

Global Water Monitor & Forecast Watch List

January 15, 2024

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Introduction

The ISciences Water Security Indicator Model (WSIM) monitors and forecasts water anomalies on a global basis. Each month we produce data and a report that document current conditions and provide forecasts with lead times from 1 to 9 months. WSIM has been run continuously since April 2011 and has been validated against subsequently observed data. ISciences also provides assessments of the impacts of water anomalies on people, agriculture, and electricity generation. Detailed data and reports are available for purchase. Additional information and pricing are available upon request.

We have recently completed the latest Water Security Indicator Model (WSIM) analysis of global water anomalies using observed temperature and precipitation through December 2023 and an ensemble of forecasts issued the last week of December 2023. This edition of Global Water Monitor & Forecast Watch List presents a selection of regions likely to encounter significant water anomalies in the next few months.

This edition uses results from a new version of WSIM that uses temperature and precipitation data from the ECMWF Reanalysis v5 (ERA5) instead of gridded station data published by NOAA's Climate Prediction Center. Spatial resolution of the maps has sharpened from half-degree to quarter-degree and we expect higher fidelity in sparsely instrumented regions of the world. We have also changed the baseline period for computing statistical distributions from 1950-2009 (60 years) to 1981-2020 (40 years) to rely more exclusively on data from the satellite era. We have published more details and some side-by-side comparisons of the two versions of WSIM, which can be viewed [in our recent blogpost](#).

In addition to the implementation of a new version of WSIM, we have also compiled a list of user questions to help us improve the Global Water Monitor & Forecast Watch List. Please take a moment to complete our [user survey](#). We thank you in advance for your responses and any supplemental information you are able to provide.

All maps have quarter-degree resolution and depict our composite water anomaly index, which is based on WSIM estimates of soil moisture, evapotranspiration deficit, runoff, and total blue water anomalies. Shades of red indicate deficits and shades of blue indicate surpluses. Since different variables are used to estimate deficits and surpluses, it is possible for a single half-degree cell to register both a deficit and a surplus. These cases are depicted on the maps in shades of purple, with the more extreme value (deficit or surplus) used to determine the shade.

Deficits and surpluses are stated in terms of return period – a measure that characterizes the rarity of an event. For example, a return period of 10 years indicates an event that would occur, on average, once every ten years. Higher return periods indicate more extreme and, therefore, more disruptive anomalies. Return period is computed by comparison to cell-specific distributions of data from 1950 through 2009. Anomaly levels correspond to return periods: abnormal=3-5 years, moderate=5-10 years, severe=10-20 years, extreme=20-40 years, and exceptional=greater than 40 years.

Please note that the WSIM model makes use of seasonal temperature and precipitation forecasts produced by the U.S. National Oceanic and Atmospheric Administration (NOAA) Climate Forecast System Version 2 (CFSv2). These forecasts predict broad temperature and precipitation patterns, but do not effectively predict singular events such as tropical storms. Detailed outlooks and analyses of tropical storms are available from the NOAA National Hurricane Center.

There are numerous regions around the world where country borders are contested. ISciences depicts country boundaries on these maps solely to provide some geographic context. The boundaries are nominal, not legal, descriptions of each entity. The use of these boundaries does not imply any judgment on the legal status of any territory, or any endorsement or acceptance of disputed boundaries on the part of ISciences or our data providers.

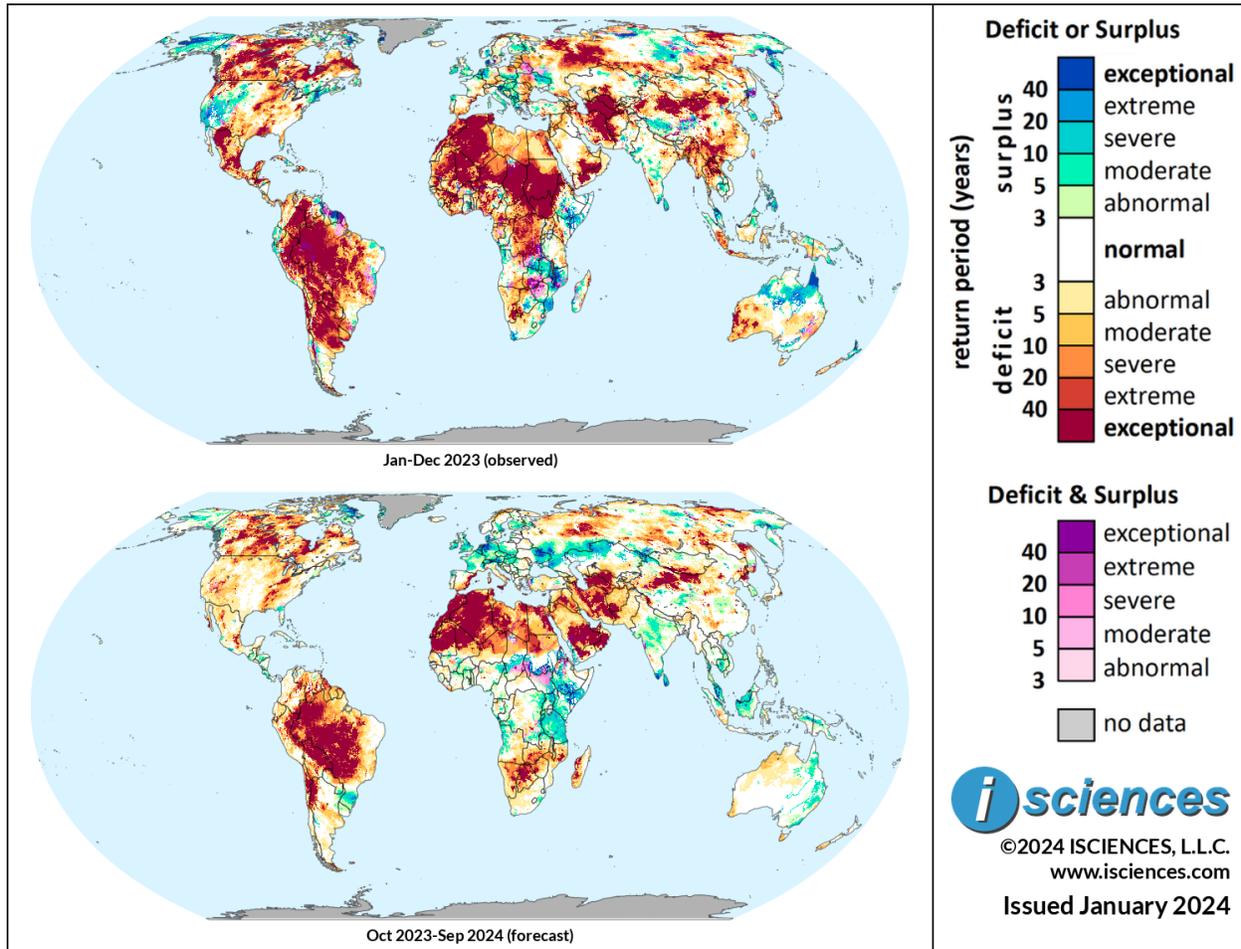
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Worldwide Water Watch List

This map presents a selection of regions likely to encounter significant water anomalies during the one-year period beginning in October 2023 and running through September 2024 using 3 months of observed temperature and precipitation data and 9 months of forecast data.

ISciences Water Anomalies Forecast: January 2023 - September 2024



Based on observed data through December 2023 and forecasts through September 2024

Watch List: Regional Synopsis

This synopsis provides highlights of regional water forecasts. More detailed analysis is available in “Watch List: Regional Details” immediately following the synopsis.

