WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

ICT Indicators for Disaster Risk Reduction

WMO Perspectives

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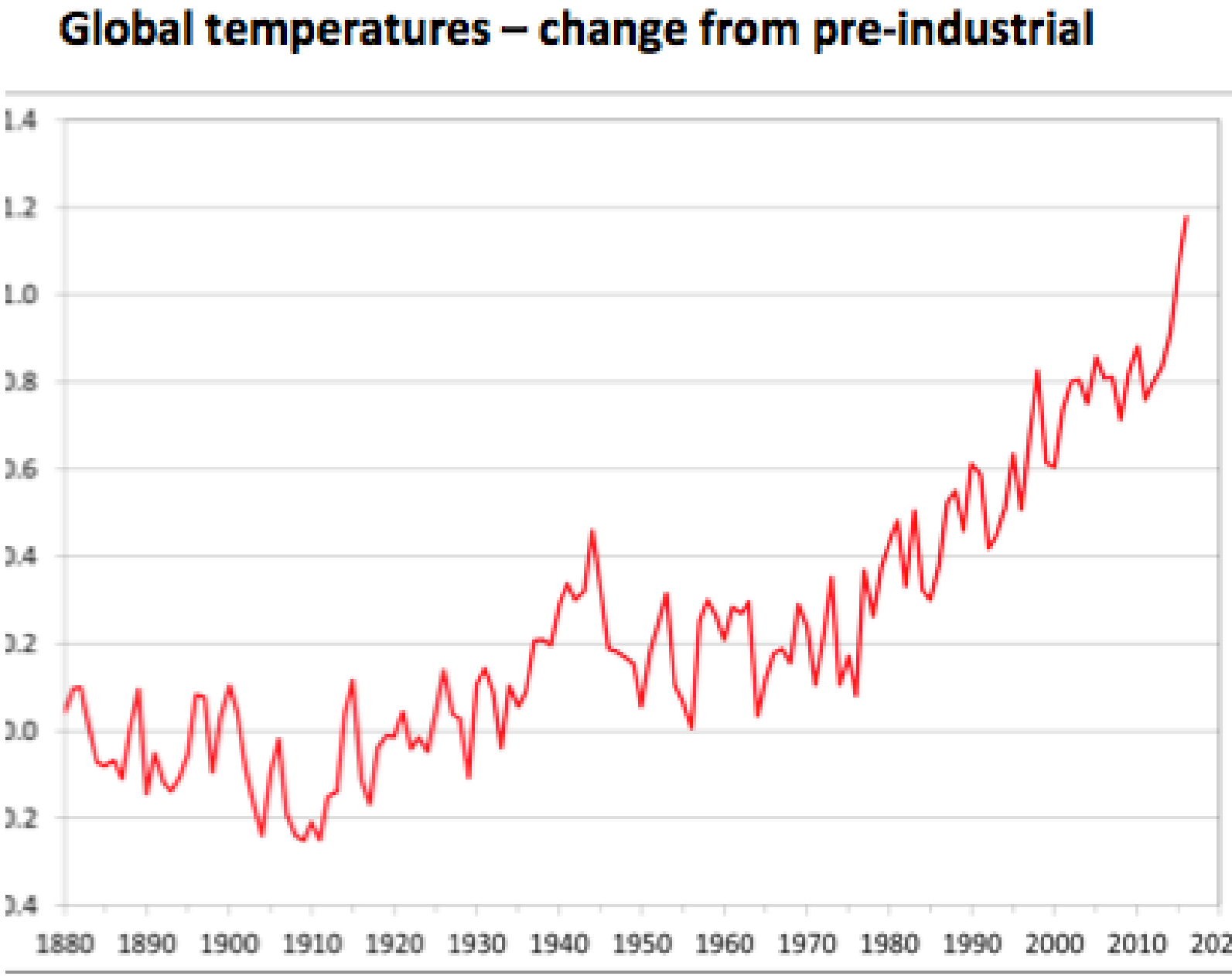
Organisation météorologique mondiale

Climate change in context

- 16 of 17 hottest years on record this century (1998 was exception)
- Parts of Arctic Russia 6°C - 7°C above average this year. Many other Arctic and sub-Arctic regions in Russia, Alaska and northwest Canada at least 3°C above average. >90% of Northern Hemisphere land areas outside tropics at least 1°C above average.
- Phalodi (India) reached 51.0C May Mitribah (Kuwait) 54.0C in July
- Global sea levels rose ~15 mm between Nov 2014 - Feb 2016 → El Niño, above post-1993 trend of 3 to 3.5 mm per year



