Weather forecasting and climate risk reduction in dry tropical Africa

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Study and Cooperation Day

International Cooperation in Applied Meteorology for Reducing Hydroclimatic Risks

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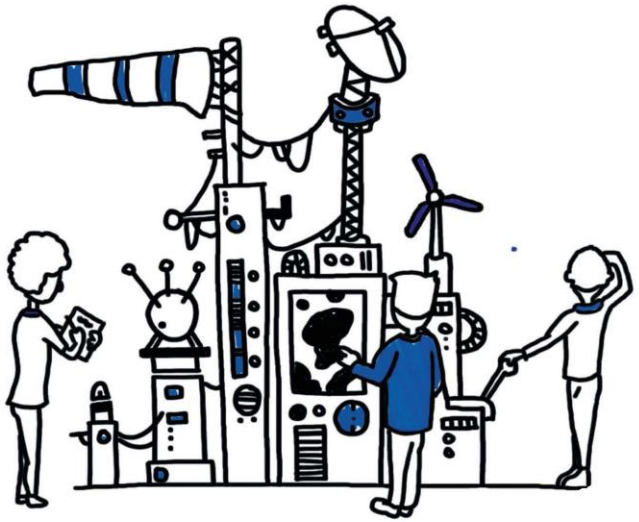
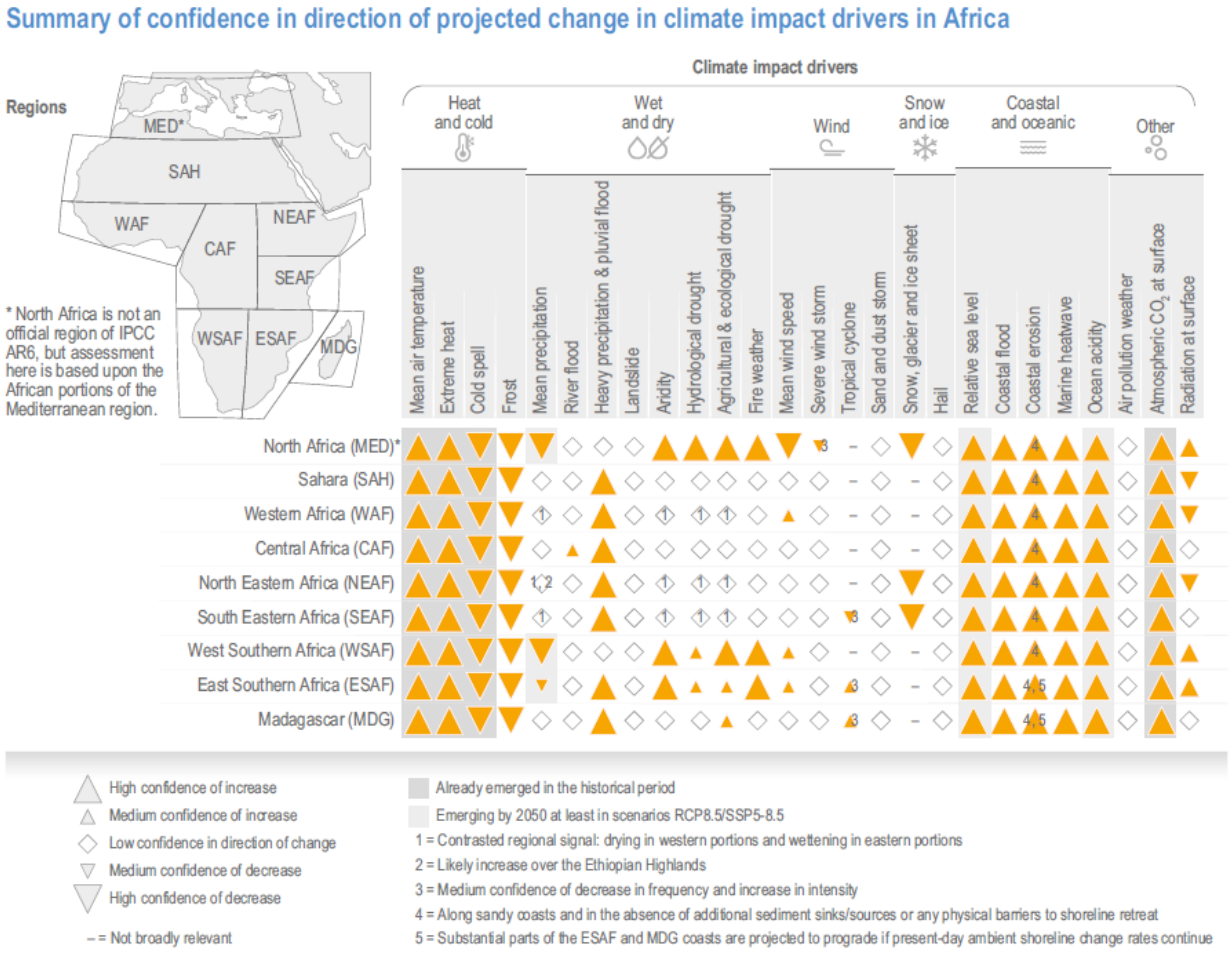
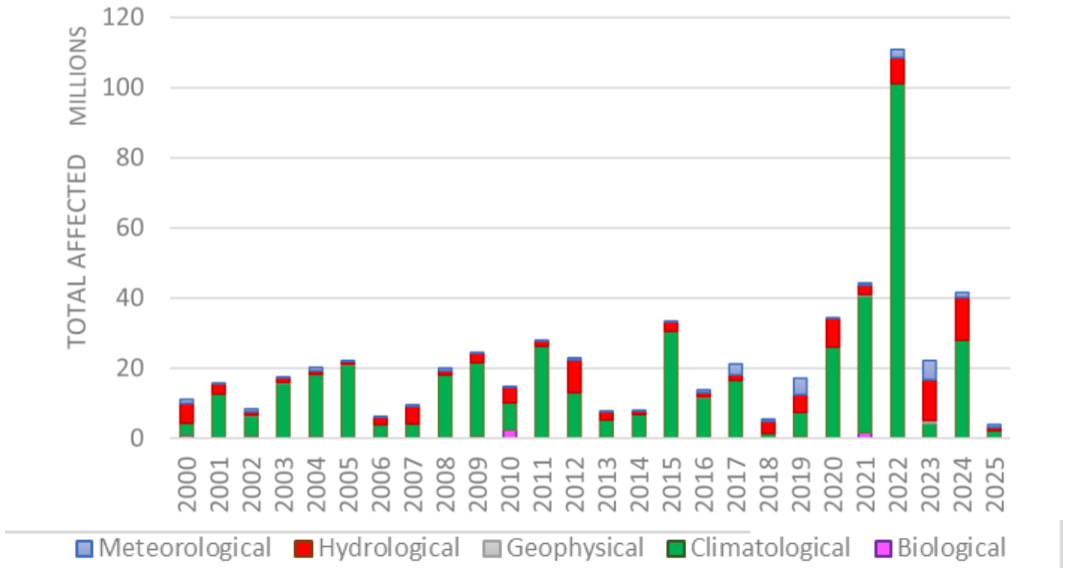
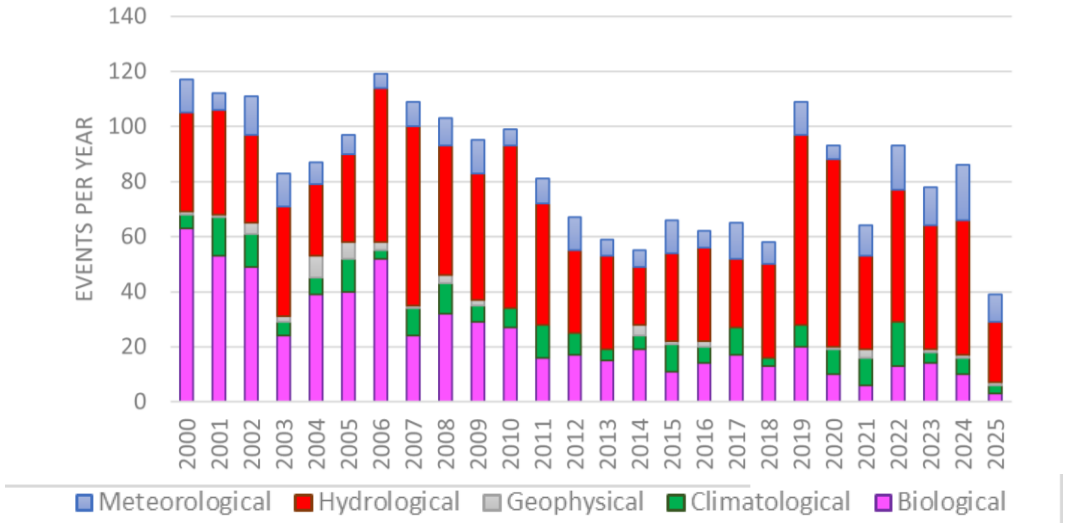


