

 Met Office



WCSSP Southeast Asia

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Overview

Project started in 2016, initially with Philippines and Malaysia, with Indonesia starting in 2018.

Vietnam have signed a letter of intent and are expected to join imminently.

Thailand have agreed to initiate a scoping study (if successful they would join in 2020)

Strong focus on weather timescales and high impact weather with links from global through to convective permitting models



Global scale science

Regional scale science

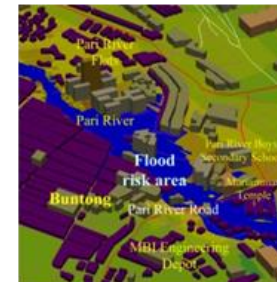
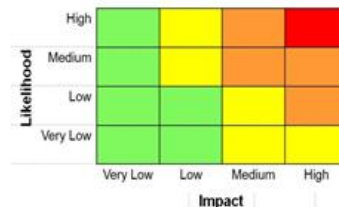
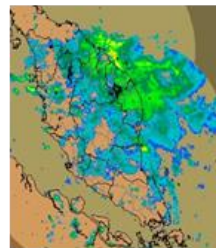
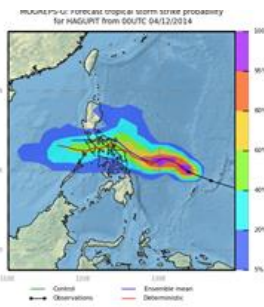
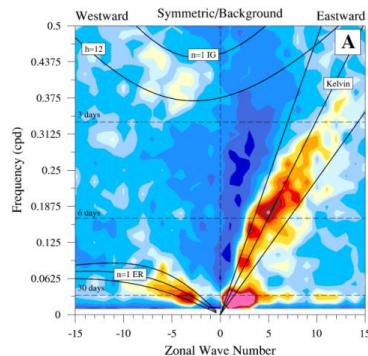
Translation into services

Understand the key meteorology of the region -> **improve models**

Understand models' skills -> **develop products and tools**

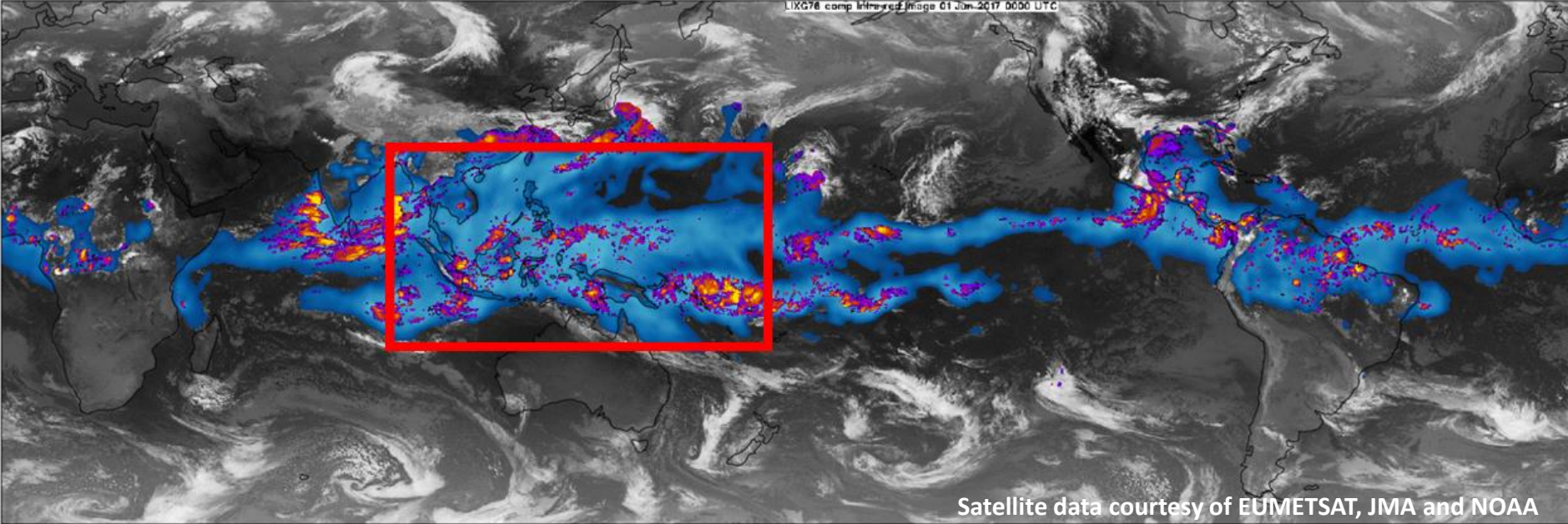
Learn best forecasting methods -> **improve methods and advice**

