Study of AIoT Weather Forecast System Technology in Thailand

Research Project Kick Off 14-02-2020

Envision
digital

Agenda

Presenter/Host	Topic	Venue	Begin
Dr.Sucharit	Welcome Introduction	Meeting Room	09.00
Henry Tay/ Dr.Tony Song	Open and Introduction Project Overview - Project Schedule - Team Organization - Domain Setup	Meeting Room	09.20
Dr.Sum Xiangming	Numerical Weather Prediction Model Setup	Zoom Conference	09.40
All	Tea Break	Meeting Room	10.30
Henry Tay	Discussion	Meeting Room	10.40
All	Lunch		12.00
Dr.Lin Miao	Machine Learning Technique for Weather Forecast	Zoom Conference	13.00
Henry Tay	Discussion	Meeting Room	14.00
All	To Do Action List	Meeting Room	14.45

Content

- Team Introduction

- Project Schedule

- Atmospheric modelling progress

- Machine Learning Plan and Solution

- Communication Protocol

- First Workshop Date

# Envision Project Organization Chart
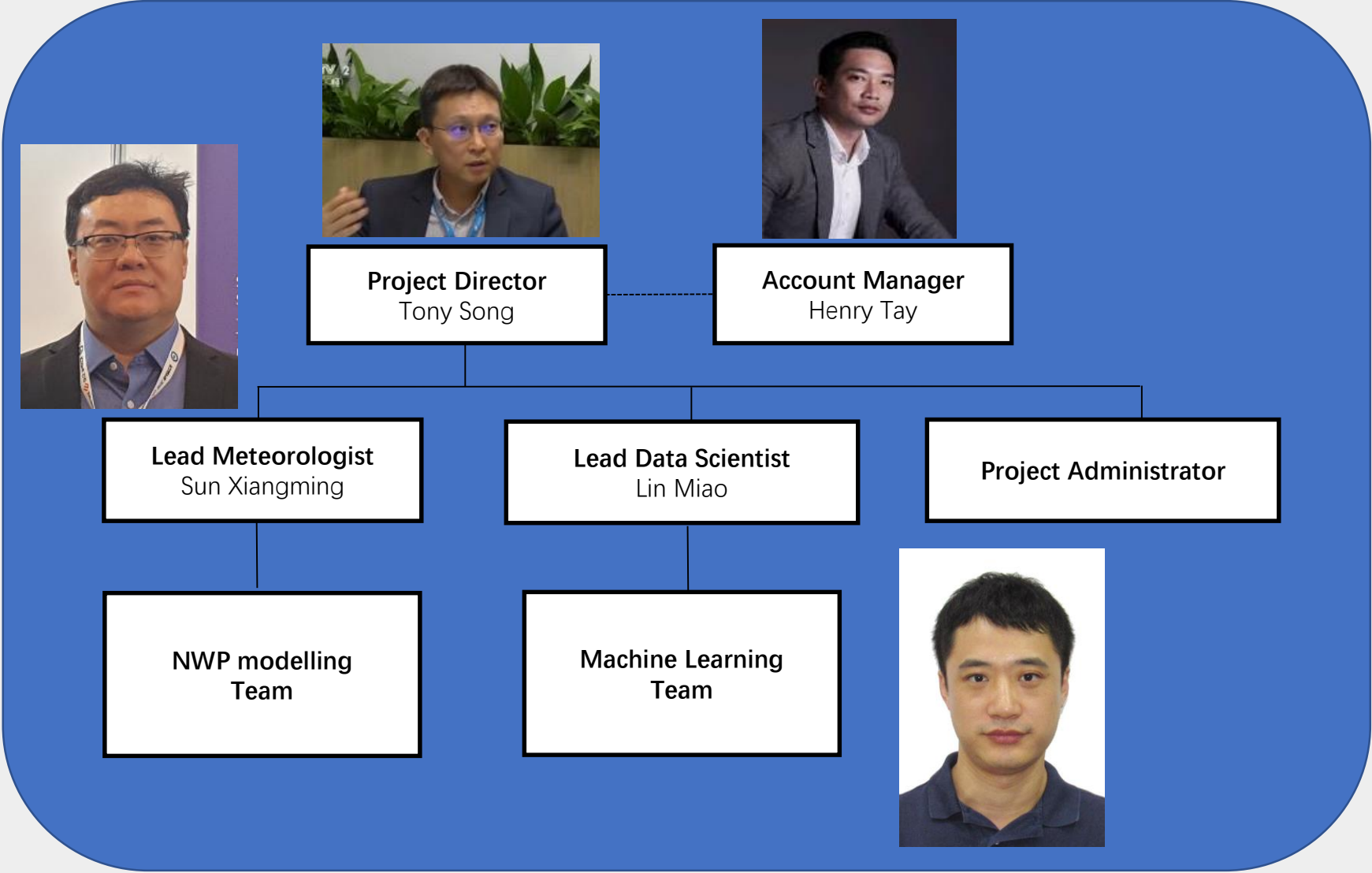
Project Schedule

ID	AIoT Weather Forecast System Project Schedule	Duration	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Proposed Overall Schedule	360 days	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
2	Kick Off Meeting	1day	■																	
3	Dynamic downscaling the NWP data to 1km by 1km Resolution and compare and share the results monthly starting from 2nd month.	180 days	■	■	■	■	■	■												
4	Applying machine learning algorithms to the calibrated NWP data for further improve the accuracy. The result will be compare and share monthly. An User Interface will also be developed to visualize the weather forecast data.	180 days							■	■	■	■	■	■						
5	Deliver operational forecast data for 6 months.	180 days													■	■	■	■	■	■
6	Final Report with Recommendations	1 day													■	■	■	■	■	■
7	Final Meeting and Future Roadmap	1 day															■			■