Climatic Risks in Africa



EM-DAT
Natural Disasters in Africa





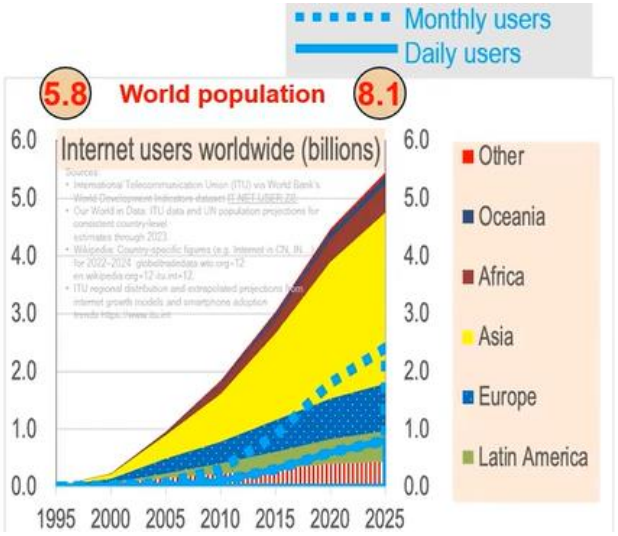
Meteorology and Society

Growing demand of Meteorological Information

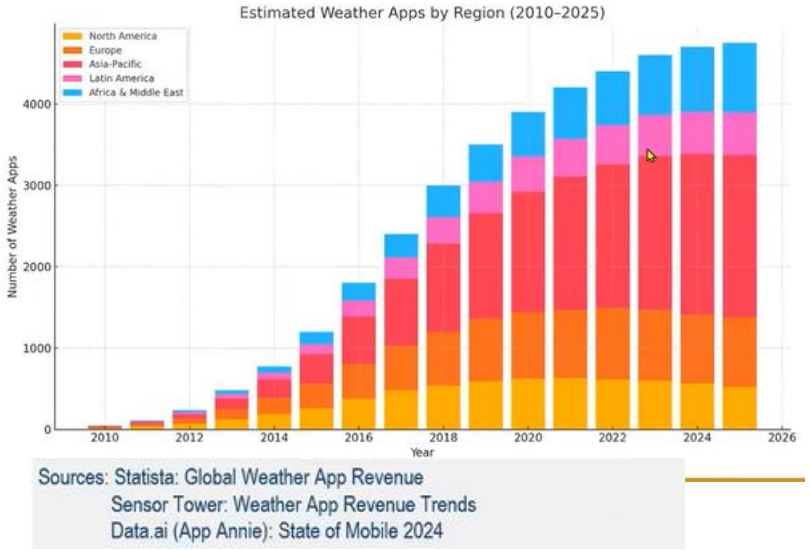
- Renewable energy: doubled in the last 12 years
- Air traffic: 786x more passenger km than 1950
- Outdoor activities: 3x more outdoor hours than 1950