Understand stakeholder needs > **develop forecasts to meet users needs**



The 'Maritime Continent' – the heat engine of the tropics

L1XG76 comp 14hrs of image 01 Jun 2017 0000 UTC



Satellite data courtesy of EUMETSAT, JMA and NOAA

An excellent “laboratory” for weather and climate science

A region where our science can make a difference - save lives and livelihoods



A regional project with
U.K. partners



WCSSP Southeast Asia Partners



Global Scale Science

L1XG76 comp retrieved image 01 Jan 2017 0000 UTC

Enhancing UK-Southeast Asia science collaboration and partnerships

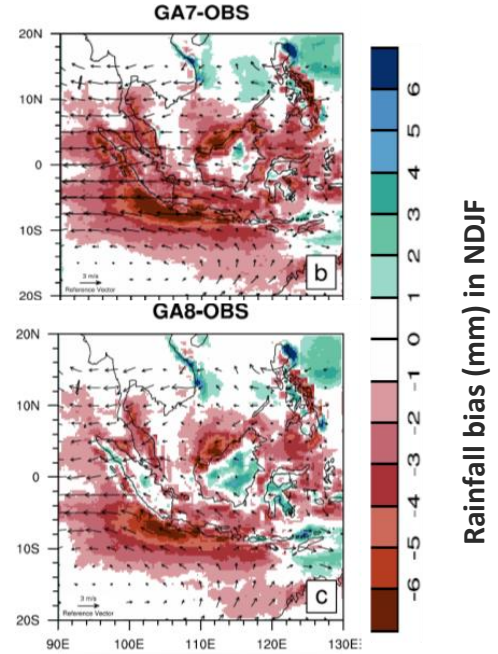
Understand large-scale processes and how they modulate local weather

Development of evaluation metrics for global models.



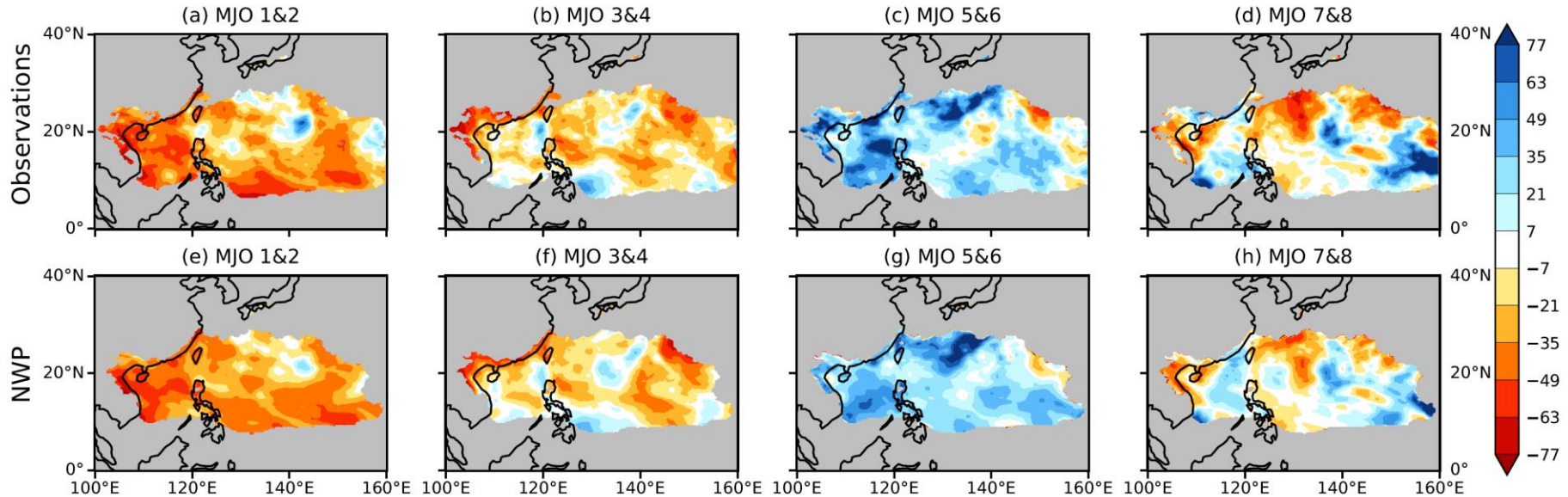
Global Scale: achievements so far...