United States: Intense deficits are expected to continue in some southeastern states until March 2024.

Canada: Most provinces are expected to observe persisting exceptional deficits until June 2024 or longer.

Mexico, Central America, and the Caribbean: Pockets of exceptional deficits are expected to persist in areas of Mexico until March 2024.

South America: Exceptional deficits are expected to continue in most areas of Brazil until March 2024.

Europe: The majority of Europe is expected to experience widespread surplus until March 2024 or longer.

Africa: Intense deficits in northern countries are expected to resolve, while surplus in central regions are expected to persist until September 2024 or longer.

Middle East: Deficits throughout Saudi Arabia are expected to dissipate by March 2024, but are expected to remerge by June 2024.

Central Asia and Russia: Western and eastern regions of Russia are expected to observe exceptional deficits, as well as surplus in southern regions, until March 2024.

South Asia: Near-normal conditions are expected in most regions, with some southern regions of India experiencing isolated pockets of surplus until March 2024.

Southeast Asia and the Pacific: Intense surplus is expected throughout Maritime Southeast Asia until March 2024 or longer.

East Asia: Some regions of northern China are expected to experience prolonged exceptional deficits until March 2024. Southwestern areas of China can expect widespread surplus throughout June 2024.

Australia & New Zealand: Eastern regions of Australia are expected to observe moderate to severe surplus throughout September 2024 or longer.

Watch List: Regional Details

United States

The 12-month forecast ending in September 2024 anticipates exceptional deficits in the Pacific Northwest and Upper Midwest and intense surpluses in western and northeastern states to mostly dissipate. Extreme to exceptional deficits will still remain in pockets throughout the Midwest.

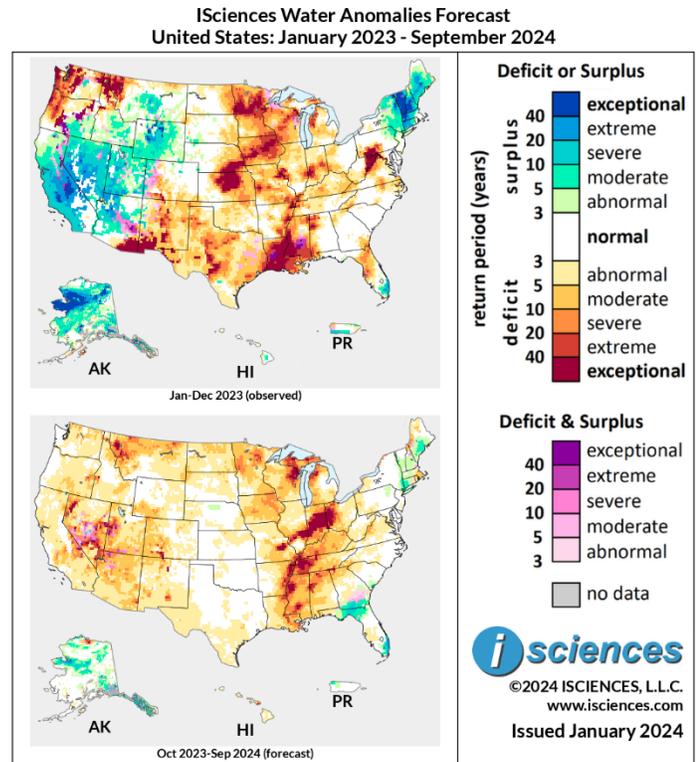
Extreme to exceptional deficits are expected in the following areas:

- Southern **Louisiana**, in areas near the cities of New Orleans and Baton Rouge. These deficits continue further north into pockets of eastern **Arkansas**, western and southern **Mississippi**, western **Alabama**, and throughout the majority of western **Tennessee**.
- Most of western **Ohio**, spreading further into much of central **Indiana** and in southern regions of **Illinois**, east of Highland Silver Lake. Similarly intense deficits are expected to appear in pockets throughout **Minnesota**, in areas west and east of Leech Lake Reservation.
- Northeastern **Wisconsin**, in areas near the Menominee Reservation. These deficits continue into northern **Michigan**, throughout the Upper Peninsula, as well as in areas of the Upper Lower Peninsula, near Traverse City.
- **Nevada**, in pockets throughout the northwestern, central, and southern regions of the state.
- Western **Utah**, appearing in western regions of Juab County. Similarly intense deficits are expected to occur in western **Montana**, throughout the Flathead Reservation and west of Flathead Lake.

Moderate to severe surpluses are expected in the following regions:

- **Florida**, throughout regions within the Aucilla Wildlife Management Area, moving north into southern **Georgia** near the city of Valdosta.
- Western **Connecticut**, in regions north of the city of Danbury.
- **Alaska**, throughout central regions of the Northwest Arctic Borough.

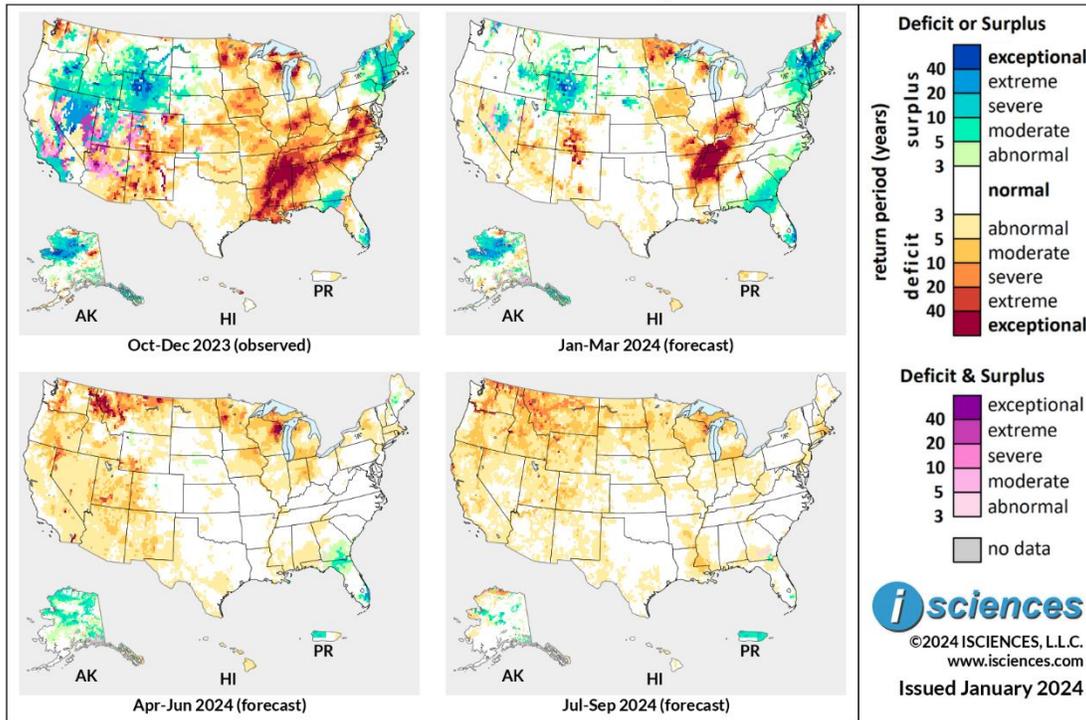
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through December 2023 and forecasts through September 2024

The map on top depicts long-term deficit and surplus anomalies as of December 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of September 2024.

