Early Warning and Nowcasting systems across the world

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San Paulo - Brazil
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WORLD METEOROLOGICAL ORGANIZATION
WWRP WORLD WEATHER RESEARCH PROGRAMME
CIMA CONICET UBA
EXACTAS UBA
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Motivation

Capacity Building

Nowcasting Course RA III

What Countries implement Nowcasting techniques? EWS? Hazard Impacts?

Perception of users? User Needs?

Co-produce activities to improve local capacities.

Nowcasting

Forecast from minutes up to six hours.

EWS

Earth system in constant change.

Improve adaptation and mitigation.

Agreement

NMR y SERA WG WWRP EUMETNET

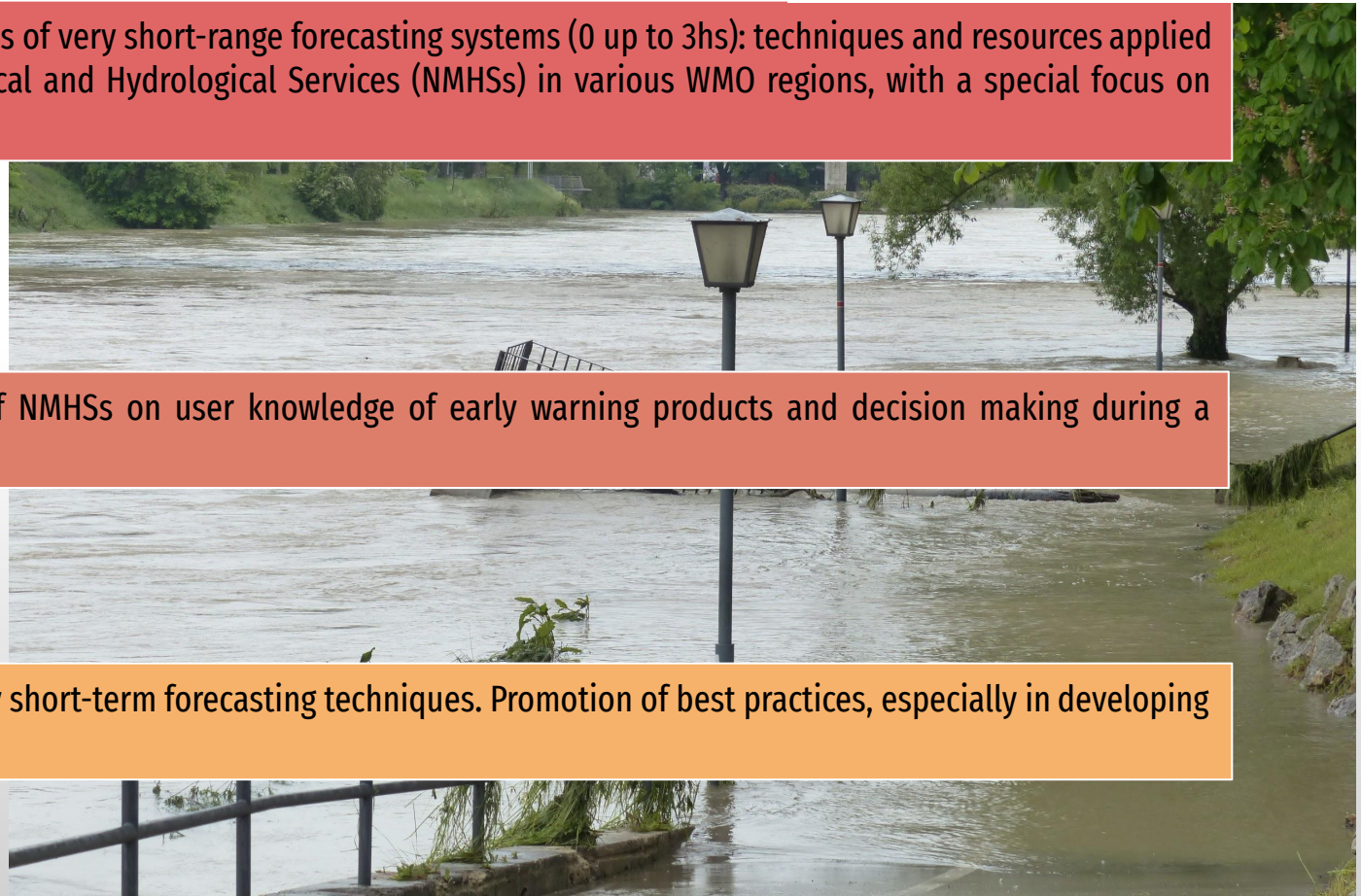
Evaluate nowcasting systems and EWS along WMO regions.

LoA

WMO sign a LoA with Exactas August 2020.

Objectives

Analyse the current status of very short-range forecasting systems (0 up to 3hs): techniques and resources applied by National Meteorological and Hydrological Services (NMHSs) in various WMO regions, with a special focus on developing countries.



Assess the perception of NMHSs on user knowledge of early warning products and decision making during a hazardous event.

Capacity building on very short-term forecasting techniques. Promotion of best practices, especially in developing countries.

Methodology. Design of the survey.

Nowcasting activities at NMHSs

- Types of nowcasting activities developed at NMHSs.
- Techniques and resources applied.

Early Warning Systems

- Implementation of EWS related to severe weather events
- Main characteristics(spatial coverage, type of phenomena included in the warning reports, impact-based forecasts)

Communication

- Identification of main user groups.
- Tools implemented for warning dissemination
- Characteristics of warning reports

Training

- Education activities, training activities, courses and specialized programmes in which members of NMHSs participate

Verification

- Verification methods applied to nowcasting systems.
- Dissemination of verification products to users.

Future work

- Identification of future activities related to NWC systems and EWS at the institutions to be implemented

Methodology. Timeline.

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Survey

Development of a survey aimed at NMHSs. EUMETNET members contributed with the design.

Mar 2021

Avoiding language barriers

Apr 2021

Test

Survey generation using the Survey Monkey tool.
Participation of SMN AR in testing responsiveness and response time.