Month

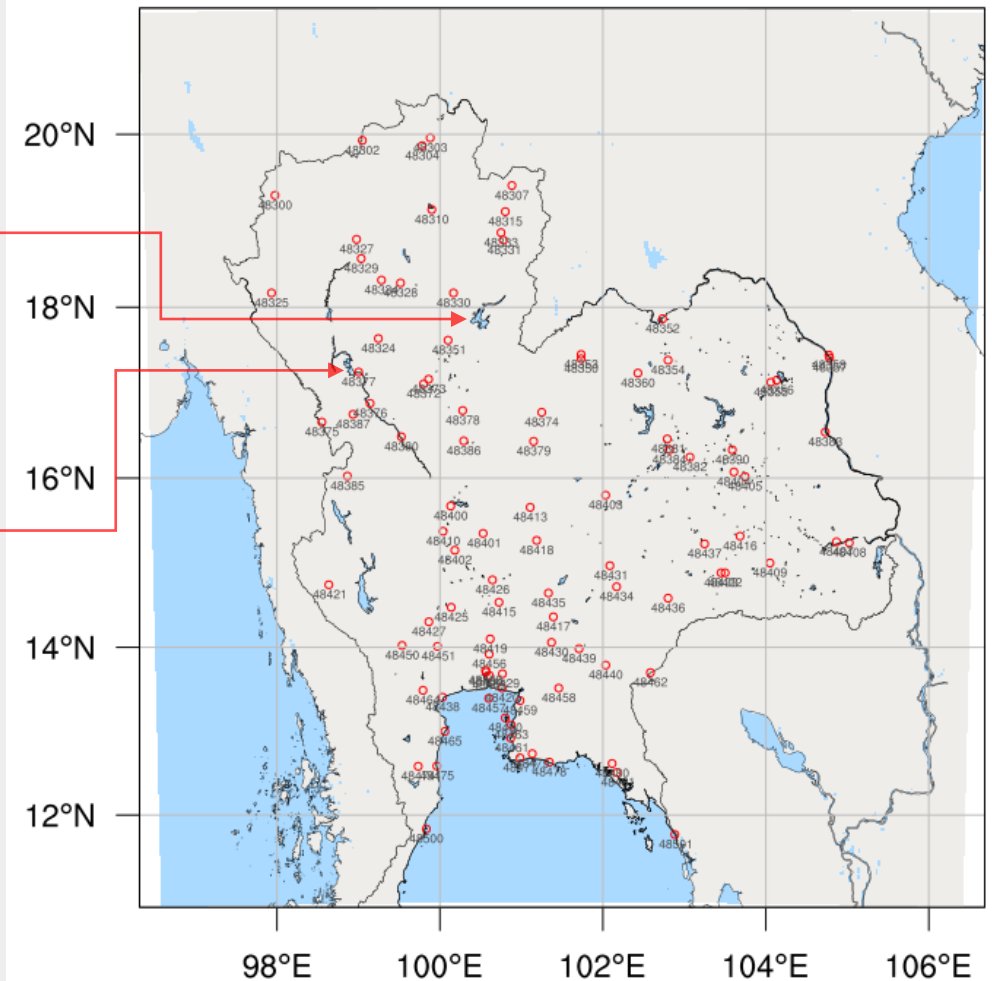# Atmospheric Model Domain