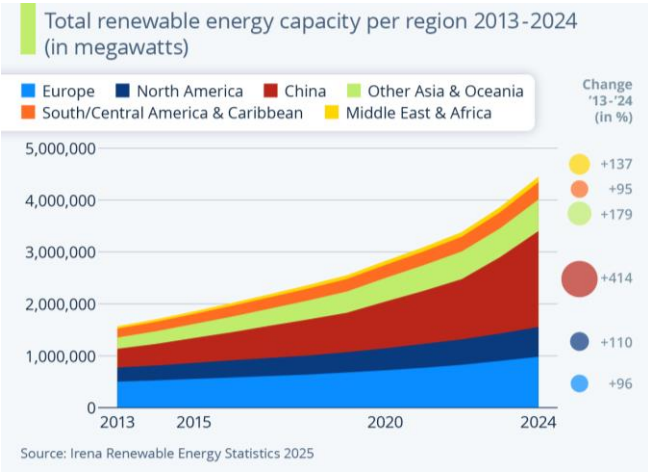
New media

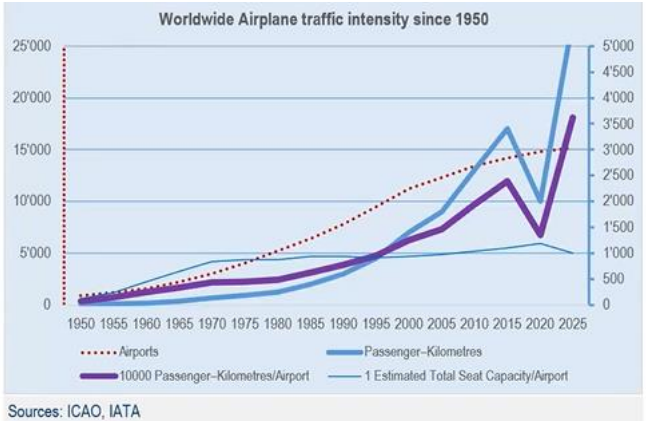
Internet

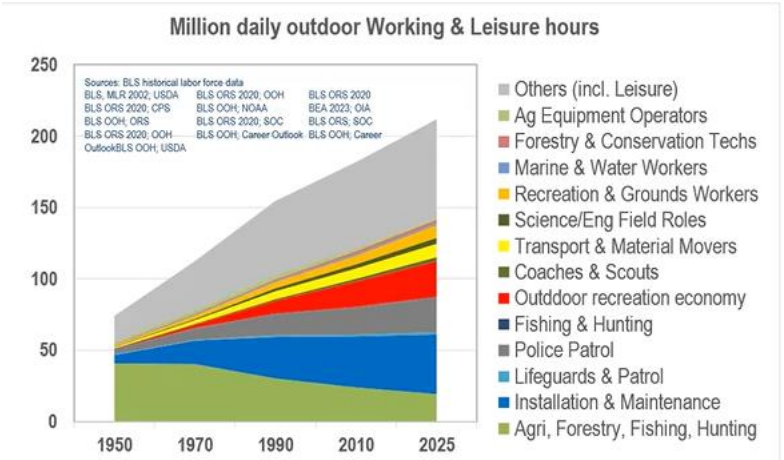


Apps





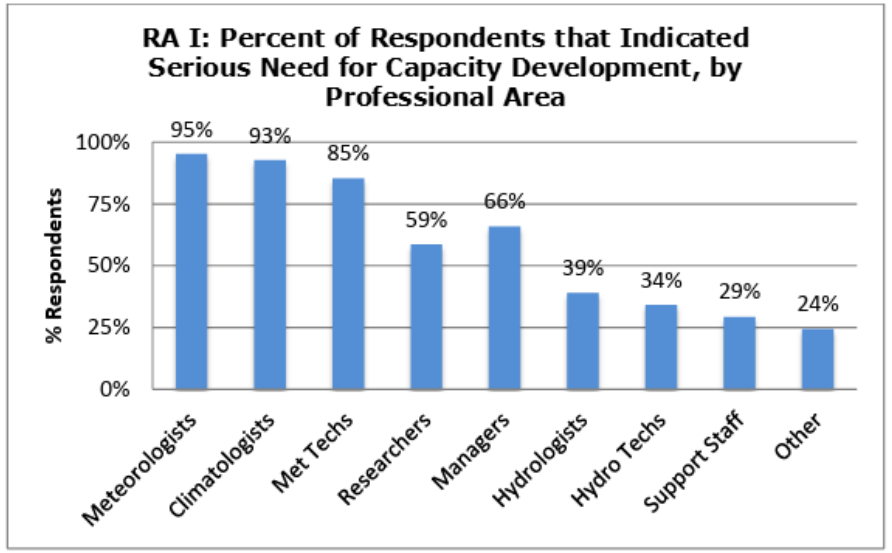


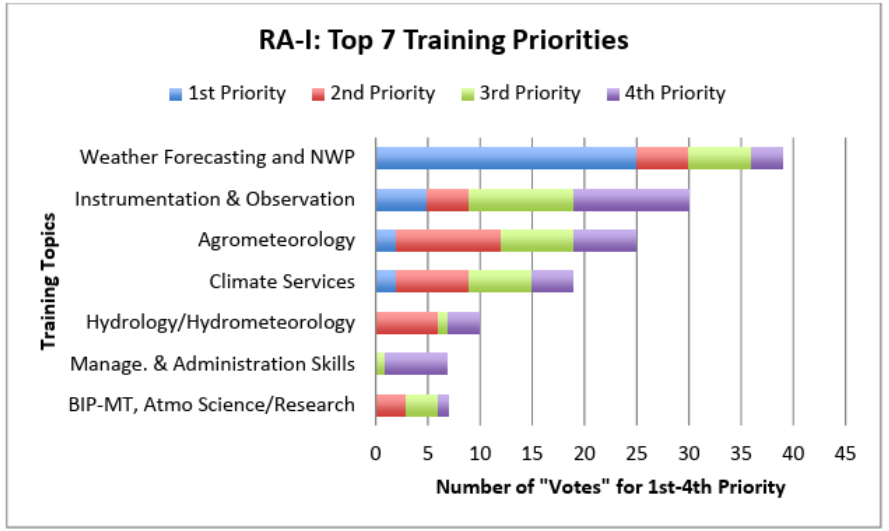


Challenges of NMHS in Africa (WMO RA-I)

- Budget (personnel, observation networks,…)
- Competencies (training staff, turn-over,..)
- Innovation (models, satellites, radars…)
- Security
- Producing Services as per WMO GFCS
- Engagement with users
- ….

WMO - Status of Human Resources in National Meteorological and Hydrological Services (ETR-21)