May 2021

Translation to four official languages in the Americas: Spanish, English, Portuguese and French.
Translation to Arabic to expand the research across the African continent

Oct 2021

Submitting the survey

Submission of the survey via Representatives Members in **RA III** and **RA IV**

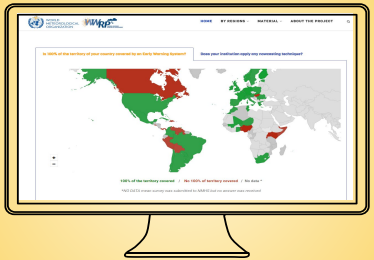
Oct 2022

Submitting the survey

Submission of the survey **RAIDEG** and **EUMETNET** members in **RA VI**

Dec 2022

Home Page



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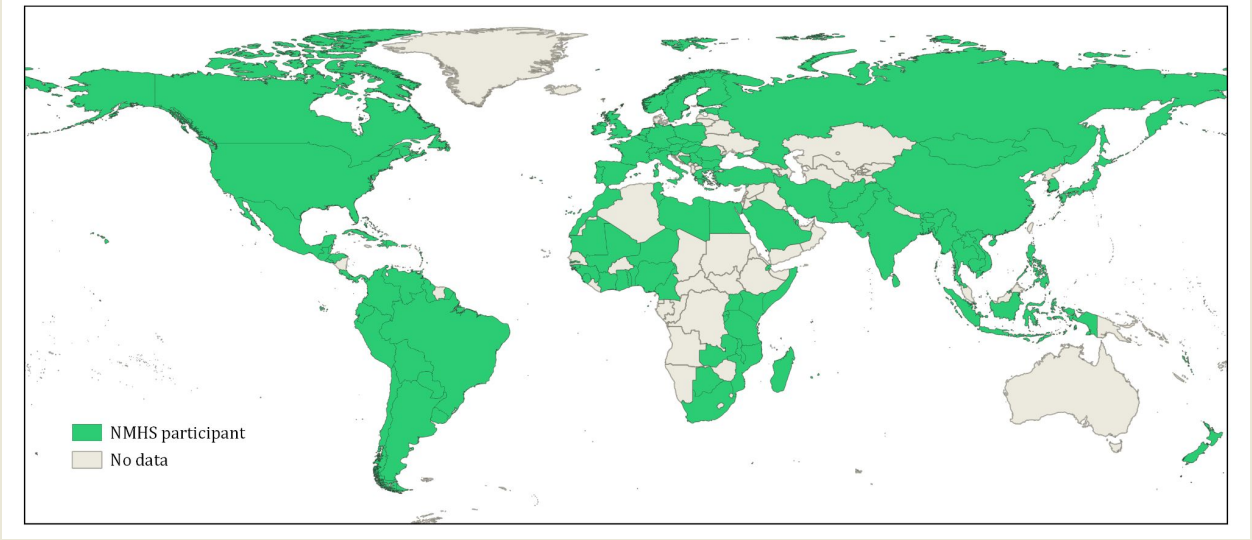
Dec 2023

Submitting the survey

Translation to Russian and Chinese
Submission of the survey via Representatives Members in **RA I**, **RA II** and **RA V**.

Results. Level of participation.



WMO Regional Associations (RA)	Collected answers (expected)	% Covered Land Region
Africa (RA I)	33 (53) [62%]	60.3
Asia (RA II)	24 (34) [71%]	87.6
South America (RA III)	12 (13) [92%]	98.6
North America, Central America and the Caribbean (RA IV)	19 (25) [76%]	99.5
South-West Pacific (RA V)	8 (22) [36%]	23.3
Europe (RA VI)	28 (51) [55%]	92.9

Reception

Reception of responses and data analysis

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Results. EW4ALL.

Countries included in the **EW4ALL** initiative and participants in the survey (18/30)

- Asia and Pacific: **Bangladesh**, **Maldives**, Nepal, **Lao (People's Democratic Republic)**, **Cambodia**
  Kiribati, Samoa, Solomon Islands, Fiji, Tonga
- Africa: **Djibouti**, **Somalia**, Sudan, Chad, Comoros, Ethiopia, Liberia, **Madagascar**, **Mauritius**, **Mozambique**, **Niger**, South Sudan, **Uganda**
- Latin America and Caribbean: **Guyana**, **Haiti**, **Barbados**, **Antigua and Barbuda**, **Guatemala**, **Ecuador**
- Central Asia: Tajikistan

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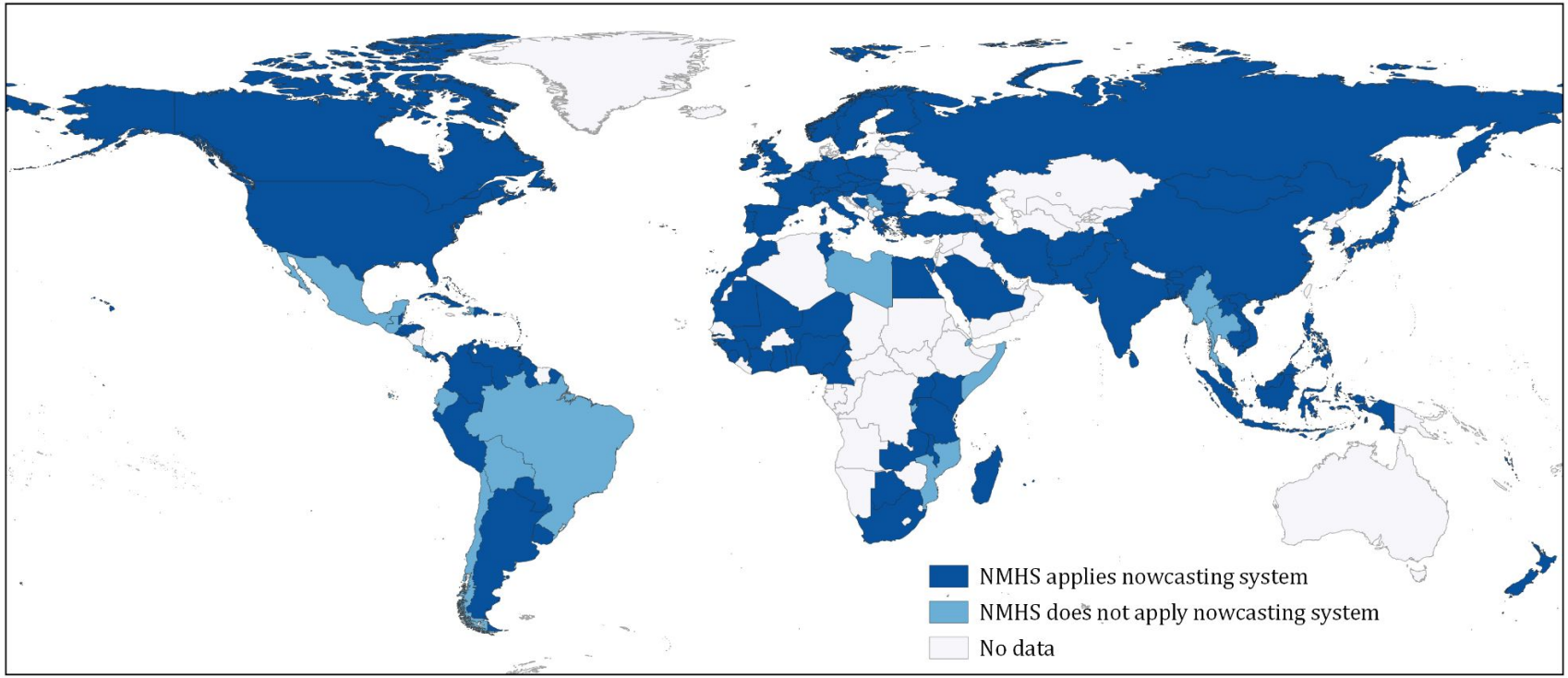
Results. Nowcasting Systems.



