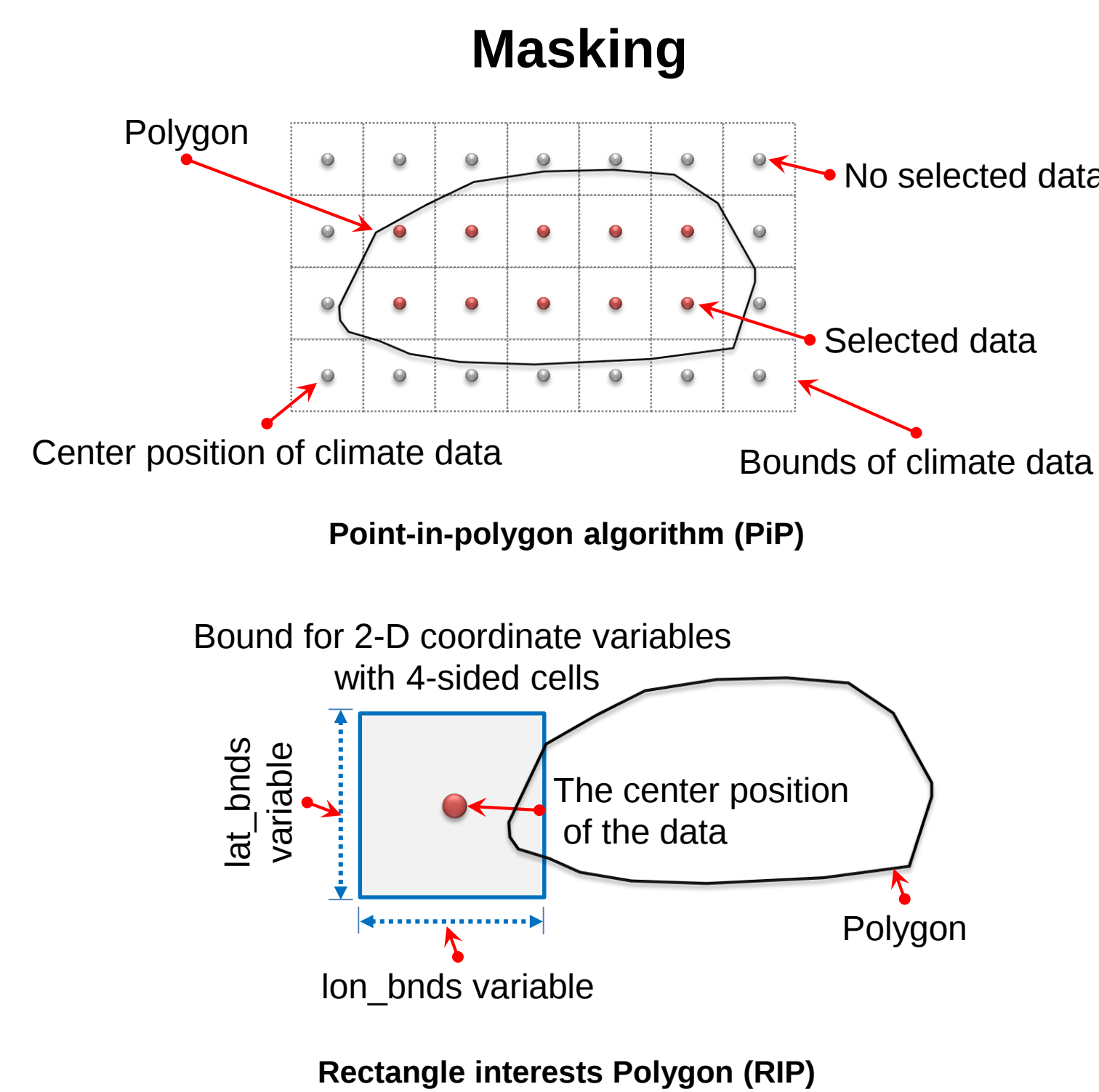
