

# Southeastern Asia - Oceania Flash Flood Guidance (SAOFFG) System: Development Status

*Hydrologic Research Center, USA  
Technical Developer*

SAOFFG Steering Committee Meeting 1  
10-12 July 2017  
Jakarta, INDONESIA



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# Global Initiative for Flash Floods

A joint Memorandum of Understanding to implement regional flash flood guidance systems worldwide.

## Program Partners



**USAID/Office of U.S. Foreign  
Disaster Assistance**

**National Oceanic and Atmospheric Administration/  
National Weather Service**



**Hydrologic Research Center**

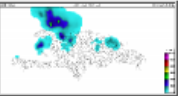
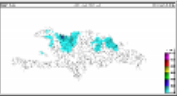
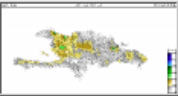
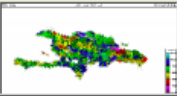


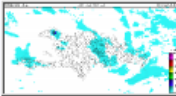
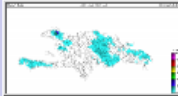

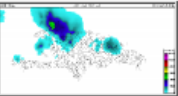
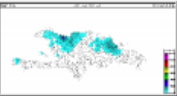
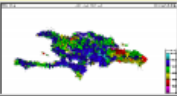


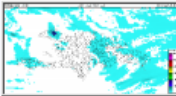
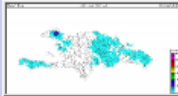

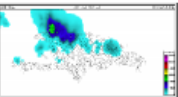
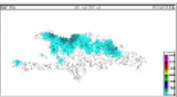
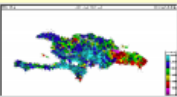


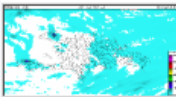


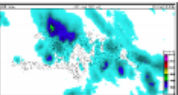
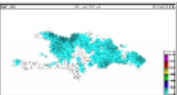
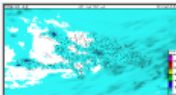
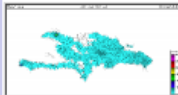
**World Meteorological  
Organization**



# Objective of Flash Flood Guidance Systems

## HDRFFG - Haiti and Dominican Republic Flash Flood Guidance System

To provide operational NHMS forecasters with up-to-date information on key variables for rapid assessment of flash flood risk.

DT	Satellite	Merged MAP	ASM	FFG	IFFT	PFFT	Forecast	FMAP	FFFT
01-hr	 2015-08-27 00:00 UTC	 2015-08-27 00:00 UTC <a href="#">Text view</a>	 2015-08-27 00:00 UTC <a href="#">Text view</a>	 2015-08-27 00:00 UTC <a href="#">Text view</a>	 2015-08-27 00:00 UTC <a href="#">Text view</a>	 2015-08-27 00:00 UTC <a href="#">Text view</a>	 2015-08-27 00:00 UTC	 2015-08-27 00:00 UTC <a href="#">Text view</a>	 2015-08-27 00:00 UTC <a href="#">Text view</a>
03-hr	 2015-08-27 00:00 UTC	 2015-08-27 00:00 UTC <a href="#">Text view</a>		 2015-08-27 00:00 UTC <a href="#">Text view</a>	 2015-08-27 00:00 UTC <a href="#">Text view</a>	 2015-08-27 00:00 UTC <a href="#">Text view</a>	 2015-08-27 00:00 UTC	 2015-08-27 00:00 UTC <a href="#">Text view</a>	 2015-08-27 00:00 UTC <a href="#">Text view</a>
06-hr	 2015-08-27 00:00 UTC	 2015-08-27 00:00 UTC <a href="#">Text view</a>		 2015-08-27 00:00 UTC <a href="#">Text view</a>	 2015-08-27 00:00 UTC <a href="#">Text view</a>	 2015-08-27 00:00 UTC <a href="#">Text view</a>	 2015-08-27 00:00 UTC	 2015-08-27 00:00 UTC <a href="#">Text view</a>	 2015-08-27 00:00 UTC <a href="#">Text view</a>
24-hr	 2015-08-27 00:00 UTC	 2015-08-27 00:00 UTC <a href="#">Text view</a>					 2015-08-27 00:00 UTC	 2015-08-27 00:00 UTC <a href="#">Text view</a>	