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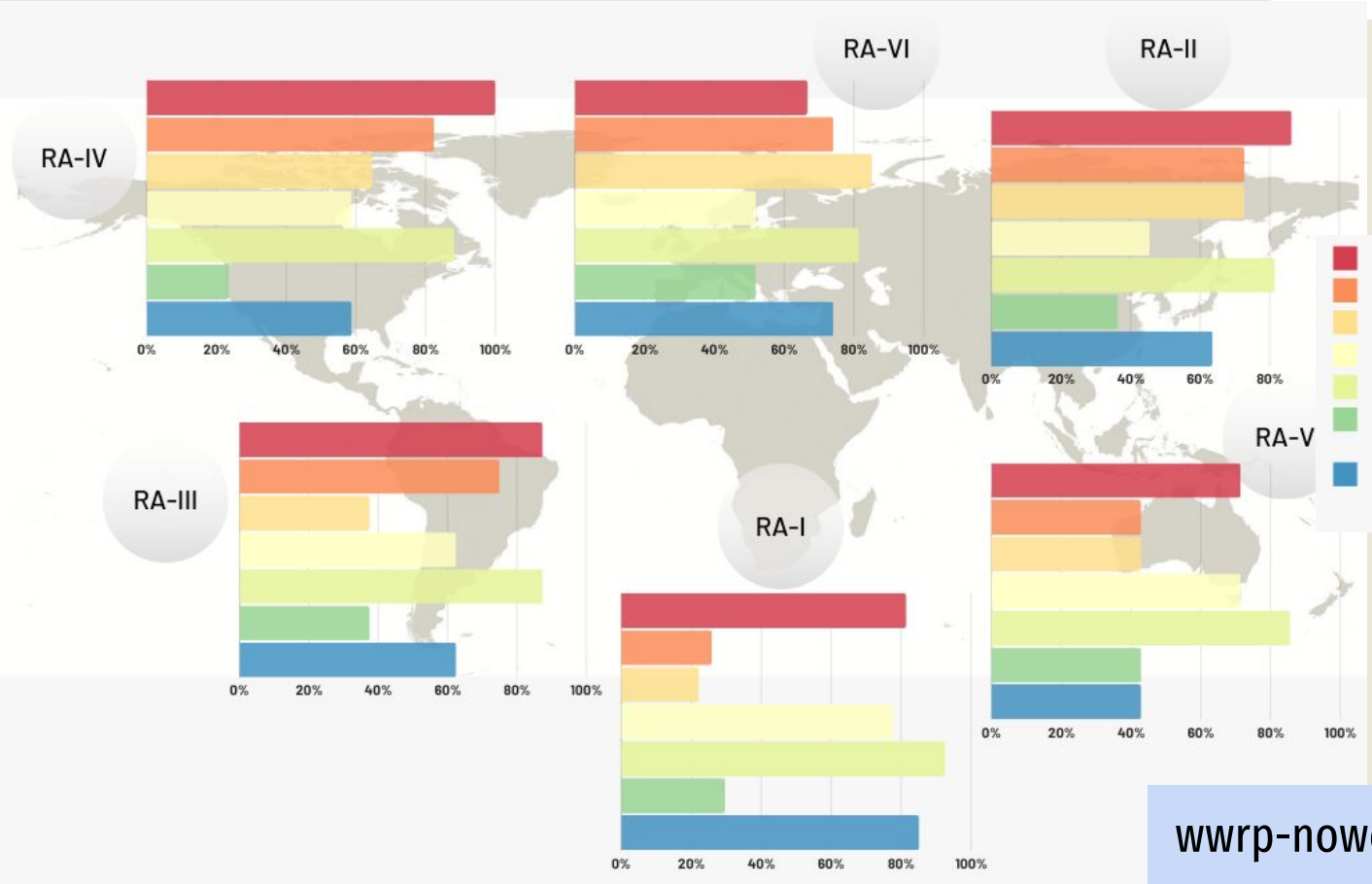