ISciences Water Anomalies Forecast United States: October 2023 - September 2024



Based on observed data through December 2023 and forecasts through September 2024

The forecast through March 2024 anticipated exceptional deficits to expand in size across much of western Tennessee, northern Mississippi, western Kentucky, and central Indiana. Exceptional deficits are expected to continue into western to southwestern regions of Ohio. Northernmost regions of Maine can expect similarly intense deficits. Further west, severe to extreme deficits are expected to occur in much of northern Minnesota, as well as in west-central Colorado, in most areas near the Grand Mesa, Uncompahgre and Gunnison National Forests, continuing south into northern New Mexico into the Jicarilla Apache Nation Reservation.

From April through June 2024, extreme to exceptional deficits are expected to arise in northern Idaho and western Montana. Deficits of equivalent intensity are expected to continue in western Minnesota, near the White Earth Reservation. In Wisconsin, deficits of similar magnitude are expected to occur near the Menominee Reservation in the town of Keshena. Moderate to severe surpluses are anticipated to occur in southeastern Florida, western Puerto Rico, several regions of Alaska, including the Seward Peninsula, northern portions of the North Slope Borough, and the Copper River Census Area.

The forecast for the final months – July 2024 through September 2024 – anticipates exceptional deficits in northern Idaho and western Montana to subside, becoming mostly moderate to severe deficits in both states. Similar deficits appear nearby throughout central and northern Washington. Further east, moderate to severe deficits are expected to linger in Michigan’s Upper Peninsula.

Please note that WSIM forecast skill declines with longer lead times.

Canada

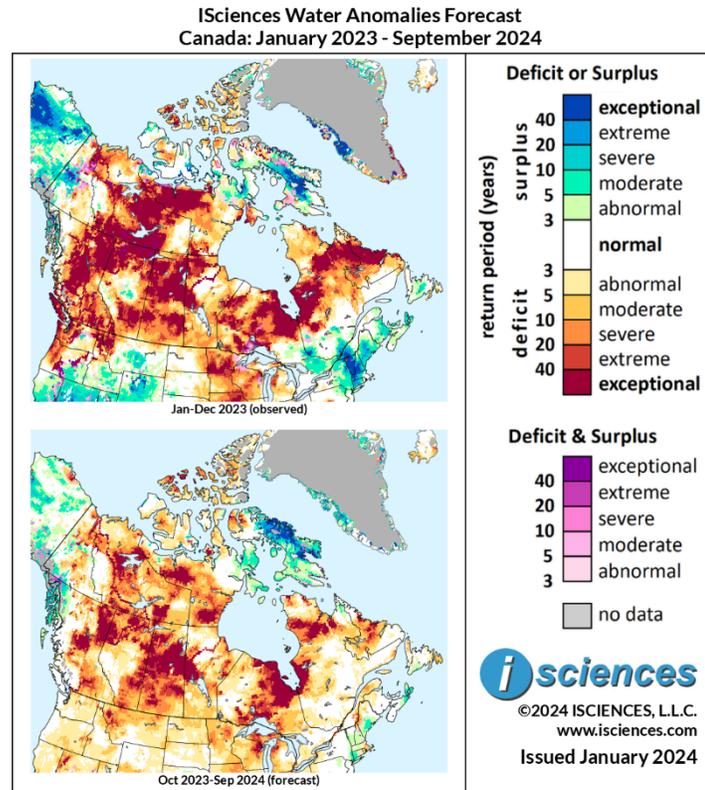
The 12-month forecast ending in September 2024 anticipates exceptional deficits to somewhat decrease in size and severity, but still remain widespread in most provinces. Some exceptional surplus is expected to continue in regions of Nunavut.

Extreme to exceptional deficits are anticipated in:

- Central to northeastern **British Columbia**, throughout regions near the Graham - Laurier Provincial Park, continuing into northeastern **Alberta**, widespread throughout MacKenzie County.
- **Saskatchewan**, widespread throughout most central areas of the province, spreading into western **Manitoba** in places northwest of Lake Winnipeg.
- Central **Ontario**, widespread throughout the Unorganized North Cochrane District and in coastal regions along the Hudson Bay.
- Western and northern **Quebec**, in coastal regions along the Hudson Bay, as well as throughout central areas of the Nunavik region, spreading east into the Kuururjuaq and Torngat Mountains national parks.
- **Northwest Territories**, with the highest concentrations appearing in areas near Great Bear Lake, as well as in areas southeast of Great Slave Lake. Similarly intense deficits are anticipated in **Nunavut**, in central portions of the Kitikmeot Region, as well as southern portions of the Kivalliq Region.

Severe to exceptional surpluses are expected in the following regions:

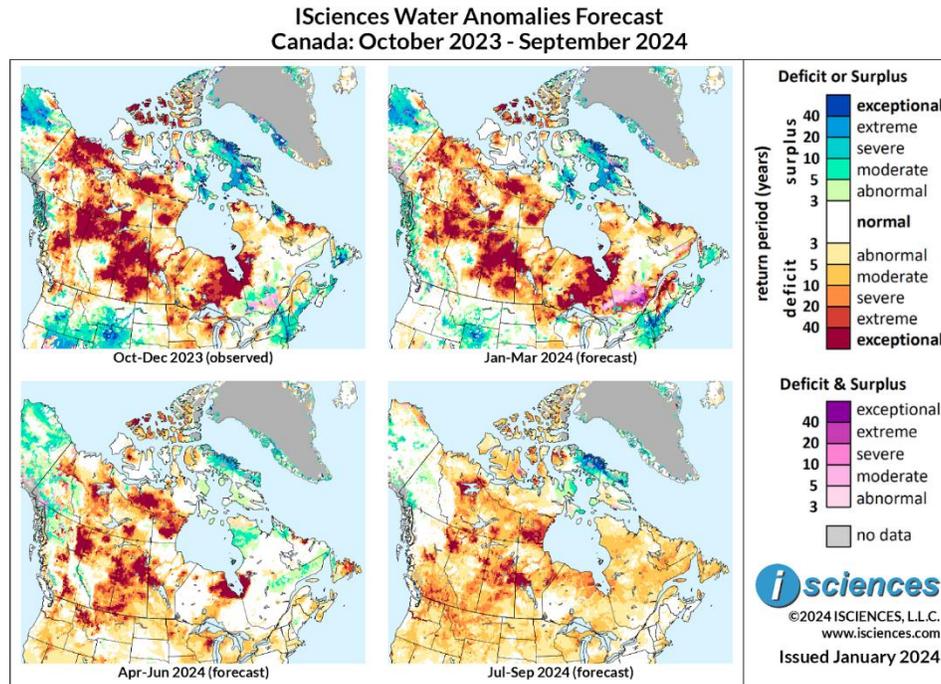
- **Nunavut**, in Baffin Island, widespread throughout the Clyde River Inuit Owned Land.



Based on observed data through December 2023 and forecasts through September 2024

The map on top depicts long-term deficit and surplus anomalies as of December 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of September 2024.

The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through December 2023 and forecasts through September 2024

The forecast through March 2024 indicates that widespread exceptional deficits will continue in most provinces. Central to northeastern British Columbia can anticipate deficits to linger, though deficits in northern Alberta will somewhat decrease in size. Deficits throughout Saskatchewan are expected to persist, as well as in western regions of Manitoba and central Ontario. Western coastal regions of Quebec are expected to observe prolonged deficits, as well as regions in Northwest Territories south of Great Bear Lake and southwest of Great Slave Lake. Similarly, deficits in central portions of the Kitikmeot Region and southern portions of the Kivalliq Region will persist. Moderate to severe surplus is expected to emerge in western coastal regions of British Columbia, and extreme to exceptional surpluses are expected to continue in Baffin Island.

