

2023 STATE OF GLOBAL WATER RESOURCES REPORT

LAUNCH EVENT

07 October 2024, Monday 14:00



WORLD
METEOROLOGICAL
ORGANIZATION

STATE OF GLOBAL WATER RESOURCES 2023



AGENDA

14:00-14:03	Welcome by the Master of Ceremonies, Mr. Ian Lisk (President of SERCOM, WMO)
14:03-14:10	Key messages and reflections on the State of Global Water Resources, Professor Celeste Saulo (Secretary-General, WMO)
14:10-14:25	Main results of the State of Global Water Resources Report, Dr Stefan Uhlenbrook (Director Hydrology, Water and Cryosphere, WMO)
14:25-14:40	Country voices: Ambassador H.E. Ms. Himalee ARUNATILAKA, Sri Lanka Ambassador H.E. Ms. Anita PIPAN, Slovenia Ambassador H.E. Mr. Mxolisi NKOSI, South Africa
14:40-14:57	Q and A with the audience, moderated by Dr Sulagna Mishra (Scientific Officer, WMO)
14:57-15:00	Closing, Mr. Ian Lisk (President of SERCOM, WMO)

STATE OF GLOBAL WATER RESOURCES 2023

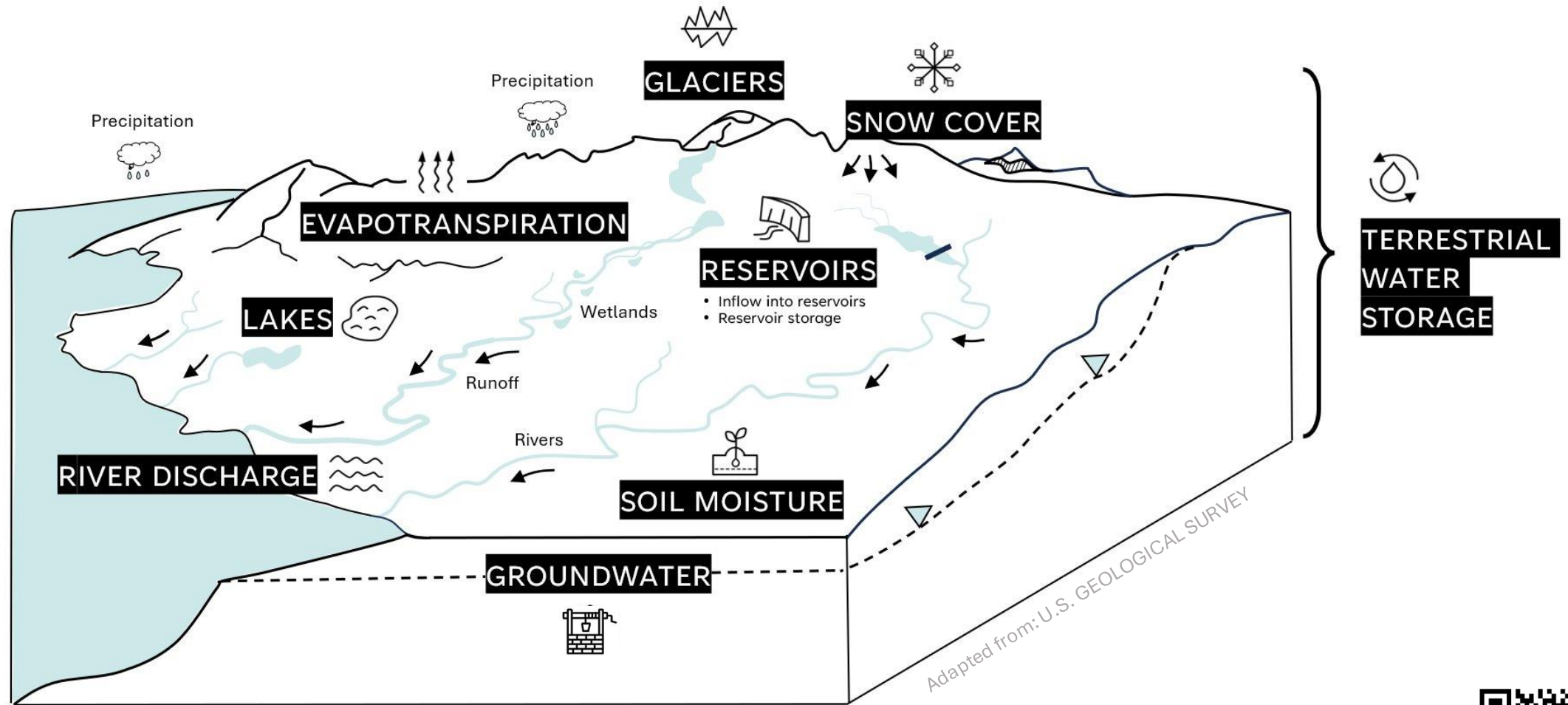


WHAT DOES THE REPORT PROVIDE?

- Provide a **quantitative assessment** of global water resources in the last year
- Give an overview of status on **data availability and data sharing** at a global scale (hydrological data)
- **Innovative methodology** used to overcome the gaps in available observations
- The report was **well received** by Members, international organizations and media

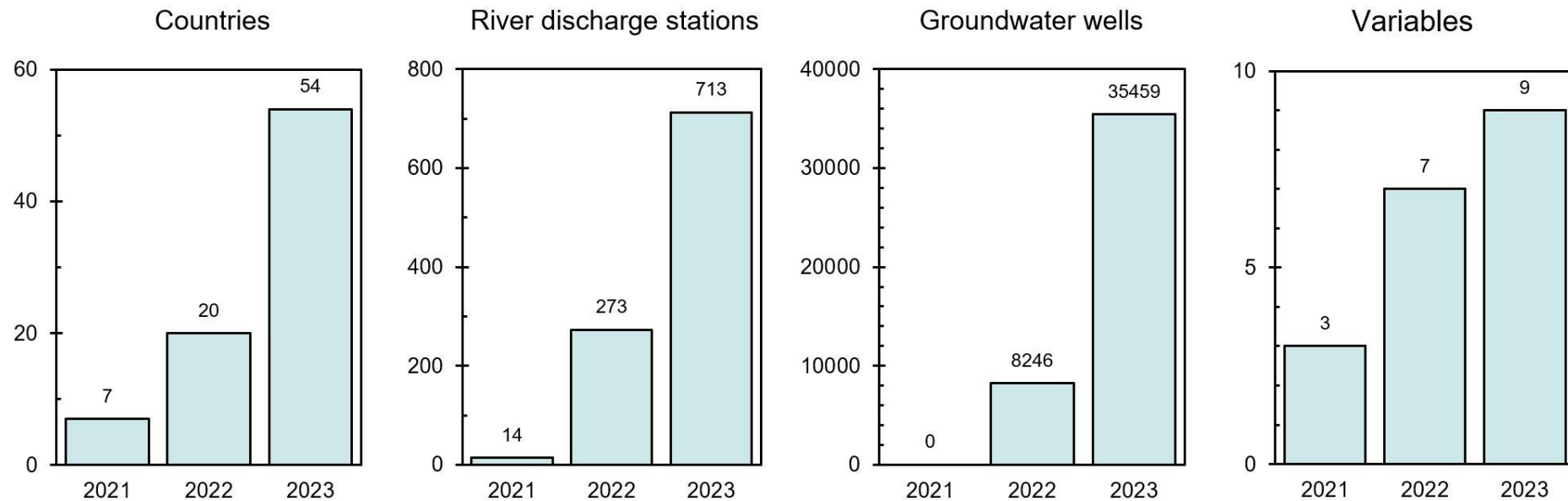


HOW DOES THE REPORT COVER THE WATER (HYDROLOGICAL) CYCLE ?



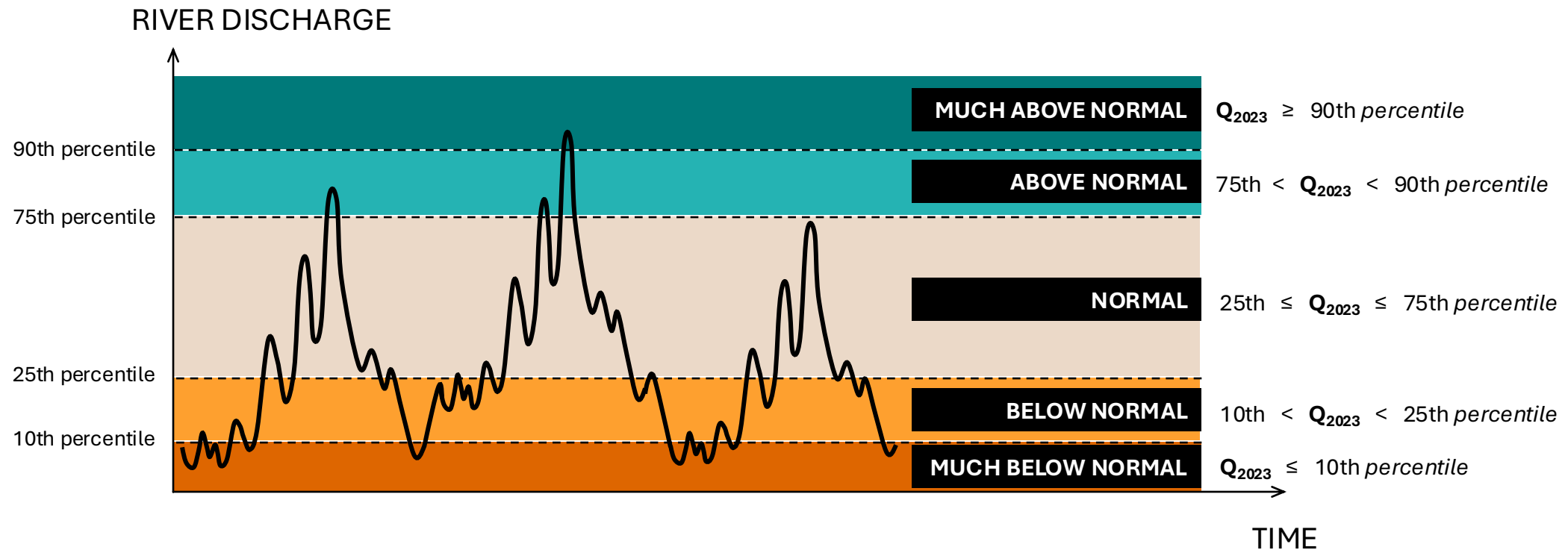
The Report is **GROWING**

2023 REPORT IS MORE COMPREHENSIVE WITH INCREASED ENGAGEMENT FROM COUNTRIES



WHAT IS “NORMAL”?

