Hydro Politics Newsletter
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Water War is not a solution

The abeyance of the Indus Waters Treaty, negotiated by the World Bank in 1960, was among a slew of measures announced by India against Pakistan last month after the April 22 attack that killed 26 men, mostly Hindu tourists. New Delhi had said the attack was backed by Pakistan – an accusation Islamabad denied – and the nuclear-armed neighbors were involved in their worst military fighting in nearly three decades before agreeing to a ceasefire on May 10.

India and Pakistan have shared a troubled relationship since they were carved out of British India in 1947, and have fought three wars, two of them over the Himalayan region of Kashmir, which they both claim in full but rule in part.

Reaching water peace between India and Pakistan again is an achievable target. They can reconsider and strengthen the Indus Waters Treaty. They need to update it to address modern challenges like climate change and new infrastructure. Transparent data sharing will play a very important role in a new basin management plan. They need to exchange regular river flow and dam operation data to build trust.

They must also empower joint bodies for dialogue and involve neutral international bodies for conflict resolution when needed. It is also important to depoliticize water issues as it has been achieved by states for 65 years. They can keep water cooperation separate from broader political tensions.

Both India and Pakistan depend on the Indus River system. A War would damage vital water sources for both.

Millions would suffer from water shortages, displacement, and food insecurity. Any war could escalate dangerously due to both nations having nuclear weapons. Peaceful dialogue, cooperation, and joint water management again will offer sustainable, long-term solutions.

We can reach peace through cooperation, not competition. War destroys; cooperation builds.

Water for peace and cooperation

Dursun Yıldız

Director

Arctic sea ice sets a record low maximum in 2025

March 27, 2025

Arctic sea ice extent appears to have reached its annual maximum on March 22, 2025. This is the lowest maximum in the 47-year satellite record, with previous low maximums occurring in 2017, 2018, 2016, and 2015.

Please note that this is a preliminary announcement. Changing weather or late-season growth could still increase the Arctic sea ice extent. NSIDC scientists will release a full analysis of the 2024 to 2025 Arctic winter sea ice conditions in early April.

Overview of conditions

On March 22, Arctic sea ice likely reached its maximum extent for the year, at 14.33 million square kilometers (5.53 million square miles), the lowest in the 47-year satellite record. This year's maximum extent is 1.31 million square kilometers (506,000 square miles) below the 1981 to 2010 average maximum of 15.64 million square kilometers (6.04 million square miles) and 80,000 square kilometers (31,000 square miles) below the previous lowest maximum that occurred on March 7, 2017.

This year's maximum occurred 10 days later than the 1981 to 2010 average date of March 12. The date of the maximum has varied considerably over the years, occurring as early as February 24 in 1987 and 1996 and as late as April 2 in 2010.

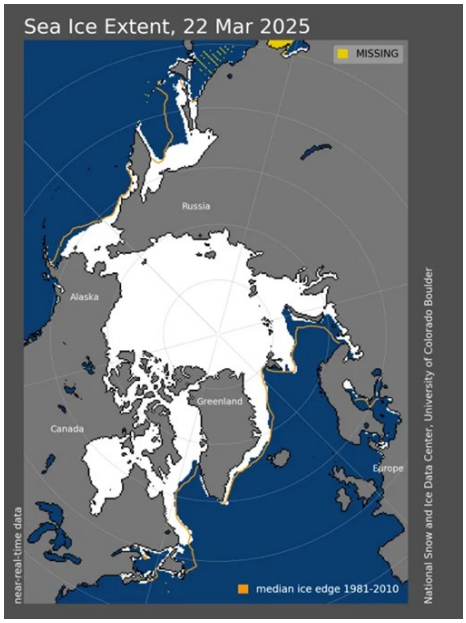


Figure 1. Arctic sea ice extent for March 22, 2025, was 14.33 million square kilometers (5.53 million square miles). The orange line shows the 1981 to 2010 average extent for that day. Sea Ice Index data. About the data — Credit: National Snow and Ice Data Center