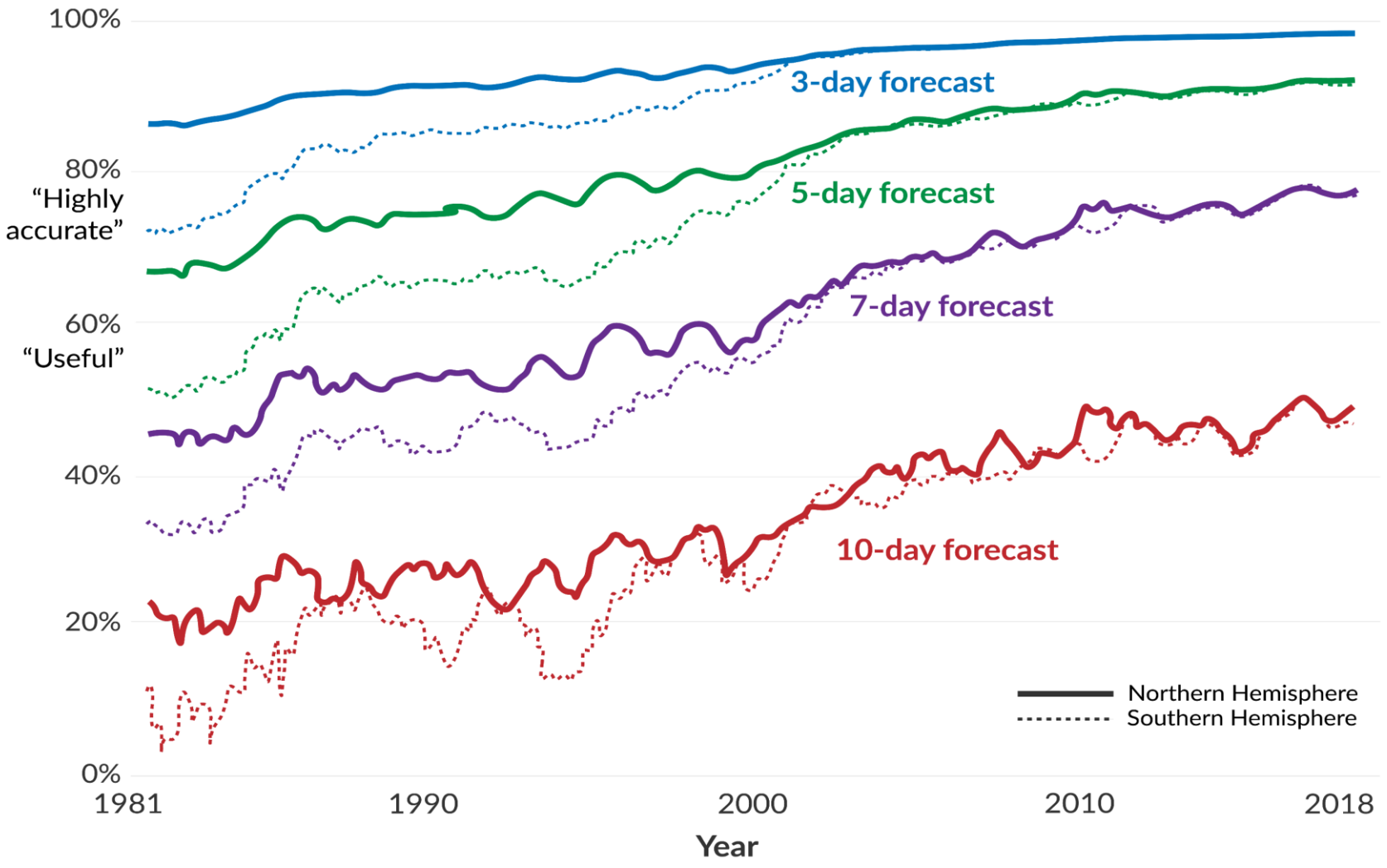




The accuracy of weather forecasts has improved

Accuracy is measured as the difference between the forecast and subsequent weather. This is based on the '500 hPa geopotential height' which is a common meteorological metric used to measure air pressure.

Our World in Data



Source: European Centre for Medium-Range Weather Forecasts (ECMWF).

Challenges in NWP: Sub-saharan Africa

There are large differences in weather forecasts across the world, with a large gap between rich and poor countries:

- a 7-day forecast in a rich country can be more accurate than a one-day forecast in some low-income ones.