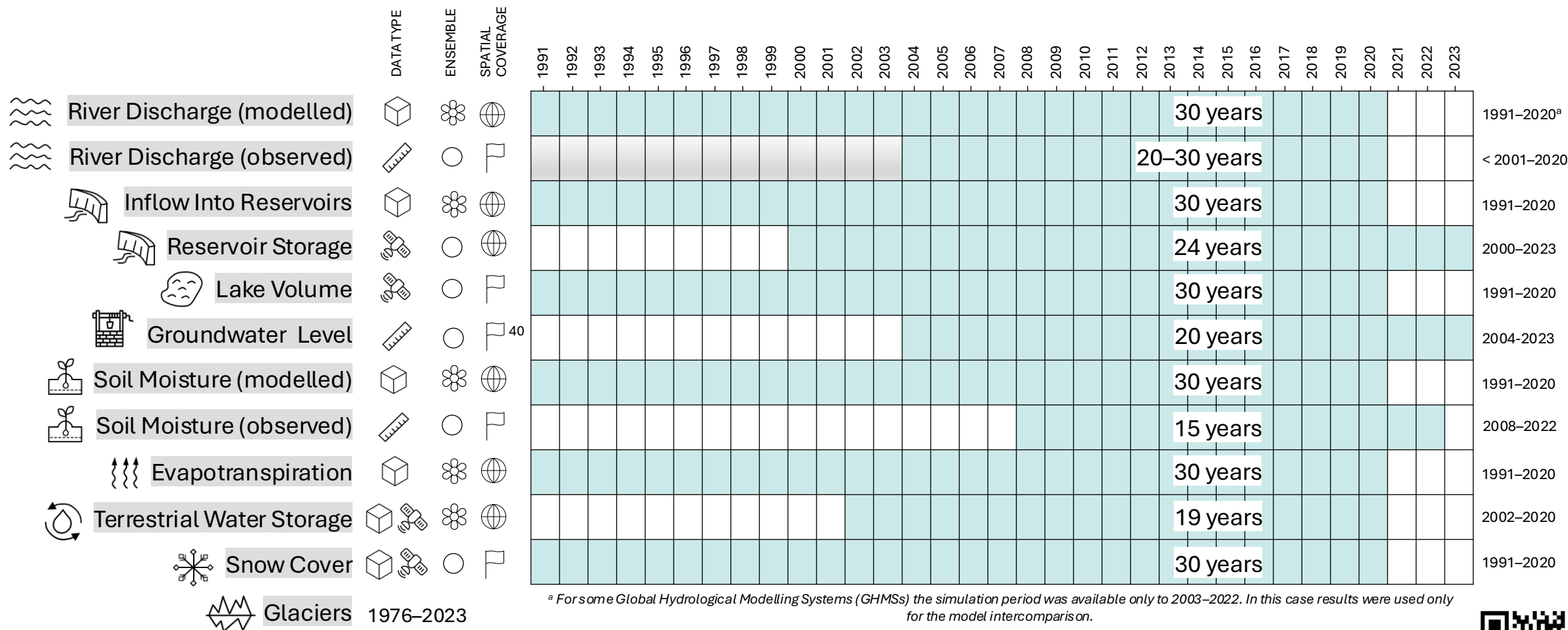
VARIABLE RANKING and CLASSIFICATION



The term “NORMAL”
refers to near-normal conditions.

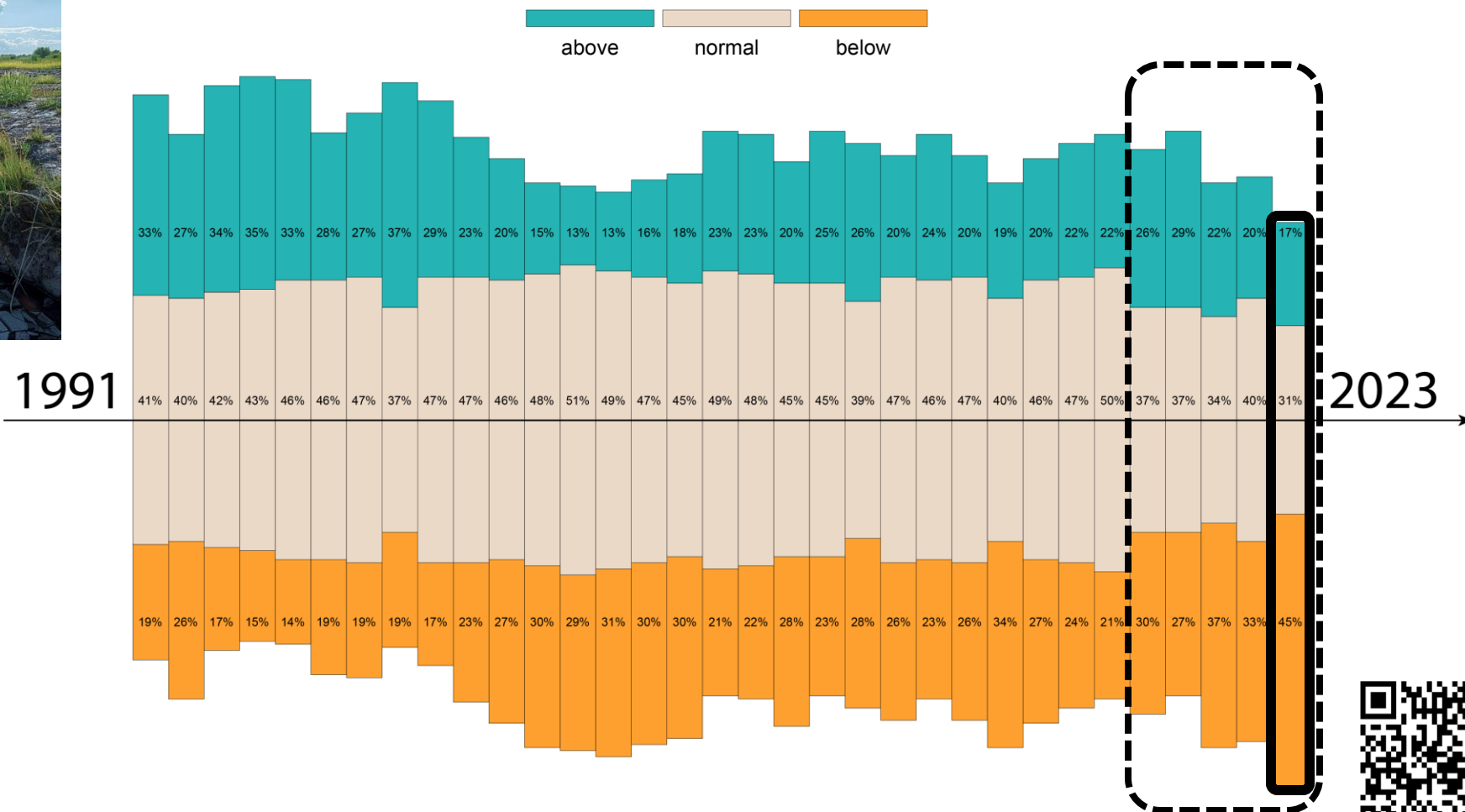


BASELINE DATA SETS USED





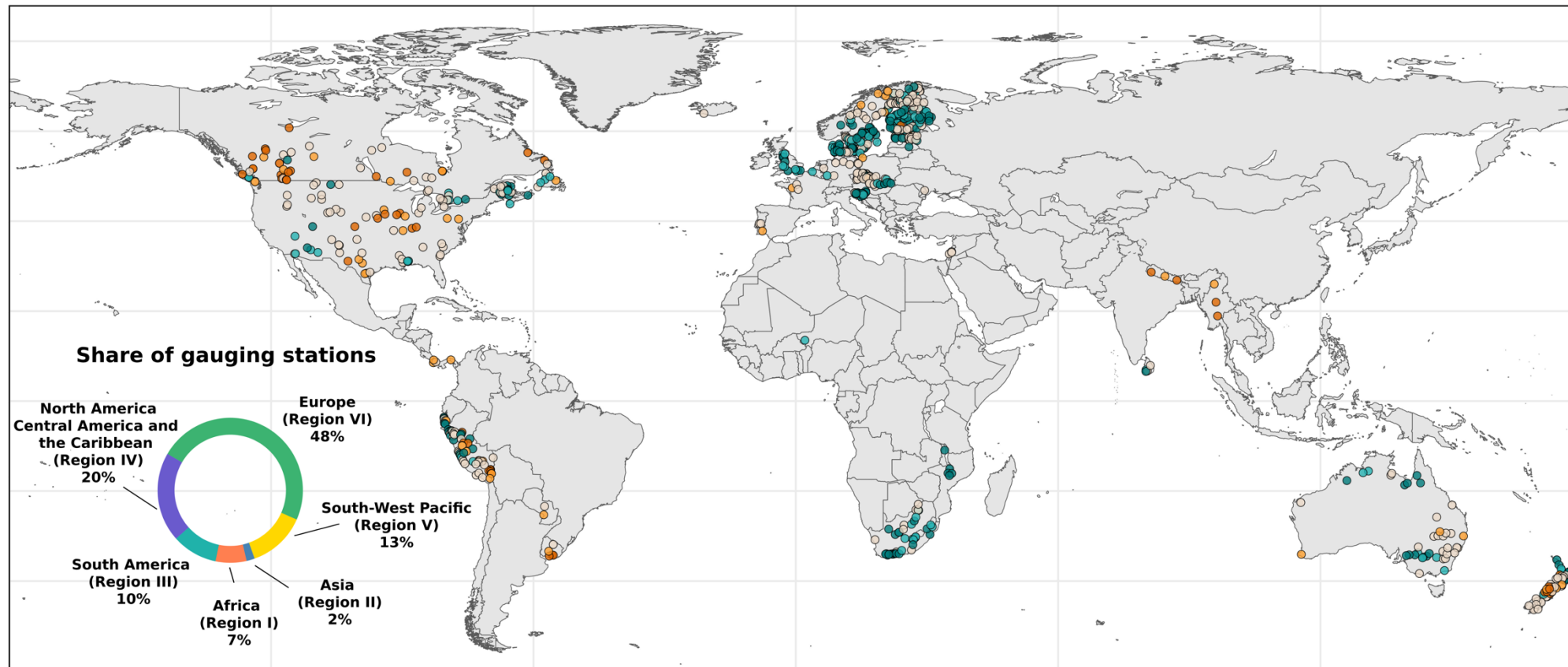
2023 DRIEST YEAR FOR GLOBAL RIVERS IN OVER THREE DECADES





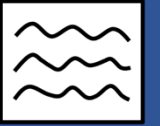
RIVER DISCHARGE (observed) – LARGE DATA GAPS

Observed mean river discharge for the year 2023 compared to the period 1991–2020 (with a minimum of 20 years of data availability)

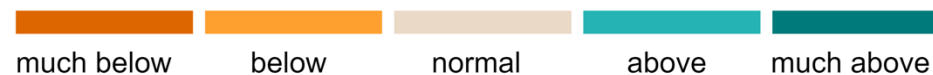
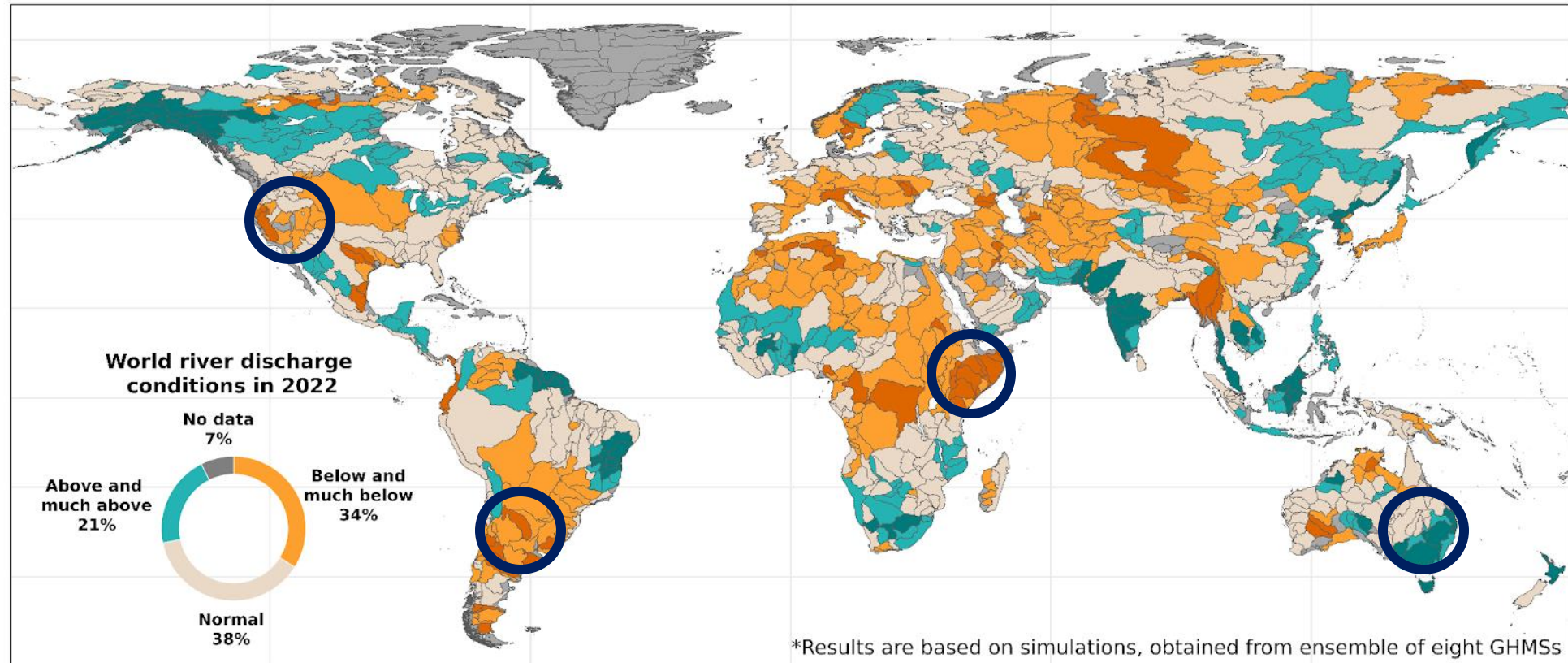




2022: RIVER DISCHARGE CONDITIONS (LET'S COMPARE WITH 2023!!)