Whole Thailand Domain Running in real-time
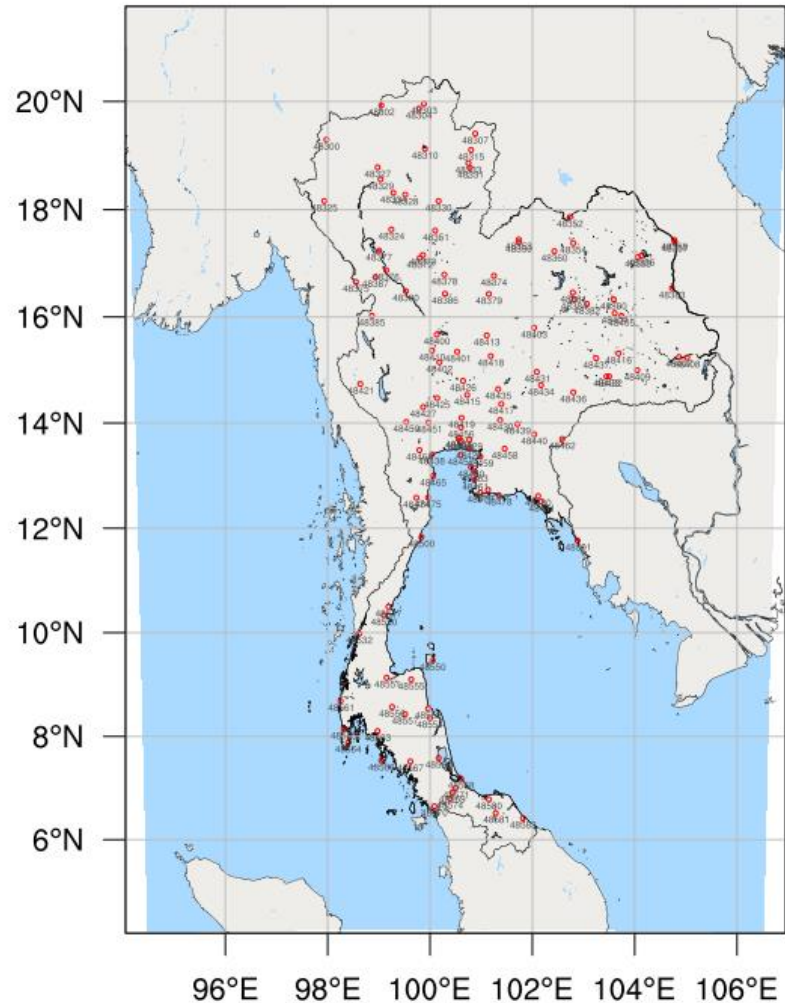