Conditions in context

Low sea ice extent persisted around most of the Arctic during the 2024 to 2025 winter season. Notably, the Gulf of St. Lawrence remained virtually ice free and the Sea Okhotsk had substantially lower sea ice extent than average. Only the East Greenland Sea had near-average extent through the winter. The Bering Sea ice extent was low for much of the season, but growth from late February through late March brought the region closer to average conditions and was the primary contributor to the increase of total Arctic sea ice during March. Temperatures were 1 to 2 degrees Celsius (2 to 4 degrees Fahrenheit) above average in the Arctic and the surrounding seas, which likely slowed the rate of ice growth.

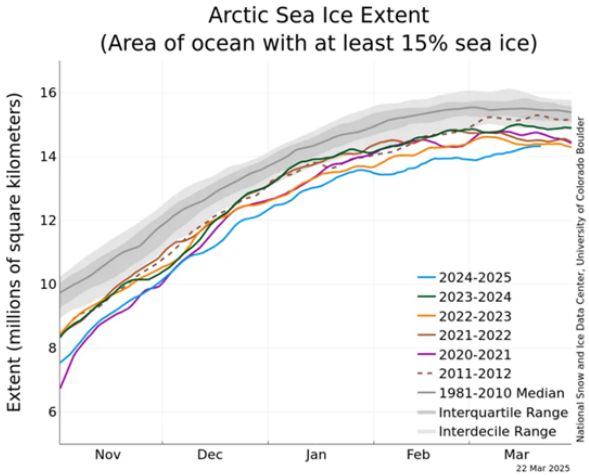


Figure 2. The graph above shows Arctic sea ice extent as of March 22, 2025, along with daily ice extent data for four previous years and the record low year. 2024 to 2025 is shown in blue, 2023 to 2024 in green, 2022 to 2023 in orange, 2021 to 2022 in brown, 2020 to 2021 in magenta, and 2011 to 2012 in dashed brown. The 1981 to 2010 median is in dark gray. The gray areas around the median line show the interquartile and interdecile ranges of the data. Sea Ice Index data. — Credit: National Snow and Ice Data Center

National Snow and Ice Data Center

Top 10 lowest Arctic sea ice maximum extents

RANK	YEAR	MAXIMUM SEA ICE EXTENT		DATE
		IN MILLIONS OF SQUARE KILOMETERS	IN MILLIONS OF SQUARE MILES	
1	2025	14.33	5.53	March 22
2	2017	14.41	5.56	March 7
3	2018	14.47	5.59	March 17
4	2016 2015	14.51 14.52	5.60 5.61	March 23 Feb. 25
6	2023	14.62	5.64	March 6
7	2011 2006	14.67 14.68	5.66 5.67	March 9 March 12
9	2007 2021	14.77 14.78	5.70 5.71	March 12 March 12

Table 1. Top 10 lowest maximum Arctic sea ice extents (satellite record, 1979 to present)

Values within 40,000 square kilometers (15,000 square miles) are considered tied.

Source: https://nsidc.org/sea-ice-today/analyses/arctic-sea-ice-sets-record-low-maximum-2025?utm_source=newsletter&utm_medium=email&utm_campaign=earthdata-discovery-042025

Risk of water shortages builds-up as Hindu Kush Himalaya faces 23-year -record-low snow persistence

22/04/2025

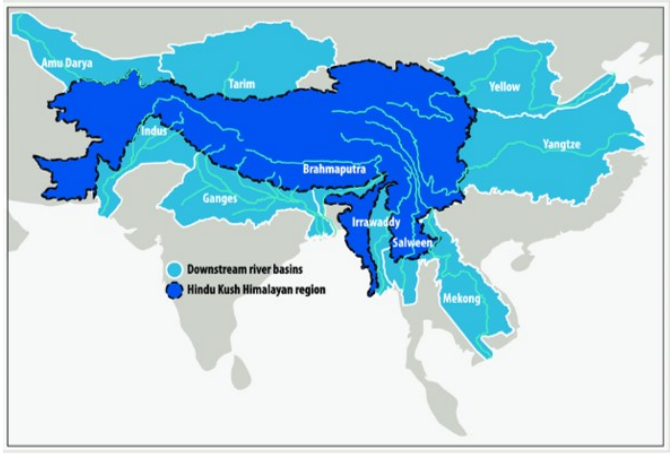
International Centre for Integrated Mountain Development (ICIMOD)