Mean river discharge for the year 2022 compared to the period 1991–2020 (for basins larger than 10 000 km²)

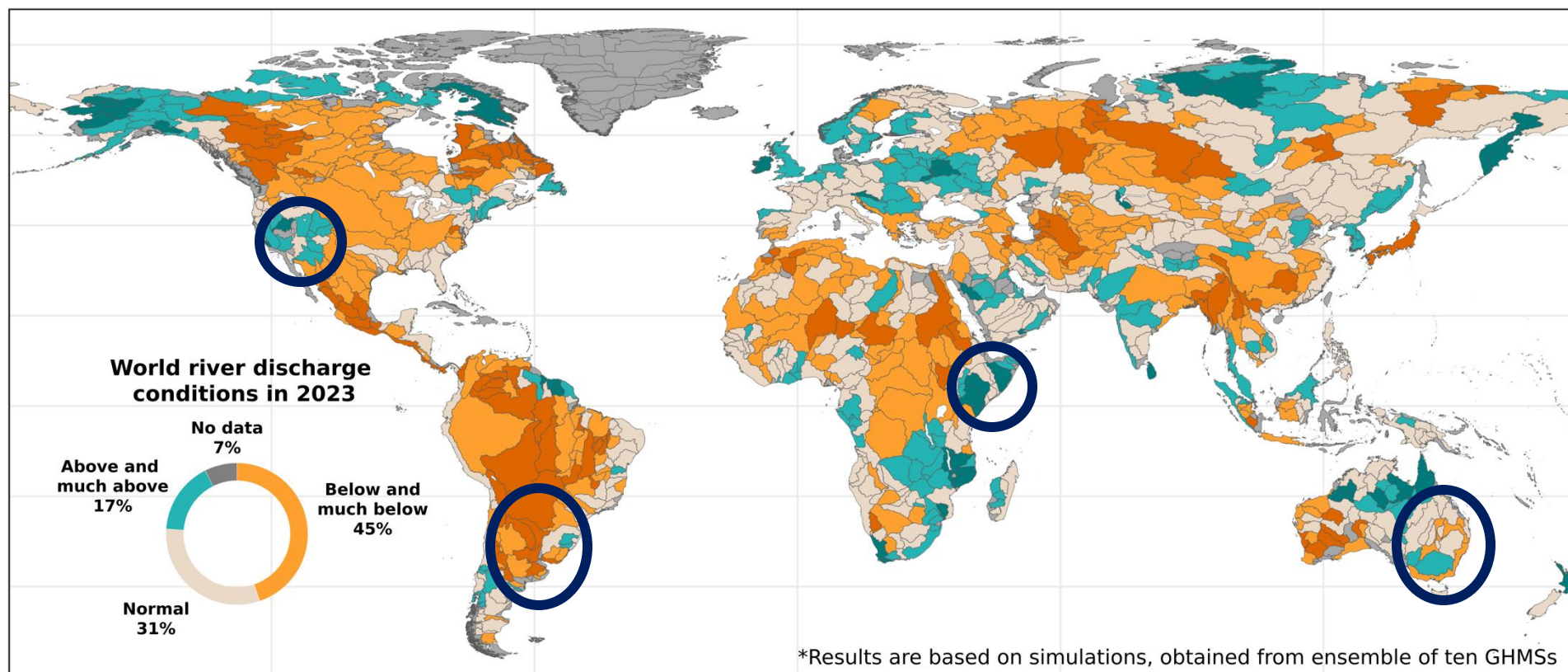




2023: HALF OF THE GLOBE HAD DRY RIVER FLOW CONDITIONS



Mean river discharge for the year 2023 compared to the period 1991–2020 (for basins larger than 10 000 km²)



much below below normal above much above

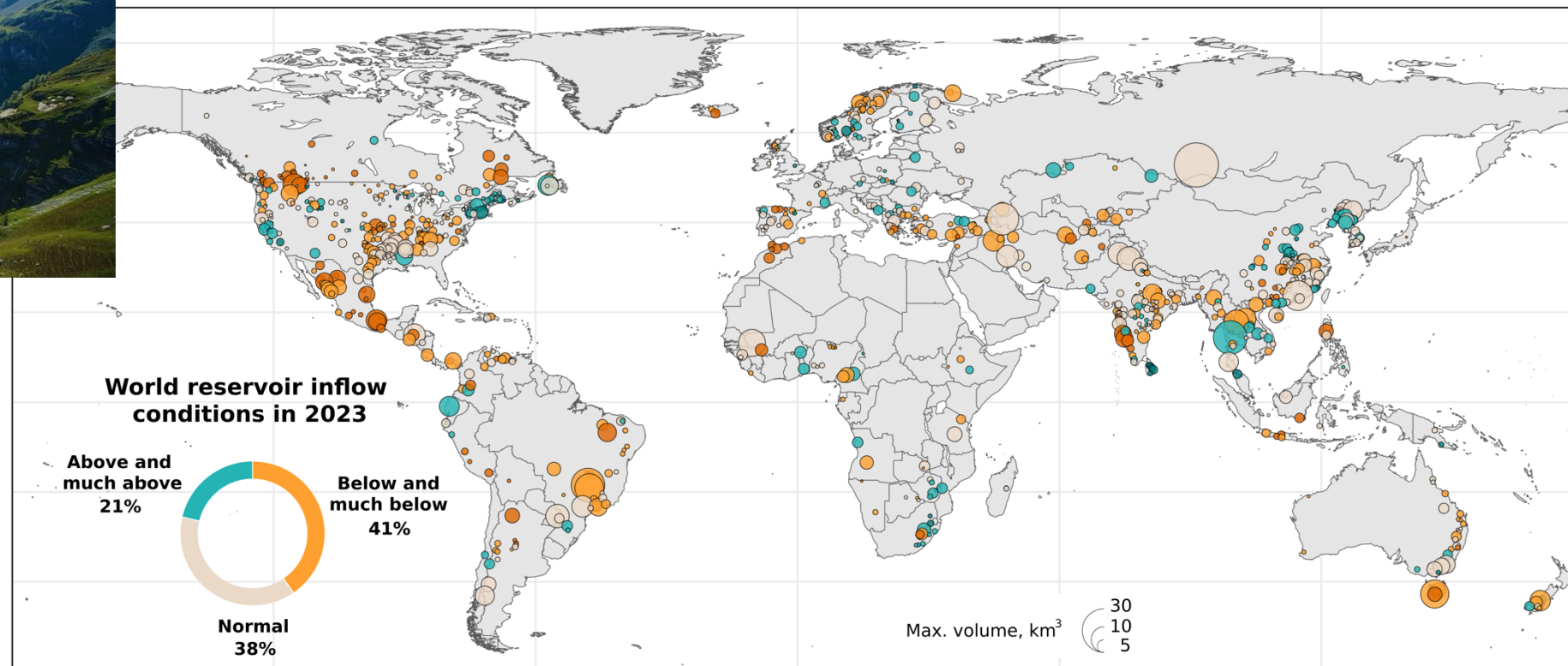




BELOW-NORMAL RESERVOIR INFLOW IN 2023

Less water available for ecosystems and societies

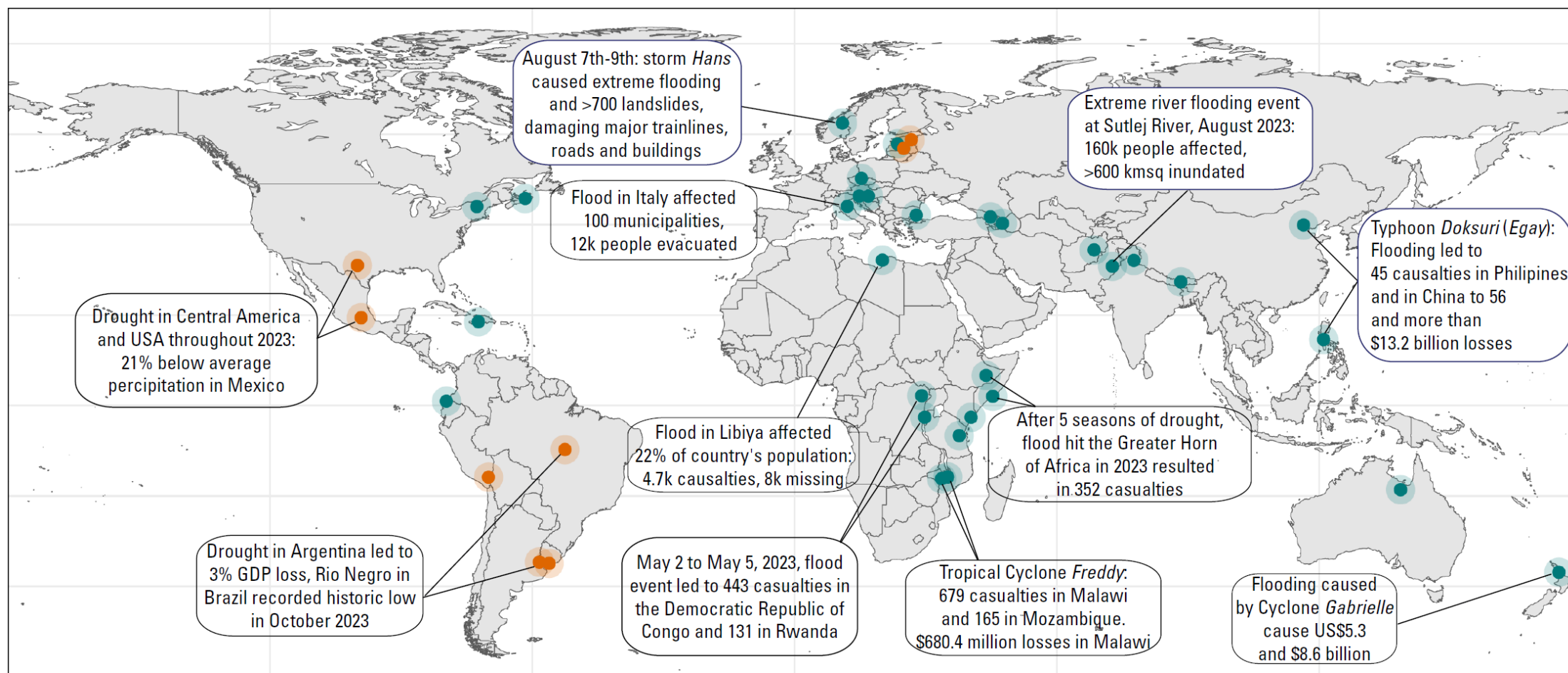
Mean annual inflow into selected reservoirs in 2023 as compared to the historical period 1991–2020





HIGH-IMPACT HYDROLOGICAL EVENTS IN 2023

Selected most notable high-impact hydrological events across the globe in 2023



Data sources: WMO Members, State of the Global Climate 2023 WMO-No. 1347, EM-DAT and others