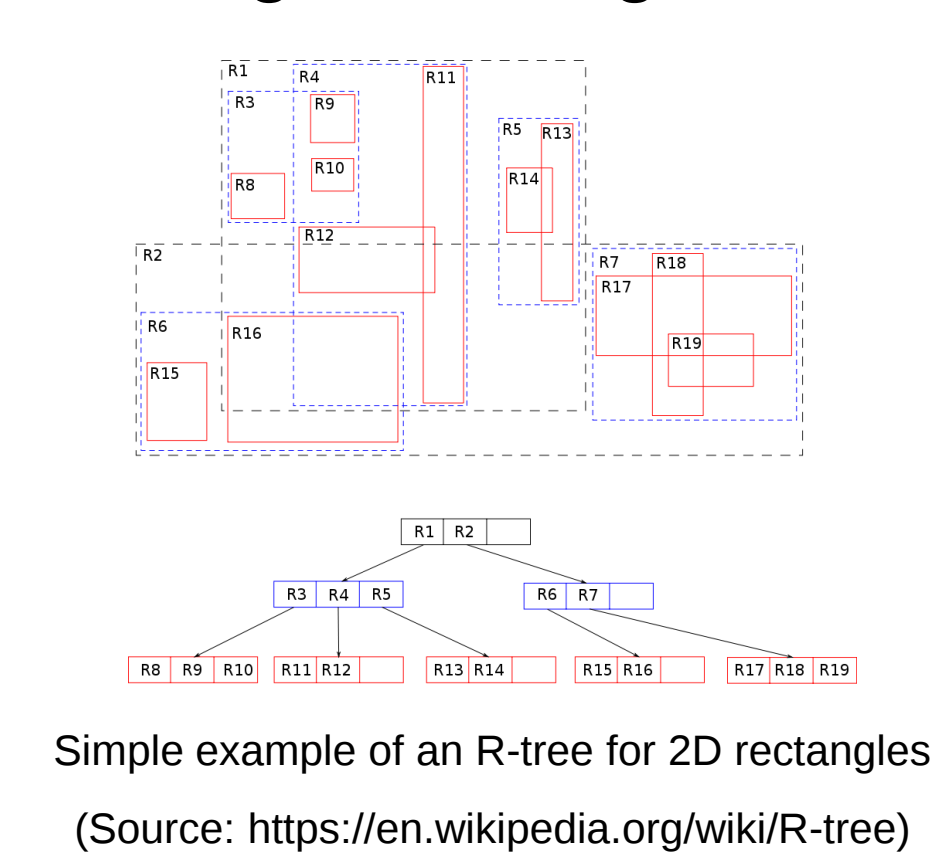
Method