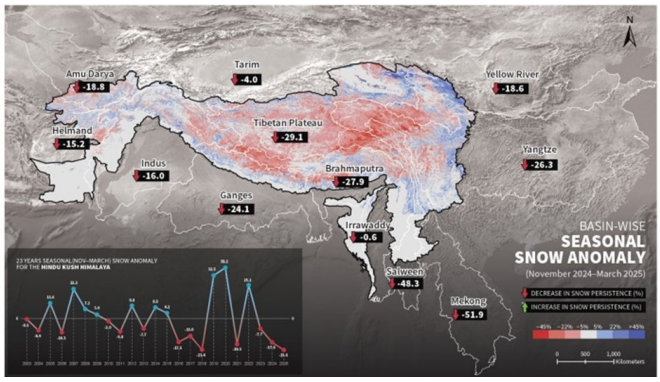
Intergovernmental knowledge and learning centre working on behalf of the people of the Hindu Kush Himalaya (HKH). It works in and for eight member countries – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan.

According to the latest Snow Update Report, **the Hindu Kush Himalaya (HKH) region experienced its third consecutive below-normal snow year in 2025**, with **snow persistence** – the fraction of time snow is on the ground after snowfall–**hitting a vicennial record low of –23.6%**. This is **worrying news for water security of nearly two billion people across 12 major river basins** that originate high in the HKH.

Launching the 2025 Snow Update report, Pema Gyamtsho, ICIMOD's Director General, emphasised the need for proactive policy actions in building long-term resilience to exacerbating snow anomalies: "Carbon emissions have already locked in an irreversible course of recurrent snow anomalies in the HKH.

To tackle this regional snow crisis and the challenges it creates for long-term food, water and energy resilience, we urgently need to embrace a paradigm shift toward science-based, forward-looking policies and foster renewed regional cooperation for transboundary water management and emissions mitigation."*Continued deficit of seasonal meltwater, in general, means lesser river runoffs and early-summer water stress*





Map shows the spatial distribution of snow persistence anomaly, and the overlaid graph is the HKH-WIDE average seasonal (November-March) anomaly for the last twenty-three years. Credit: HKH Snow Update 2025.

On average, **seasonal snowmelt contributes about a fourth of the total annual runoff of these rivers**, with the share gradually rising from the rivers in the east to those in the west of the region.

Despite such basin-wise differences in the dependency on seasonal snowmelt, continued deficit of seasonal meltwater, in general, means lesser river runoffs and early-summer water stress, especially for downstream communities, already reeling under premature and intensifying heat spells across the region

According to Sher Muhammad, Remote Sensing Specialist at ICIMOD and the lead expert for Snow report 2025: "We are observing such deficit situations occurring in continuous succession. This is an alarming trend. While our findings give broad picture across the region, each must act based on the specific conditions of their river basins, particularly where seasonal snow melt is the major water source.

While the level of deficit in snow persistence in the western river basins, this year, has been less compared to the last year, it provides no respite from the existing water stress in these areas. Seasonal snowmelt is critical for water supply in these basins. So, persisting below-normal snowfall and reduced melt rate will only worsen water availability.

On the other hand, the eastern river basins, which experienced near normal snow persistence last year, face deficits up to 50% below normal. Although seasonal snow contributes less to total meltwater here, around 15% drop in persistence of seasonal snow could still impact downstream communities, especially in the mountains and Tibetan Plateau, where annual snow conditions are generally erratic."