Drought



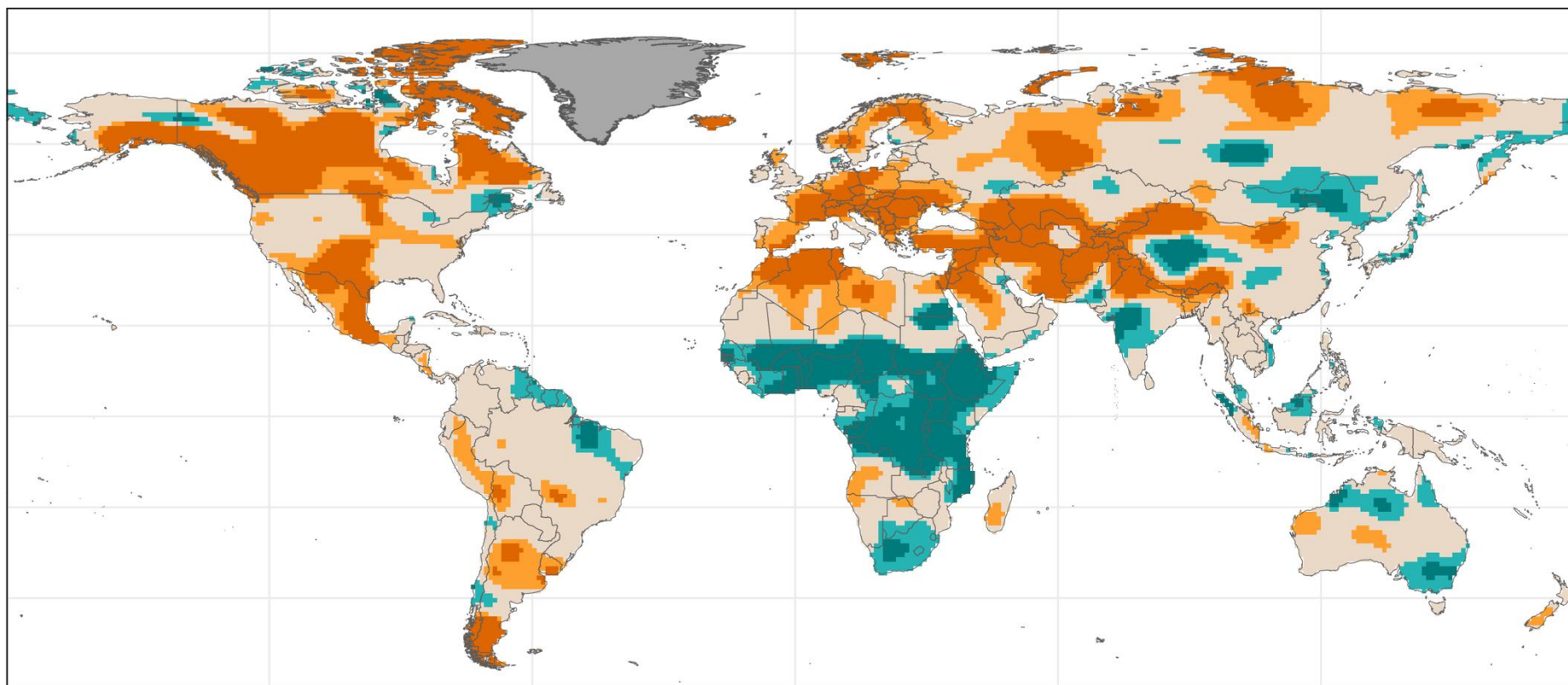
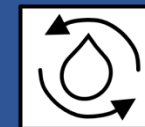
Flood/Heavy rainfall



2023: TERRESTRIAL WATER STORAGE

SUM OF GROUNDWATER, SOIL MOISTURE, RIVERS, LAKES, RESERVOIRS, SNOW & ICE STORAGE etc.

In the year 2023 ranked with respect to the historical period 2002–2020



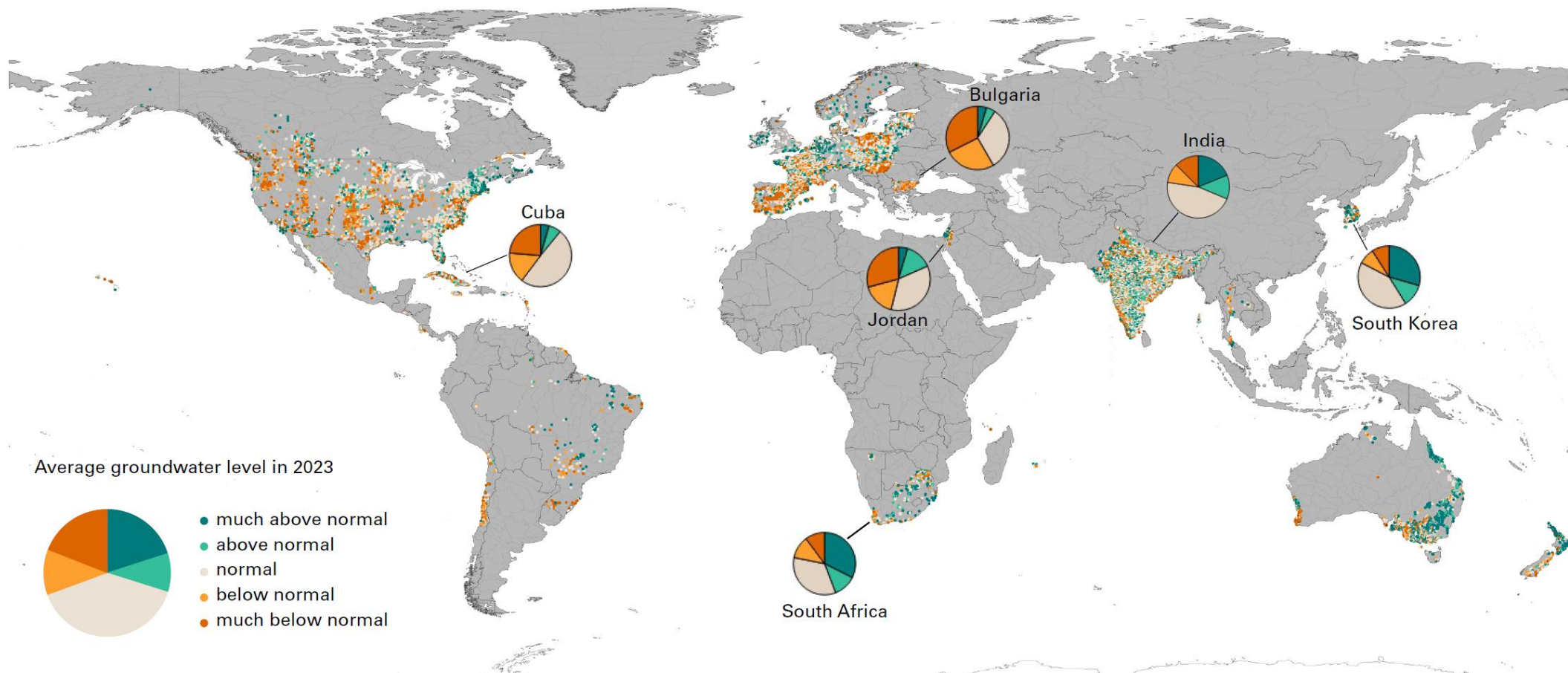
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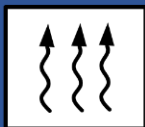




2023: GROUNDWATER LEVELS

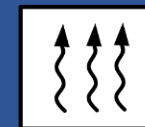
“not-normal” conditions in >50% of the wells, insufficient data



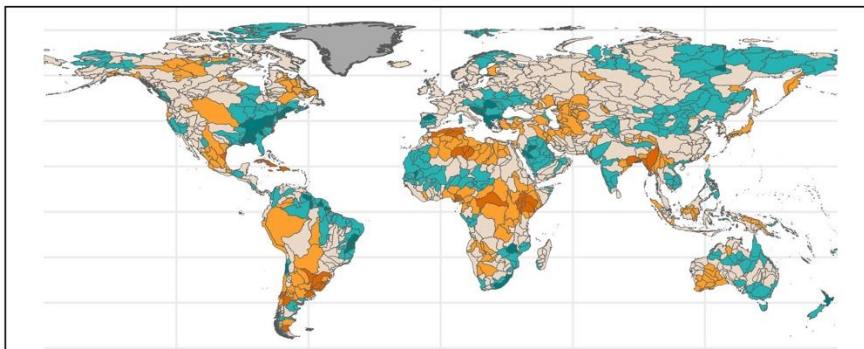


EVAPOTRANSPIRATION

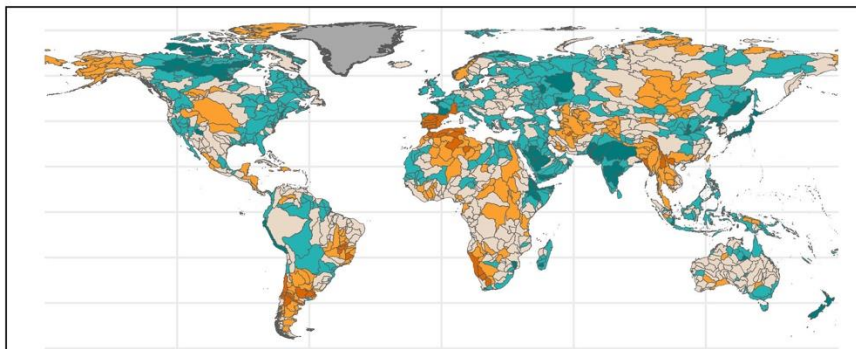
Anomaly in seasonal actual evapotranspiration (AET) in 2023 as ranked with respect to the historical period 1991–2020



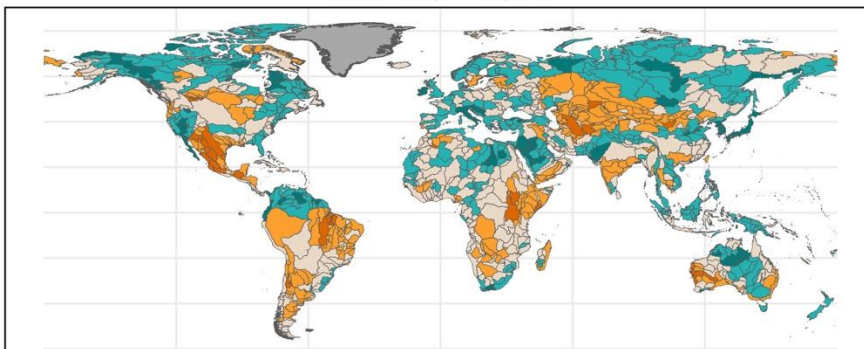
December - January - February



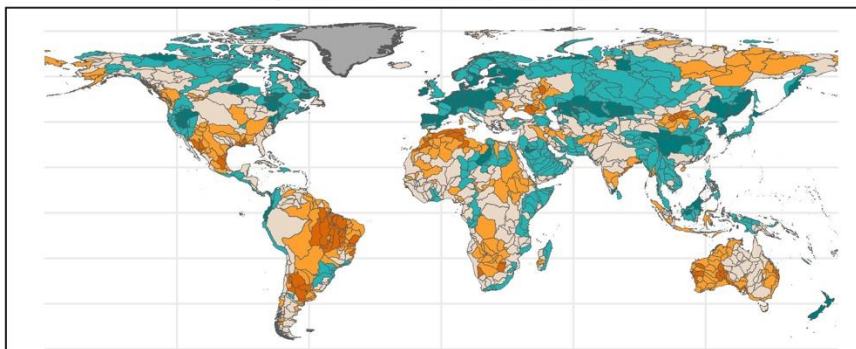
March - April - May



June - July - August



September - October - November



120°W 60°W 0° 60°E 120°E

120°W 60°W 0° 60°E 120°E

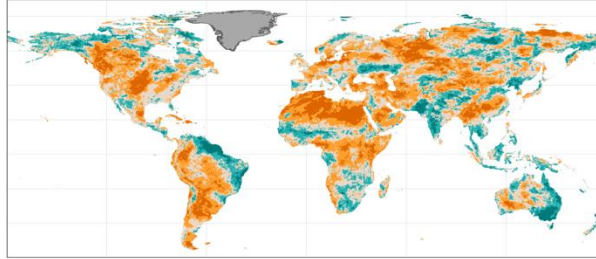




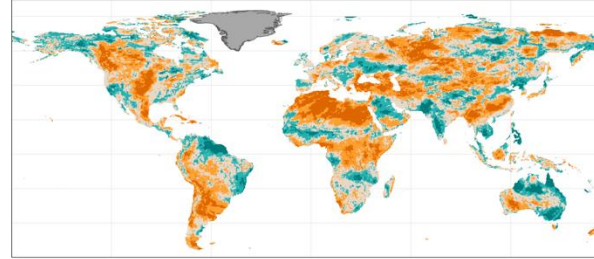
IN 2023 LARGE AREAS HAD DRY SOIL MOISTURE conditions, highlighting the impact of high temperatures