- Four collaborative papers submitted on cold surges and their interaction with the MJO, tropical cyclones prediction and the importance of air-sea coupling for TC's. Others in preparation.
- Development of an equatorial wave dataset made available for ongoing research.
- Collaborative work on model evaluation with the UK and other Unified Modelling partners.
- Strong interaction of all three SE Asia partners with UK science community - Met Office and UK Academia



Some incremental improvement in rainfall over land in the region

Madden-Julian Oscillation impact on Tropical Cyclone precipitation



Contribution of TC-related precipitation, composited over 6- or 7-day forecast windows whose first day was in either of the MJO phases

Regional Scale Science



Enhance UK-
Southeast Asia
science collaboration
and partnerships

Regional modelling
and evaluation over
Southeast Asia
including ensembles

Collaborative case
studies and model
comparisons

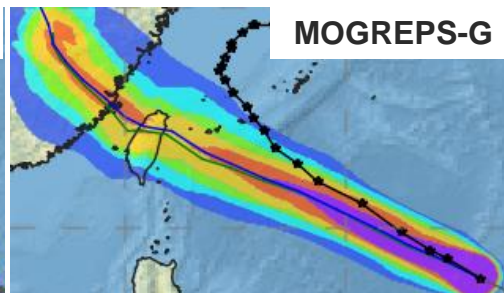
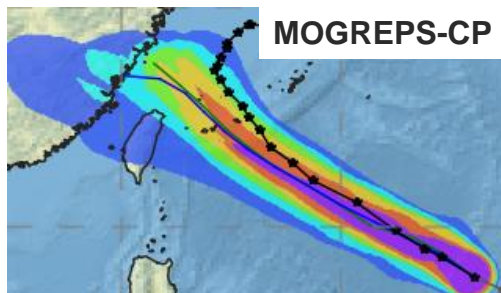
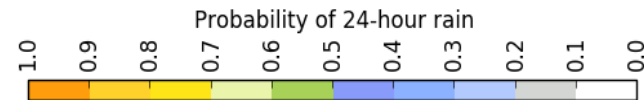
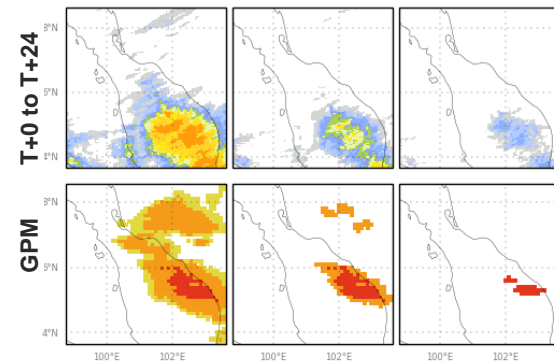


Regional Scale Science: achievements so far...