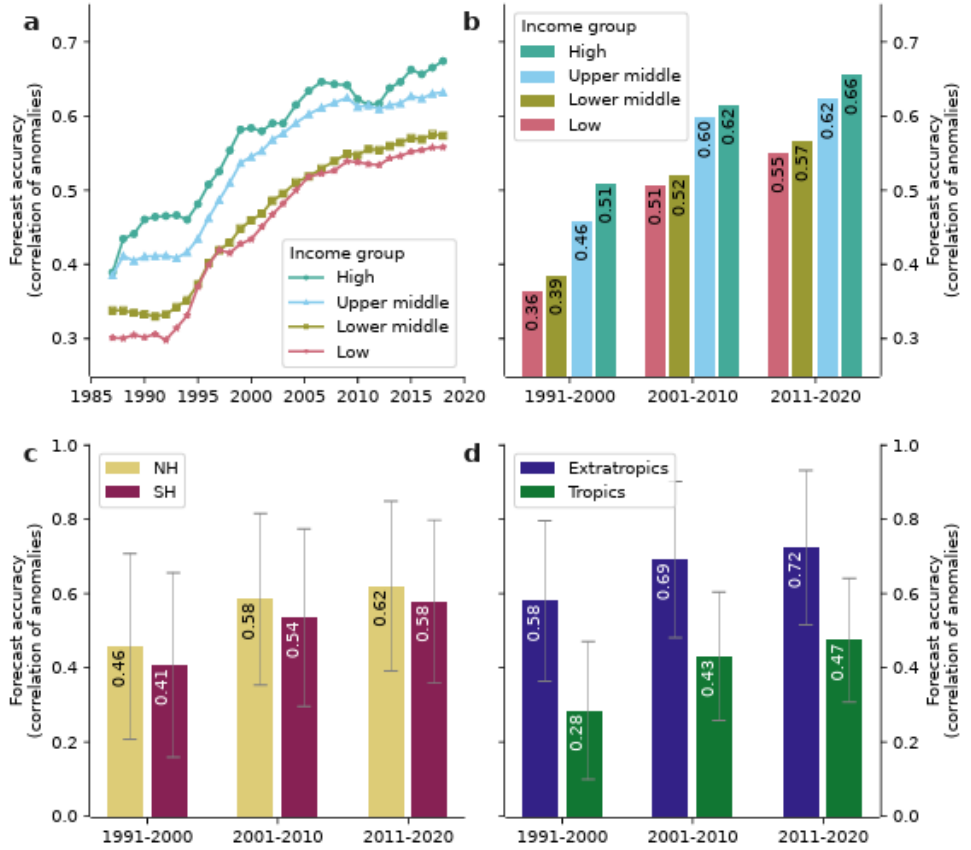
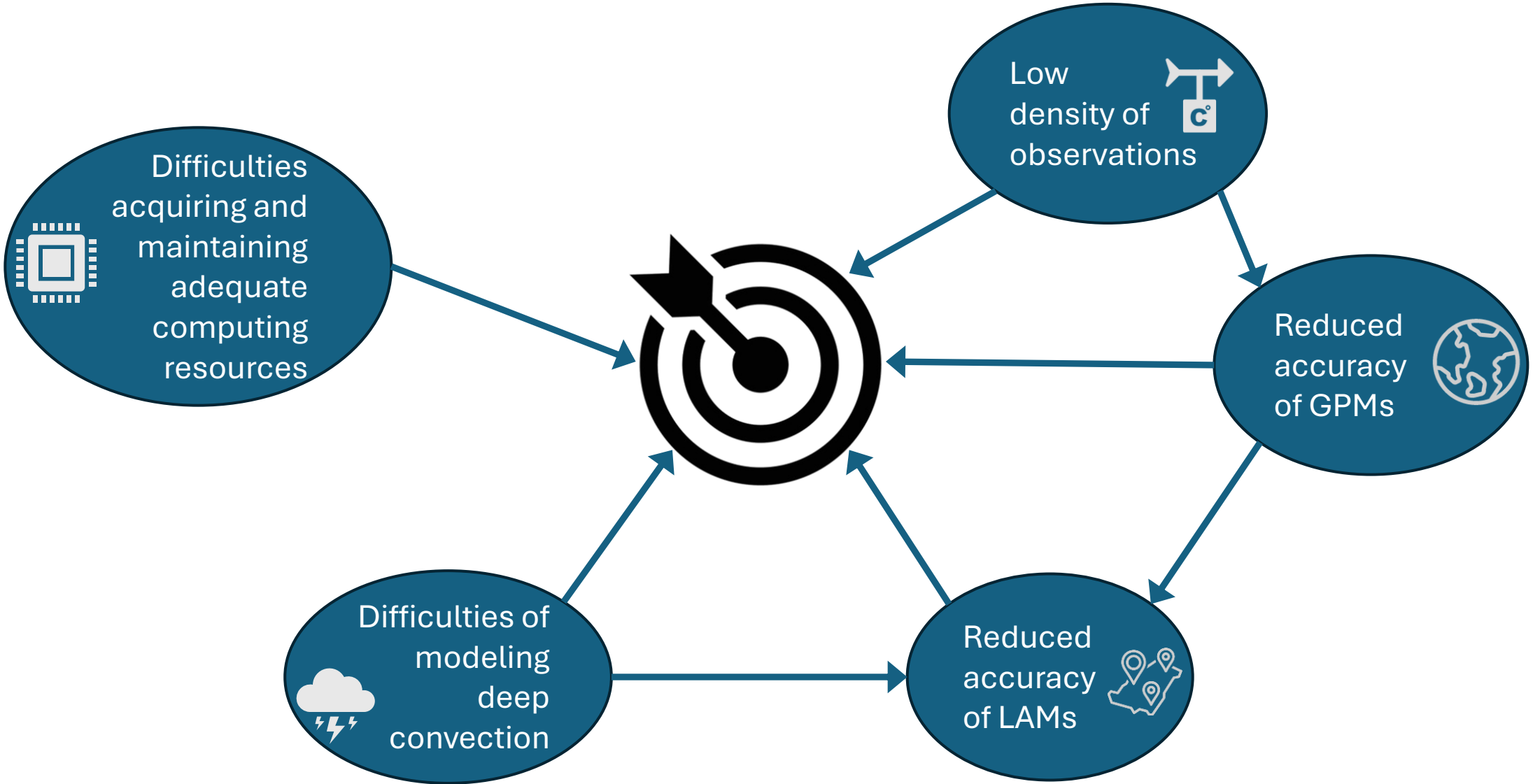


Figure 2. **Forecast accuracy has improved over time, but persistent gaps between richer and poorer countries remain**. Based on the same data as Figure 1. Forecast horizon is 1-day-ahead. **a.** Timeseries of forecast accuracy for different country income groups using a five-years moving average. **b.** Forecast accuracy by country income group and by time period. **c.** Forecast accuracy by hemisphere (NH = Northern Hemisphere, SH = Southern Hemisphere) and by time period. **d.** Forecast accuracy by world region (tropics, extratropics) and by time period.

Linsenmeier, Manuel & Shrader, Jeffrey G., 2023. "**Global inequalities in weather forecasts**," SocArXiv 7e2jf, Center for Open Science.