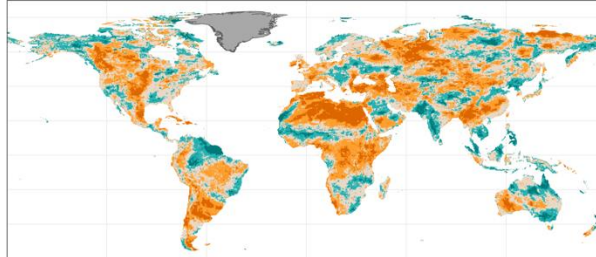
December



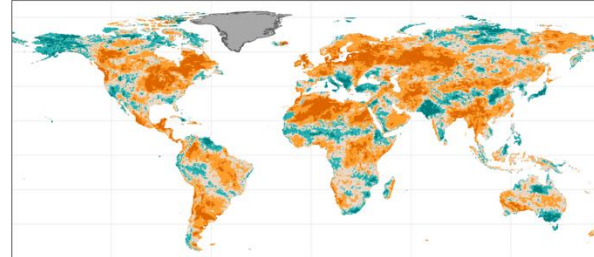
January



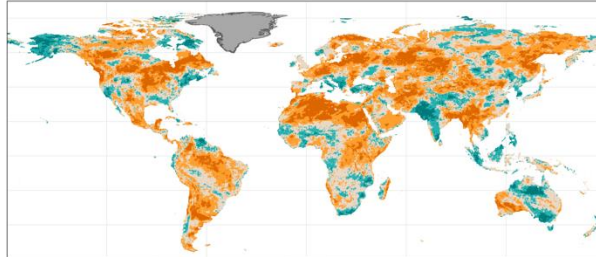
February



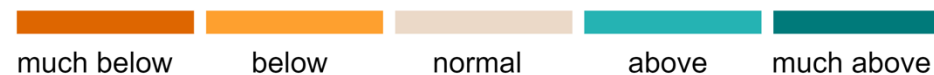
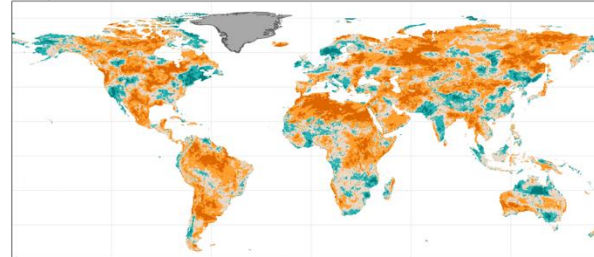
June



July

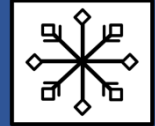


August

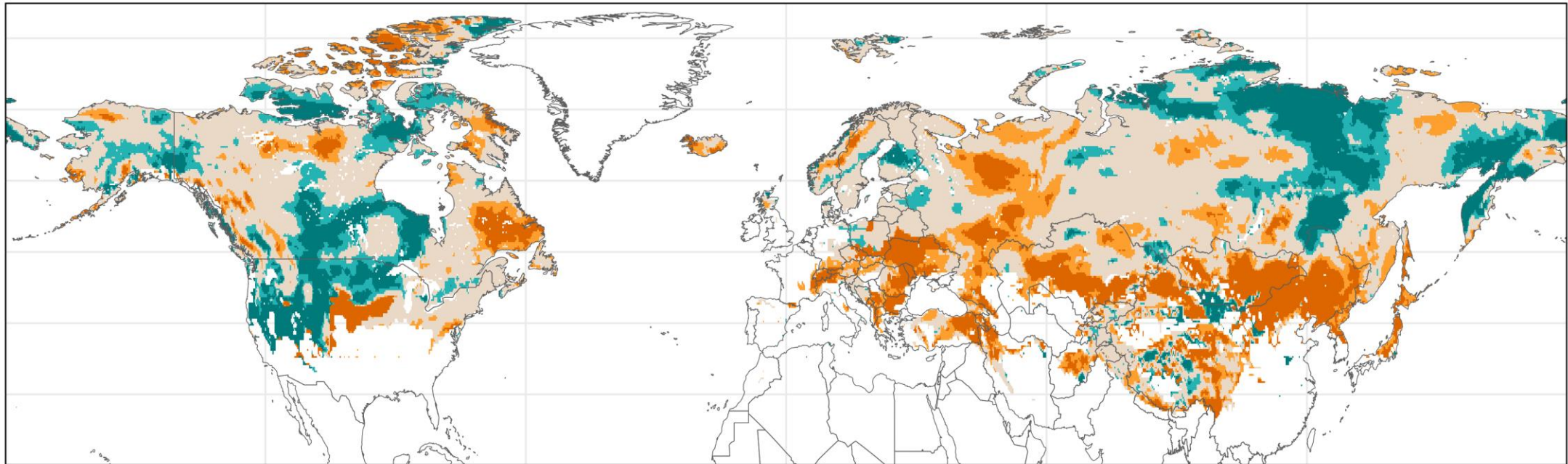




MOST AREAS WITH BELOW-NORMAL SNOW WATER EQUIVALENT



EXAMPLE – NORTHERN HEMISPHERE IN MARCH 2023



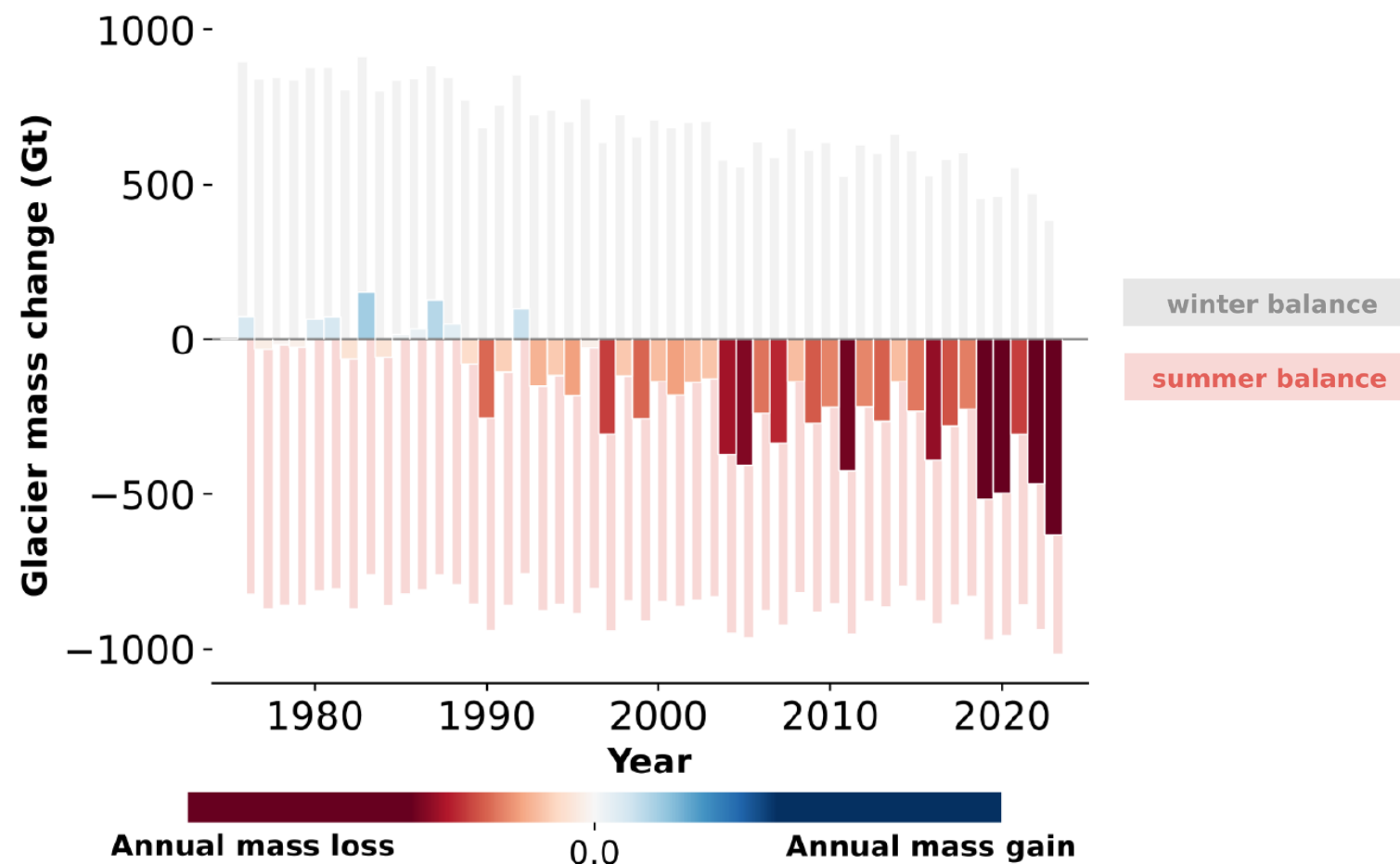


RETREATING GLACIERS

Annual and seasonal mass changes in gigatons (Gt) from 1976 to 2023 for the 19 GTN-G glacier regions