- Convective scale model (deterministic and ensemble) running in real time twice a day.
- Development of a 'warm-start' system to improve short-range predictions without DA.
- Initial development of convective DA system over region for future joint research.
- Driving model evaluation work:
 - UM vs EC – driving WRF and UM

Total rainfall in 24 hours up to 00z 28 Nov 2017

>50 mm > 100 mm > 150 mm



Translating science into forecasts and advice

Enhance UK-
Southeast Asia
science collaboration
and partnerships

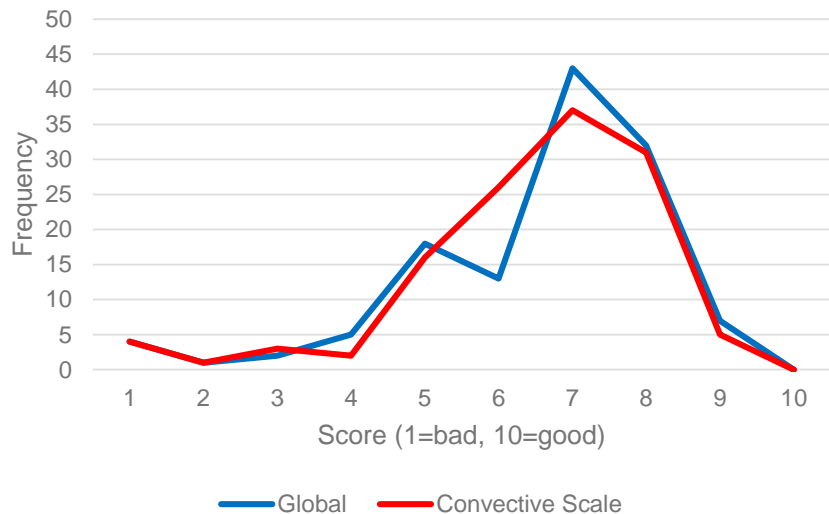
Improving tools and
products for
forecasting and
model evaluation

Improving high-
impact weather
forecasting



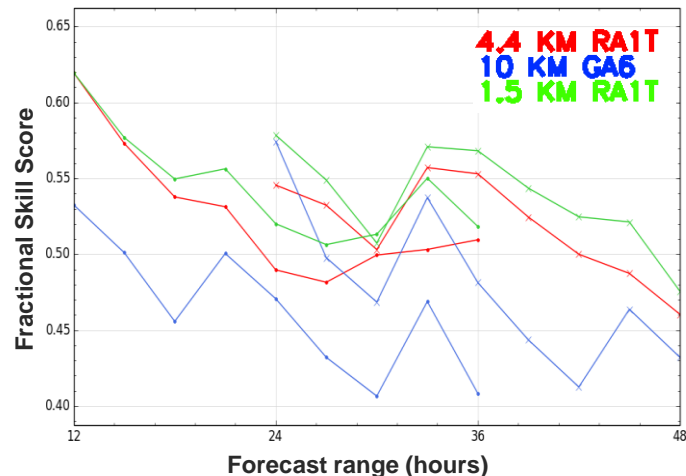
Why do we need to ‘translate science into forecasts and advice’?

Did the UM highlight key HIW areas?



Based on 104 surveys compiled by PAGASA forecasters between May and October 2017

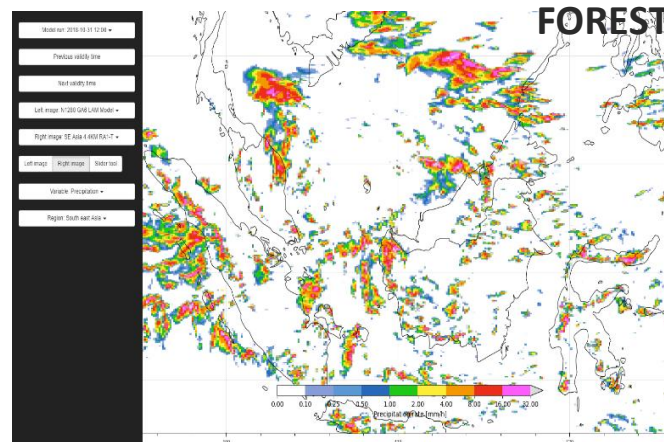
250 km 95th percentile



Timeseries of the 95th percentile fractional skill score (FSS) for a 250 km length-scale

Translating science into forecasts and advice: achievements so far...

- Forecaster led evaluation of models and tools
 - Workshops developing guidance on interpreting models.
- FORTIS: Advanced tropical meteorology training
- FOREST: A proto-type toolkit for model evaluation
 - Running on Amazon Web Services.
- Improved model evaluation products
 - Simulated himawari-8 satellite imagery from model output.
 - Water vapour and cloud top height evaluation using satellite observations.
- Sharing knowledge on impact based forecasting
 - IBF workshops held in each country



What is Impact Based Forecasting?