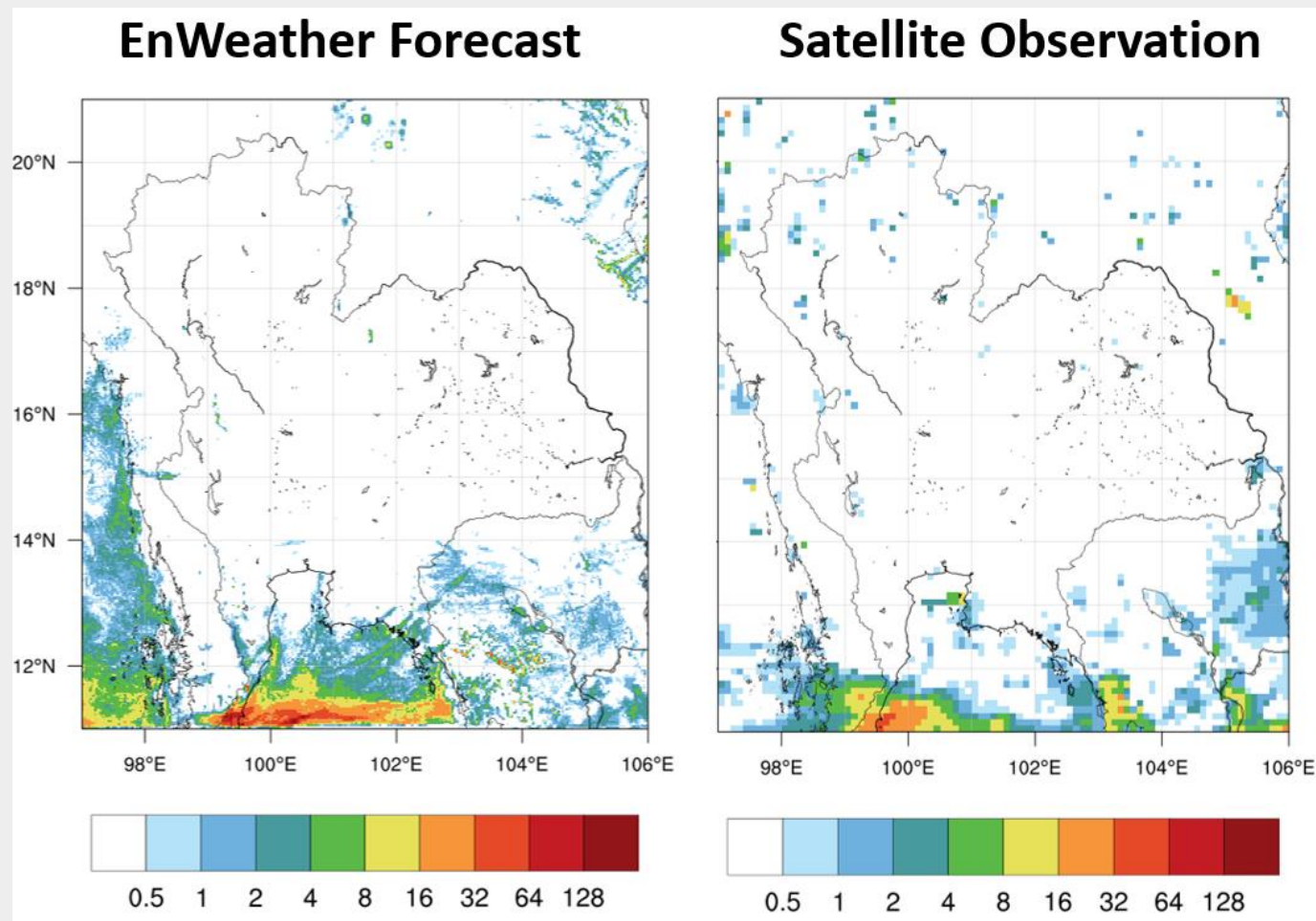North Thailand Domain under optimization