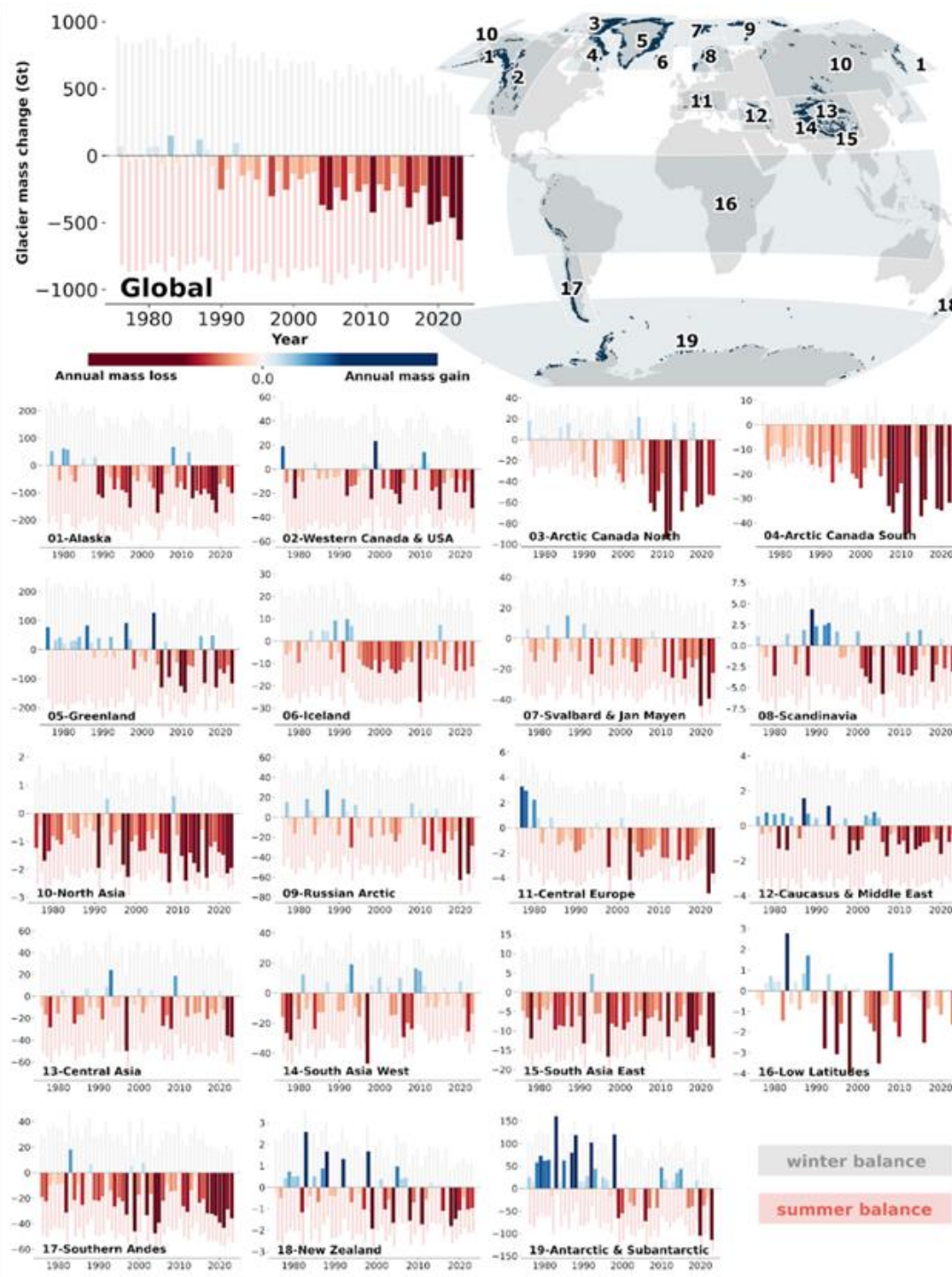


PHOTO CREDIT: Kabutov Khusrav / Tajiki stan, 2024





RETREATING GLACIERS



winter balance

summer balance

winter balance

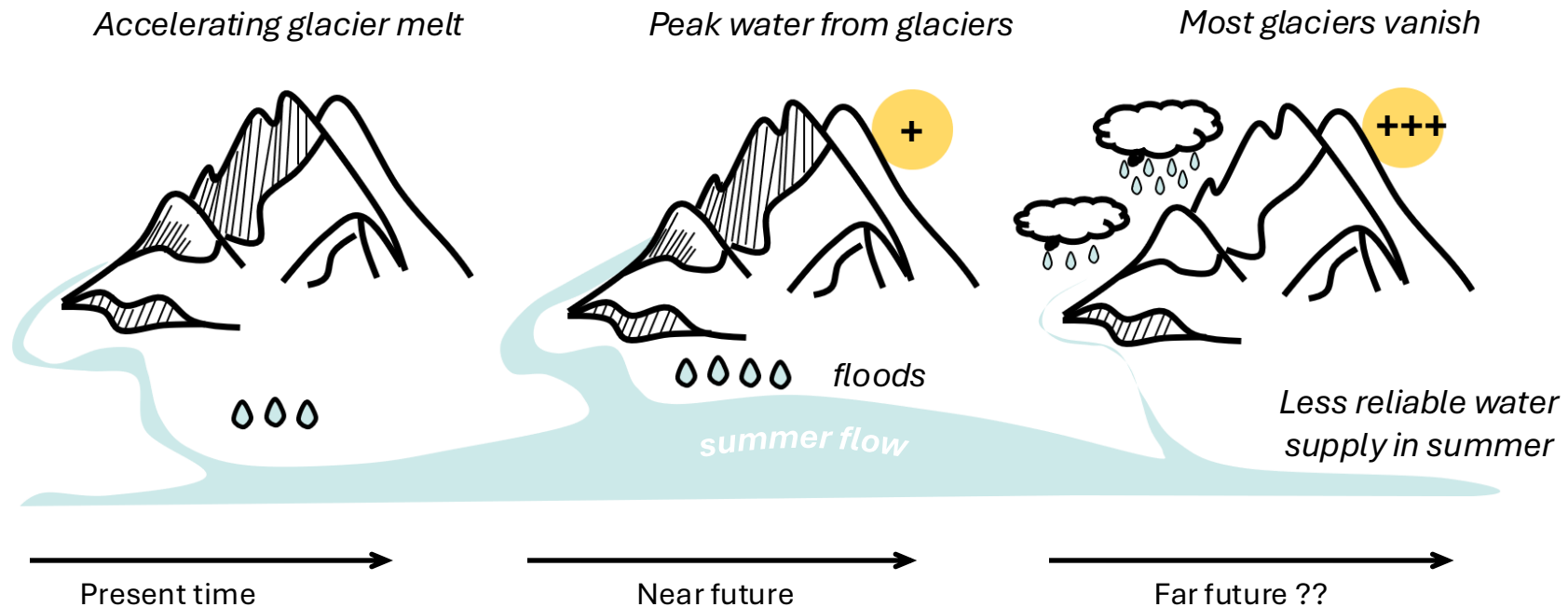
summer balance





WHAT IS GLACIER PEAK WATER ?

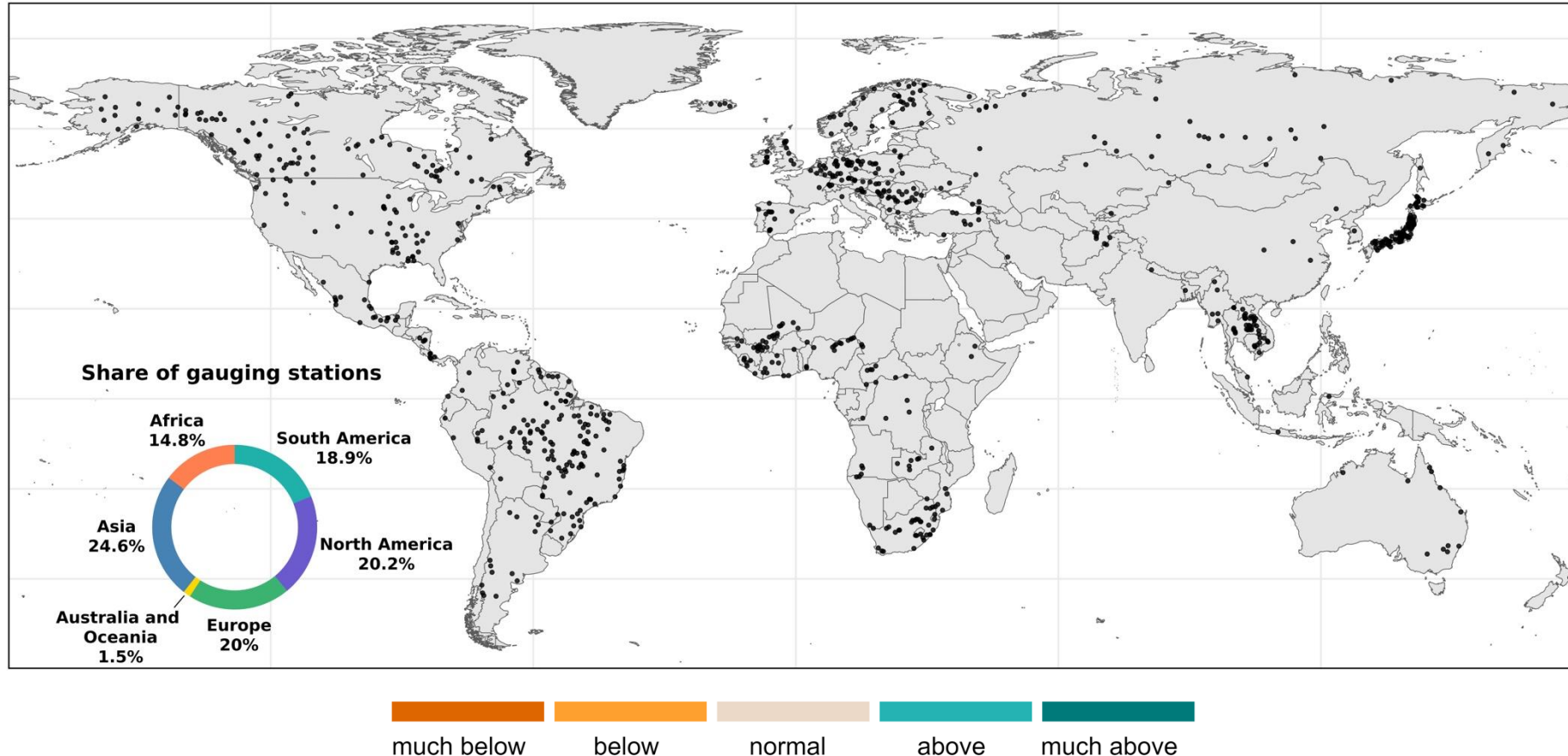
Water flow increases with glacier melting,
then declines rapidly until the glaciers are gone





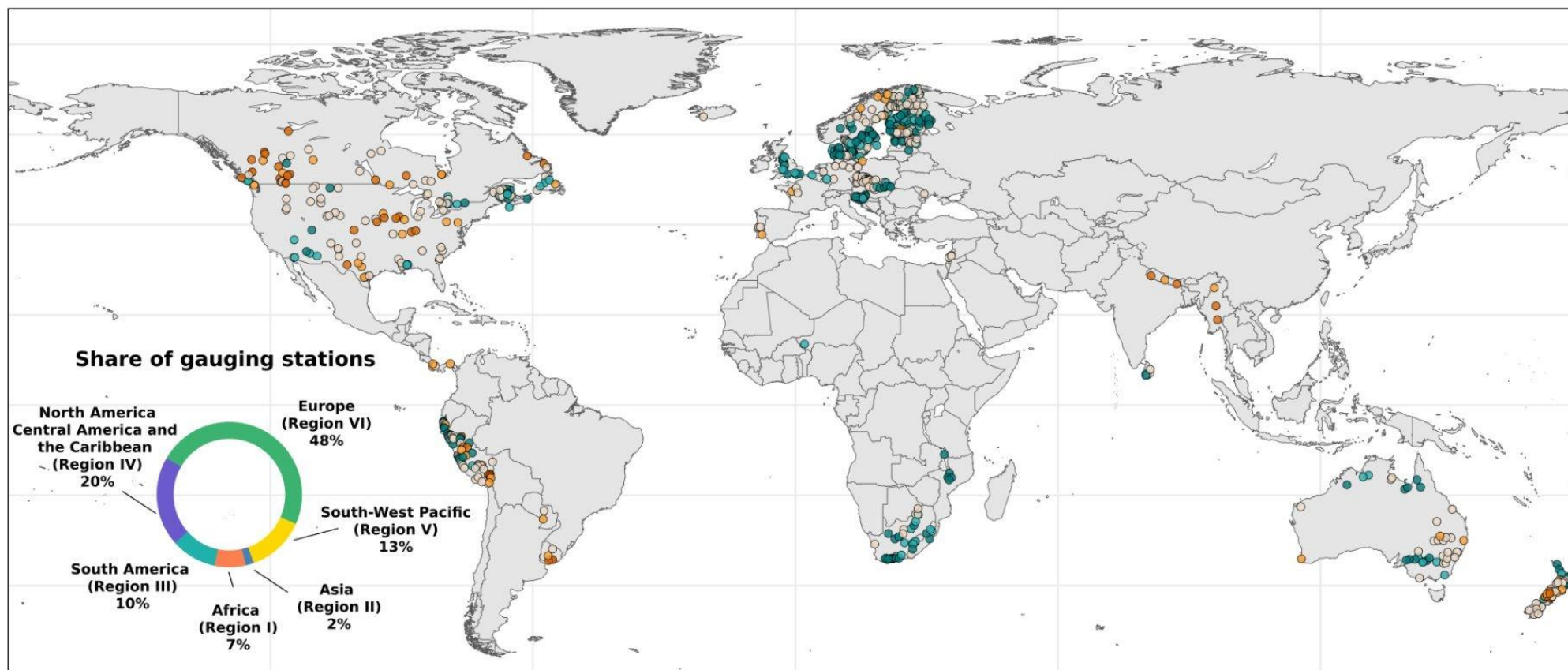
INNOVATION IS THE KEY:

e.g. EARTH OBSERVATIONS FOR INFILLING OF DATA GAPS





OBJECTIVE IS TO HAVE DOTS ALL OVER THE GLOBE! MONITORING IS THE BACKBONE FOR EW4ALL

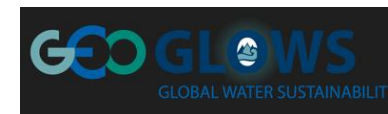


BIG THANK YOU TO ALL!

WMO MEMBERS & ...



Universität Stuttgart

Environment and
Climate Change Canada

& many more !