Conveys the impact of a hazard, or multi-hazards, to either an individual or community at risk

Examples:

- forecasting the possible impact of rainfall on *road users* during *rush hour*, or the impact on *passengers* of *closing an airport* due to strong winds.
- These could be done in a **subjective way** working alongside transport customers, or in an **objective way** through developing an impact model using vulnerability and exposure datasets as well as meteorological information.

Likelihood	High				
	Medium				
	Low				
	Very low				
		Very low	Low	Medium	High
Impact					



Progress in IBF

- First 'Introduction to IBF' Workshops held in each country in 2017-18
- Creation of 'impacts tables' that describe, for a given weather event, what the effects are for different sectors
- Each country working towards a road map for the development and trialling of an IBF system during WCSSP pilot studies
- Currently, in-country stakeholder workshops are being run, and preparations for pilot studies within the next 6 months



IBF Training in the Philippines,
March 2018

 Met Office



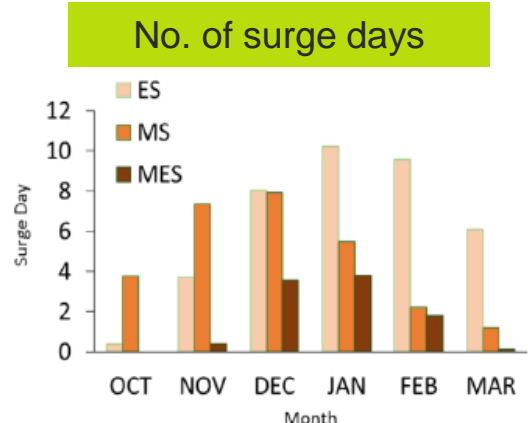
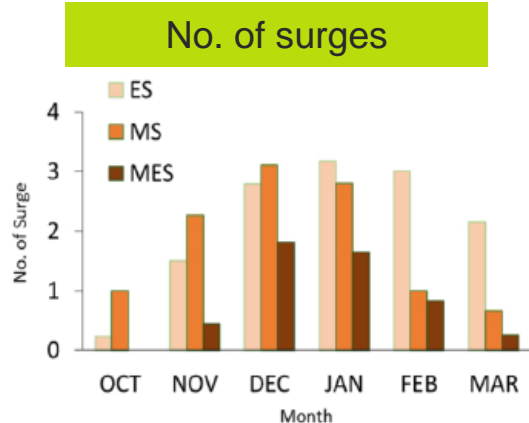
Malaysia Highlights

Mr. Muhammad Helmi Abdullah
Deputy Director-General (Operations)
Malaysian Meteorological Department

WORK PACKAGE 1- Global Scale Science

Details of work

A large part of the synoptic variability in the tropics is due to propagating disturbances moving parallel to the equator. Thus the main work in WP 1 is focused on identifying these waves and the role of Equatorial Waves in Modulating High Impact Weather Events



Occurrence of Meridional and Easterly Surges and Their Impact on Malaysian Rainfall during Northeast Monsoon: A Climatology Study, Fadilla et. Al, RMetS, 17 August 2019

<https://doi.org/10.1002/met.1836>

Current progress

- Visit by MET Malaysia's Officer Mr. Diong)National Centre for Atmospheric Science (NCAS) at the University of Reading from 11 – 28 February 2019.
- Two Case Studies based on 2 extreme events as part of the cross-cutting research are being conducted. These events are driven by the following monsoon surges: 1) 1-3 January 2018 – easterly surge 2) 9-12 January 2018 – 9-12 Jan (Cold Surge)