From April through June 2024, widespread deficits are expected to decrease in intensity, but still remain present in most provinces. British Columbia, northern Alberta, and central Saskatchewan are expected to observe shrinking deficits. Exceptional deficits will remain in coastal regions of Ontario and Quebec along the Hudson Bay, as well as central regions of Northwest Territories and western to southern regions of Nunavut. Surplus is expected to continue in Baffin Island.

The forecast for the final months – July 2024 through September 2024 – expects deficits to continue lessening in intensity, with exceptional deficits continuing in pockets of central Saskatchewan, western Manitoba, central to northeastern British Columbia, southern Nunavut, and regions near Great Bear Lake. Surpluses in Baffin Island area are expected to expand in size.

Please note that WSIM forecast skill declines with longer lead times.

Mexico, Central America, and the Caribbean

The 12-month forecast ending in September 2024 anticipates widespread exceptional deficits to resolve throughout the majority of Mexico, but persist in isolated portions of northwestern and eastern states. Similarly, intense deficits are expected to dissipate in Central America. Moderate surplus will emerge in pockets across Nicaragua and Costa Rica.

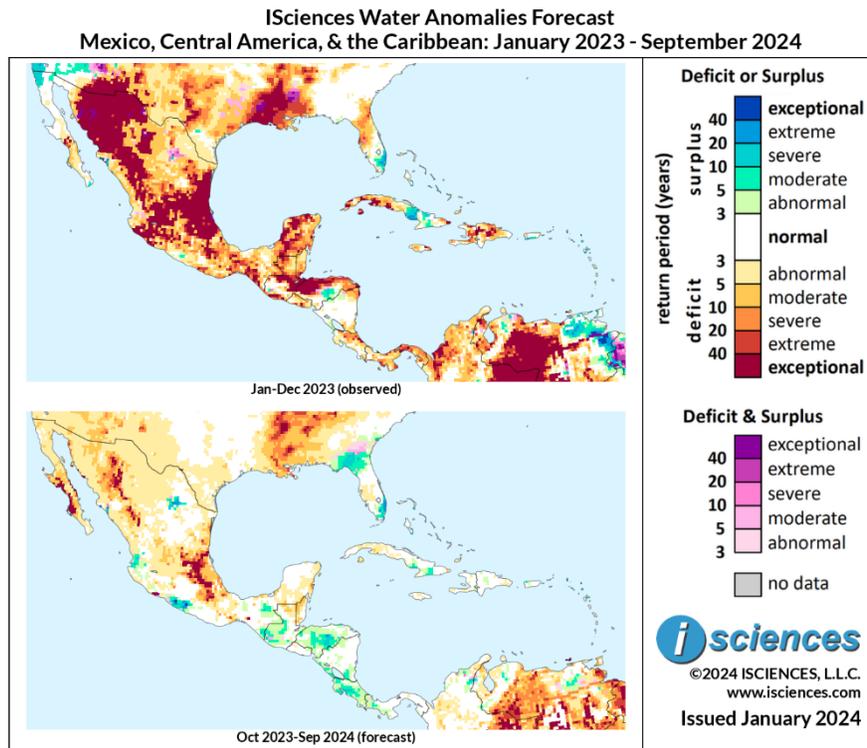
Severe to exceptional deficits are anticipated in:

- Northwestern **Mexico**, throughout western to southwestern regions of the state of Chihuahua.
- East-central **Mexico**, widespread throughout the states of Hidalgo, Puebla, and Oaxaca.
- Northern to central regions of **Baja California Sur**.

Moderate to severe surpluses are expected in the following regions:

- Southwestern **Mexico**, in southern regions of the state of Guerrero.
- North-central **Mexico**, in central regions of the state of Coahuila.
- Southeastern **Honduras**, throughout the departments of El Paraiso and Olancho.
- Throughout most of central **Costa Rica**.

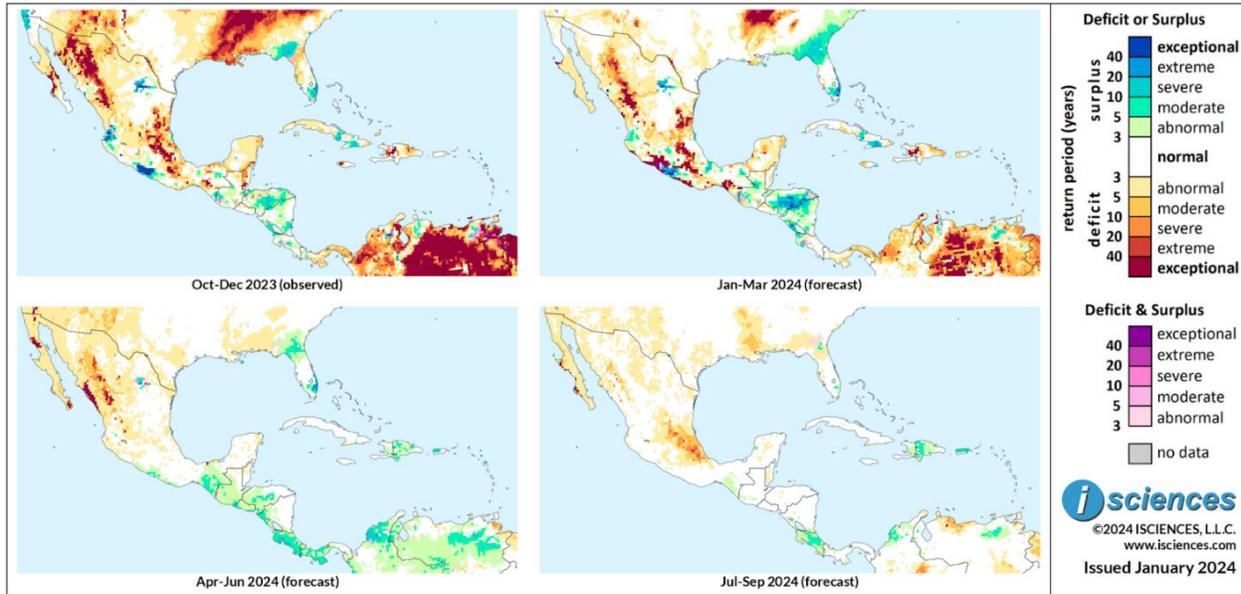
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through December 2023 and forecasts through September 2024

The map on top depicts long-term deficit and surplus anomalies as of December 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of September 2024.

**ISciences Water Anomalies Forecast
Mexico, Central America, & the Caribbean: October 2023 - September 2024**



Based on observed data through December 2023 and forecasts through September 2024

The forecast through March 2024 anticipates deficits to linger in Mexico, specifically in the state of Chihuahua, as well as further east in Hidalgo, Puebla, and Oaxaca. Exceptional deficits are expected to emerge in southwestern coastal regions of Guerrero, though exceptional surplus is expected to linger nearby, near the town of Acapulco. Surpluses are expected to intensify in southeastern Honduras, spreading further into Nicaragua, in territories along the country's northern border, as well as regions northwest of Lago Cocibolca.

From April through June 2024, most intense anomalies in Mexico are expected to resolve, though some exceptional deficits will still remain in northwestern regions of the country, as well as southernmost portions of Baja California and Baja California Sur. Most of Central America will experience moderate surplus, with the highest concentrations appearing throughout Costa Rica, Panama, central Honduras, and southern Mexico, in western Chiapas.

The forecast for the final months – July 2024 through September 2024 – anticipates moderate to extreme deficits to appear in eastern regions of Mexico, in most regions east of Mexico City. Similar deficits are anticipated in western coastal regions of Baja California and Baja California Sur, near El Rosario de Arriba and Bahía Tortugas. Near-normal conditions are expected throughout most other regions.

Please note that WSIM forecast skill declines with longer lead times.