The report reveals **the most alarming declines in snow persistence in the Mekong (-51.9%) and Salween (-48.3%) basins**, followed by the Tibetan Plateau (-29.1%), the Brahmaputra (-27.9%), Yangtze (-26.3%), and the Ganges (-24.1%) basins.

Monitoring a 23-year timeseries (from 2003 to 2025) of basin-scale snow persistence during the snow season between November and March, the report shows recurrent seasonal deficits, coupled with severe yearly fluctuations. Moreso, over the last five years.

Experts of the report emphasis **immediate need for basin-level targeted actions toward adaptive water resource management for mitigating forthcoming impacts of water shortages** on agriculture, hydropower generation, and other vital ecosystem services.

Investing in adaptive infrastructure like seasonal storage systems and enhancing efficient use of meltwater, developing national preparedness and response plans for negative snow anomaly and drought conditions, integrating snow anomaly information into national water strategies for hydropower, agriculture, and allied sectors, and disseminating snow anomaly statistics to strengthen evidence-based decision making and sectoral coordination, are some of the key action areas recommended in the report.

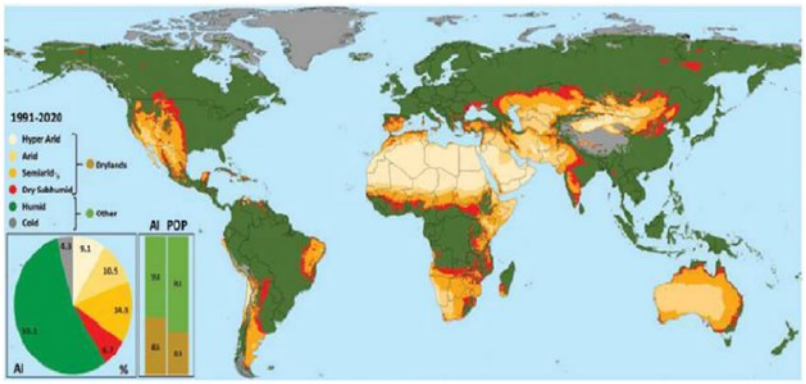
GEF Drin II Project advances transboundary cooperation in Southeast Europe

During an Inception meeting in Tirana, 26-28 March 2025, high-level representatives from the Drin Riparians together with international agency representatives reaffirmed their commitment to work together for sustainable management, ecosystem preservation and climate resilience in the Drin River Basin.

The GEF Drin II project sets a solid standard for sustainable transboundary action providing support to the implementation of the Drin Strategic Action Programme, its content endorsed by the Riparians back in 2020. The project is funded by the GEF and is implemented by UNDP in the four project beneficiary areas in partnership with relevant line ministries, GWP -Med and UNECE.

Source : https://www.gwp.org/en/GWP-Mediterranean/WE-ACT/News-List-Page/2025/drin-ii-inception-meeting/

The Global Threat of Drying Lands: Regional and global aridity trends and future projections



Key Messages

Increasing aridity is expected to play a role in larger and more intense wildfires in the climate altered future not least because of its impacts on tree deaths in semi-arid forests and the consequent growing availability of dry biomass for burning. Europe is likely to be especially affected.

- More than two thirds of all land on the planet (excluding Greenland and Antarctica) is projected to store less water by the end of the century, if greenhouse gas emissions continue to rise even modestly.
- Aridity is considered the world's largest single driver behind the degradation of agricultural systems, affecting 40 per cent of Earth's arable lands.
- Rising aridity has been blamed for a 12 per cent decline in gross domestic product (GDP) recorded for African countries between 1990–2015.
- Rising aridity's impacts on poverty, water scarcity, land degradation and insufficient food production have been linked to increasing rates of sickness and death especially among children and women around the world.
- Rising aridity and drought play a key role in increasing human migration around the world particularly in the hyperarid and arid areas of southern Europe, the Middle East and North Africa and southern Asia.
- Quantifying future socioeconomic impacts can enhance equitable societal resilience. While some successful local and regional adaptation measures exist, transformational approaches are needed that blend traditional and local knowledge with evolving, up-to-date scientific understanding.
- Stakeholder engagement is crucial to enhance resilience to aridity, requiring sufficient financial resources, governance structures, partnerships, capacity-building initiatives, evaluation and learning, along with robust monitoring mechanisms.
- Aridity-driven desertification the degradation of land and terrestrial ecosystems in non-desert drylands can result in a cascade of potentially devastating environmental and socioeconomic consequences.