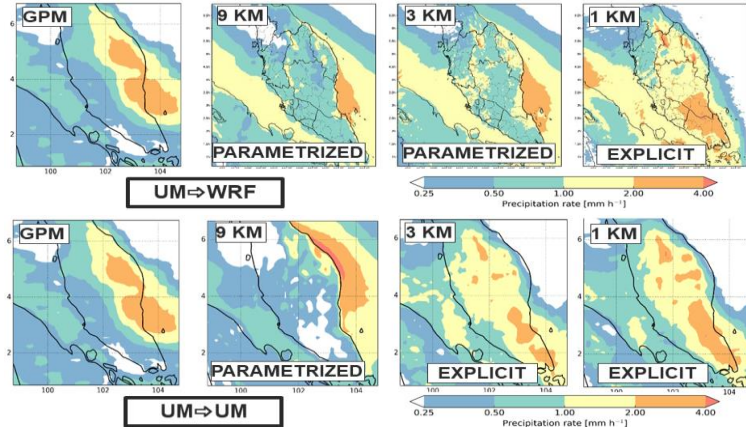
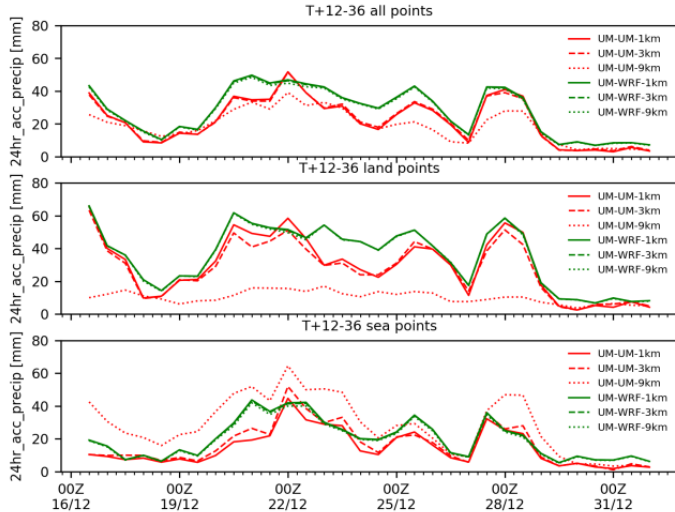


WORK PACKAGE 2 - Regional Scale Science

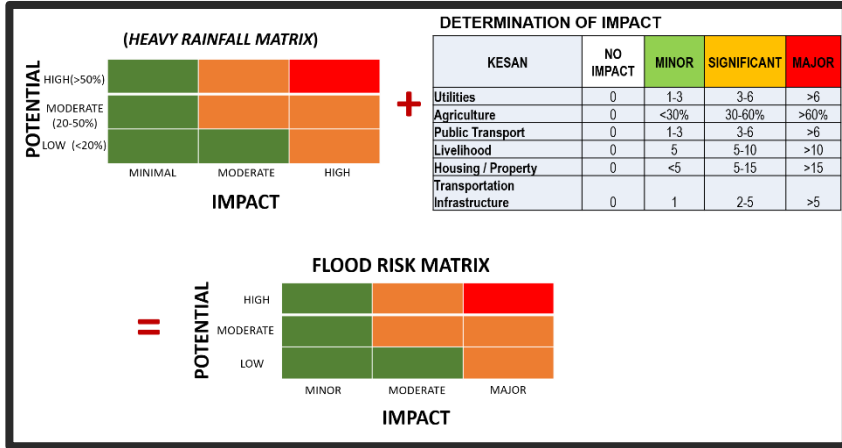
Details of work

- Cold surge event from Dec 2014
- 4-way comparison between GFS-WRF, UM-WRF, UM-UM and EC-UM
- 18-day case study period to assess model performance
- 2 Meridional Surge events occurred in this period, 15th and 25th of December and the 29th of December to the 2nd of January

Driving Model	Nested Model	Representation of Convection			Models Run
		9 km	3 km	1 km	
GFS	WRF	parametrized	parametrized	explicit	Met Malaysia
UM	WRF	parametrized	parametrized	explicit	Met Malaysia
UM	UM	parametrized	explicit	explicit	UKMO
ECMWF	UM	parametrized	explicit	explicit	UKMO