South America

The 12-month forecast ending in September 2024 anticipates widespread exceptional deficits to decrease in size, but remain throughout much of Brazil, Chile, and eastern portions of the Bolivarian Nations.

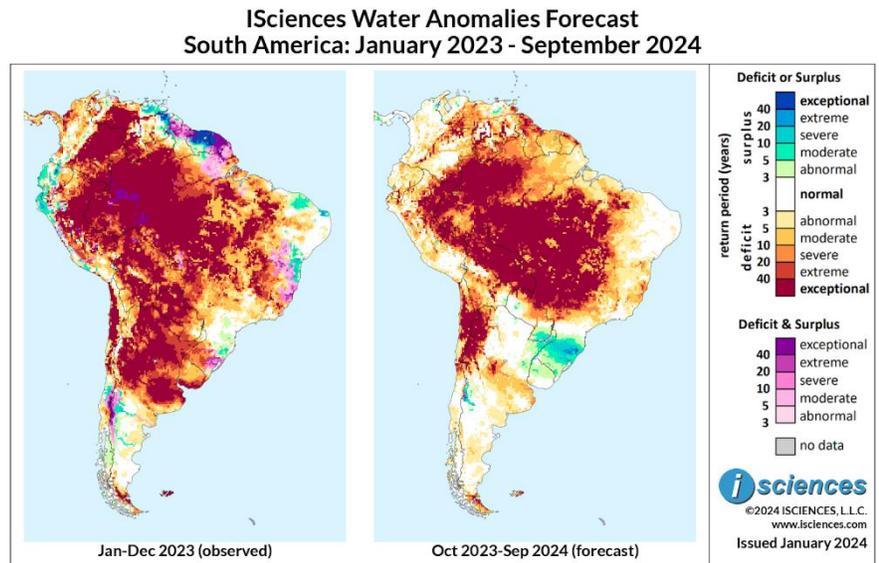
Severe to exceptional deficits are anticipated in:

- **Brazil**, widespread throughout the majority of the country's western and central regions.
- **Colombia**, across the country's central regions, continuing into western **Venezuela** and northern coastal regions of the **Guianas**.
- Eastern **Peru**, across much of the Selva region, continuing southeast and covering much of central to northern **Bolivia**.
- Northern **Chile**, widespread throughout the Antofagasta region, as well as in southernmost regions of the country near the Alberto de Agostini National Park.

Severe to exceptional surpluses are expected in the following regions:

- Southern **Brazil**, within the state of Rio Grande do Sul.

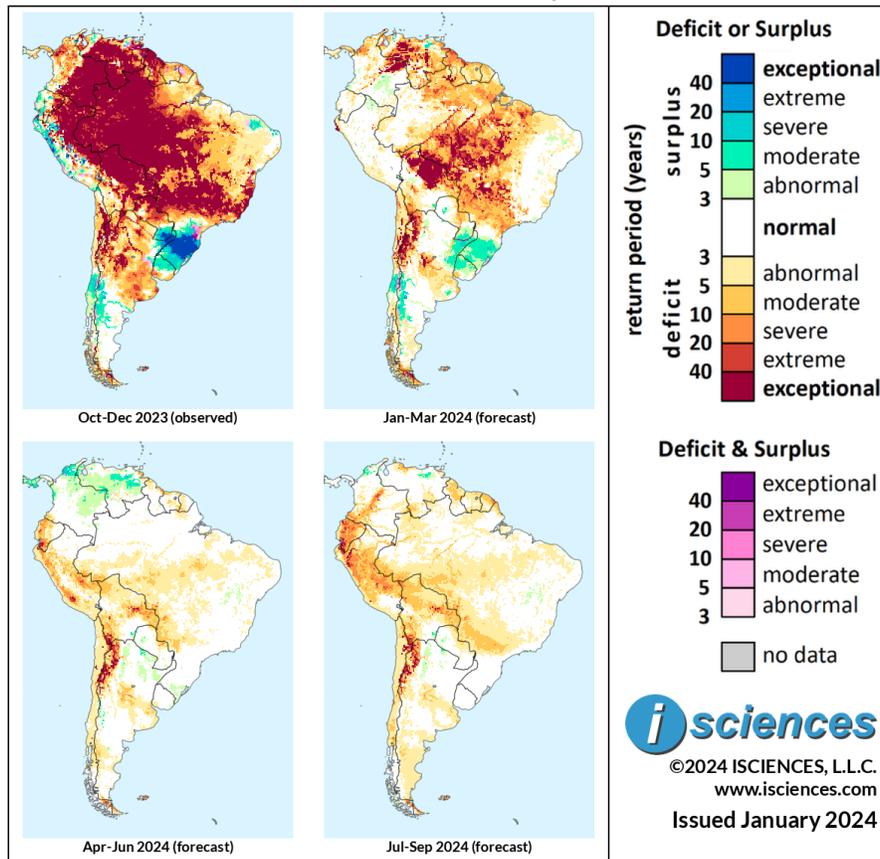
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through December 2023 and forecasts through September 2024

The map on top depicts long-term deficit and surplus anomalies as of December 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of September 2024.

**ISciences Water Anomalies Forecast
South America: October 2023 - September 2024**



Based on observed data through December 2023 and forecasts through September 2024

The forecast through March 2024 indicates that exceptional deficits will resolve in some regions of Brazil, but will continue in pockets throughout central regions of the country, as well as in northern Bolivia, northwestern Argentina, northeastern Colombia, and western Venezuela. Some similar deficits are expected to continue in northern coastal regions of the Guianas. Moderate to severe surplus is expected to persist in southern Brazil in the state of Rio Grande do Sul, and is expected to continue west into eastern Argentina. Some regions of central Chile can expect similarly intense surpluses.

From April through June 2024, near-normal conditions are expected to arise throughout most of South America. However, extreme to exceptional deficits are expected to appear in northwestern and central regions of Argentina, east-central Bolivia, western to southern Peru, and southern Ecuador. Moderate to severe surpluses are expected to occur in northern Colombia and eastern Venezuela.

The forecast for the final months – July 2024 through September 2024 – anticipates continued near-normal conditions throughout the majority of the continent, though extreme to exceptional deficits are expected to endure in northwestern Argentina, southern Ecuador, and central Colombia. Additionally, much of Peru may experience moderate to severe deficits widespread across the country.

Please note that WSIM forecast skill declines with longer lead times.

Europe

The 12-month forecast ending in September 2024 anticipates surplus anomalies to intensify in western and eastern Europe, as well as in the United Kingdom and Ireland. In southern Europe, exceptional deficits are expected to continue, intensifying in some regions of Spain and Italy.