Sirikit

Bhumibol

Atmospheric Model Optimization

1. More than 5000 experiments need to be tested using 24,000 cores

2. Model physics optimization

3. Model seasonal optimization

4. Utilize observation from AIoT platform, Uni. Chulalonkorn and/or TMD)

Preliminary Results

Drought Simulation Comparison
Accumulated rainfall 15 Nov – 1 Dec 2019

EnWeather Forecast   Satellite Observation

Machine Learning Development Timeline

p1   Preparation: observation data, weather pattern analysis, prepare first workshop

p2   Build *temperature* forecast model pipeline

p3   Build *humidity* forecast model pipeline

p4   Build *rainfall* forecast model pipeline and evaluate/tune *temperature/humidity* model

p5   Build *wind* forecast model pipeline and evaluate/tune *rainfall* model

p6   Evaluate/tune *wind* model

p7   Optimize models for a particular area / region

1	2	3	4	5	6	7	8	9	10	11	12

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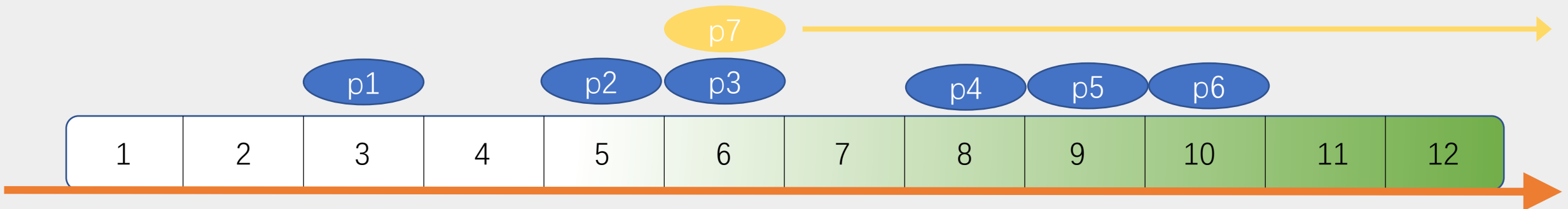
Observation Requirement

Weather attributes	Learning target	Periods	Frequency	Properties
Rainfall	Station	At least 1 year	Hourly / 3 hourly	Small coverage, accurate
	Radar image	At least 6 months, L3/L2/ Image format	5 minutes / 15 minutes	Large coverage, whole domain, less accurate
	GPM			Self-collected, less accurate than Radar
Temperature	Station	At least 1 year	Hourly	
Humidity				
Wind				

Communication Protocol

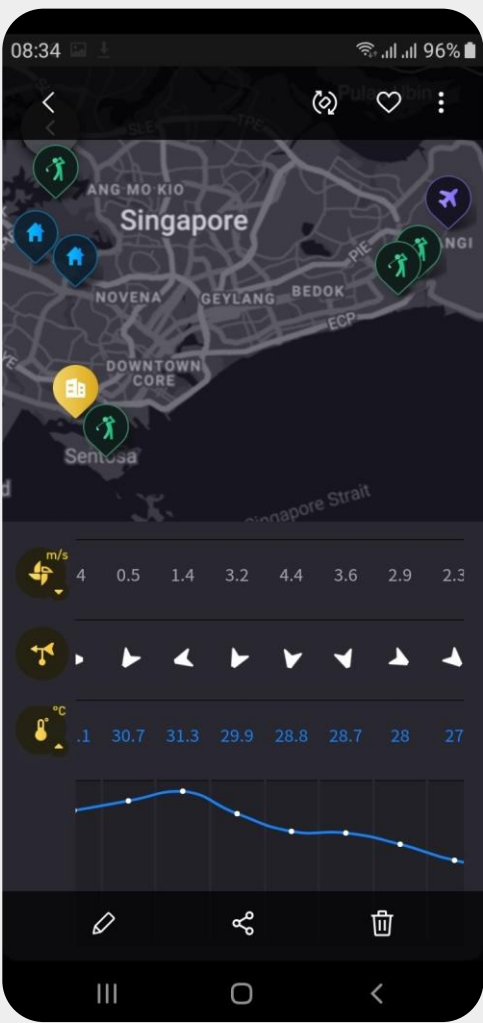Communication Methods: LINE, Email, Zoom Meeting