Composite Product... [text](#), [DBF](#)

SFTP data transfer (requires SFTP Client): [EXPORTS/REGIONAL/2015/08/27](#)

Surfmet Gauge Precipitation Accumulations ending on 2015-08-27 00:00 UTC

[Station Identifier](#)  
 [Station Name](#)  
 [Observation Date & Time \(UTC\)](#)  
 [Precipitation \(mm\)](#)  
 [Temperature \(C\)](#)  
 [Relative Humidity \(%\)](#)  
 [Atmospheric Pressure \(mb\)](#)  
 [Solar Radiation](#)  
 [Wind Direction](#)  
 [Wind Velocity](#)  
 [Battery Voltage](#)

# Objective of Flash Flood Guidance System

## HDRFFG - Haiti and Dominican Republic Flash Flood Guidance System

Current Date: 2016-09-02 19:45 UTC

Nav Date: 2015-08-27 00:00 UTC

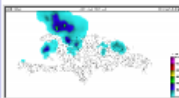
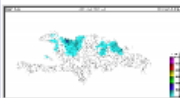
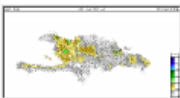
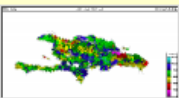


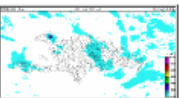
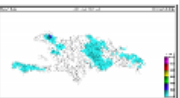

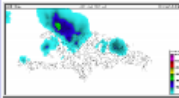
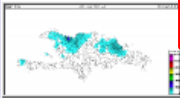



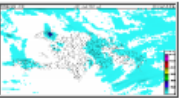
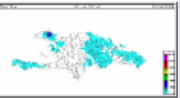

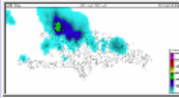
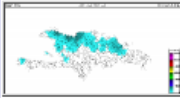
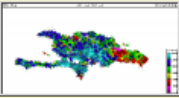


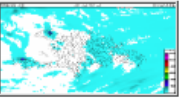
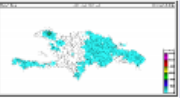

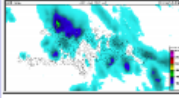
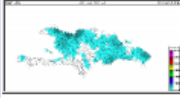
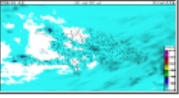
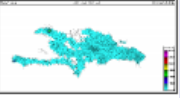
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Month -1 Day -6 Hours -1 Hour +1 Hour +6 Hours +1 Day +1

*Observed Precipitation*

*Forecast Precipitation*

Prev 6-hr Interval Reset to Current Next 6-hr Interval

DT	Satellite	Merged MAP	ASM	FFG	IFFT	PFFT	Forecast	FMAP	FFFT
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*Hydrologic state of land surface*

Composite Product... [text](#), [DBF](#)

SFTP data transfer (requires SFTP Client): [EXPORTS/REGIONAL/2015/08/27](#)

Surfmet Gauge Precipitation Accumulations ending on 2015-08-27 00:00 UTC

Station Identifier	Station Name	Observation Date & Time (UTC)	Precipitation (mm)	Temperature (C)	Relative Humidity (%)	Atmospheric Pressure (mb)	Solar Radiation	Wind Direction	Wind Velocity	Battery Voltage
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# FFG Research and Development History