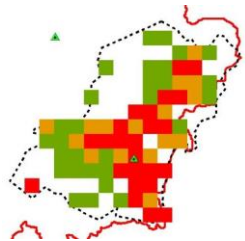
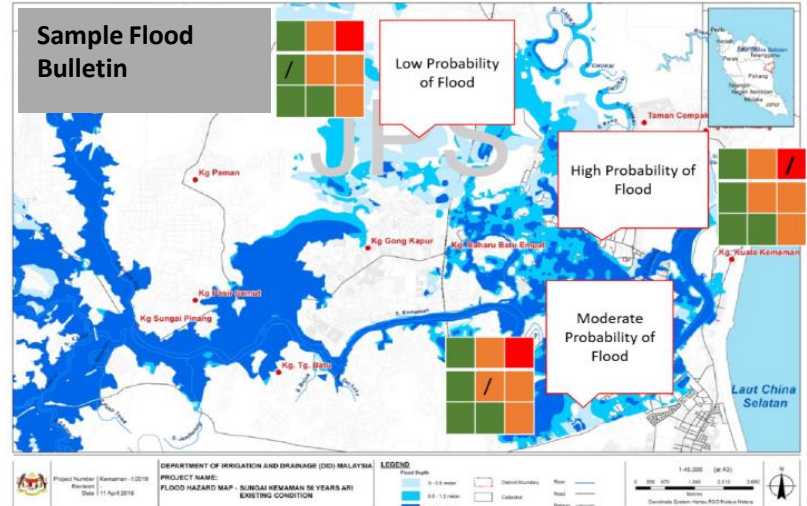


WP3: Translating science into forecasts and advice



IMPACT POTENTIALS

- MINOR:** Localised flooding affecting roads and low-lying areas; Impact to private properties; Minimal impact to road users and daily activities.
- MODERATE:** Moderate impacts to the community, transport and infrastructure
- MAJOR:** Widespread flooding bringing about major impact to a large; percentage of the population involving large scale evacuation. This includes all infrastructure and properties



Study was conducted based on a 100km² downstream of the Kemaman river basin based on 2,5 and 10-year ARI. The rainfall period used are 12, 24, 48 and 72 hours accumulated rainfall.

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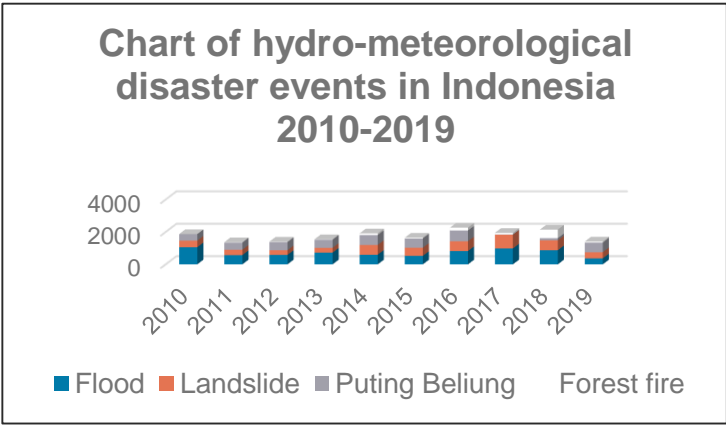
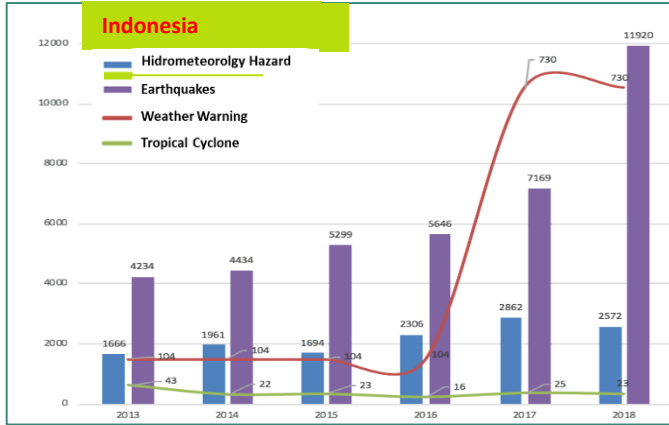
Indonesia Highlights