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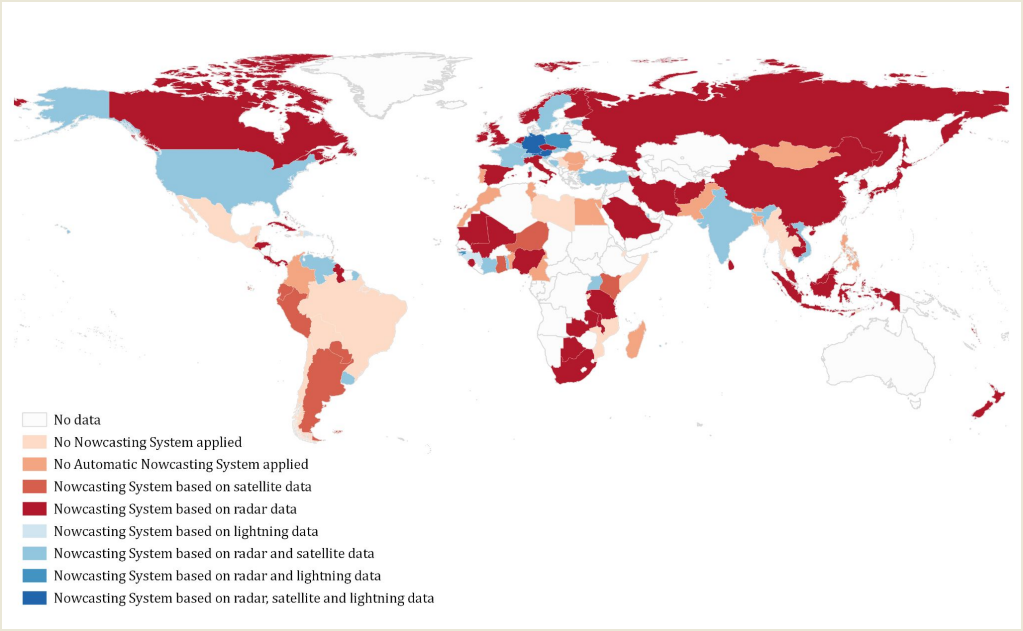
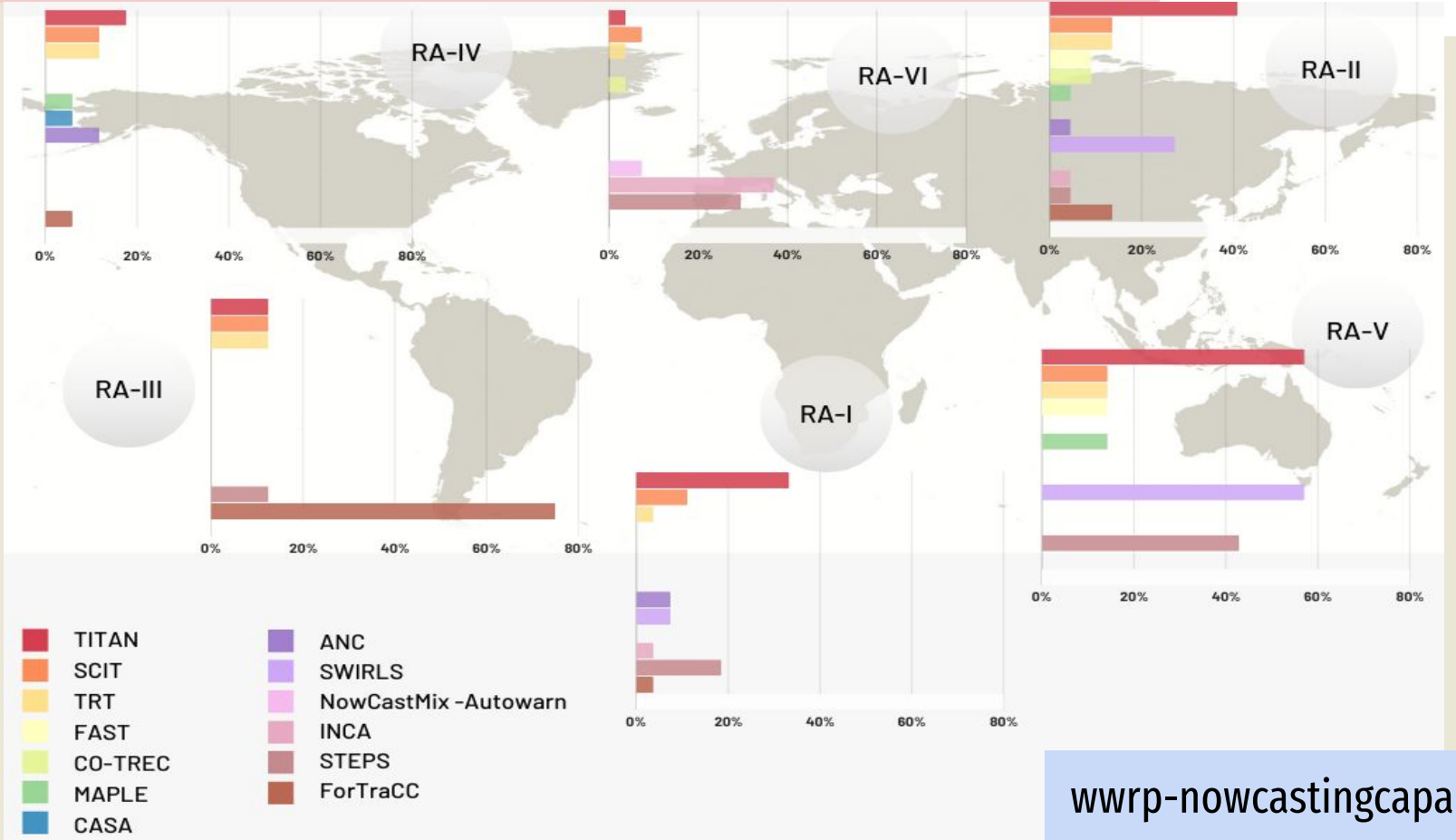


Automatic nowcasting system based on						
	RA I	RA II	RA III	RA IV	RA V	RA VI
Satellite data	9.1%	4.2%	36.7%	5.3%	-	-
Radar data	36.4%	54.2%	9.1%	36.8%	75.0%	32.1%
Lightning data	3.0%	-	-	5.3%	-	-
Radar and satellite data	9.1%	12.5%	18.2%	5.3%	-	35.7%
Radar and lightning data	3.0%	-	-	-	-	3.6%
Radar, satellite and lightning data	-	-	-	-	-	7.1%
No Automatic nowcasting system	21.2%	20.8%	9.1%	31.6%	12.5%	14.3%
No Nowcasting system	18.2%	8.3%	27.3%	15.8%	12.5%	3.6%

Results. Nowcasting Systems.



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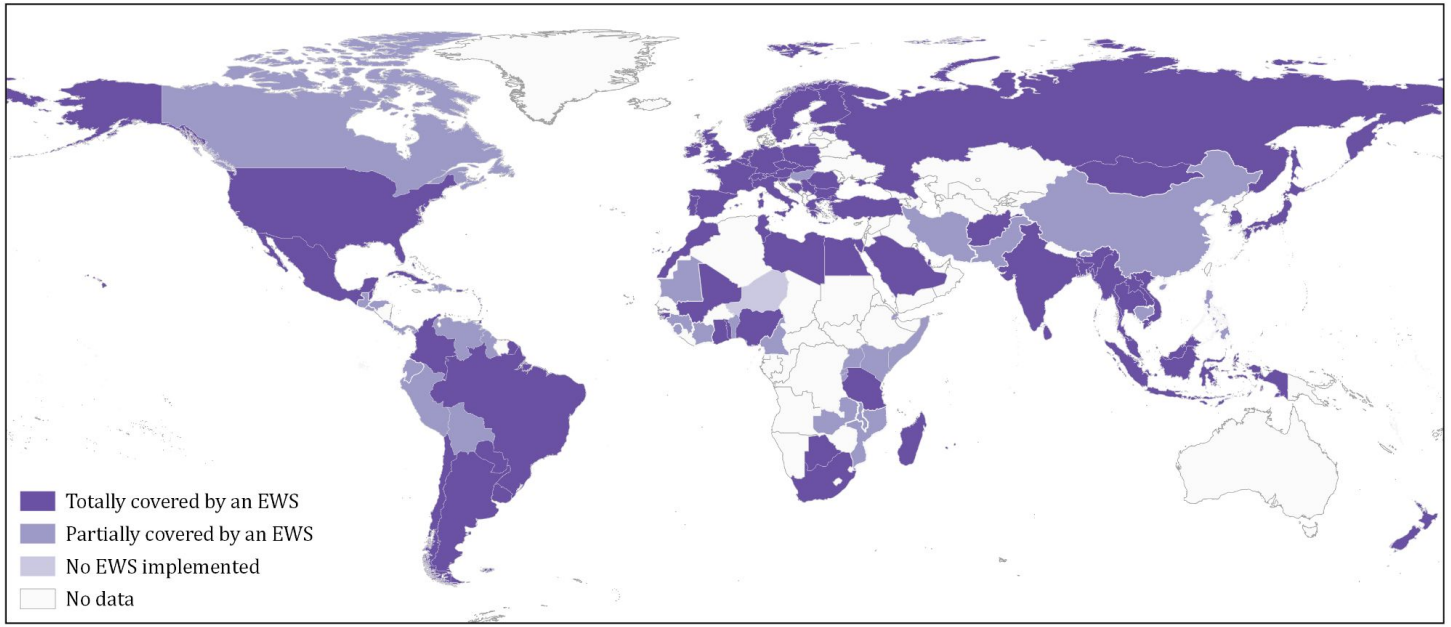
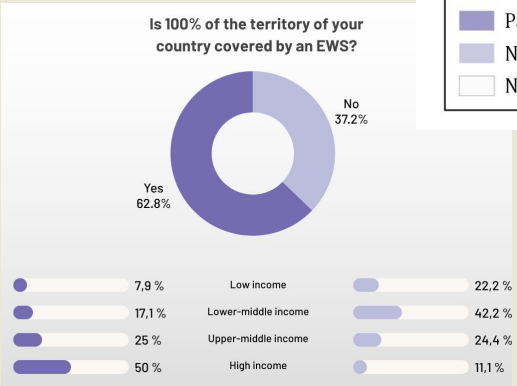
Results. Early Warning Systems.