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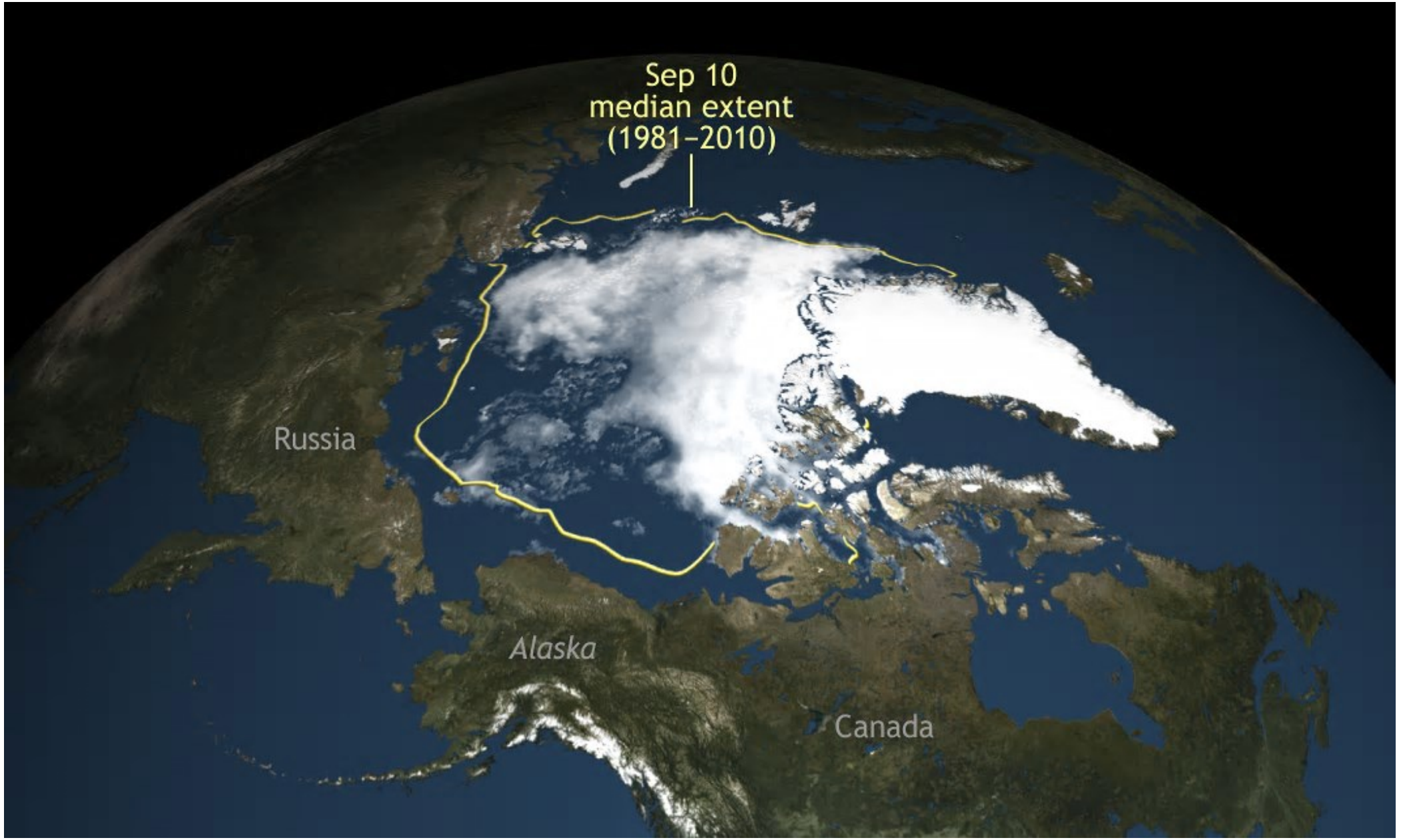