- ❑ **1970-1988:** US NWS Produces **FFG statistically** for each River Forecast Center. Also, **research** in adaptive site specific FF prediction systems.
- ❑ **1988-1993:** IIHR/HRC develop **physically consistent FFG formulations based on GIS** and create the first operational codes for US NWS
- ❑ **1993-2005:** HRC continues **research** in various aspects of the FFG process and system (sparsely gauged basins and uncertainty issues, forcing and models). The development of **prototype regional systems** using FFG is proposed and accepted in work plan of **WMO CHy Working Group on Applications (2002-2003)**.
- ❑ **2004:** The **Central America Flash Flood Guidance System becomes operational** (serves 7 countries in CA)
- ❑ **2008:** WMO, USAID, NOAA, HRC sign a quad-part Memorandum of Understanding to collaborate in the development of a regional flash flood guidance systems with global coverage (currently in second 5-year phase).
- ❑ **2015:** Discussion of FFGS for Southeastern Asia and Oceania Region

# FFG Development Team at HRC

**Dr. Konstantine Georgakakos** – Technical Director/Hydrometeorology

**Robert Jubach** – Program Management/Disaster Risk Reduction

**Dr. Rochelle Graham** – Education and Training / Disaster Risk Reduction

**Dr. Theresa Modrick Hansen** – Mesoscale Modeling, Hydrology & Routing Models

**Dr. Eylon Shamir** – Soil Water and Snow Models

**Dr. Zhengyang Cheng** – Hydraulic modeling and Routing Models

**Randall Banks** – IT Engineering/Programming / Web Development

**Cris Spencer** – IT Engineering/Programming

**Jason Sperflage** – IT Systems Engineering

# Typical Timeline of FFG System Implementation

- (1) Initial Meeting** \* As Part of WMO Flash Flood Guidance Program  
Country representatives within a region meet with WMO and HRC for introduction and description of FFG Systems; participation agreements; and establish regional center.
- (2) HRC begins development**  
Request local data; defining regional extent; delineation of small flash flood watersheds; begin model parameterization with global datasets.
- (3) Within region training**  
Future introduction of system components and capabilities of FFG System, intended for operational forecasters.
- (4) Advanced Training at HRC**  
4-week training at HRC office for operational meteorological and hydrological forecasters on FFG System use.
- (5) Operational Use at NMHSs**
- (6) Regional Workshop (6mo-1yr after 4)**