Challenges in NWP: Sub-saharan Africa



Responses

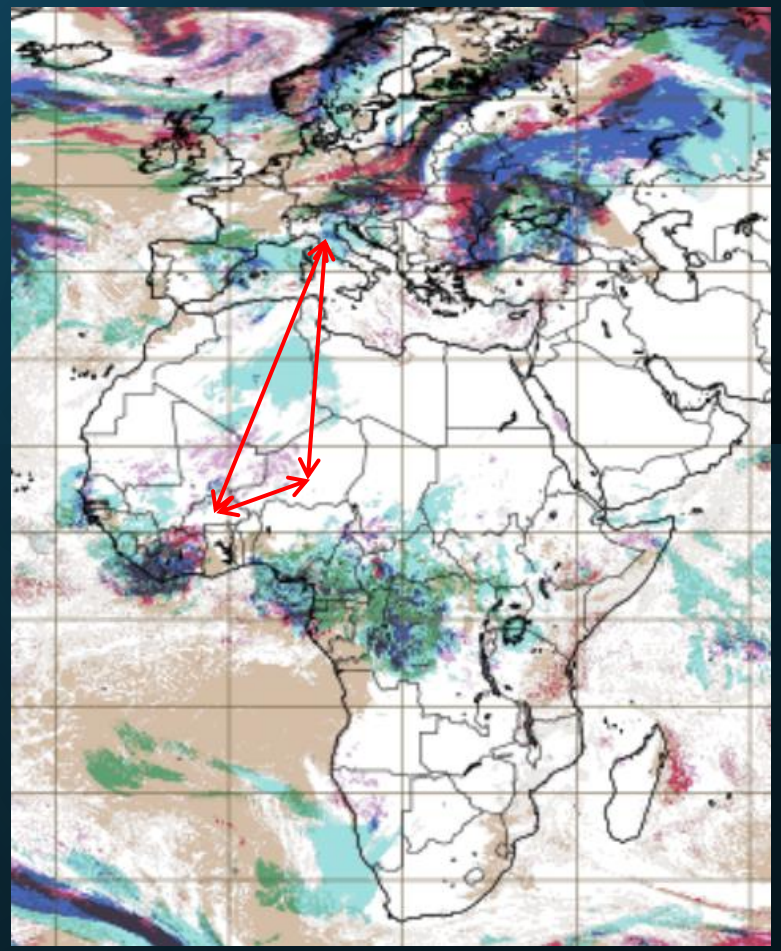
3C

- Cooperation: North-South and South-South, increased public-public and public-private cooperation
- Coordination: International frameworks, WMO, avoiding overlapping, optimizing resources
- Collaboration: homologue entities, embedding researchers and technicians in operational teams, win-win solutions

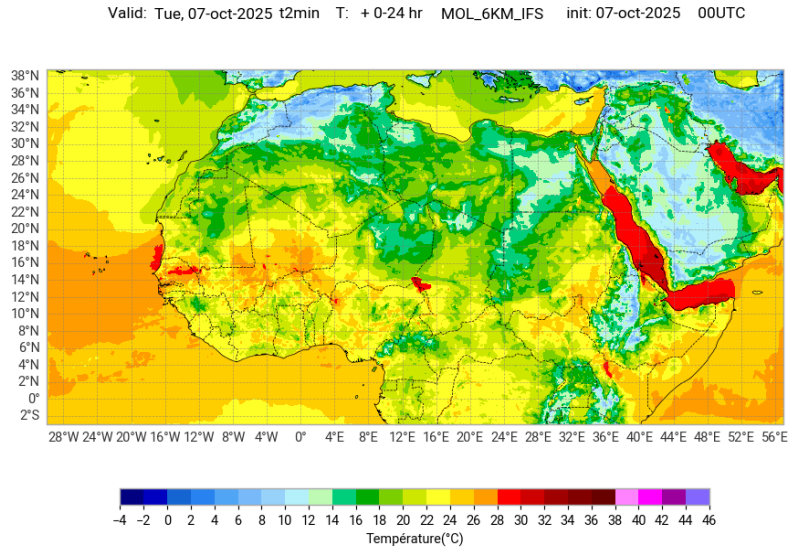
Sharing resources

- Open data : GFS, IFS, …
- Open tools : WRF, MOLOCH, ….
- Computing resources: ECMWF

An operational exemple: SLAPIS Sahel



- Numerical weather forecasting for flood risk reduction:
  - IBE-CNR (ITA)
  - Agence Nationale de la Météorologie (BF)
  - Direction de la Météorologie Nationale (NER)
  - LaMMA (ITA)
- NWP: WRF, MOLOCH
- From knowledge to competencies: embedding in operational teams
- Sharing tools and ressources
- Win-win: testing and improving MOLOCH in tropical areas



Thank you

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