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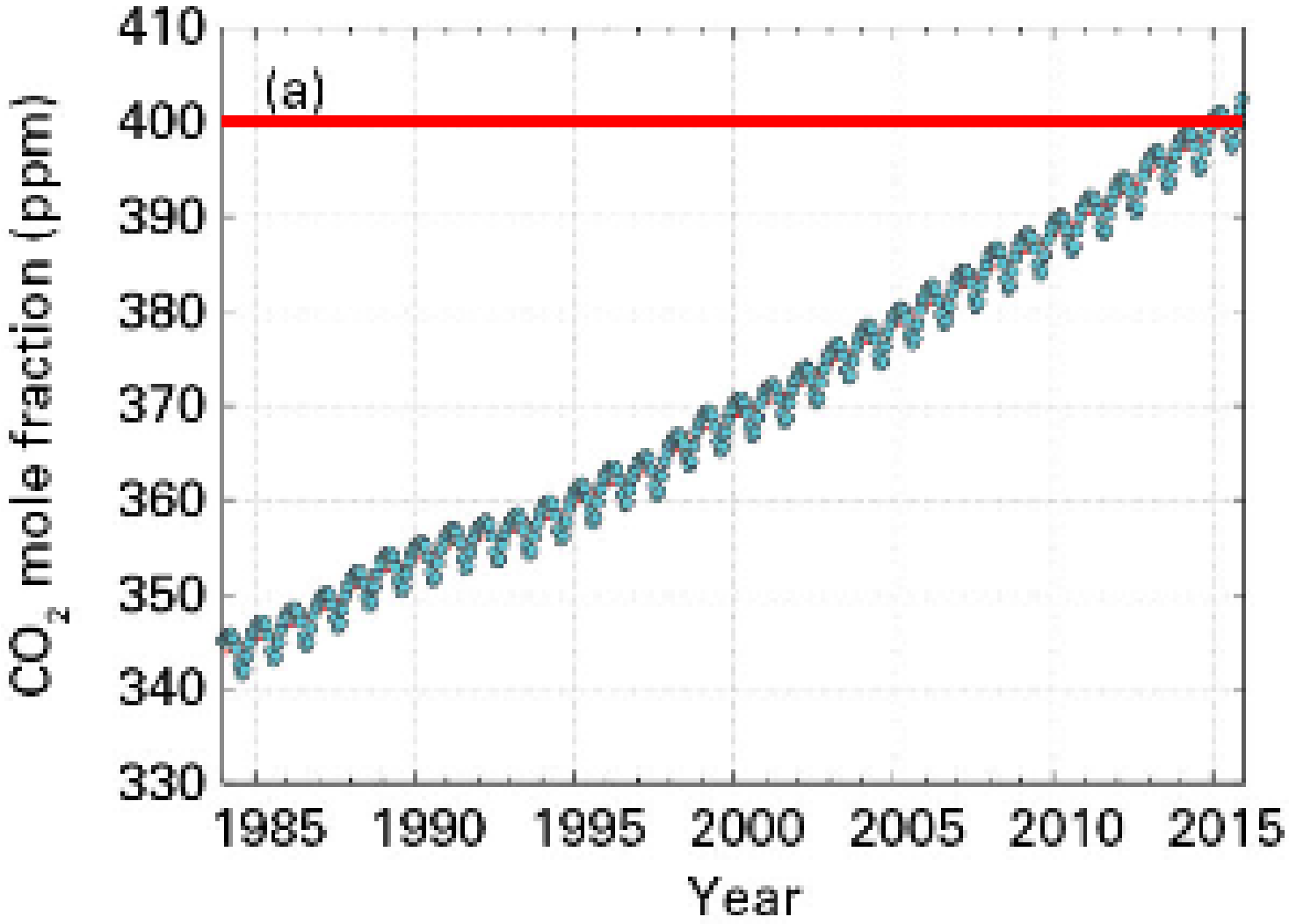
CO2 passes 400 ppm level

IMPACTS in 2016

- Deadliest event so far Hurricane Matthew - Haiti's worst humanitarian emergency since 2010 earthquake.
- Throughout 2016, extreme weather lec to considerable socio-economic losses in all regions of the world.
- Extreme weather and climate related events have damaged farming and foo security, affecting more than 60 millior people, according to the UN Food and Agriculture Organization.
- Coral mortality of up to 50% in parts of Australia's Great Barrier Reef decimating marine ecosystems



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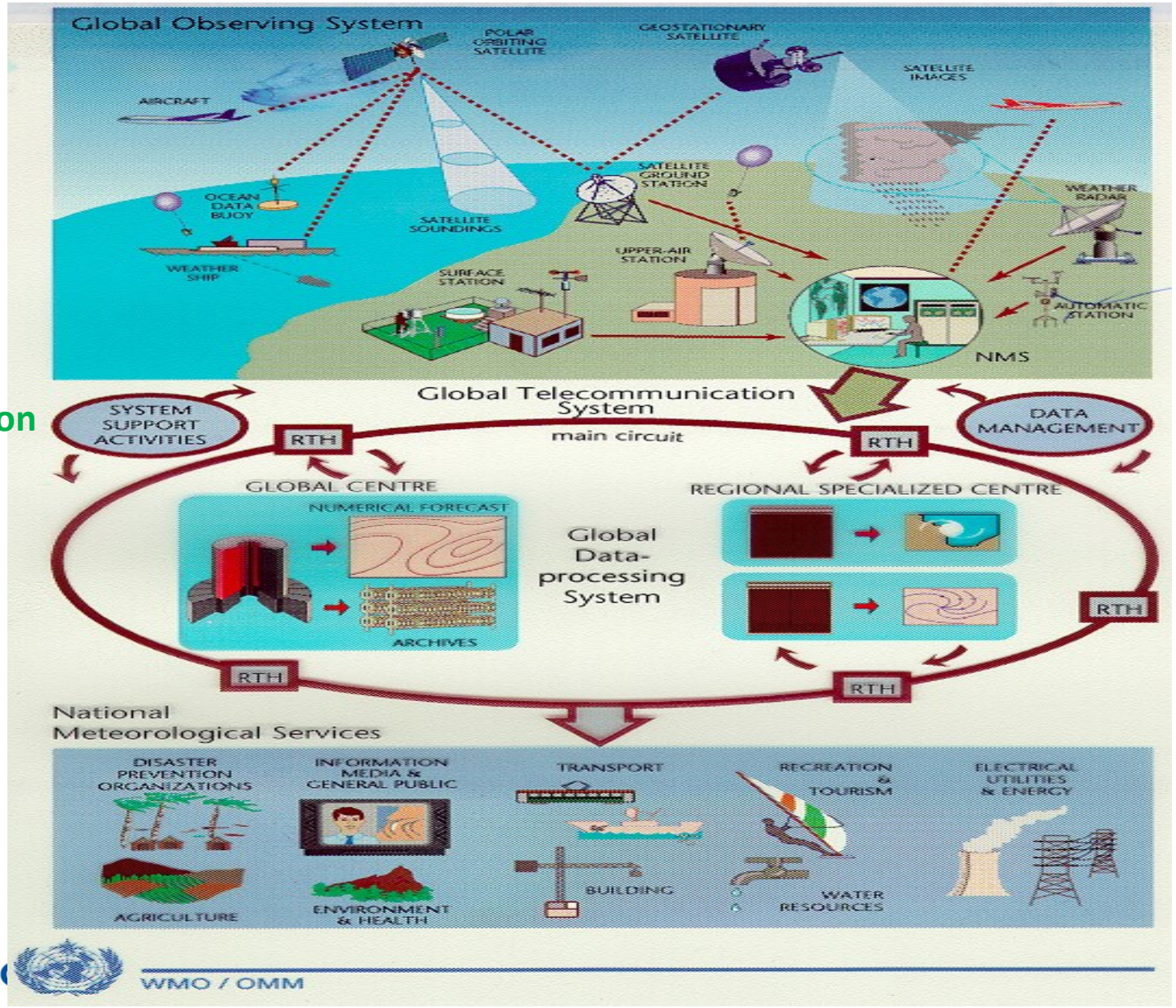
WMO Operational Networks – end to end