# Where do we stand on the development of SAOFFG?

Feb 2016 – Initial Planning Meeting held in Jakarta

- Agreement to participate in Regional System
- Discussion of data needs

May 2016 – Distribution of FFG basin delineation results

- Request for review and comments

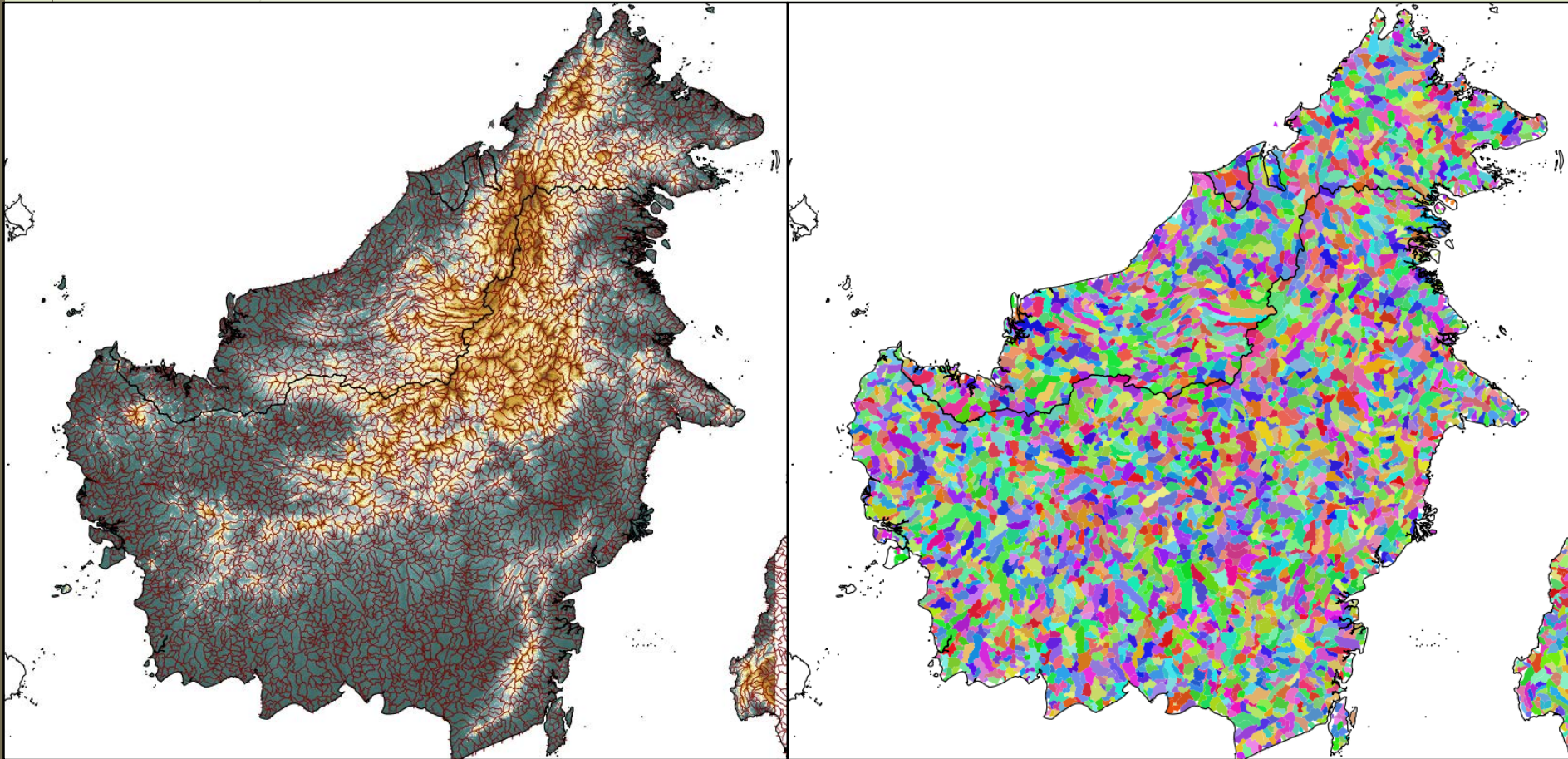
Nov 2016 – Second request for data





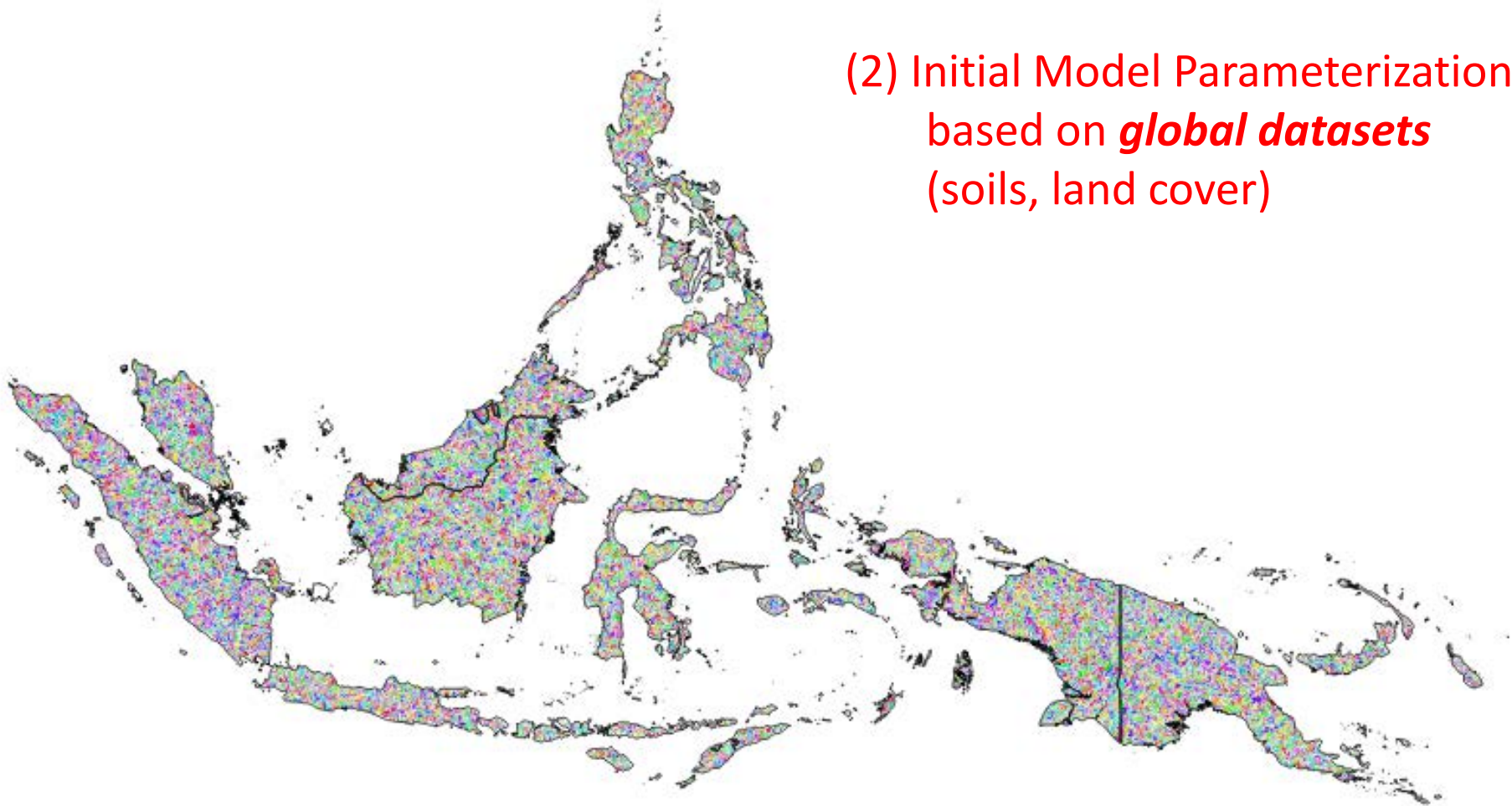
# Where do we stand on the development of SAOFFG?