- While many aridification impacts in the world's drylands are expected to intensify and expand to new areas in the climate-altered future, a better quantification of future socioeconomic impacts is needed to plan and implement adaptation measures that increase the resilience of vulnerable people
- Many poor, rural dryland populations have historically implemented sustainable practices to adapt their agriculture and pastoral activities to aridity, but intensifying aridification and the expansion of global drylands in the future will require transformational approaches that combine traditional knowledge with evolving scientific understanding and technical solutions.
- Stakeholder engagement supported by sufficient financial resources, governance structures and partnerships, capacity-building initiatives and robust monitoring and reporting mechanisms is needed to promote an enabling environment to significantly enhance the resilience of societies to climate aridification.Increasing aridity is expected to play a role in larger and more intense wildfires in the climatealtered future not least because of its impacts on tree deaths in semi-arid forests and the consequent growing availability of dry biomass for burning. Europe is likely to be especially affected.
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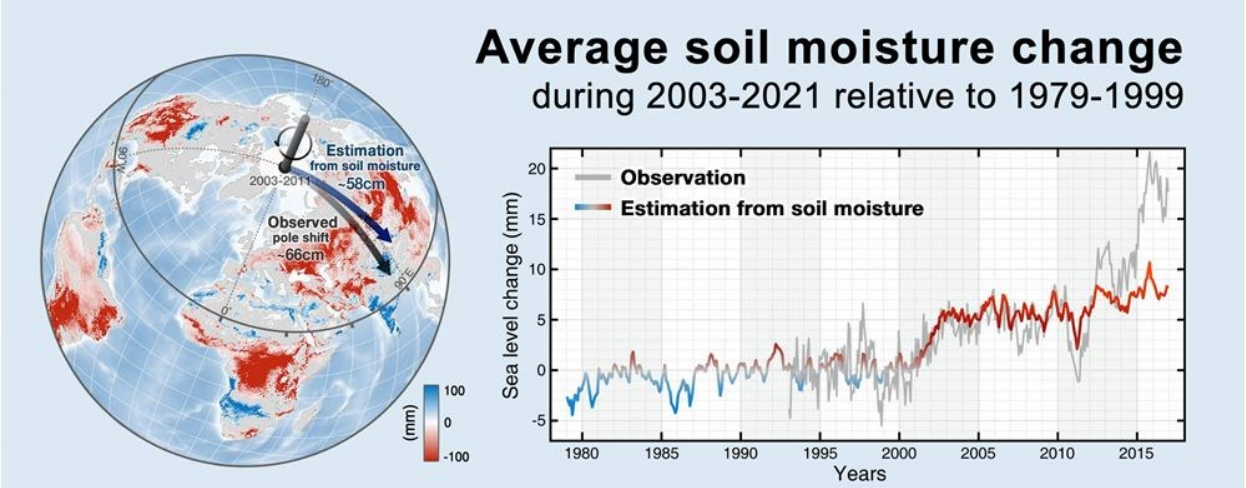
Source: Vicente-Serrano, S. M., N. G. Pricope, A. Toreti, E. Morán-Tejeda, J. Spinoni, A. Ocampo-Melgar, E. Archer, A. Diedhiou, T. Mesbahzadeh, N. H. Ravindranath, R. S. Pulwarty and S. Alibakhshi (2024). The Global Threat of Drying Lands: Regional and global aridity trends and future projections. A Report of the Science-Policy Interface. United Nations Convention to Combat Desertification (UNCCD). Bonn, Germany. Published in 2024 by United Nations Convention to Combat Desertification (UNCCD), Bonn, Germany UNCCD-SPI Technical Series No. 09