Observations

Data Transmission

Data Processing and Forecasting systems

Service delivery

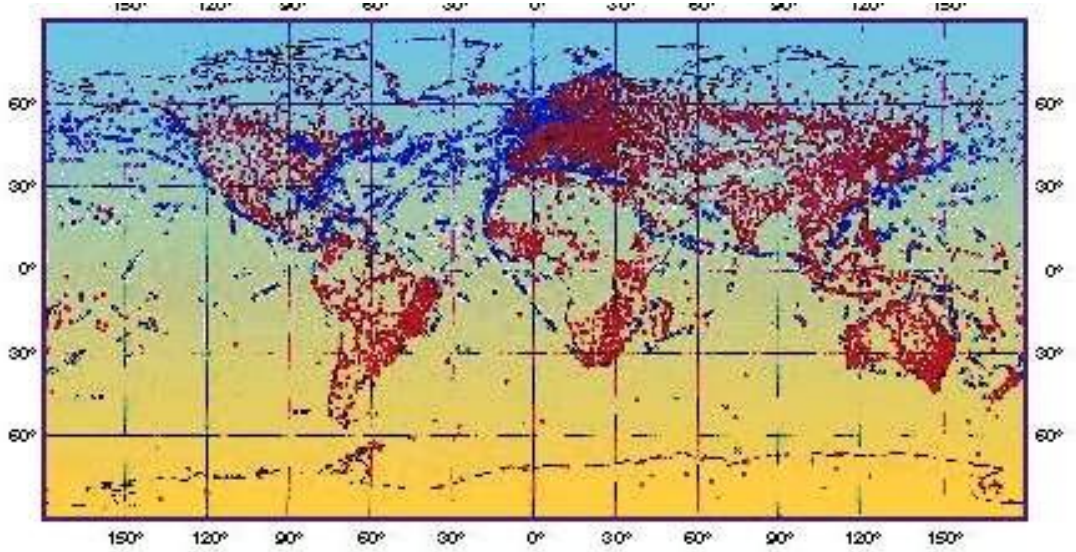


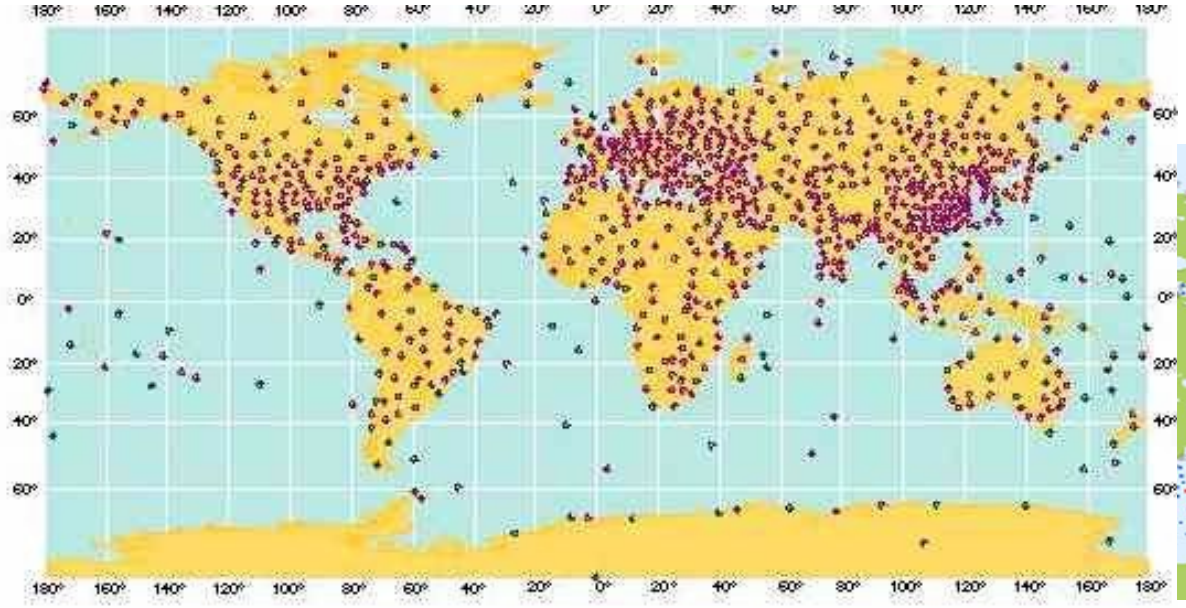
191 NMHSs: satellites, land, ships, buoys, and aircraft contribute to Global Observing every day