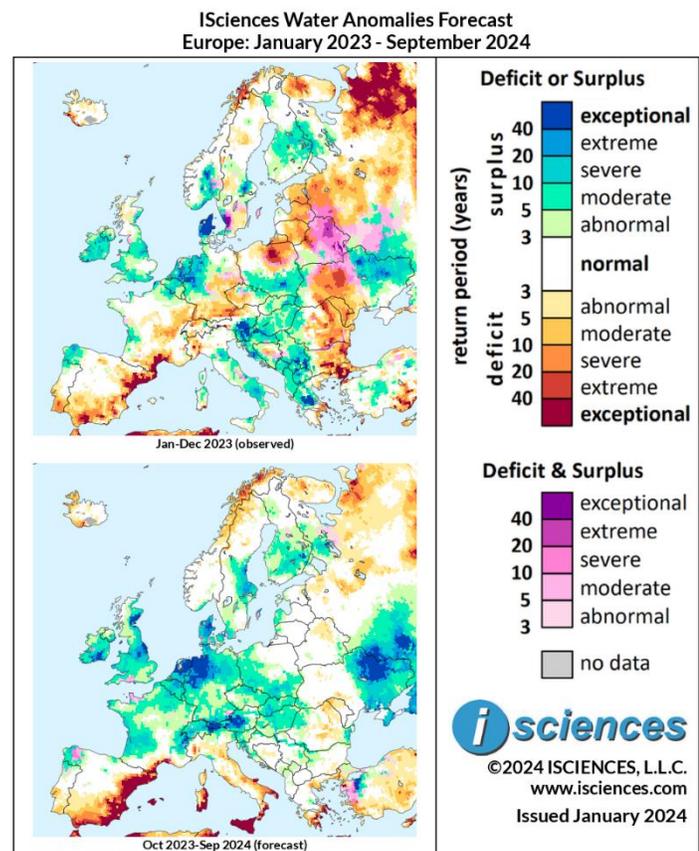
Severe to exceptional surpluses are expected in the following regions:

- Northwestern **Germany**, throughout much of Lower Saxony, spreading further into the majority of the **Netherlands** and **Belgium**.
- Eastern **Switzerland**, throughout most regions near Beverin Nature Park, spreading east into most of western **Austria**.
- Northeastern **Ukraine**, widespread in regions northeast of the Dnipro River.
- Central **Sweden**, near the city of Stockholm, moving further north along eastern coastal regions of the Gulf of Bothnia. Regions near the region of North Karelia in **Finland** can expect similarly intense surpluses.
- **United Kingdom**, with the highest concentrations appearing in East Yorkshire and Edinburgh, as well as southern regions of the Munster region of **Ireland**.

Severe to exceptional deficits are anticipated in:

- Southern **France**, in southern coastal regions near the city of Montpellier. These deficits continue south into most eastern to southern coastal regions of **Spain**, spreading along the coast from Barcelona to Gibraltar.
- Coastal regions of southern **Italy** near the cities of Foggia, Lecce, and Catanzaro. Similar deficits are expected throughout **Sicily** and Sardinia.
- Southern **Greece**, in regions near Athens and Peloponnese.
- Northern **Sweden**, throughout Troms og Finnmark.

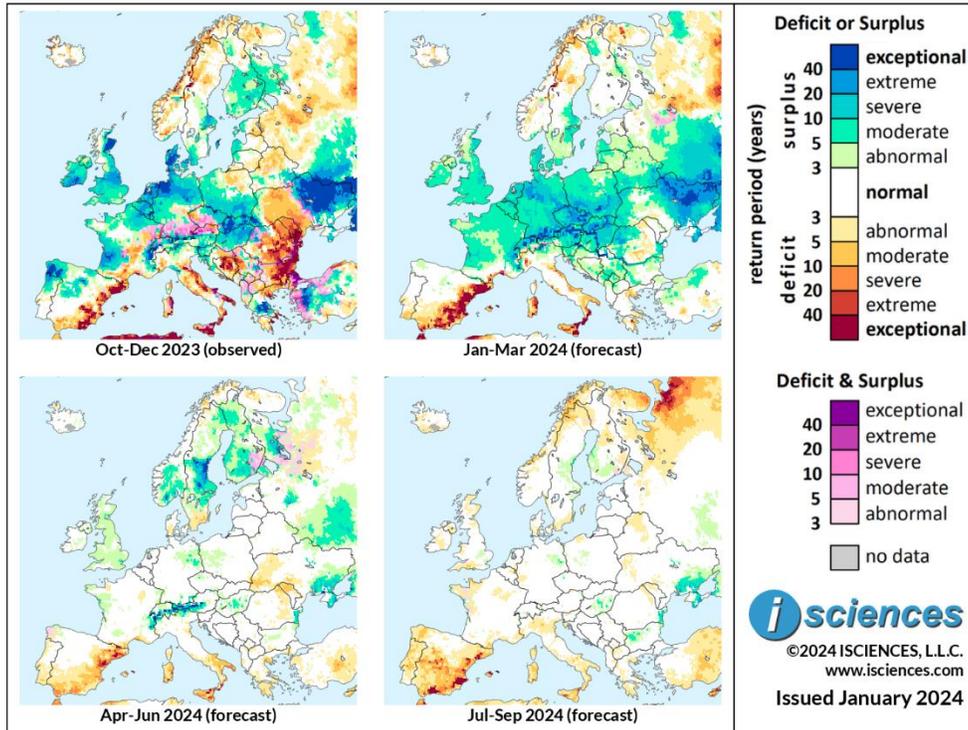
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through December 2023 and forecasts through September 2024

The map on top depicts long-term deficit and surplus anomalies as of December 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of September 2024.

ISciences Water Anomalies Forecast Europe: October 2023 - September 2024



Based on observed data through December 2023 and forecasts through September 2024

The forecast through March 2024 anticipates widespread severe to extreme surpluses to continue throughout most of western and eastern Europe, with the most intense concentrations appearing in southeastern France, Switzerland, southern Germany, Czech Republic, Slovakia, and eastern Ukraine. Moderate to severe surpluses are expected to occur throughout France, Poland, the United Kingdom, and Ireland. Exceptional deficits along Spain's eastern and southern coasts will expand, moving further west into the Auvergne-Rhône-Alpes region.

From April through June 2024, most regions in Europe will experience near-normal conditions. Some exceptions are expected, as pockets of severe to exceptional surplus are expected to continue in Switzerland, Austria, and eastern coastal regions of Sweden along the Gulf of Bothnia. Deficits are expected to mostly resolve in southern Spain, but northeastern regions of the country near Catalonia are expected to observe isolated pockets of extreme to exceptional deficit.

The forecast for the final months – July 2024 through September 2024 – anticipates near-normal conditions to persist throughout most of the region, though some pockets of severe to exceptional deficits are expected to reemerge throughout Spain.

Please note that WSIM forecast skill declines with longer lead times.

Africa

The 12-month forecast ending in September 2024 anticipates exceptional deficits to persist in northwestern and southern regions, but significantly decrease in north-central regions of the country. Severe to exceptional surplus is expected to expand in central and eastern portions of Africa.

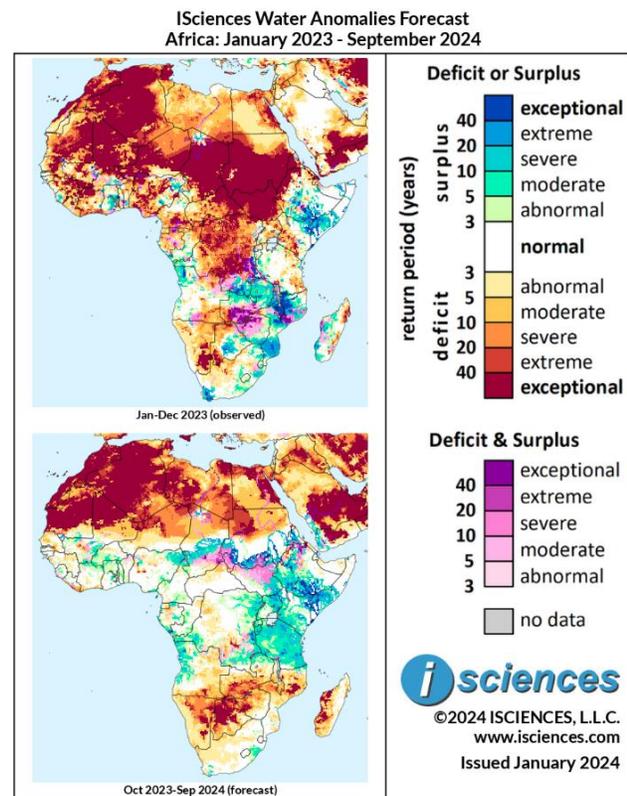
Extreme to exceptional deficits are anticipated in:

- **Mauritania**, widespread throughout the country, as well as in **Western Sahara, Morocco, Algeria**, and northern **Mali**.
- Western and eastern **Libya**, with the highest concentrations appearing in regions near the city of Sabhā, as well as the Al Wahat and Kufra districts. Similarly intense deficits are expected in northeastern **Egypt** along most coastal regions bordering the Mediterranean and Red seas.
- Northwestern **Sudan**, in northern areas of the Al Malha region.
- Eastern **Namibia**, in pockets throughout the Omaheke Region, continuing throughout most of **Botswana**. Regions of western **Zimbabwe**, southern **Zambia**, and northern **Mozambique** can expect similarly intense deficits.
- **Madagascar**, in most regions along the country's western coast.