Sharp depletion in soil moisture drives land water to flow into oceans, contributing to sea level rise



May 14, 2025

The Hong Kong Polytechnic University

Summary:

The increasing frequency of once-in-a-decade agricultural and ecological drought has underscored the urgency of studying hydrological changes. A research team has analyzed the estimated changes in land water storage over the past 40 years by utilizing space geodetic observation technology and global hydrological change data. This innovative method has revealed a rapid depletion in global soil moisture, resulting in a significant amount of water flowing into the oceans, leading to a rise in sea levels. The research provides new insights into the driving factors behind the alarming reduction in terrestrial water storage and rise in sea levels.

The increasing frequency of once-in-a-decade agricultural and ecological drought has underscored the urgency of studying hydrological changes. A research team from the Department of Land Surveying and Geo-informatics of The Hong Kong Polytechnic University (PolyU) has collaborated with international experts to analyse the estimated changes in land water storage over the past 40 years by utilising space geodetic observation technology and global hydrological change data. This innovative method has revealed a rapid depletion in global soil moisture, resulting in a significant amount of water flowing into the oceans, leading to a rise in sea levels. The research provides new insights into the driving factors behind the alarming reduction in terrestrial water storage and rise in sea levels.

The findings have been published in the international journal *Science*.

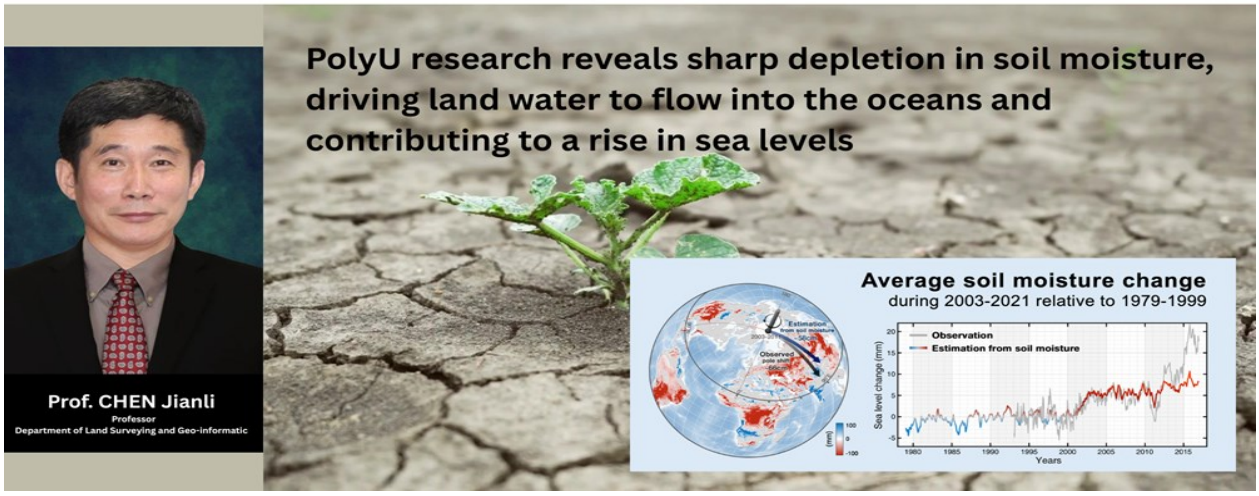
Since polar motion reflects mass redistribution within the Earth system, integrating models and observations across the atmosphere, hydrosphere and lithosphere is crucial.However, previous challenges in measuring terrestrial water storage, particularly groundwater and root zone soil moisture, limited understanding of hydrological depletion at continental scales.

Prof. Jianli CHEN, Professor of the PolyU Department of Land Surveying and Geo-informatics and core member of the Research Institute for Land and Space and the international team employed satellite altimetry and gravity missions, including the Gravity Recovery and Satellite Experiment (GRACE), and GRACE Follow-On, to enable continental-scale observations of terrestrial water storage variations.