■ Design of a masking algorithm based on spatial index

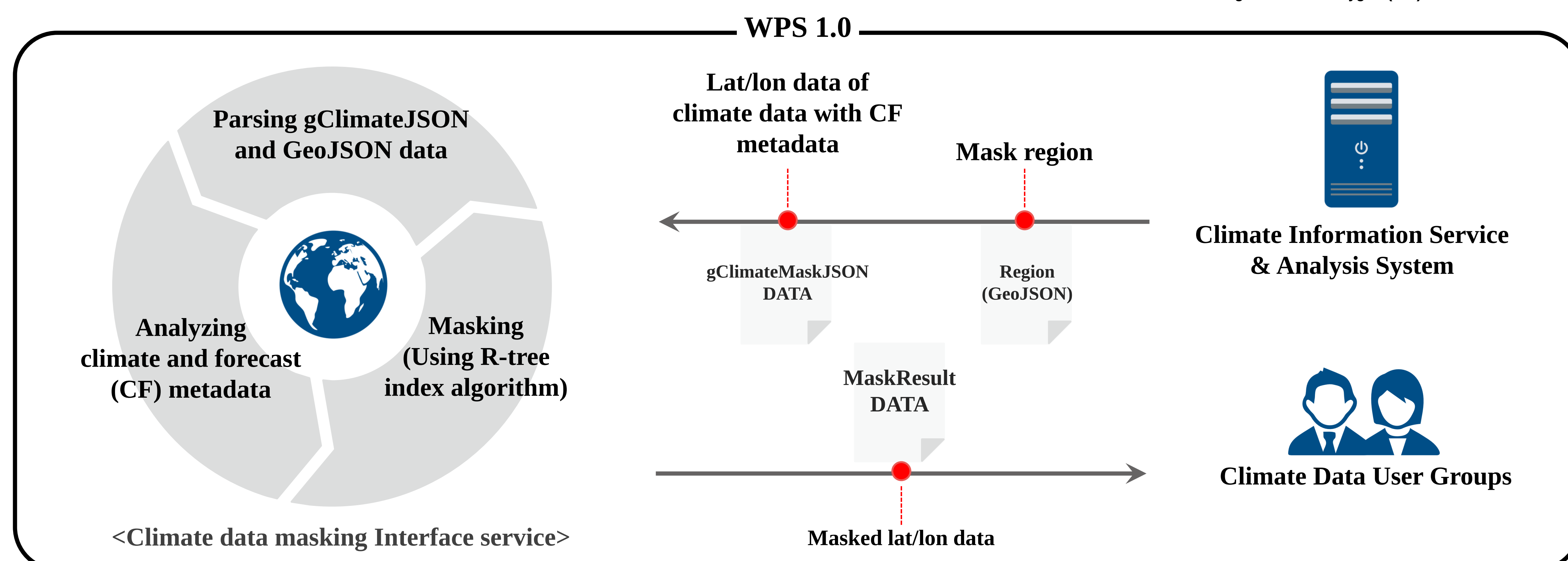
Generating lat/lon data with CF metadata from climate data



Generating spatial index using R-tree algorithm



■ OGC WPS-based Climate Data Masking Interface Service



■ Development Environment: CentOS 6.5 64bit, Python 3.6, PyWPS 4.0.0 and apcc 0.2.1 with Rtree 0.8.3 and shapely 1.6.2



