



USAID
FROM THE AMERICAN PEOPLE



WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

Overview of the Global Flash Flood Guidance System



WMO OMM

World Meteorological Organization

Organisation météorologique mondiale

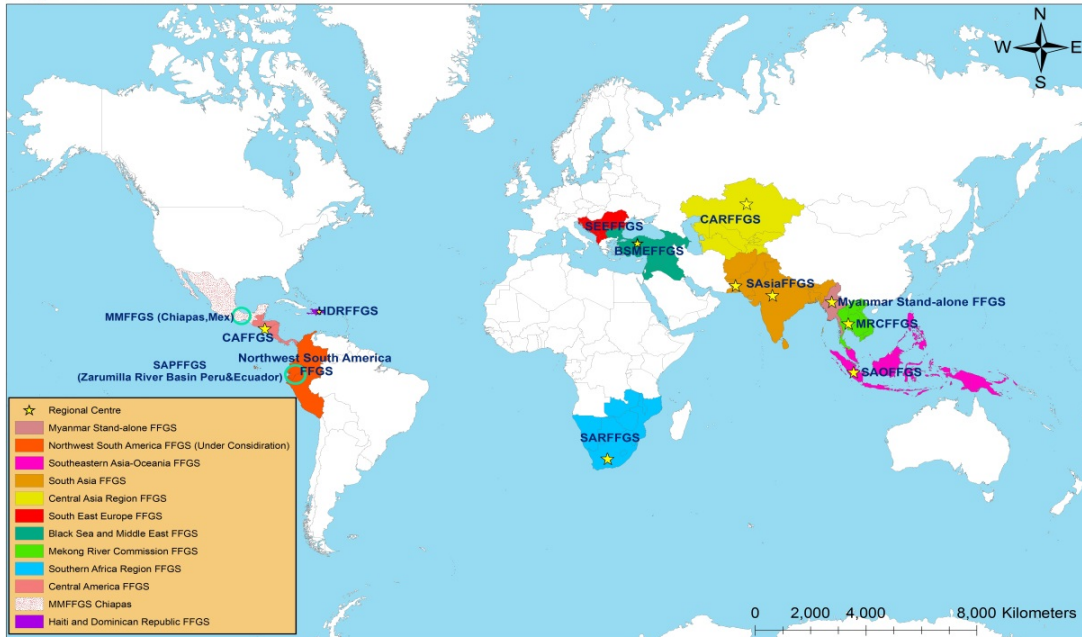
Flash Floods – The most deadly natural (weather-related) disaster in the world

- “Recent findings of the WMO country-level survey where of the 139 countries, 105 indicated that flash floods were among the top two most important hazards around the world and require special attention”.
- “On the average, these events kill more people worldwide than any other [weather-related] natural disaster; in an average year, flash floods kill over 5,000 unsuspecting people and cause millions of dollars of property damage” (WMO 2008).



Flash Flood Guidance System (FFGS)

WORLD METEOROLOGICAL ORGANIZATION GLOBAL FLASH FLOOD GUIDANCE SYSTEM COVERAGE



Flash Flood Guidance System with global coverage (Resolution 21, World Meteorological Congress-XV) enhances early warning capabilities of the NMHSs, currently **covers more than 60 (sixty) countries** and **more than two billion people** around the world saving lives and decreasing economic losses.

The WMO Commission for Hydrology (CHy) jointly with the WMO Commission for Basic Systems (CBS) and in collaboration with the US National Weather Service, Hydrologic Research Center (HRC), and USAID/OFDA have developed the concept of the Flash Flood Guidance System (FFGS) with global coverage.

The concept has been endorsed by the Fifteenth WMO Congress and is being implemented through a series of regional projects with funding from USAID.