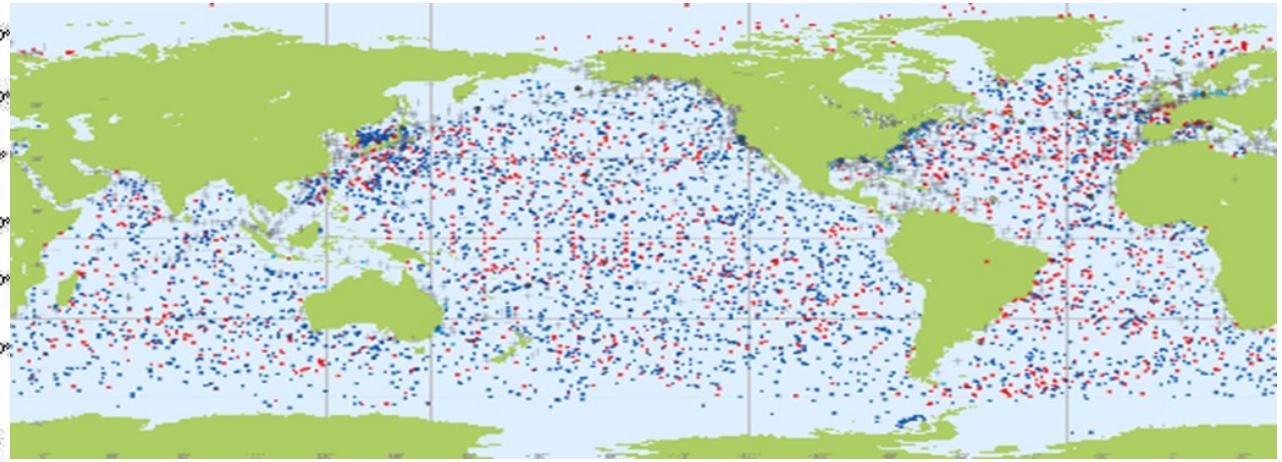
Global Telecom with Regional Hubs –
becoming the WMO Information System

The GDPFS:
Global, Regional Specialized Met. Centres (RSMC, RCC), and National Centres