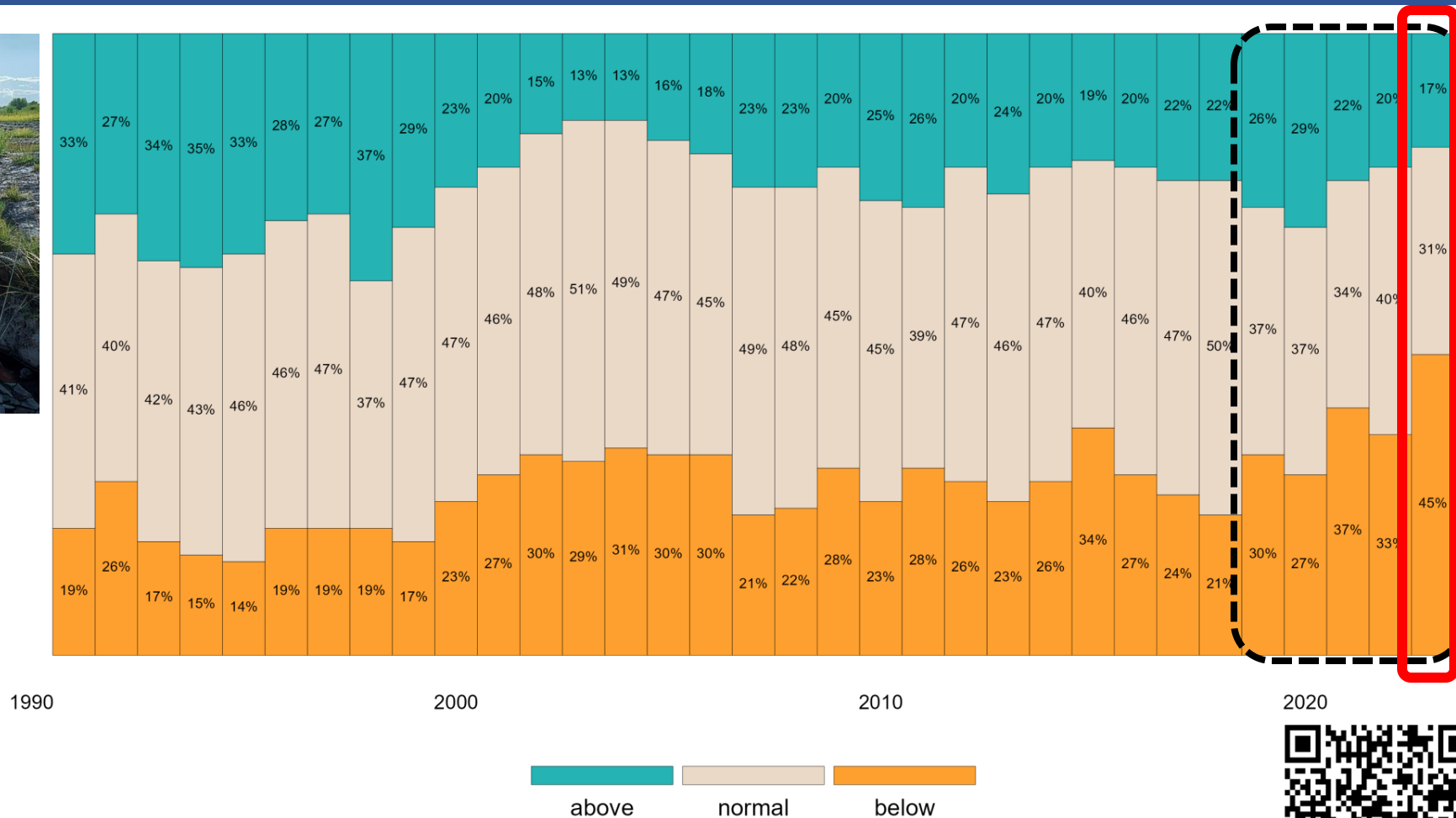


STATE OF GLOBAL WATER RESOURCES 2023





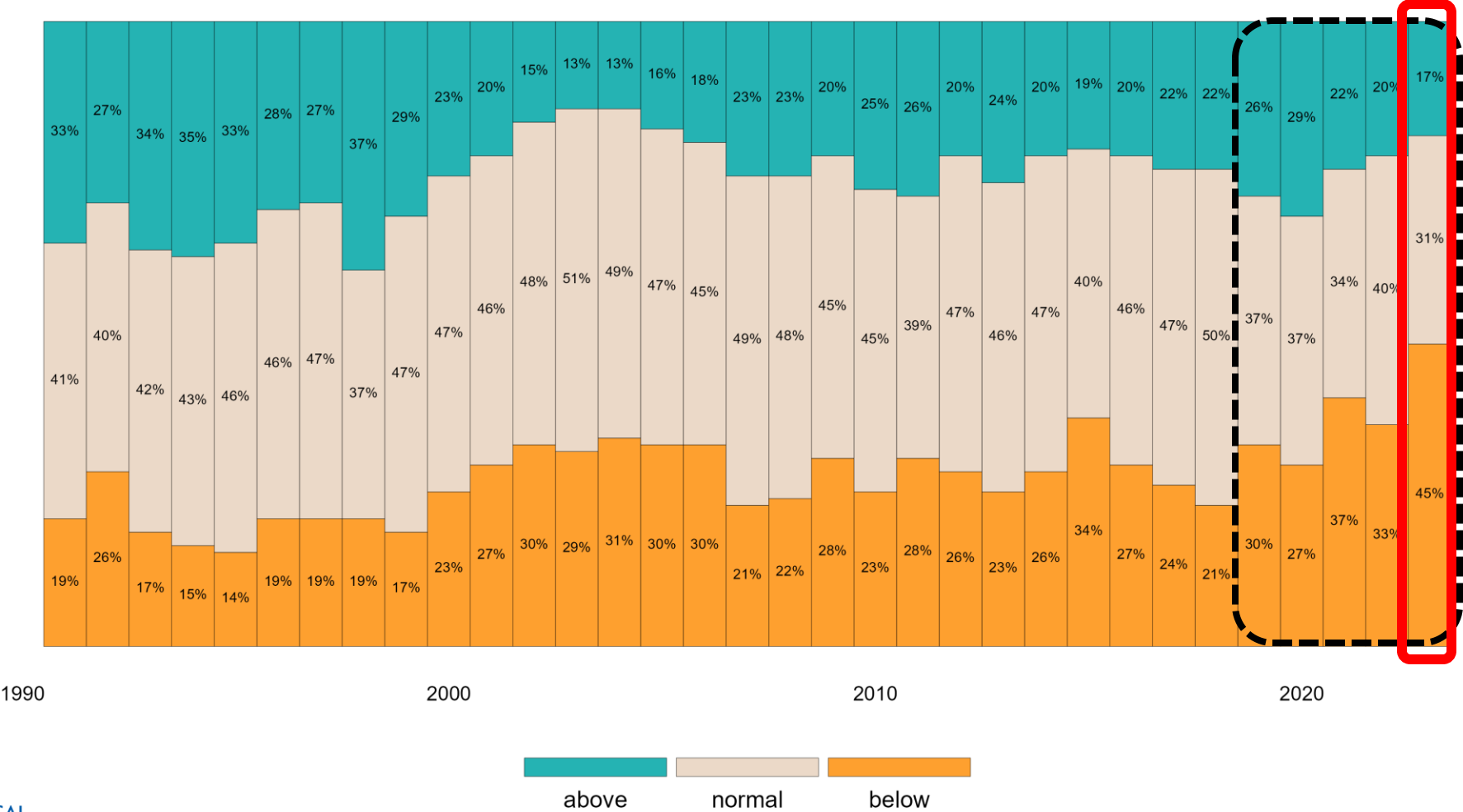
2023 DRIEST YEAR FOR GLOBAL RIVERS IN OVER THREE DECADES





2023: DRIEST YEAR FOR GLOBAL RIVERS

Comparison of the areas under different river discharge conditions for every year since 1991 to 2023 taking a constant historic normal (1991 - 2020)

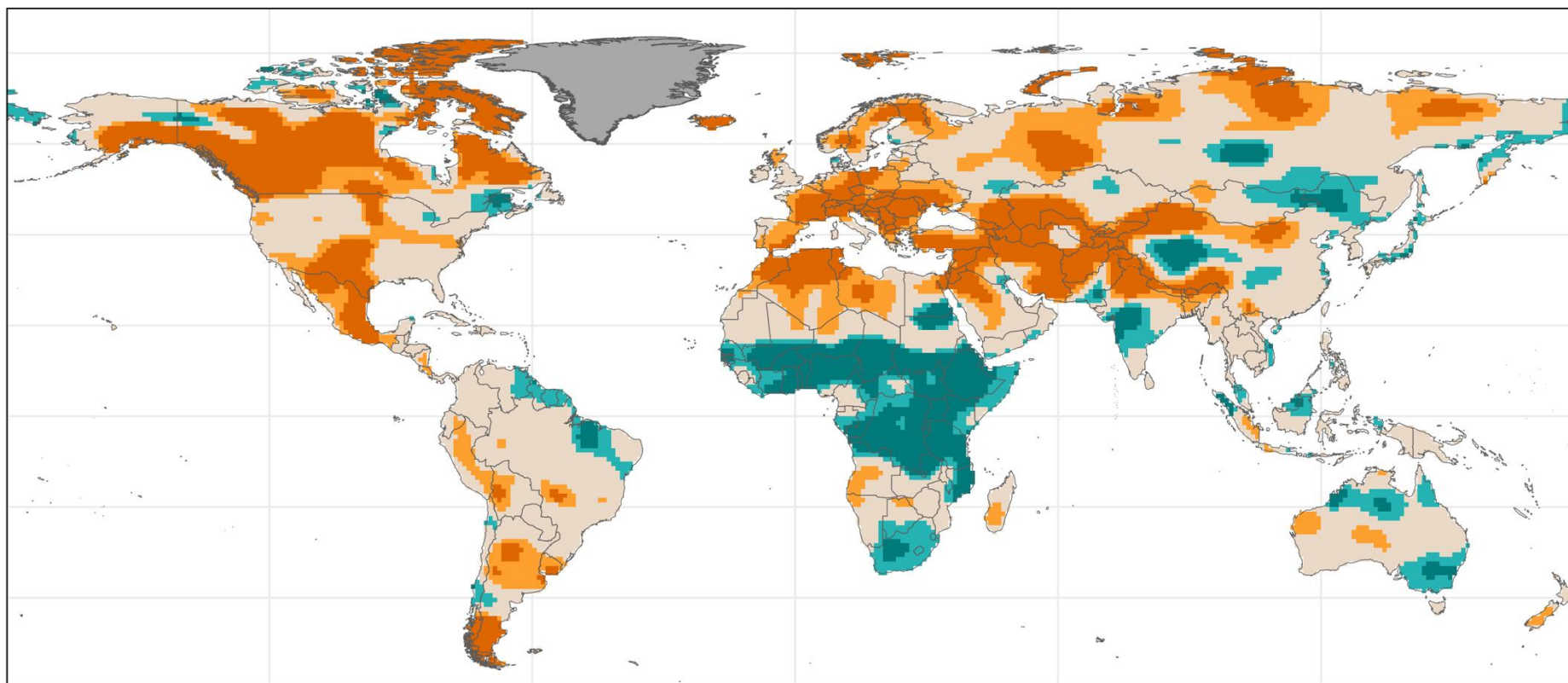
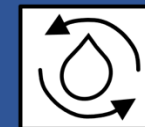




TERRESTRIAL WATER STORAGE

TWS = Σ GROUNDWATER, SOIL MOISTURE, RIVERS, LAKES, RESERVOIRS, SNOW & ICE STORAGE etc.

In the year 2023 ranked with respect to the historical period 2002–2020.