Regional FFGS Projects

The following regional Flash Flood Guidance (FFG) projects have been implemented or under implementation:

- **Central America FFGS** (Operational): Costa Rica (Regional Centre RC), Belize, El Salvador, Guatemala, Honduras, Nicaragua, and Panama;
- **Southern Africa Region FFGS**: (Operational): Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa (RC), Swaziland, Zambia, and Zimbabwe;
- **Mekong River Commission FFGS** (Operational): Cambodia (RC), Lao People's Democratic Republic, Thailand, and Viet Nam;
- **Black Sea and Middle East FFGS** (Operational): Armenia, Azerbaijan, Bulgaria, Georgia, Israel, Jordan, Lebanon, and Turkey (RC);
- **South East Europe FFGS** (Operational): Albania, Bosnia-Herzegovina, Croatia, Moldova, Montenegro, Romania, Serbia, Slovenia, The Former Yugoslav Republic of Macedonia, and Turkey (RC);

Regional FFGS Projects

- **Southeastern Asia-Oceania FFGS** (under implementation): Brunei Darussalam, Indonesia (RC), Malaysia, Papua New Guinea, Philippines, and Timor-Leste;
- **South Asia FFGS** (under implementation): Afghanistan, Bangladesh, Bhutan, India (RC), Nepal, Pakistan (RC), and Sri Lanka;
- **Southeast Asia** (under implementation): Cambodia, Lao PDR, Thailand, Viet Nam;
- **Central Asia Region FFGS** (under implementation): Kazakhstan (RC), Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan;

Regional FFGS Projects

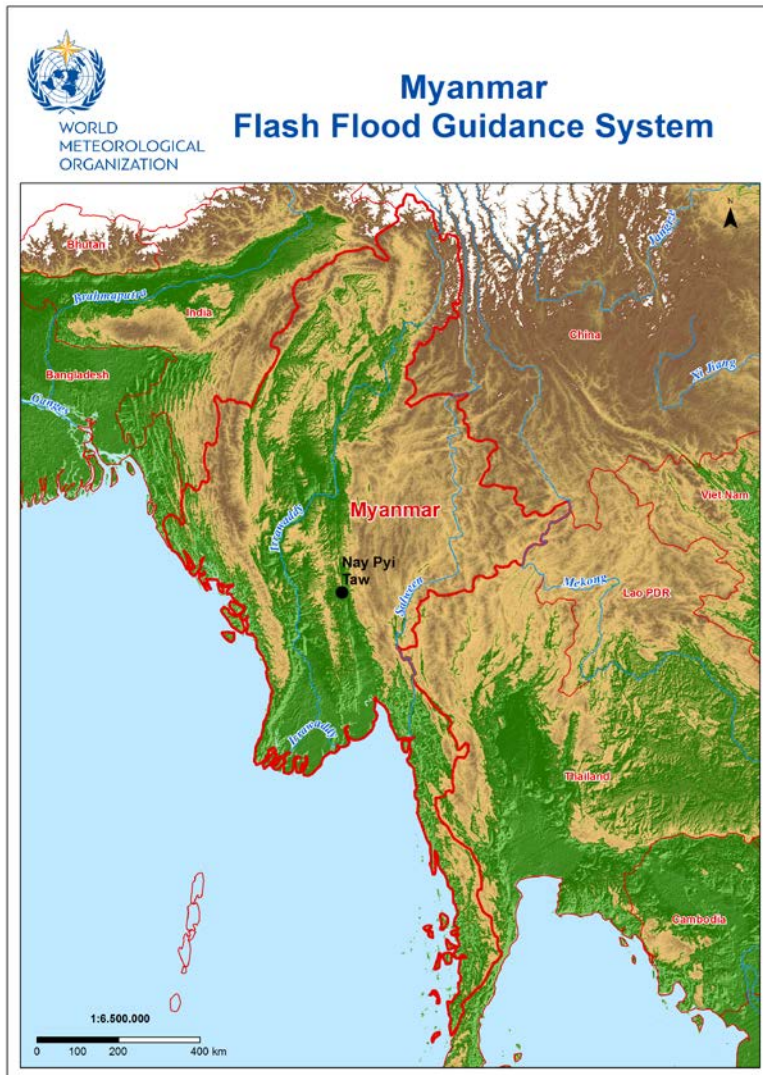
- **South America Pilot FFGS (Completed):** Zarumilla River Basin (Peru and Ecuador);
- **Northwest South America FFGS** (Under implementation): Colombia, Ecuador and Peru;
- **Haiti and Dominican Republic FFGS** (Under implementation): Dominican Republic and Haiti;
- **Myanmar FFGS** (under consideration).