NMHSs deliver analyses, forecast and early warning services



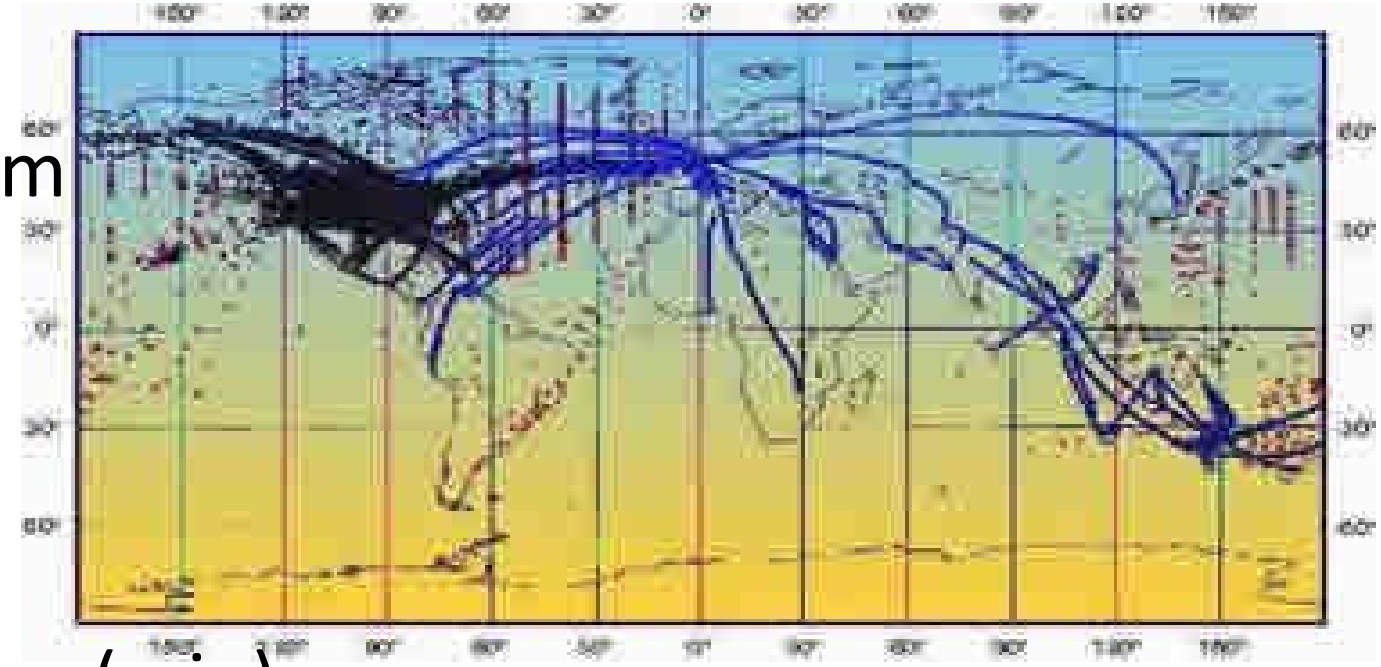




Big Data

Existing sources:

- WMO Global AMDAR System
- Satellite observations
- Social media



Examples of new sources:

- Temperatures from cars
- Wind screen wiper activation (rain)
- Solar panel outputs
- Mobile phone signal attenuation for pptn
- Satellite signal attenuation for water vapour.

Relevant ICT Indicators:

Basically coverage and capacity

- Percentage of population covered by a mobile-cellular network
- Percentage of population covered by at least a 3G mobile network
- Percentage of population covered by at least an LTE/WiMAX mobile network.
- International Internet bandwidth (bit/s) per Internet user
- International Internet bandwidth, in Mbit/s
- Lit/equipped international Internet bandwidth, in Mbit/s
- Used international Internet bandwidth (traffic), in Mbit/s
- Perhaps need one on areal mobile coverage? Regulation?

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WMO needs you!

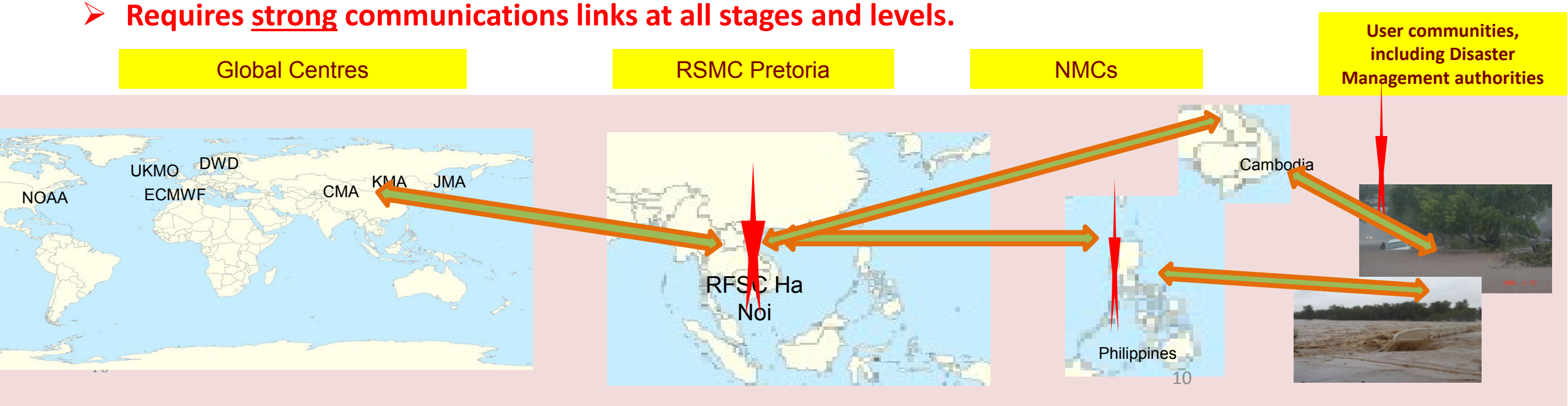
Computers are getting larger

- Future limitation to predict weather and climate may not be due to computational capability, but power consumption and comms;
  - Current largest meteorological purposed computers Peta scale – $1x10^{15}$
  - **1,000,000,000,000,000 calculations per second** (using 8MW power)
  - **New generation will be Exa scale – $1x10^{18}$ (**requires powerstation!)
- Shifting ~30-50 Tb information/day - millions of observations – **real-time**.
- **MUST HAVE RELIABLE, LARGE** communications links
- To take advantage of this **may require regulation** at national level

Severe Weather Forecasting Demonstration (SWFDP)-

efficient delivery of weather data through Cascading Forecasting Process

- ***Global NWP*** centres to provide available NWP/EPS and sat-based products, including probabilistic outputs, for the relevant area;
- ***Regional centres*** to interpret information received from global centres, prepare daily guidance products (out to day-5) for NMCs, run limited-area model to refine products, maintain RSMC Web site, liaise with the participating NMCs;
- ***NMCs*** **to issue alerts, advisories, severe weather warnings; to liaise with user communities, and to contribute feedback and evaluation of the project;**
- ***NMCs*** **have access to all products, and maintained responsibility and authority over national warnings and services.**
- **Huge data transfers around the world – ensure that only the most relevant reaches destination.**
- **Requires strong communications links at all stages and levels.**