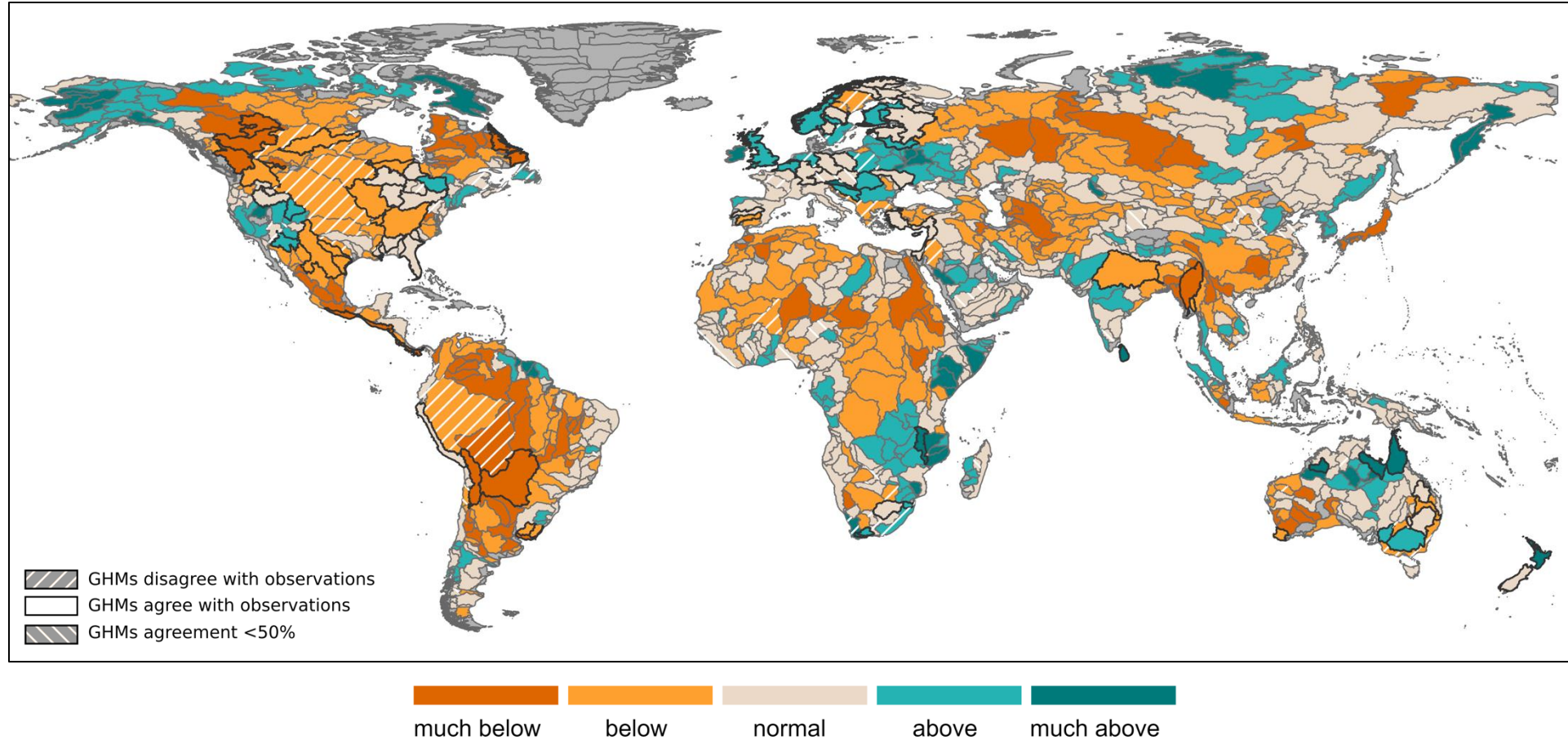
much below below normal above much above





VALIDATION OF TRENDS SIMULATIONS

Areas where simulated and observed trends agree on the direction of change is indicated by a bold outline. Areas where GHMs disagree with each other are marked with left slanting hashing, and areas where GHMSs disagree with observations are marked with right slanting hashing.

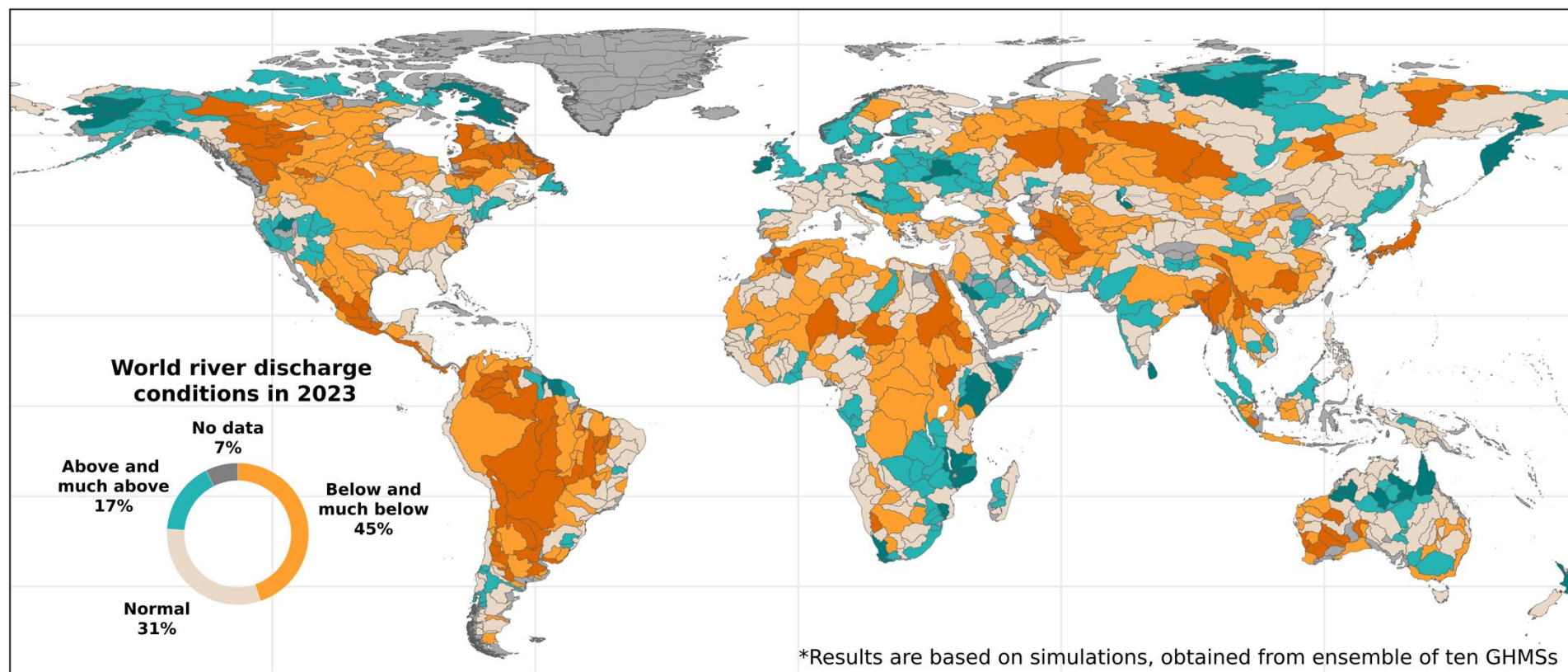




HALF OF THE GLOBE EXPERIENCED DRY RIVER CONDITIONS



Mean river discharge for the year 2023 compared to the period 1991–2020 (for basins larger than 10 000 km²).



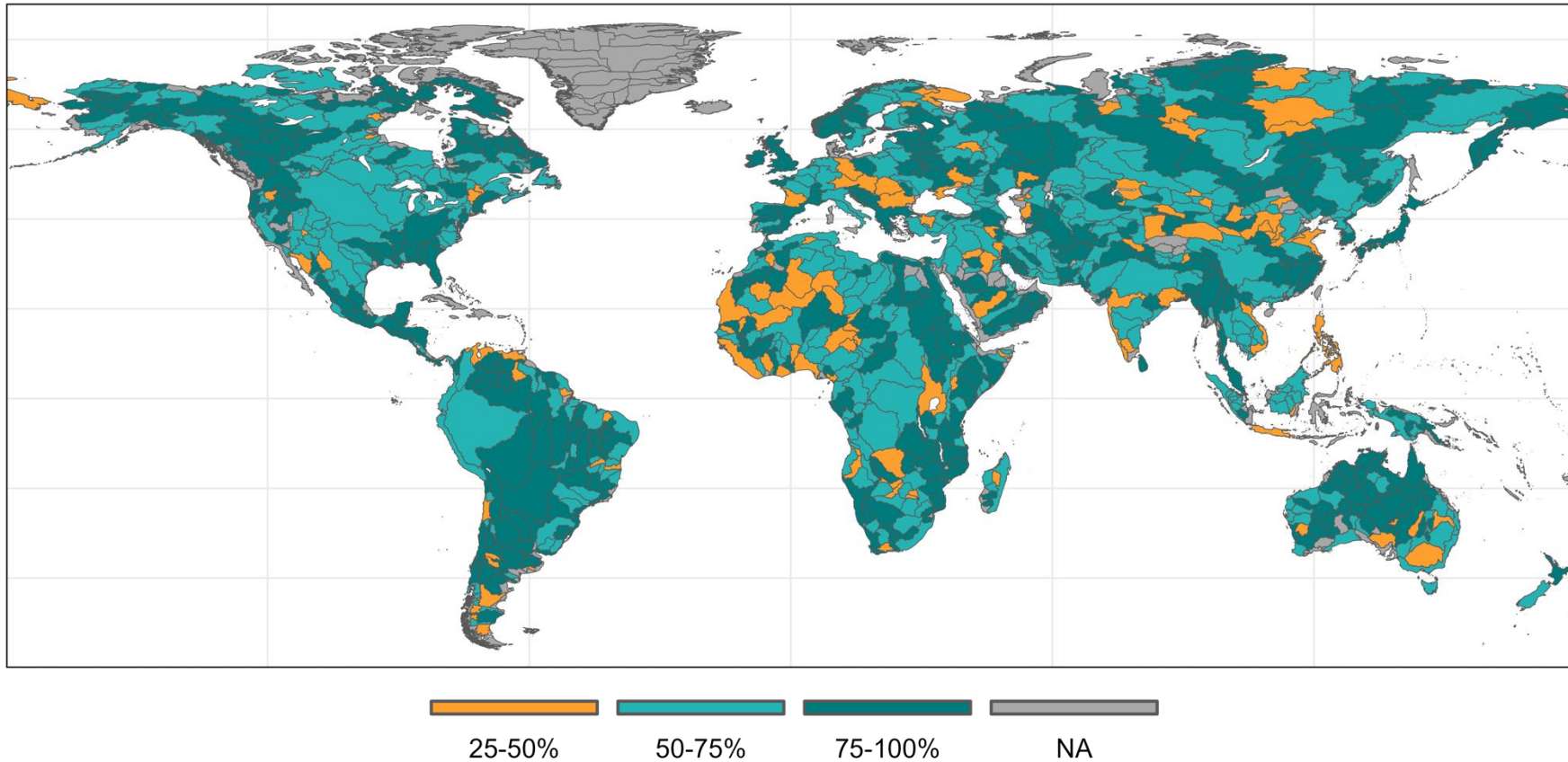
much below below normal above much above





GHMSs* MODEL AGREEMENT

Share of Global Hydrological Modelling Systems (GHMSs) agreed on changes of the annual river discharge with respect to mean (above, below, normal) for each basin.



KEY MESSAGES

1. **2023 marked the driest year for global rivers in over three decades**, with streamflow levels at their lowest in 33 years, signaling critical changes in water availability. Note that 2023 was also one of the hottest year on records.
2. **River Flows were -- The last five consecutive years have recorded some of the lowest percentages of areas under normal conditions**, marking a significant deviation from historical **river flow patterns** over the past 33 years.
3. **Reservoir inflows have followed a similar pattern like the river flow**, reducing the amount of water available for communities and ecosystems, further stressing global water resources.
4. **Widespread dry conditions and elevated temperatures**, have contributed to an increase in extreme hydrological events, not only prolonged droughts but significant number of floods around the world.
5. While the 2023 **SoWR** report benefited from increased data sharing by WMO Members, significant gaps remain in global water monitoring and open data sharing, emphasizing the need for continued progress in these areas. Innovation will be key for improved monitoring and data sharing.