Objectives of the FFGS with Global Coverage

The main objectives of the Flash Flood Guidance System with global coverage are to:

- enhance NMHSs capacity to issue flash flood warnings and alerts;
- mitigate adverse impacts of hydrometeorological hazards;
- enhance collaborations between NMHSs and Emergency Management Agencies;
- generate flash flood early warning products by using state-of-the-art hydrometeorological forecasting models;
- provide extensive training including on-line training to the hydrometeorological forecasters;
- foster regional developments and collaborations; and
- Support WMO Flood Forecasting Initiative.

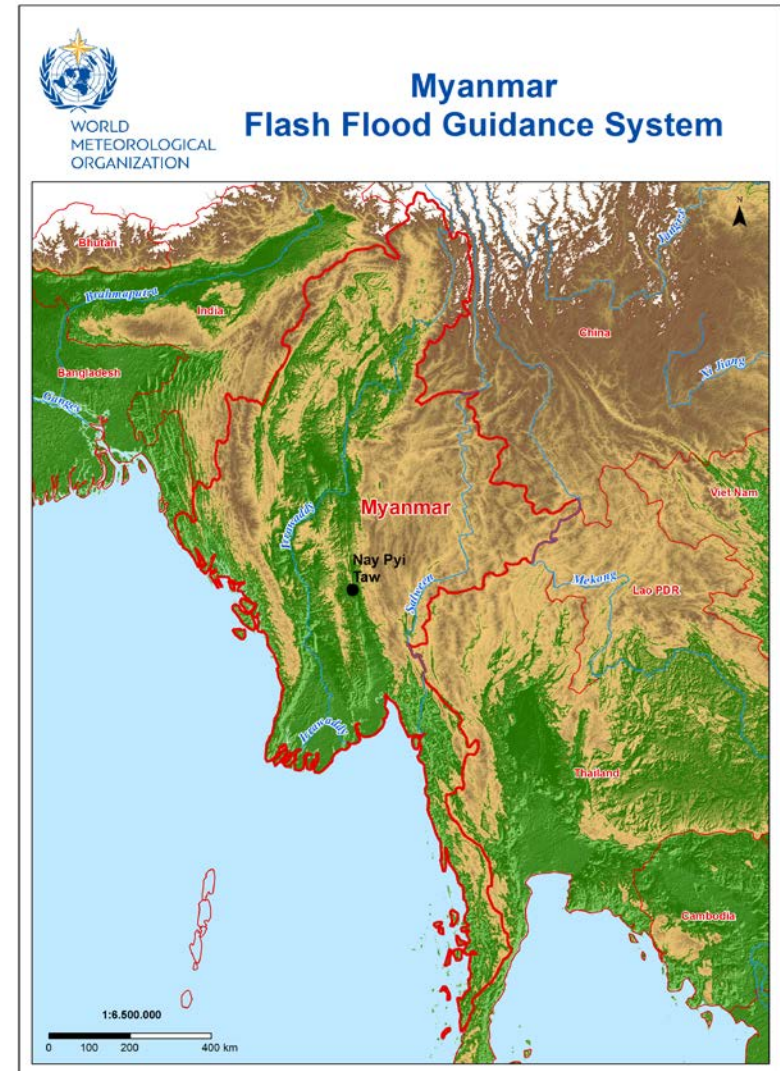
The Department of Meteorology and Hydrology of Myanmar is to:



- Host the FFGS servers to provide products and data to forecast operations,
- collaborate with WMO and its project partners to implement the flash flood hydrometeorologist training programme,
- have good IT infrastructure to access data in real-time and internet connectivity,
- evaluate FFG products and conduct verification studies,

The Department of Meteorology and Hydrology of Myanmar is to:

- provide historical and in-situ local data to the FFG system developer (HRC),
- prepare and issue flash flood warnings and alerts to the public and national agencies including Disaster Management Agency, and
- participate in the Flash Flood Hydrometeorologist Training Programme (Steps 1-5).