Severe to exceptional surpluses are expected in the following regions:

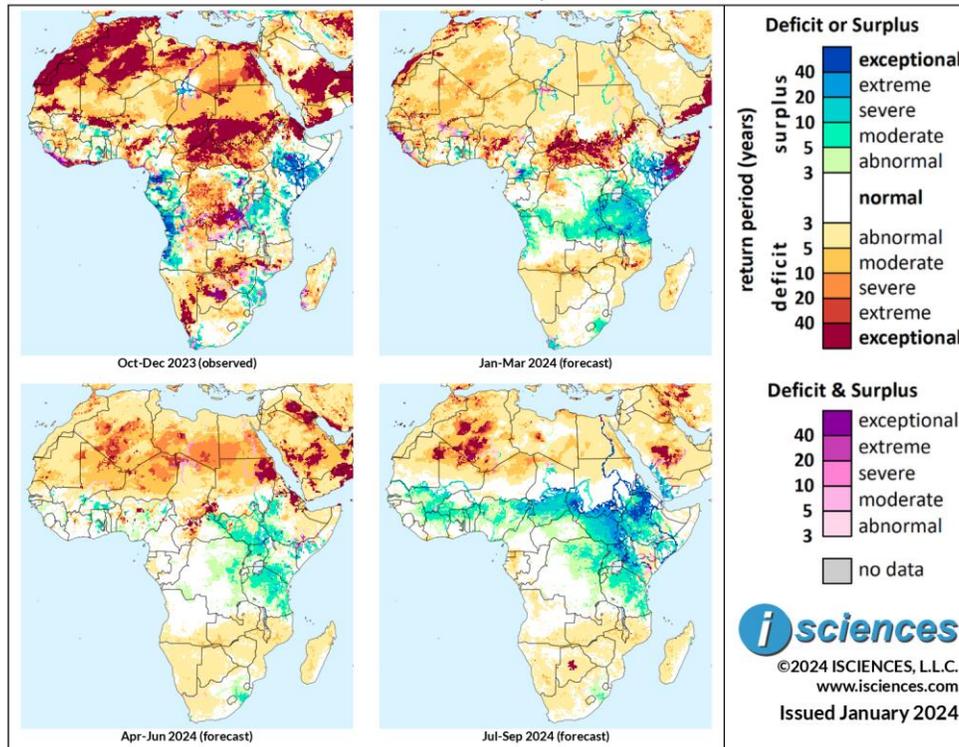
- **Tanzania**, widespread throughout the country.
- Much of the Horn of Africa, with intense surpluses arising throughout **Kenya**, southern **Somalia**, and southern **Ethiopia**.
- Southern portions of **Sudan** and **South Sudan** along the southern borders, as well as central **Chad**, across from the Ouaddāi Region. Similarly intense anomalies are expected in northeastern **Nigeria** in the state of Borno.

The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through December 2023 and forecasts through September 2024
The map on top depicts long-term deficit and surplus anomalies as of December 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of September 2024.

**ISciences Water Anomalies Forecast
Africa: October 2023 - September 2024**



Based on observed data through December 2023 and forecasts through September 2024

The forecast through March 2024 indicates that exceptional deficits in northern and northwestern regions of Africa will resolve. Exceptional deficits are still expected to remain in southern Chad, Sudan, Central African Republic, and South Sudan. Similarly intense deficits are expected to arise in the Horn of Africa, specifically in eastern Ethiopia and northern to central Somalia. Severe to extreme surpluses are expected to expand in Tanzania, and are expected to persist in southern Ethiopia, southern Somalia, and Kenya.

From April through June 2024, pockets of extreme deficits are expected to emerge, scattered across northern African countries, including Algeria, Libya, and Sudan. Exceptional deficits are expected to arise in northwestern regions of Sudan, as well as northwestern regions of Ethiopia. Some regions of western Central African Republic are expected to experience severe to exceptional deficits. Moderate to severe surpluses are expected to arise in western Ethiopia, continuing into South Sudan, Tanzania, and Uganda.

The forecast for the final months – July 2024 through September 2024 – expects surpluses to intensify in central countries, specifically in southern Chad, southern Sudan, South Sudan, Ethiopia, and Uganda. Exceptional surpluses are expected to move north from southern Sudan into portions of Egypt’s Asyut Governorate. Moderate to severe surpluses are expected in Tanzania, moving east through the Ivory Coast, southern Mali, and into Nigeria. Exceptional deficits are expected to reappear in pockets throughout Algeria, Mauritania, Mali, and central Botswana.

Please note that WSIM forecast skill declines with longer lead times.

Middle East

The 12-month forecast ending in September 2024 anticipates exceptional deficits to expand throughout Saudi Arabia, continuing down into Yemen and Oman. Jordan, Iraq and Iran are expected to observe similarly intense expansion of exceptional deficits.

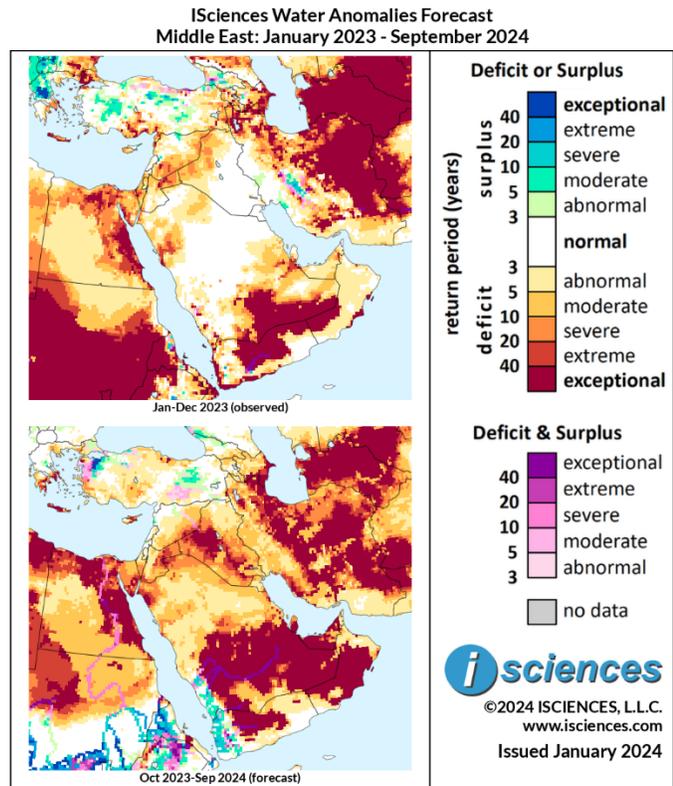
Severe to exceptional deficits are anticipated in:

- Central to southern **Saudi Arabia**, throughout the Riyadh, Makkah, Asir, and Najrah provinces, which continue into the majority of western United Arab Emirates.
- **Yemen**, in north-central regions of the country, and throughout most of **Oman**.
- **Western Iraq**, in regions west of the Therthar and Habbaniyah lakes. Similarly intense deficits are anticipated in eastern regions of **Jordan**.
- **Iran**, widespread throughout most of the country.