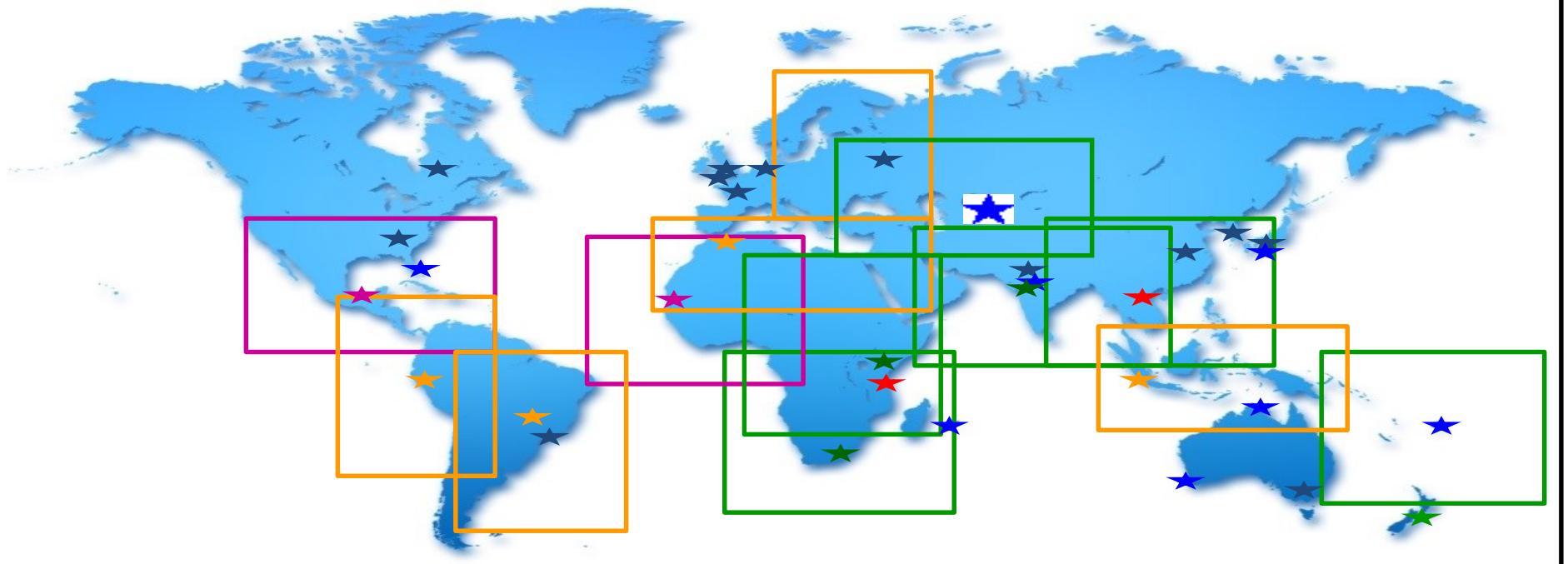


SWFDP Regional Subprojects

SWFDP Strengths

- **Cost effective;**
- **Simplicity;**
- **NMHSs need internet only;**
- **Highly operational focus;**
- **Capacity development with improved forecasts and lead-time of warnings**

Depending upon the resources, the number of developing countries and LDCs to benefit from the SWFDP may grow to over 100 in next 5 years