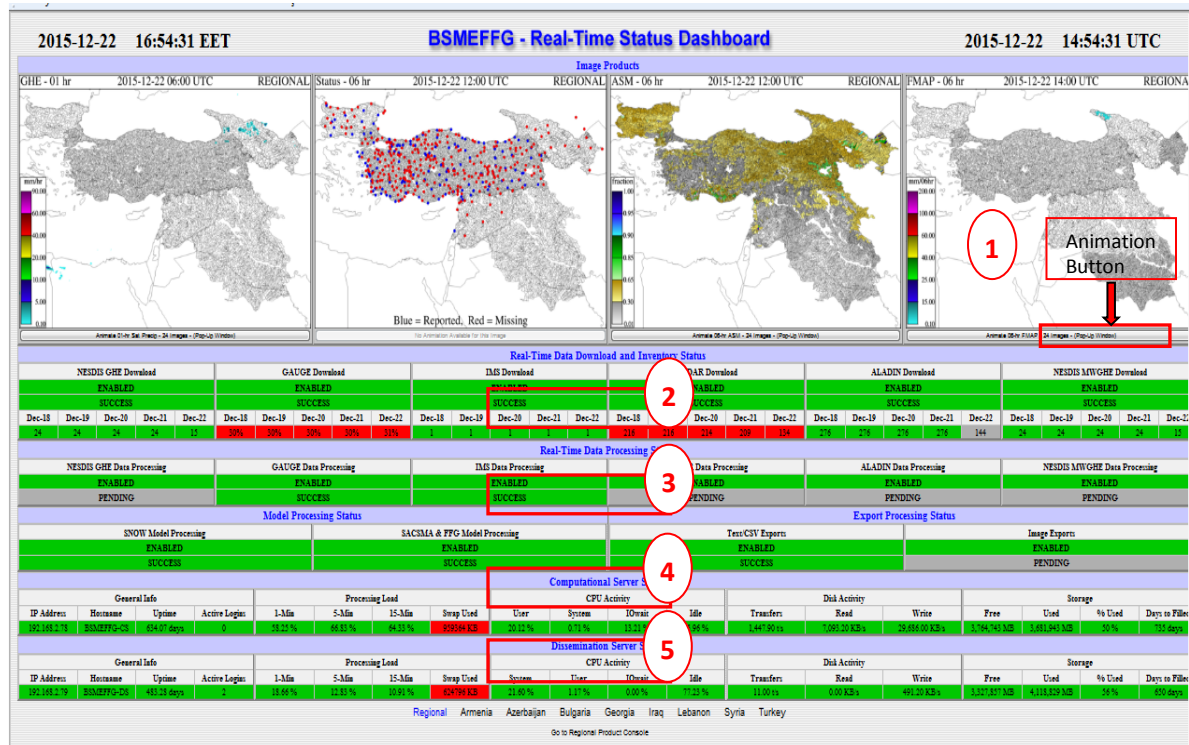
FFGS User Interface

The screenshot displays the BSMEFFG Real-Time Product Console Main Product Table interface, which is a web-based application for managing and viewing flood forecast products. The interface is organized into several key sections:

- Products, Date and Time Selection Toolbar:** Located at the top, this toolbar allows users to filter products by Year, Month, Day, Hour, and Region. It includes buttons for 'Previous', 'Next', and 'Refresh'.
- Time Interval:** A vertical column on the left side of the main product grid, showing time intervals such as 01 hr, 03 hr, 06 hr, and 24 hr.
- FFGS Products:** The central grid displays various flood forecast products, including RADAR Precipitation, MINGHE Precipitation, GHE Precipitation, Gauge MAP, Merged MAP, ASM, FFG, IFFT, PFFT, ALADIN Forecast, FMAP, and FFFT. Each product is represented by a small map with a color-coded overlay.
- Surface Met. Observations:** A table below the main product grid provides detailed surface meteorological observations, including station ID, name, elevation, and various meteorological parameters like temperature, humidity, and wind speed.
- Snow Products:** A separate section at the bottom left shows snow products, including maps for 'Usage SCAI' and 'Lambert SCAI'.
- Products Desc. & System Monitoring Toolbars:** A toolbar at the bottom right provides links for product descriptions, system monitoring, and other utility functions.

The interface is accessed via a web browser (Internet Explorer) and includes standard navigation and search tools.

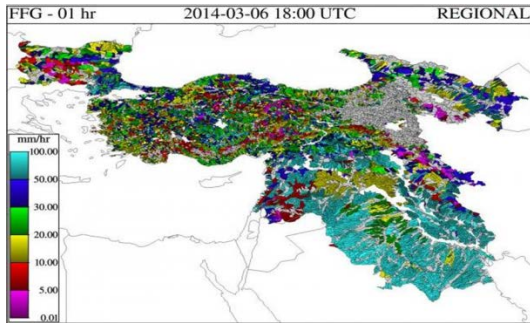
FFGS Dashboard



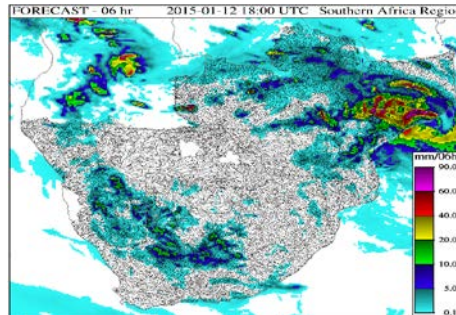
Dashboard is designed to monitor server processes:

- (1) Quick-look;
- (2) Real-Time data downloads and inventory status;
- (3) Real-Time Data processing status;
- (4) Computational server status; and
- (5) Dissemination server status.

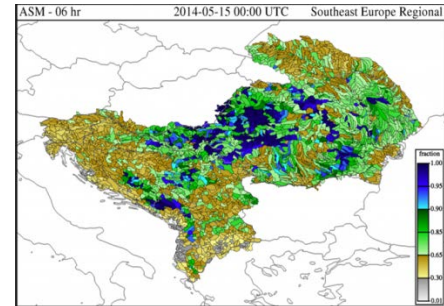
FFGS Products



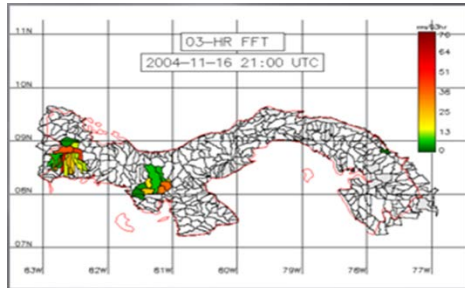
- Flash Flood Guidance for Black Sea and Middle East FFGS.



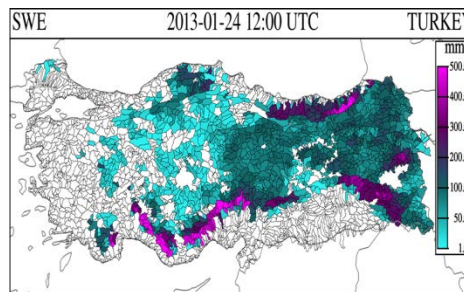
- GHE Satellite precipitation for Southern Africa Region FFGS.



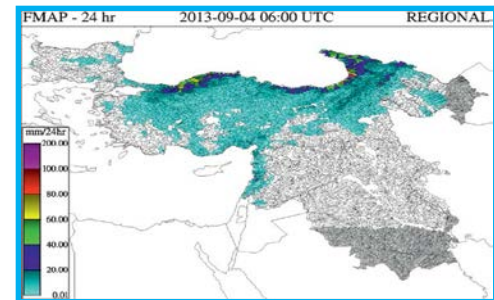
- Average Soil Moisture for South East Europe FFGS.