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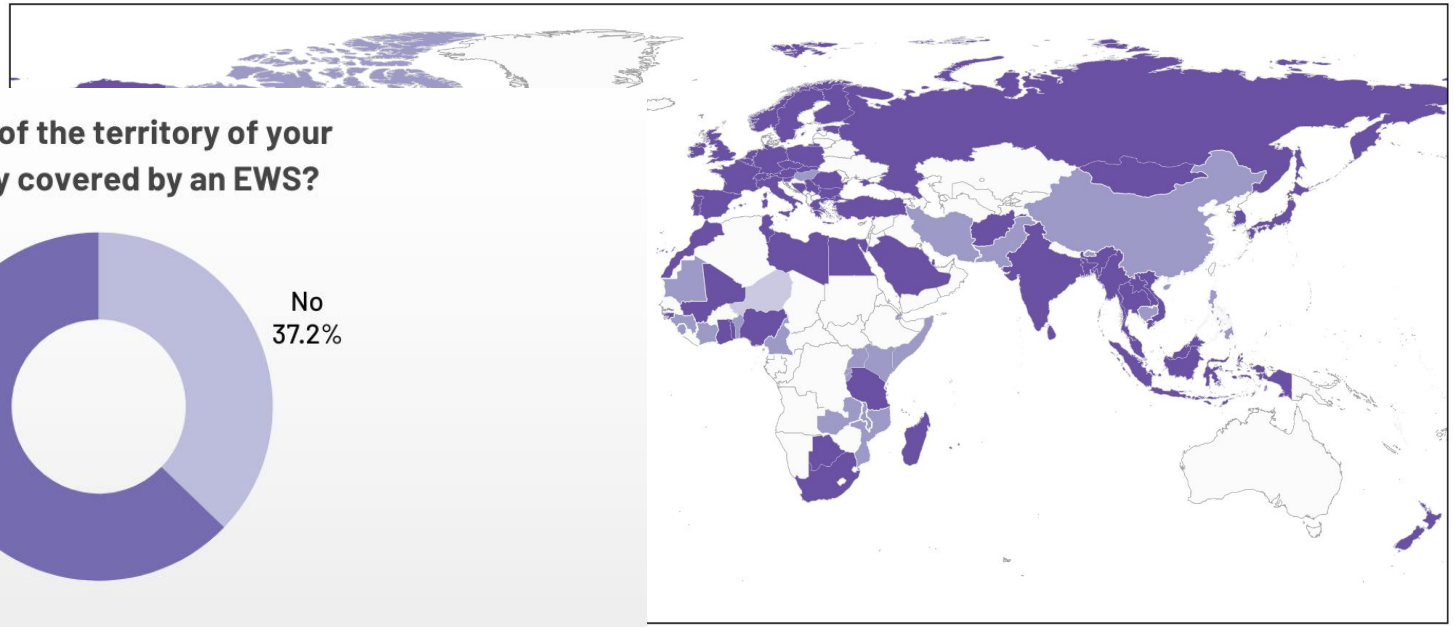