(1) FFG basin delineation using SRTM 30m DEM



# Where do we stand on the development of SAOFFG?

(1) FFG basin delineation using SRTM 30m DEM



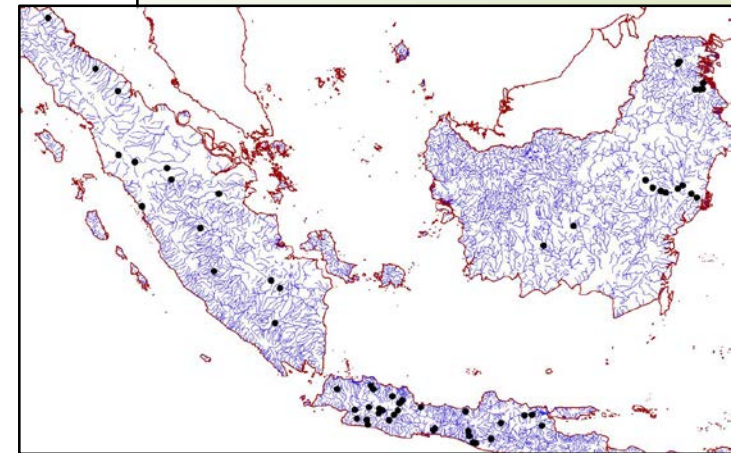
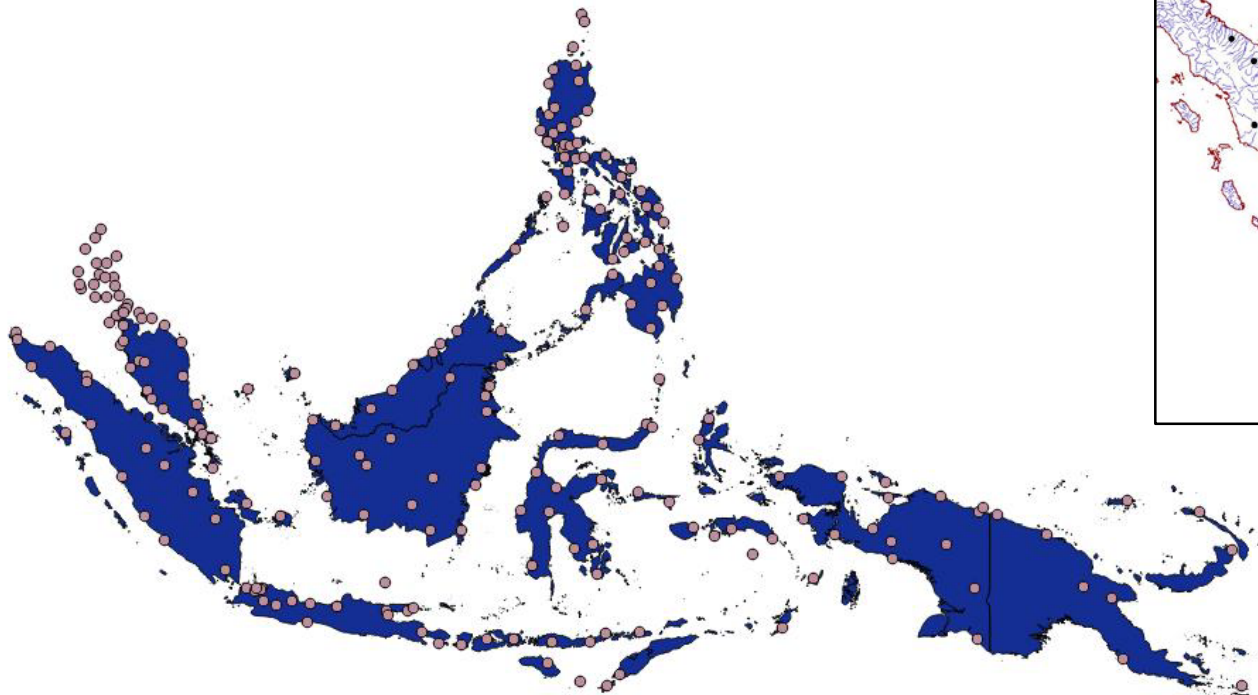
(2) Initial Model Parameterization  
based on *global datasets*  
(soils, land cover)

# Where do we stand on the development of SAOFFG?

(3) Collection of *publically-available* data from global datasets

*Observations of precipitation, streamflow and channel cross-sections allow us to improve model parameterization.*

*Sites of daily precipitation from Global "GSOD" dataset / NCDC*



*Sites of channel cross-section data from literature*

# Where do we stand on the development of SAOFFG?

(4) System engineers are beginning integration of SAOFFG

- ❖ Developing ingest for satellite precipitation for SAO region
- ❖ Integration of spatial and parametric data for SAO region
- ❖ Develop communication and ingest for real-time gauge data
- ❖ Develop communication and ingest for forecast precipitation
- ❖ Software implementation for FFGS initially at HRC
- ❖ Design of Forecaster User Interface of SAOFFG System

# What do we need for the development of SAOFFG?

## We need Local Data

All development work has been based on global datasets, which typically have coarse resolution and/or spatial coverage.

- ❖ Real-time precipitation data
- ❖ Historical precipitation data from rain gauges
- ❖ Digital spatial data on soils characteristics and land cover
- ❖ Historical streamflow data from stream gauges
- ❖ Channel cross-sectional data

Also, it is very beneficial for HRC to have a local technical point of contact from each country for data issues.

# SAOFFG Development Status

My hope ... a deluge of data will come after this SCM-1!



**THANK YOU**