By integrating this with global mean sea levels and polar motion data, the team has explored terrestrial water storage depletion patterns.

Notably, this study introduced novel methods for estimating global soil moisture, which improves the accuracy of continental and global scale modeling to enable a more effective understanding of soil moisture variations under climate change.

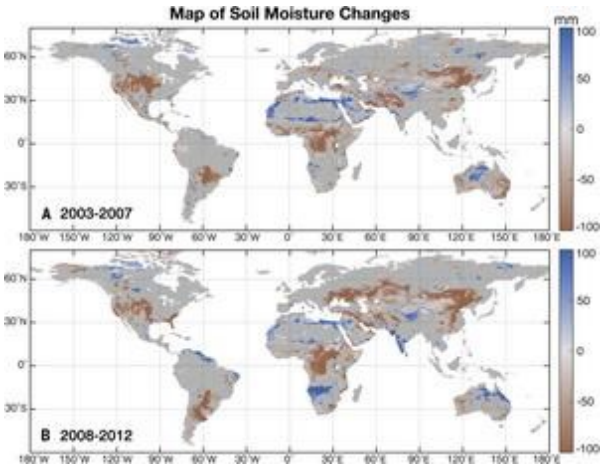
The melting of Greenland's ice sheet is recognised as the largest single contributor to the rise in global sea levels, adding approximately 0.8mm annually. This study reveals that between 2000 and 2002, the global terrestrial water storage significantly declined, with a total of 1,614 billion tons of water lost to the oceans,



which is twice as much as resulting from the current melting of Greenland ice, and equivalent to a 4.5mm rise in sea levels.

Since then, the rapid loss of terrestrial water storage has been followed by a more gradual but continuous depletion, with no signs of recovery. In addition, compared to the period from 1979 to 1999, a notable decline in global average soil moisture was observed from 2003 to 2021. Between 2003 and 2011, the Earth's pole shifted 58cm toward 93° East Longitude, demonstrating that the continued decline in soil moisture is leading to a reduction in terrestrial water storage.

The team also pointed out that precipitation deficits and stable evapotranspiration caused by global warming, changing rainfall patterns



and increasing ocean temperatures are likely the key factors for the abrupt decline in terrestrial water storage.The ERA5-Land soil moisture data of the European Centre for Medium-Range Weather

Forecasts' corroborates these findings, showing substantial terrestrial water storage losses in Africa, Asia, Europe, and South America.

In Asia and Europe, the affected areas expanded from northeastern Asia and eastern Europe to broader regions across East and Central Asia, as well as Central Europe, following the sharp water storage depletion observed between 2000 and 2002.

With increasing agricultural irrigation in regions such as northeast China and the western United States, and global greening, soil moisture may further diminish in semi-arid areas with intensive agriculture and high levels of greening.

The team suggests the need for improved land surface models which consider these factors for a more comprehensive understanding of long- term changes in terrestrial water storage.

Prof. Jianli Chen said, "Sea level change and Earth rotation serve as indicators of large-scale mass changes in the Earth system. Accurately measured sea level change and variation in Earth rotation provide a unique tool for monitoring large-scale mass changes in the global water cycle. By integrating multiple modern space geodetic observations, it enables comprehensive analysis of the driving factors behind changes in terrestrial water storage and sea level rise. This, in turn, provides reliable data for climate and Earth system science experts to further investigate drought issues, aiding authorities in formulating water resource management and climate change mitigation strategies to address new challenges posed by climate change."

Source:: Ki-Weon Seo, Dongryeol Ryu, Taehwan Jeon, Kookhyoun Youm, Jae-Seung Kim, Earthu H. Oh, Jianli Chen, James S. Famiglietti, Clark R. Wilson. **Abrupt sea level rise and Earth's gradual pole shift reveal permanent hydrological regime changes in the 21st century**. *Science*, 2025; 387 (6741): 1408 DOI: 10.1126/science.adq6529

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We need to built a future,
Where people live in harmony with nature

HPA

Think Forward , Lead Forward