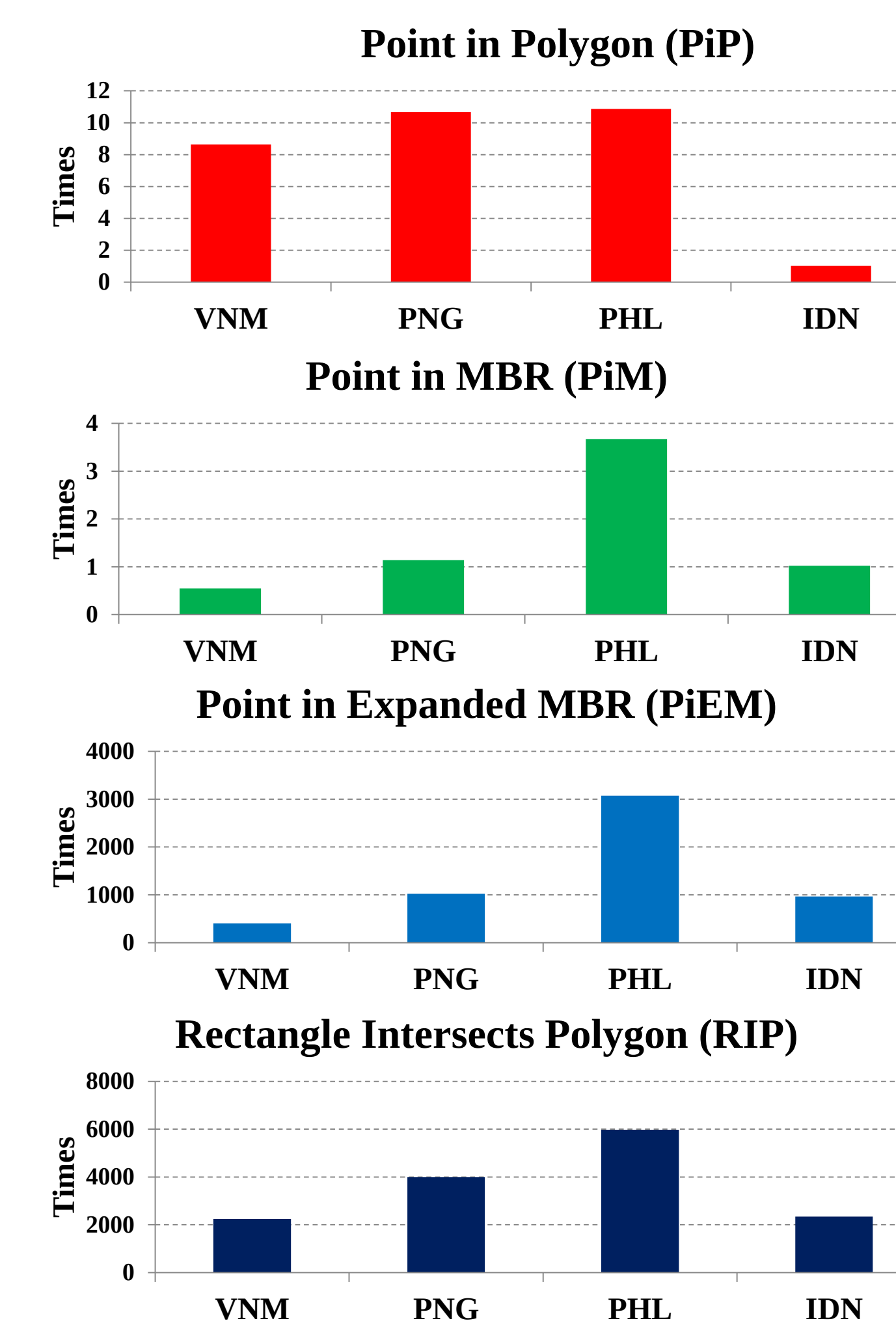
8-13 April, 2018
Austria Center Vienna (ACV), Vienna, Austria