- Flash Flood Threat for Central America FFGS

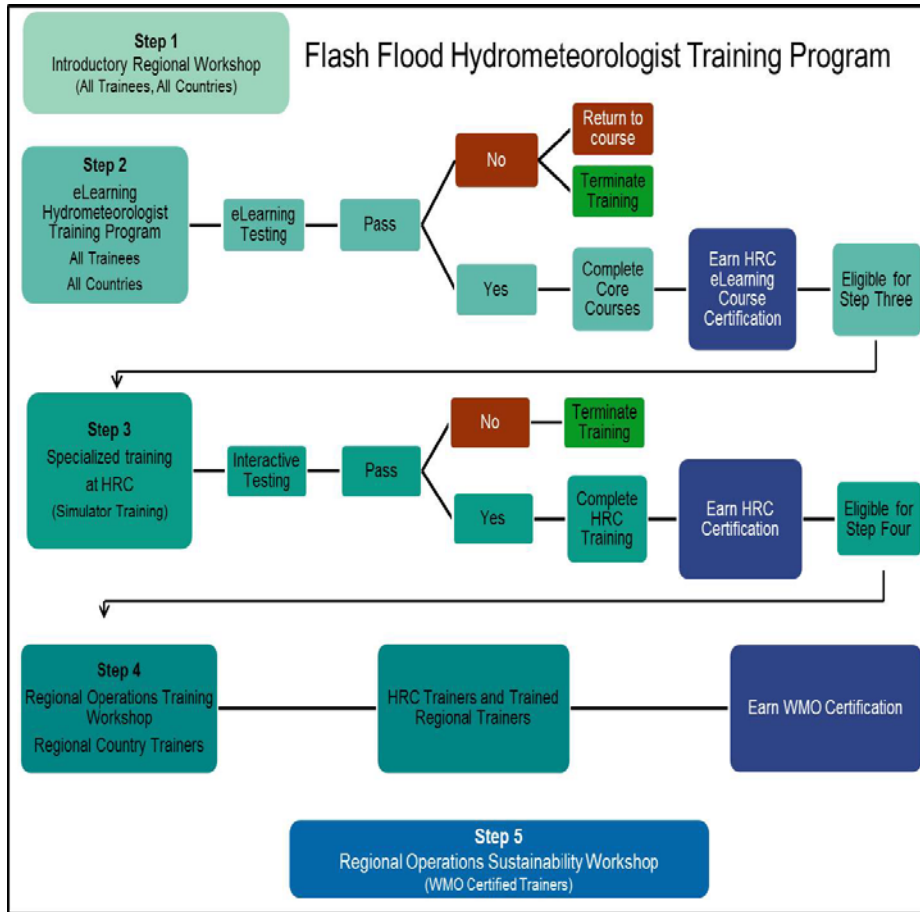


- Snow Water Equivalent (SWE) for Turkey.



- Forecast Mean Areal Precipitation for Black Sea and Middle East FFGS.

Training Programme



Training is an integral part of regional FFG Systems and consists of five steps:

Step-1: Introductory in-country workshops and meetings such as Steering Committee Meetings;