- Downscaling – Sun Xiangming, xiangming.sun@envision-digital.com

- Machine Learning – Lin Miao, miao.lin@envision-digital.com

- General / Commercial matters   – Henry Tay, henry.tay@envision-digital.com

        – Tony Song, guiting.song@envision-digital.com
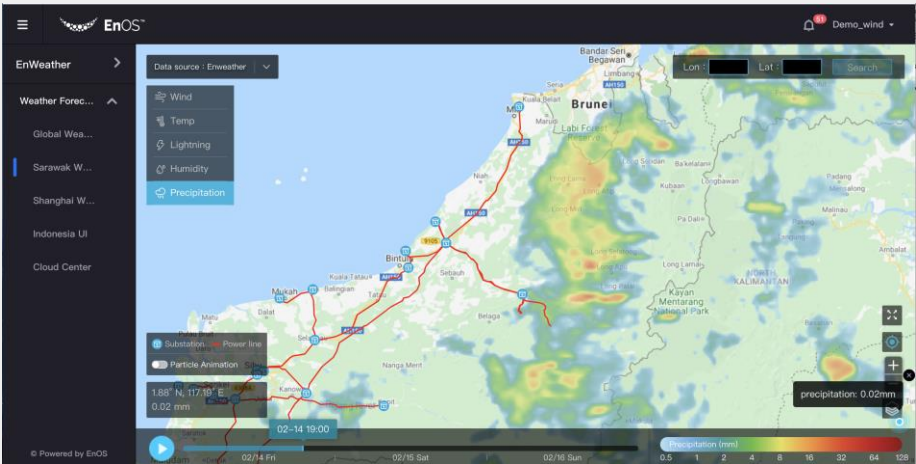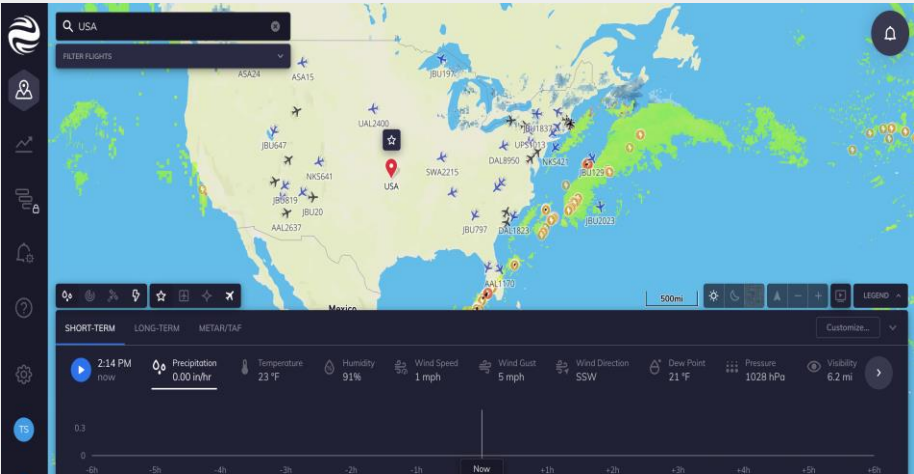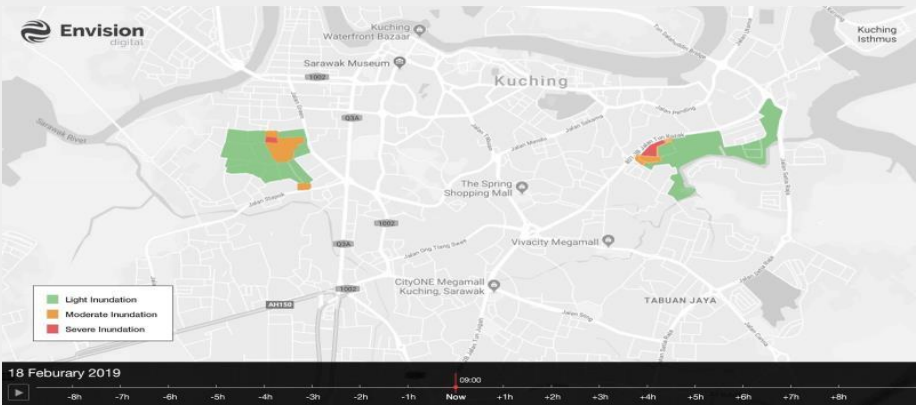
Thank You