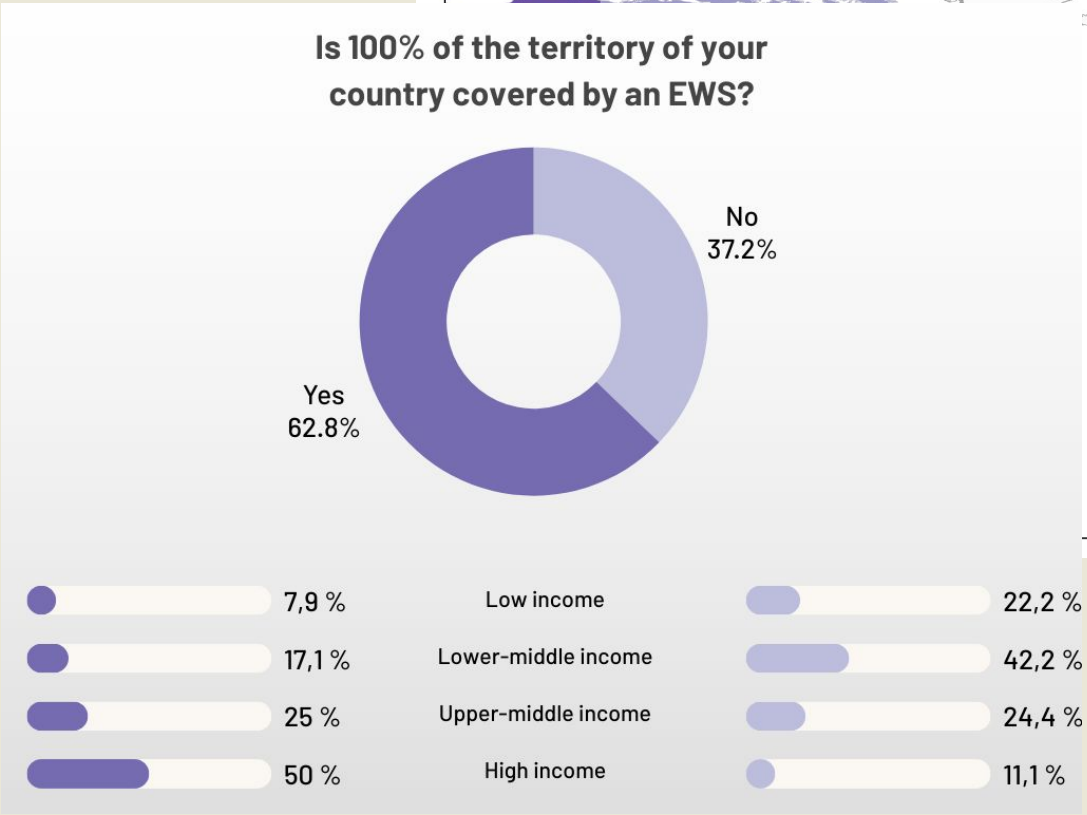

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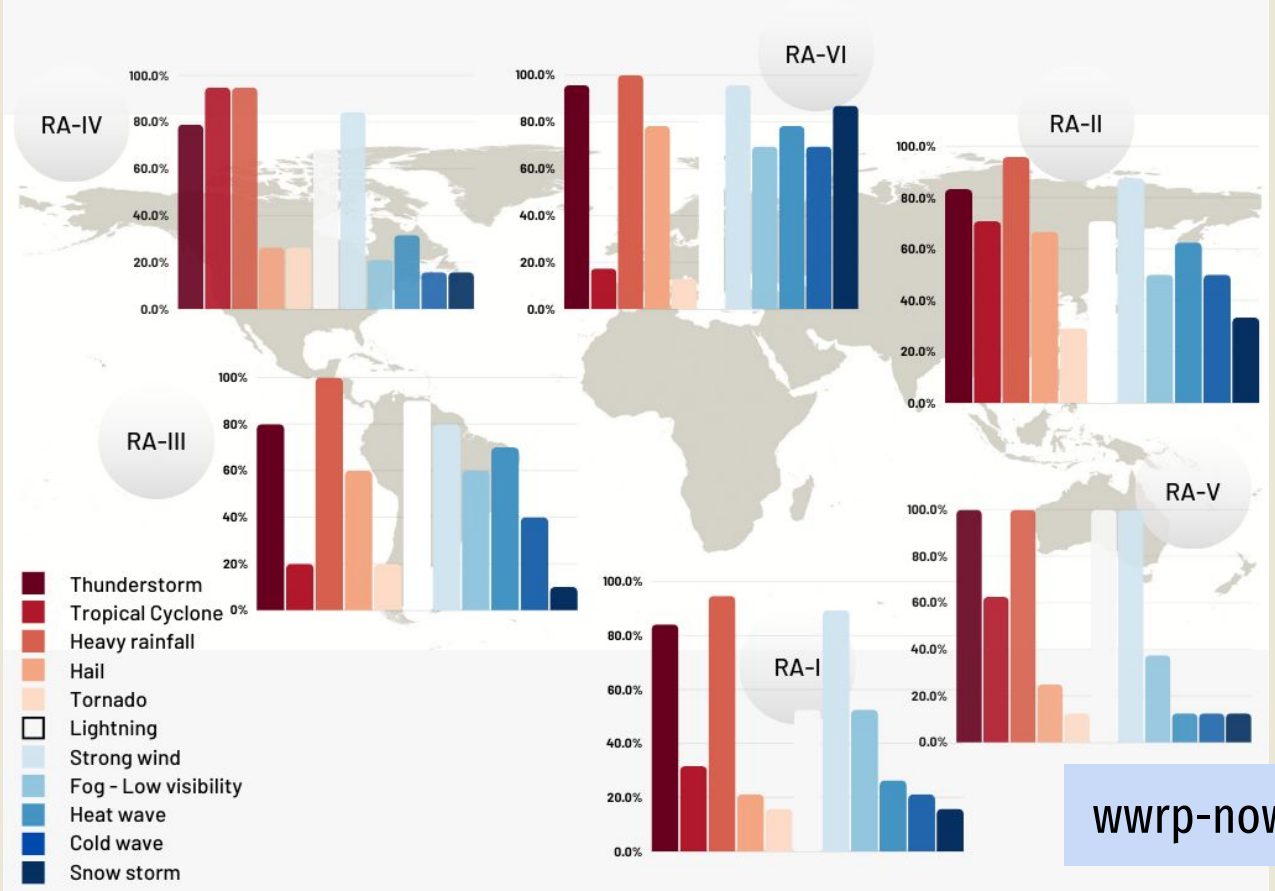
Results. What kind of meteorological phenomena are included in the EWS?



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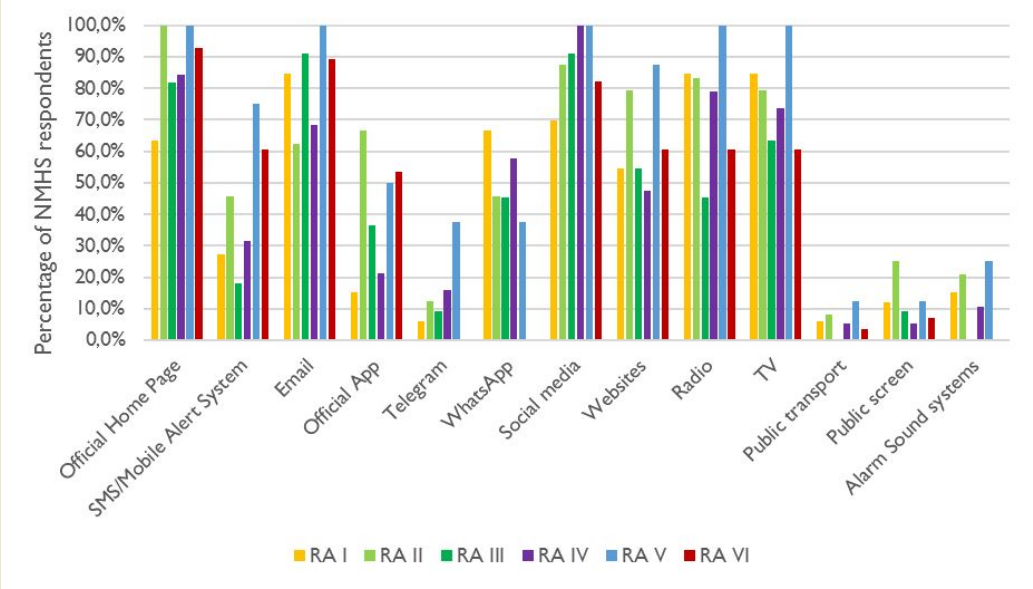
Results. Communication. Key EWS tool

How are the warnings disseminated?