Experiments and Results

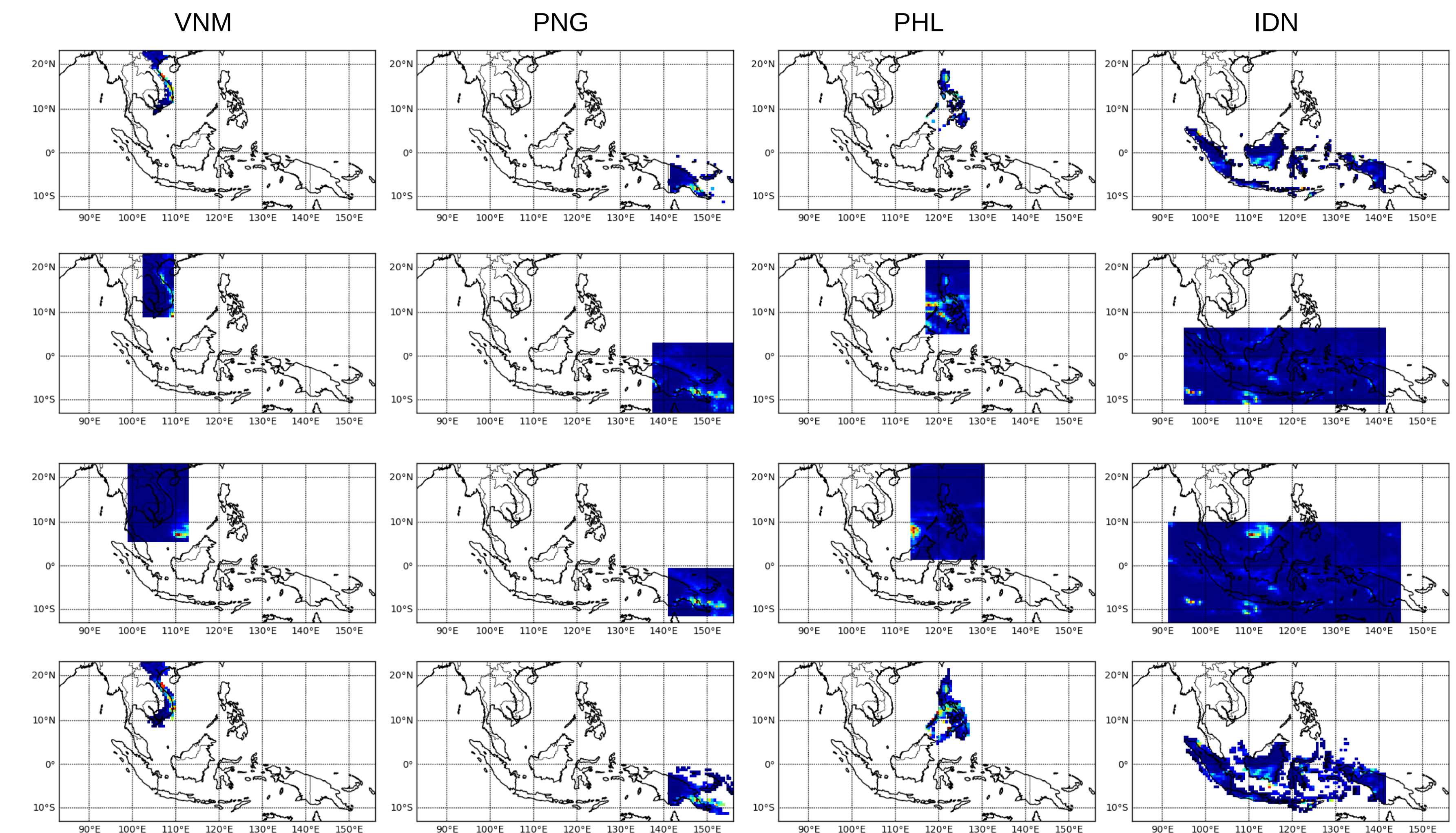
• Experiment setup

- **OS:** Centos 6.5 (final) 64bit **CPU:** Intel(R) Xeon(R) CPU E5606 @ 2.13GHz **RAM:** 32GB
- **Climate data:** CORDEX-SEA50 (SR: 50 km) downloaded from APCC Data Service System (<http://adss.apcc21.org>)
- **Test countries:** Vietnam (VNM), Papua New Guinea (PNG), Philippines (PHL), Indonesia (IDN)

• Computational performance



• Climate data extraction results



■ OGC WPS-based Climate Data Masking Interface Service

- Providing masking services with the improved algorithm as a part of OpenWPS service
- OGC WPS operation name:
 - OpenWPS:CP_MaskWithCF
 - OpenWPS:CP_MaskWithISO3166



<http://openwps.apcc21.org>

Conclusion & Remarks

- ✓ In this study, the improved masking algorithm with R-tree index algorithm was proposed. Also, OGC WPS (Web Processing Service)-based climate data masking interface service was developed using PyWPS with the proposed algorithm.
- ✓ The proposed algorithm showed faster performance than the extraction algorithm without spatial index algorithm.
- ✓ The OGC WPS-based climate data masking interface service developed using the proposed algorithm can be used as an important part in developing real-time climate data analysis system that requires fast computational performance.
- ✓ Also, the proposed algorithm can be used for extracting not only climate data, but also environmental data effectively.

ACKNOWLEDGEMENTS

This research was supported by APEC Climate Center