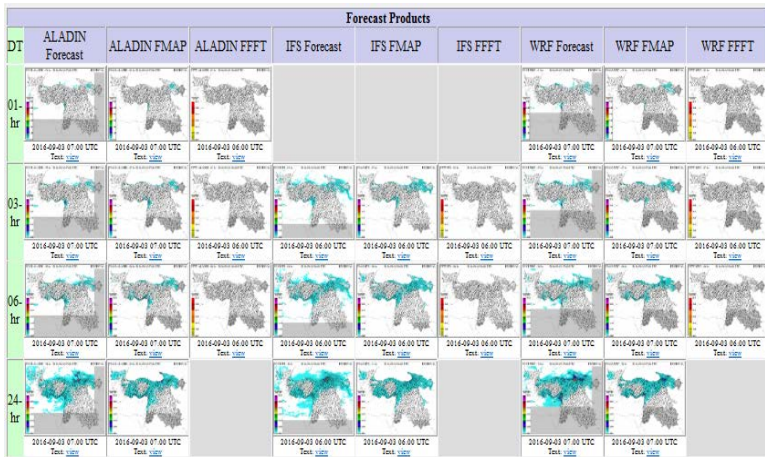
Step-2: On-line eLearning comprises elements of Meteorology, Hydrology, Flash Flood Guidance, GIS, and remote sensing;

Step-3: Advanced operations training at the Hydrologic Research Center (HRC), USA;

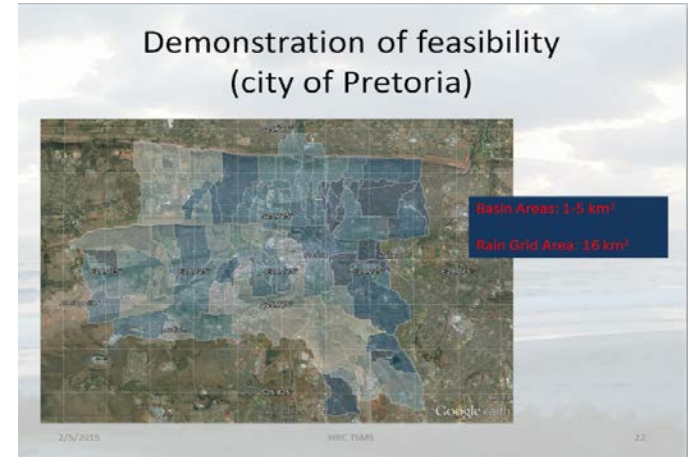
Step-4: Regional operations training workshop toward qualification of WMO flash flood trainer certificate;

Step-5: Regional operation sustainability workshop provided by the WMO certified trainer.