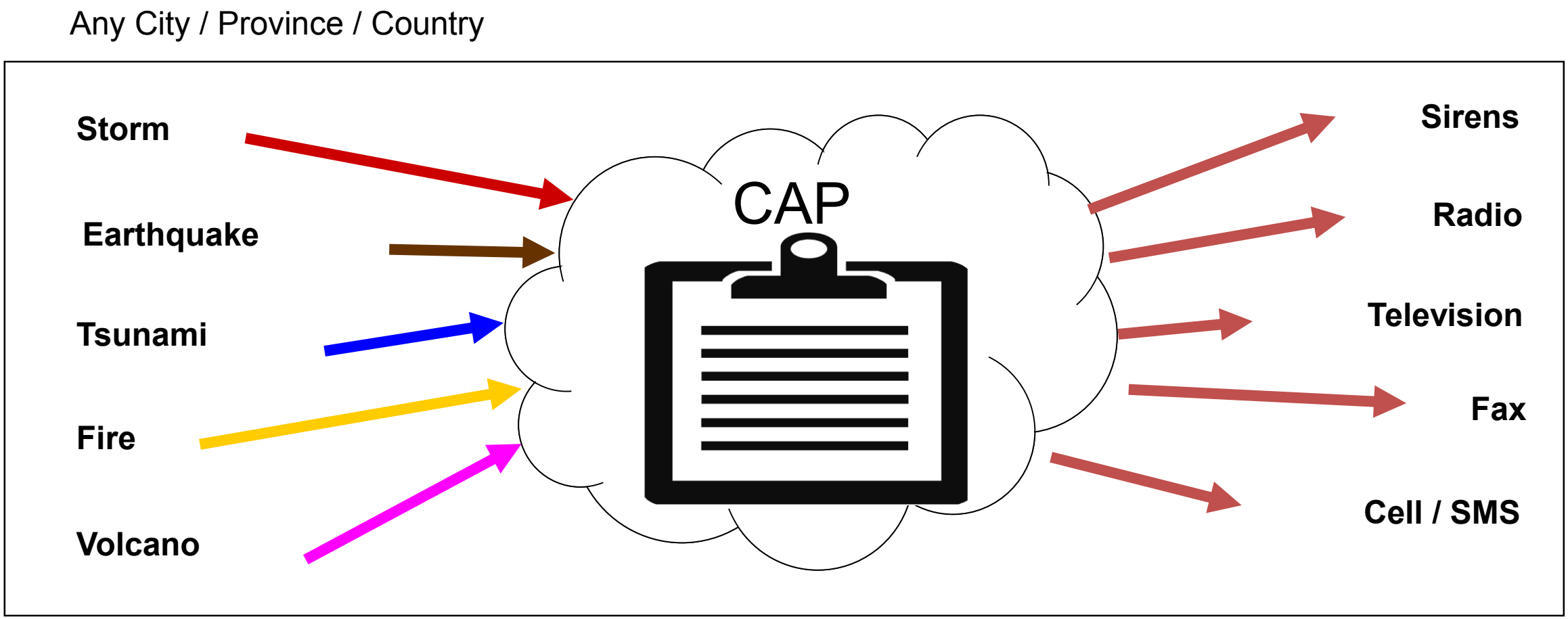
Green color boxes - the domains of existing SWFDP regional subprojects. **Pink** and **Orange** color boxes - the regions for future SWFDP subprojects which will be developed within next 1-2 years and 3-5 years respectively.

Common Alerting Protocol (CAP)

CAP – (ITU) standard message format designed for All-Media, All-Hazard, communications:

- **over any and all media** *(television, radio, telephone, fax, highway signs, e-mail, Web sites, RSS "Blogs", ...)*
- **about any and all kinds of hazard** (*Weather, Fires, Earthquakes, Volcanoes, Landslides, Child Abductions, Disease Outbreaks, Air Quality Warnings, Transportation Problems, Power Outages ...)*
- **to anyone:** the public at large; designated groups (civic authority, responders, etc.); specific people

All-Hazards, All-Media Message Format



Sendai Framework provisions especially relevant to WMO

- **Expected outcome** of the Sendai Framework: → **substantial reduction of disaster risk and losses of lives, livelihood, health and assets**
- **Goal:** → Prevent new and reduce existing risk and thus strengthen resilience
- **7 global targets:** → g) **Substantially increase the availability of and access to MHEWS and disaster risk information and assessments** to the people by 2030
- Maintaining and strengthening **in situ and remotely sensed Earth and climate observations**; promoting the **collection**, analysis, management, and use of relevant data and practical information and ensure its **dissemination and accessibility**, taking into account the **needs of different categories of users**;

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Monitoring progress – targets and indicators - Sendai Target g)early warning

No.	Indicator	Methodology	Data
	Recommended - for measurement of the global target		
G-1	Number of countries that have multi-hazard early warning system.	Y	N
G-2	Number of countries that have multi-hazard monitoring and forecasting system.	Y	N
G-3	Number of people who are covered by and have access to multi-hazard early warning system per 100,000	Y	N
G-4	Number of local governments having a preparedness plan (including EWS) or evacuation plan with standard operating procedures.	Y	N
G-5	Number of countries that have multi-hazard national risk assessment / information, with results in an accessible, understandable and usable format for stakeholders and people.	Y	N
G-6	Number of local governments that have multi-hazard risk assessment / risk information, with results in an accessible, understandable and usable format for stakeholders and people.	Y	N

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SDGs relevant to WMO

- TARGET 13 – Action to combat climate change and its **impacts**.
- TARGET 13.1 - Strengthen **resilience and adaptive capacity** to climate-related hazards and natural disasters in all countries
- TARGET 13.3 - Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, **impact reduction and early warning**

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- TARGET 11.5 - By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product **caused by disasters, including water-related disasters**, with a focus on protecting the poor and people in vulnerable situations
- TARGET 11.9 By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, **mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels**

Relevant ICT Indicators

ICT Household

- Percentage of households with computer
- Percentage of households with electricity
- Percentage of households with fixed-telephone
- Percentage of households with Internet
- Percentage of households with mobile-cellular telephone
- Percentage of households with radio
- Percentage of households with TV
- Percentage of individuals using a computer
- Percentage of individuals using a mobile cellular telephone
- Percentage of individuals using the Internet

Relevant ICT Indicators

Broadcasting

- Direct-to-home (DTH) satellite antenna subscriptions
- Multichannel TV subscriptions
- Terrestrial multichannel TV subscriptions
- IPTV subscriptions
- Cable-TV subscriptions
- Other TV subscriptions

Thank you!

For more information please contact ahainsworth@wmo.int