Open Discussion

Co-develop Application

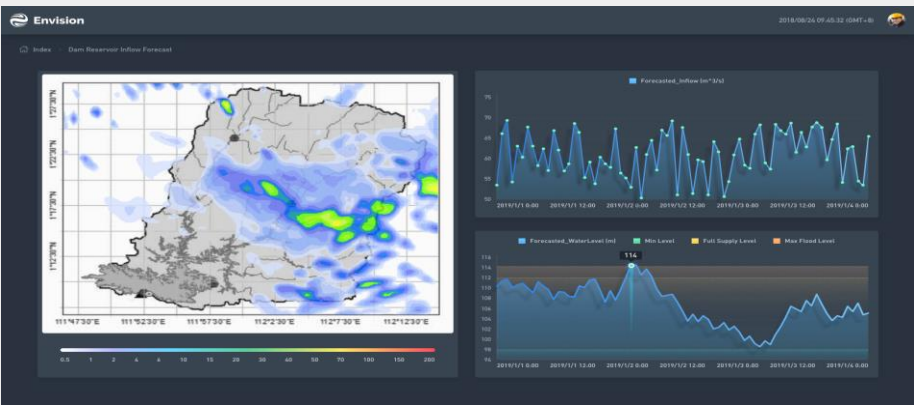## Mobile App

Reservoir and Grid

Aviation

Flash Flood

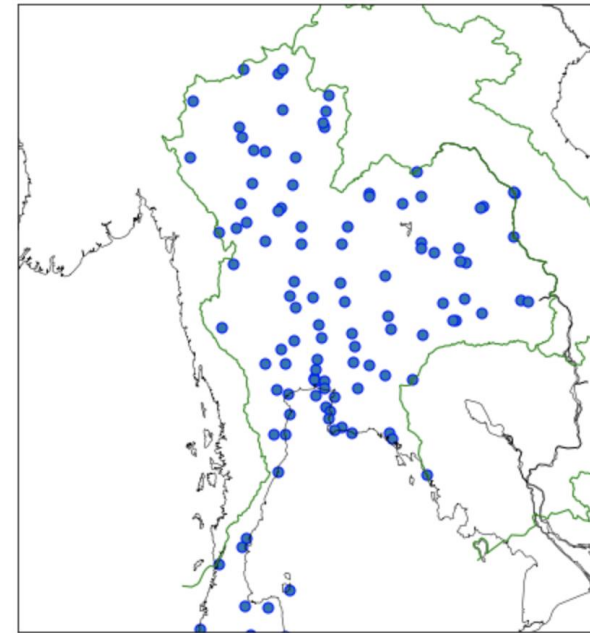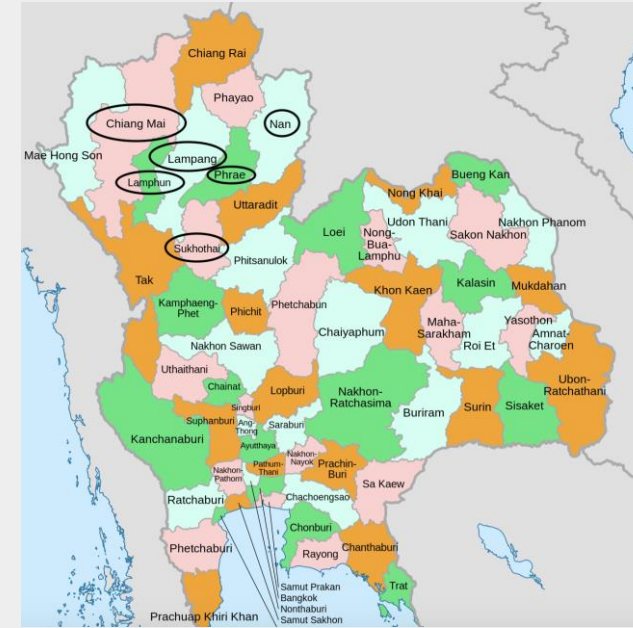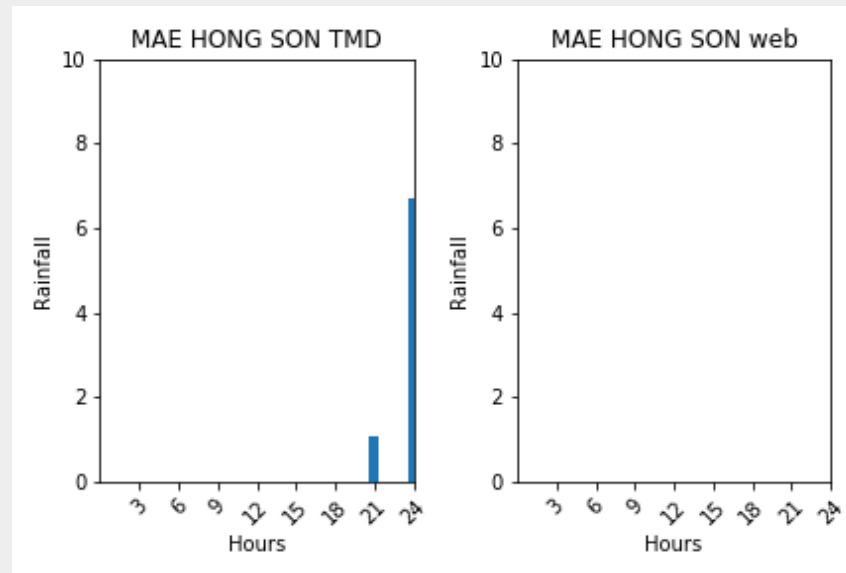## Hydro Energy

Publication or Patent

Observation Problem

3 years and hourly historical observation are expected: station and radar

Observation TMD VS Web

Dam observation

2019-12-28 TMD vs web

ftp & Internet

ftp a bit slow for big volume data

api need to be tested

Real-time Comparison?

AIoT Weather Forecast Technology Workshop Agenda
Morning Session (930am to 12pm)

Begin	Topic	Presenter / Host
0930	Opening and Introduction	**Henry Tay** Regional Manager
0945	AIoT Weather Forecast Technology Overview	**Tony Song** Director, Weather Solutions
1015	Numerical Weather Prediction Model	**Sun Xiangming** Lead Meteorologist
1100	Tea Break	
1115	Meteorological Data Processing	**Sun Xiangming** Lead Meteorologist
1200	Lunch Break	

AIoT Weather Forecast Technology Workshop Agenda
Afternoon Session (1pm to 5pm)

Begin	Topic	Presenter / Host
1300	Session Recap	**Henry Tay** Regional Manager
1315	Downscaling	**Sun Xiangming** Lead Meteorologist
1400	Machine Learning Techniques for Numerical Weather Forecast - Part 1	**Lin Miao** Lead Data Scientist
1500	Break	
1515	Machine Learning Techniques for Numerical Weather Forecast - Part 2	**Lin Miao** Lead Data Scientist
1615	Discussion	**All**