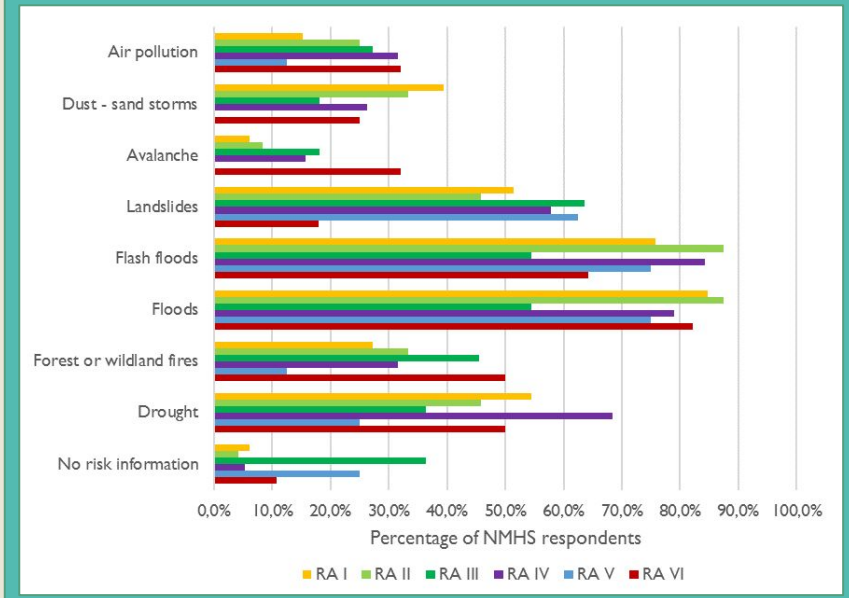
Important role of social media - email and Home Page (radio and TV)

Whatsapp groups important in RAIII and IV

10% do not provide risk information in the warning

Around 40% of respondents in RA III do not include risk information in their reports.

The most frequently reported hazards are: Landslides, floods and flash floods.



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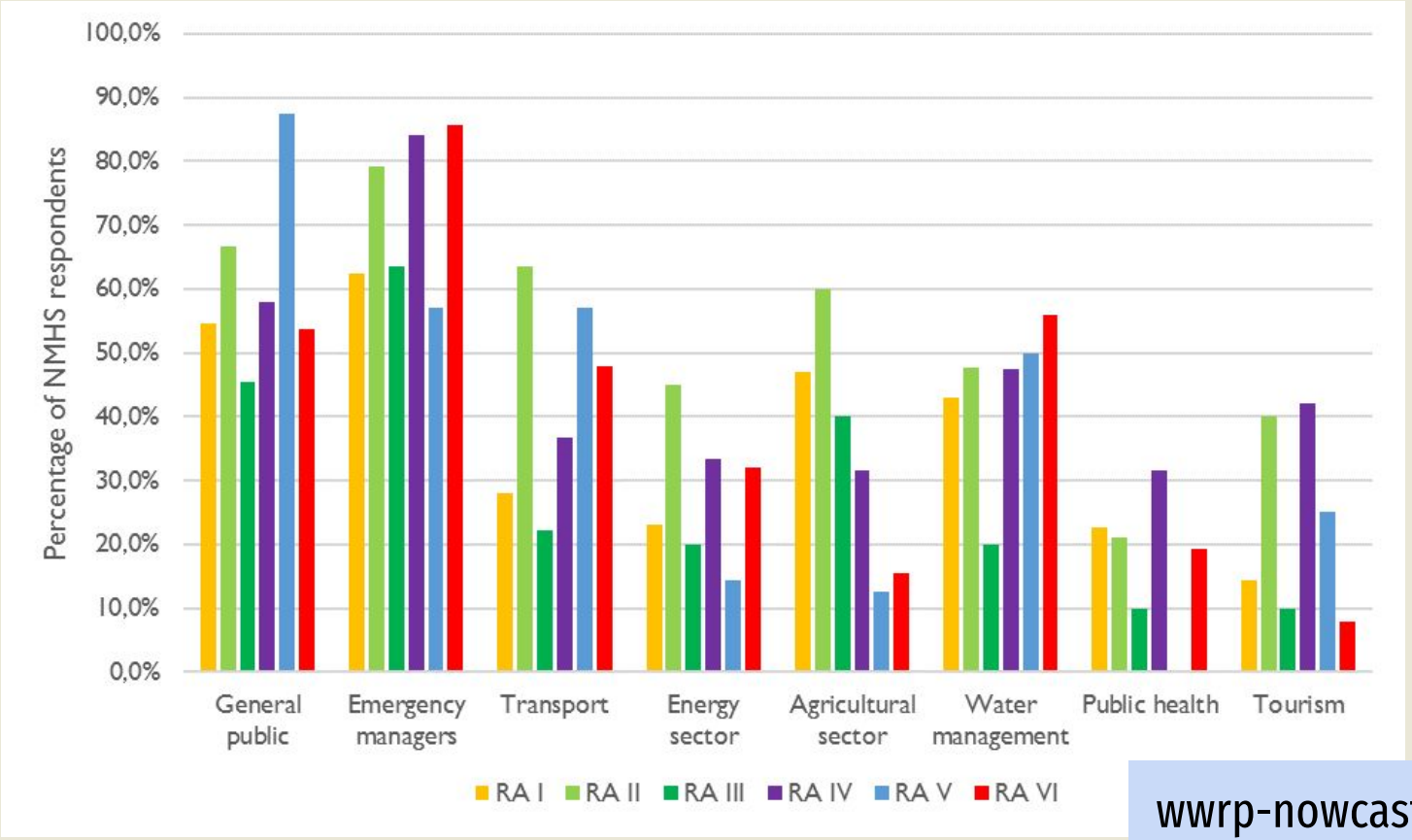