Prof. Dwikorita Karnawati

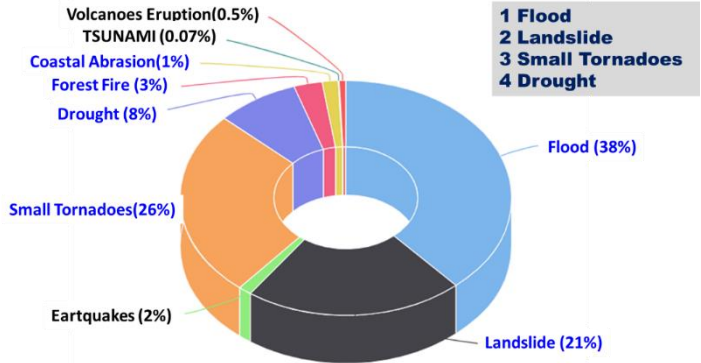
BMKG, Indonesia

BACKGROUND

NATURAL DISASTER STATISTIC IN INDONESIA



	LOMBOK EQ 07/2018	SULAWESI EQ & TSUNAMI 09/2018	SUNDA STRAIT EQ & TSUNAMI 12/2018	INDONESIA EL NINO 2015
deaths	564	2.101	429	~20
injuries	1.886	4.338	1.485	~100.000 (respiratory problem)
relocated	11.510	221.450	16.082	... (mills?)
loss & damages	1.3 Bn US\$ (0.1% GDP)	1.21 Bn US\$ (0.1% GDP)	surveyed	25 Bn US\$ (2% GDP)



1. Access to Unified Model (UM) global model output:

- 10 km resolution for research purposes (raw data)
- 4.4 km and 1.5 km resolution for operational purposes (image) and raw data model for particular cases
- Access to tropical waves data

2. Capacity building :

- Visiting scientist: Adi Mulsandi (STMKG) visited UK on February - March 2019
- Workshop: WCSSP 1st workshop, June 2018
- Forecaster Training in South East Asia (FORTIS) on March 11-15, 2019 in BMKG. Attended by 20 participants from BMKG and STMKG
- Training on Model Evaluation, November 2018. Attended by 15 forecasters from BMKG
- Keynote Speaker on HMD: Jon Petch, April 2019. Attended by 150 participants

3. Joint Research & Publication

- *Seasonal Dependence of Cold Surges and their Interaction with the Madden-Julian Oscillation over Southeast Asia.* **Prince Xavier, See Yee Lim, Muhammad Firdaus Ammar Bin Abdullah, Michael Bala, Sheeba N. Chenoli, Tya Handayani, Charline Marzin, Donald Permana, Fredolin Tangang, Keith D. Williams dan Diong Jeong Yik** and submitted to **Journal of Climate**



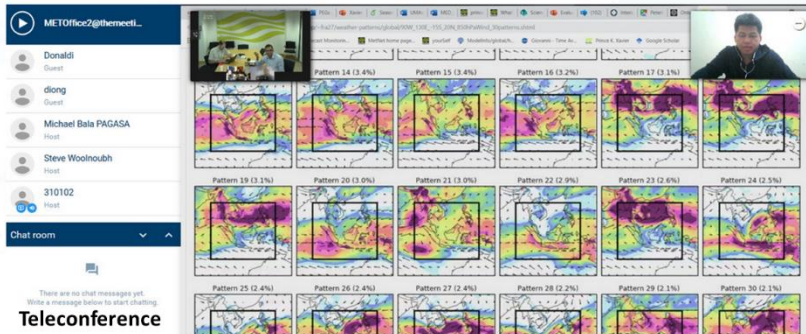
Training Forecaster for Model Evaluation Nov 18



WCSSP-SEA , Jakarta, June 2018



With the team working on equatorial waves in NCAS. From left (back): Diong Jeong Yik (MMD), Adi Mulsandi (BMKG), Kevin Hodges (NCAS), Steve Woolnough (NCAS), John Methven (NCAS); (front) Guying Yang (NCAS) and Samantha Ferret (NCAS).



Donaldi as lead of WP I, in video conference with UKMO



General Lecture on NWP by Jon Petch



FORTIS Training March 11-15, 2019



WCSSP Southeast Asia Partners