FFGS Advances

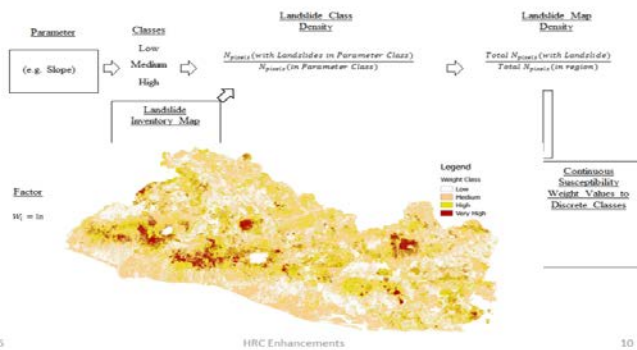


Multi-NWP Model ingestion



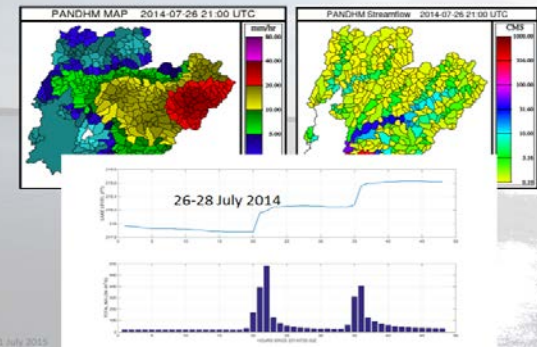
Urban Flash Flood Early Warning System

C.1 Susceptibility Mapping



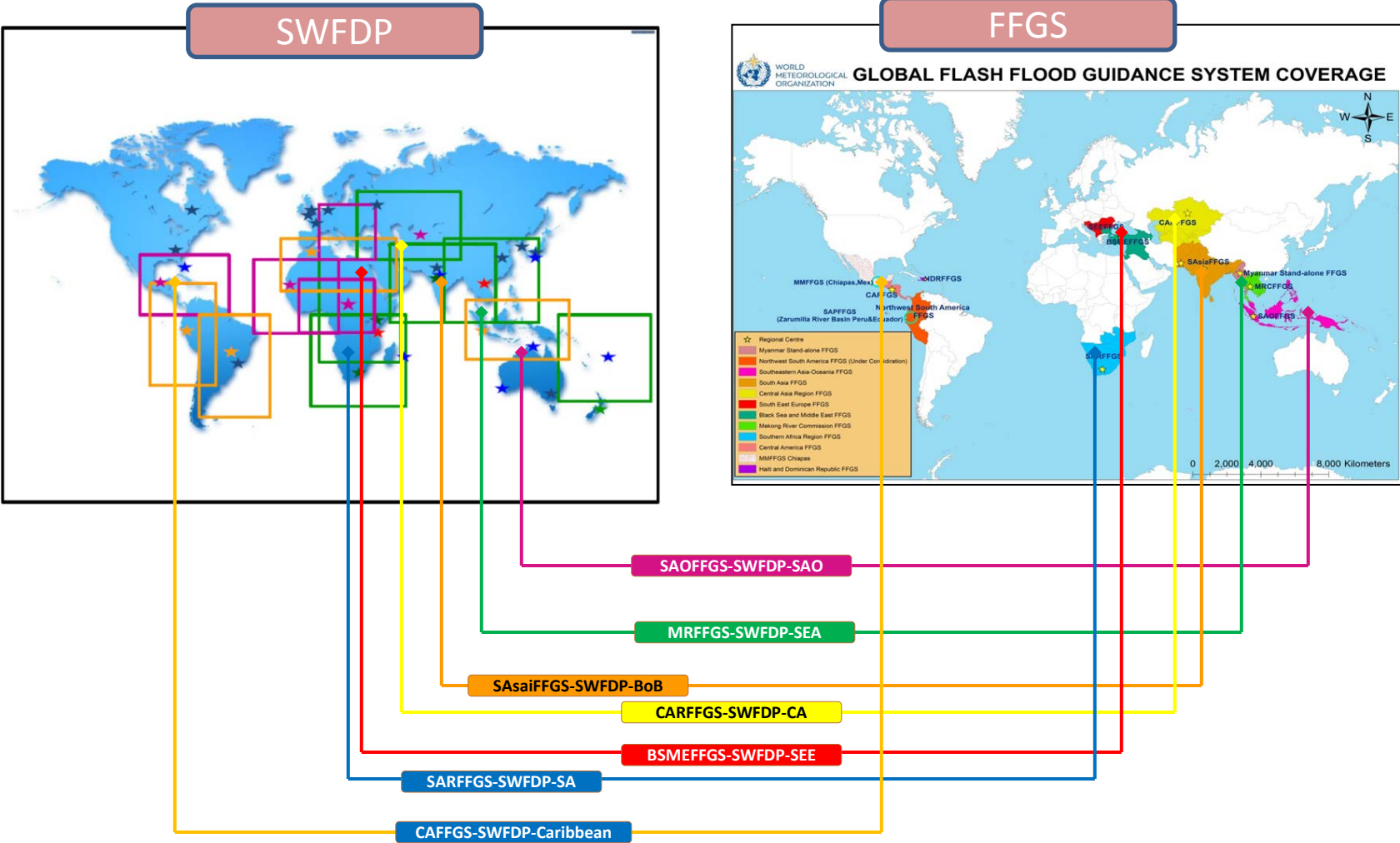
Landslide Susceptibility Mapping

Example Simulation Products



Riverine Routing

Linkages between SWFDP and Regional FFGS



Thank you

Paul Pilon

ppilon@wmo.int

Petra Mutic

pmutic@wmo.int



WMO OMM

World Meteorological Organization

Organisation météorologique mondiale

For more information please visit:

<http://www.wmo.int/ffgs>

<http://www.hrcwater.org>