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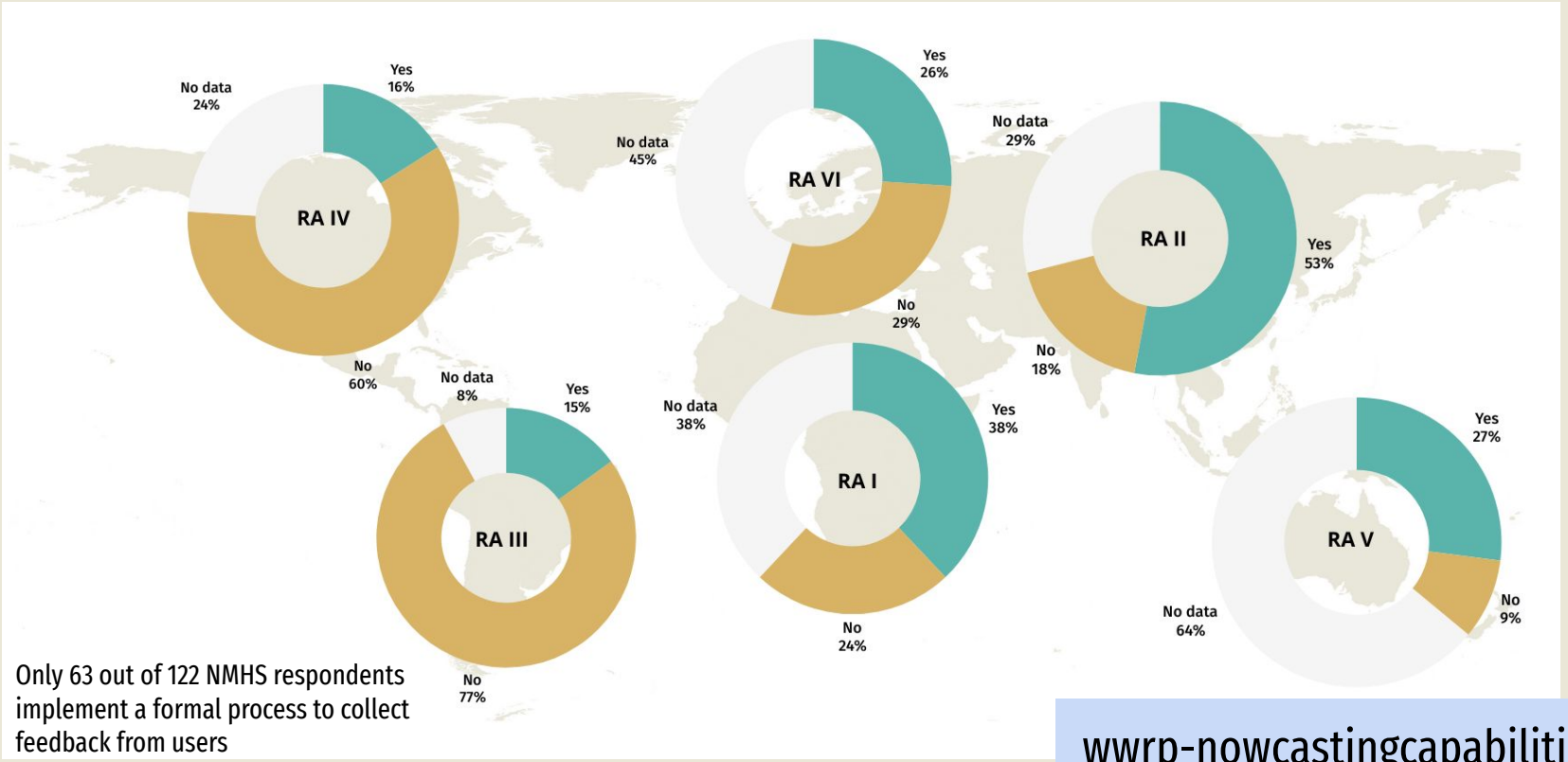
Results. Interaction with users:
Do you have a formal process to collect feedback from users?



Only 63 out of 122 NMHS respondents implement a formal process to collect feedback from users

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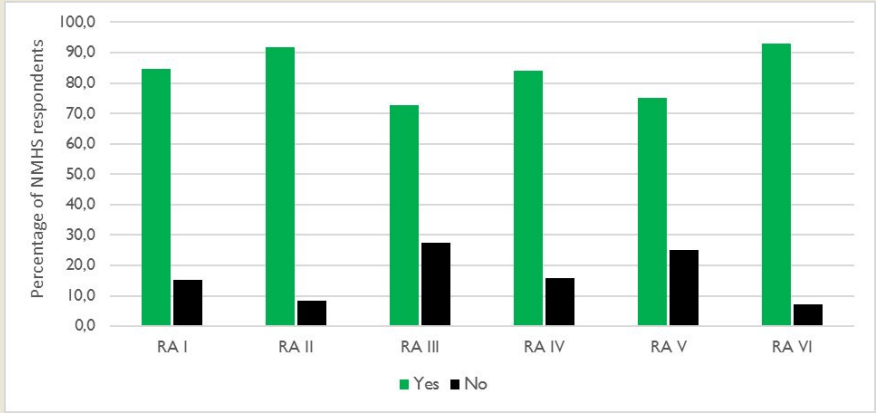
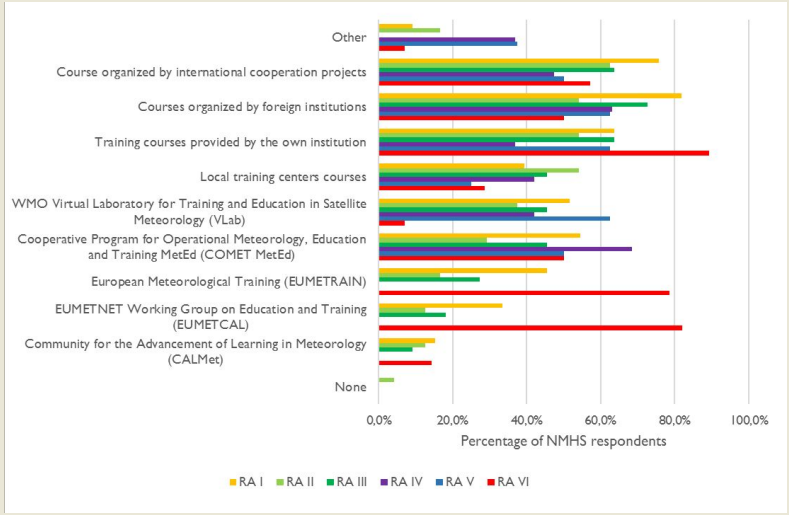
Results. Training

Have you participated in training courses on NWC techniques?



Do forecasters attend specialized training/workshops to improve their technical/practical skills to develop and/or use nowcasting products?



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Highlights

We would like to thank the NMHS for taking part in the survey in 2021 - 2024

Valuable efforts are made by NMHSs to incorporate NWC techniques and resources.

- To improve their EWS products.
- Increasing incorporation of impact-based forecasts

The use of NWC techniques based on satellite data are dominant in RA III and I .
Evidence of the importance of a regionally focused sensor.

Deficient EWS on Low and Low-middle income countries
Very low communication with final user of the EWS
Communication gaps have been identified between NMHSs in the exchange of radar information, which is essential for NWC.