Severe to exceptional surpluses are expected in the following regions:

- Western **Yemen**, in western coastal regions of the Al Hudaydah Governorate.
- Western **Turkey**, in regions directly south of the Sea of Marmara.

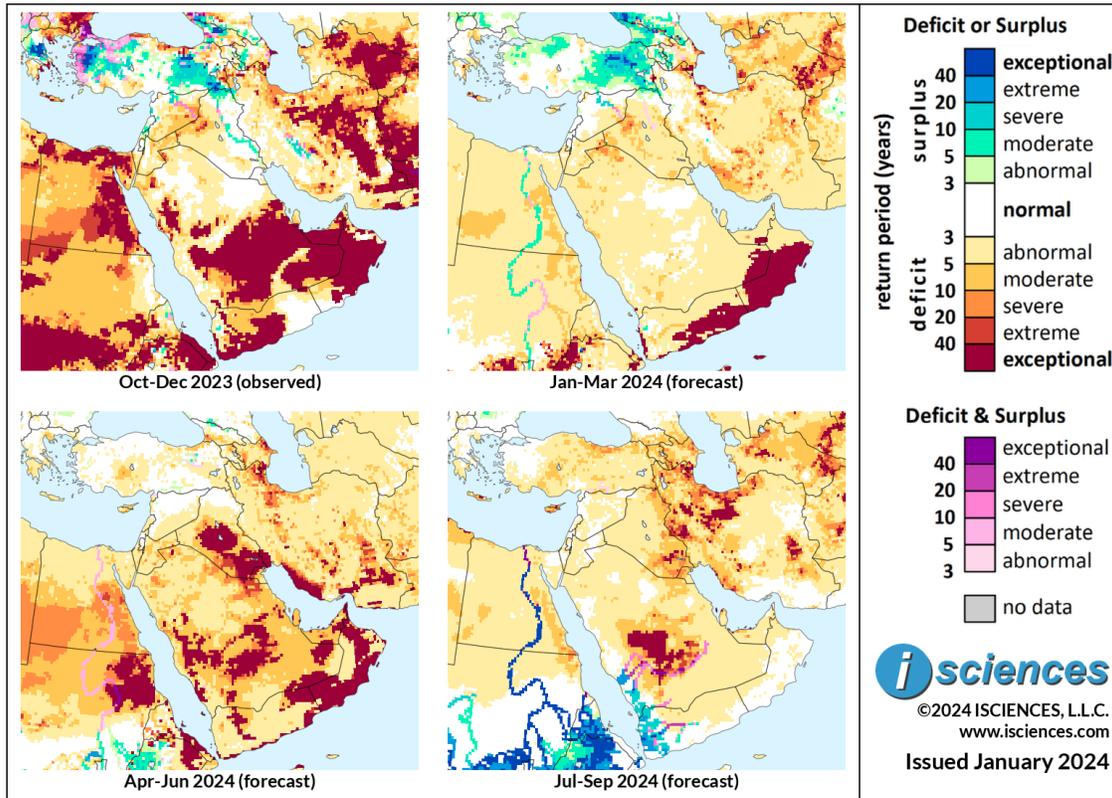
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through December 2023 and forecasts through September 2024

The map on top depicts long-term deficit and surplus anomalies as of December 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of September 2024.

ISciences Water Anomalies Forecast Middle East: October 2023 - September 2024



Based on observed data through December 2023 and forecasts through September 2024

The forecast through March 2024 indicates that most of Saudi Arabia will experience near-normal to abnormal conditions, with exceptional deficits continuing in south-central to southeastern Yemen, and throughout most of Oman. Pockets of intense deficits are expected to resolve in Iran, as well as Iraq, becoming near-normal to abnormal conditions. Surplus in western Turkey is expected to dissipate, but severe to exceptional surplus is expected to emerge in eastern Turkey, near eastern Anatolia.

From April through June 2024, exceptional deficits are expected to re-emerge in central Saudi Arabia, as well as in eastern Yemen and central to southern Iraq. Exceptional deficits are expected to continue throughout Oman. Southwestern coastal regions of Iran along the Persian Gulf are expected to observe exceptional deficits, which continue into southeastern regions of the country. Similarly intense deficits are expected to emerge in northern Iran, throughout the Gilan Province.

The forecast for the final months – July 2024 through September 2024 – anticipates most exceptional deficits in the area to resolve, with the exception of regions of central Saudi Arabia in the Riyadh Province. Small, isolated pockets of similarly intense deficits are expected to occur in southeastern Iraq, as well as north-central to northwestern Iran.

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Central Asia and Russia

The 12-month forecast ending in September 2024 indicates that exceptional deficits in western and southern Russia will shrink considerably, with near-normal conditions appearing throughout most of the remaining regions. Southwestern Russia and Kazakhstan can anticipate intense surplus.

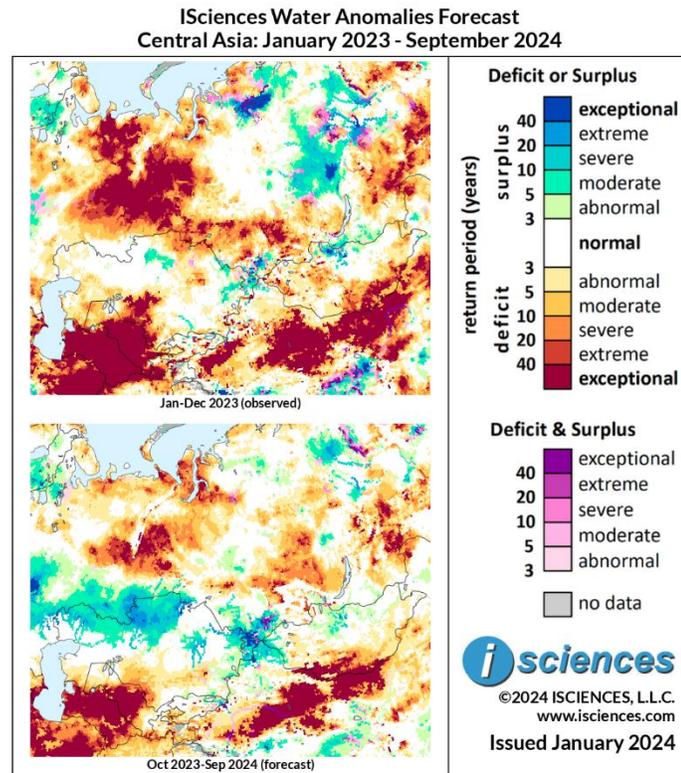
Extreme to exceptional deficits are anticipated in:

- Western **Russia**, spanning most central regions of the Western Siberian Plain.
- Northern **Russia**, spread throughout northern coastal regions of Yamalo-Nenets Autonomous Okrug, and near the settlement of Navy Port.
- Southeastern **Russia**, throughout central, southern, and eastern regions of the Irkutsk Oblast. These deficits are expected to continue north into the Olekminskiy Ulus district, as well as most of the southern Sakha Republic.
- **Uzbekistan**, widespread throughout most central regions of the country, as well as the majority of **Turkmenistan**.

Severe to exceptional surpluses are expected in the following regions:

- Southern **Russia**, throughout the Altai Republic.
- **Kazakhstan**, widespread throughout northern and eastern regions of the country.

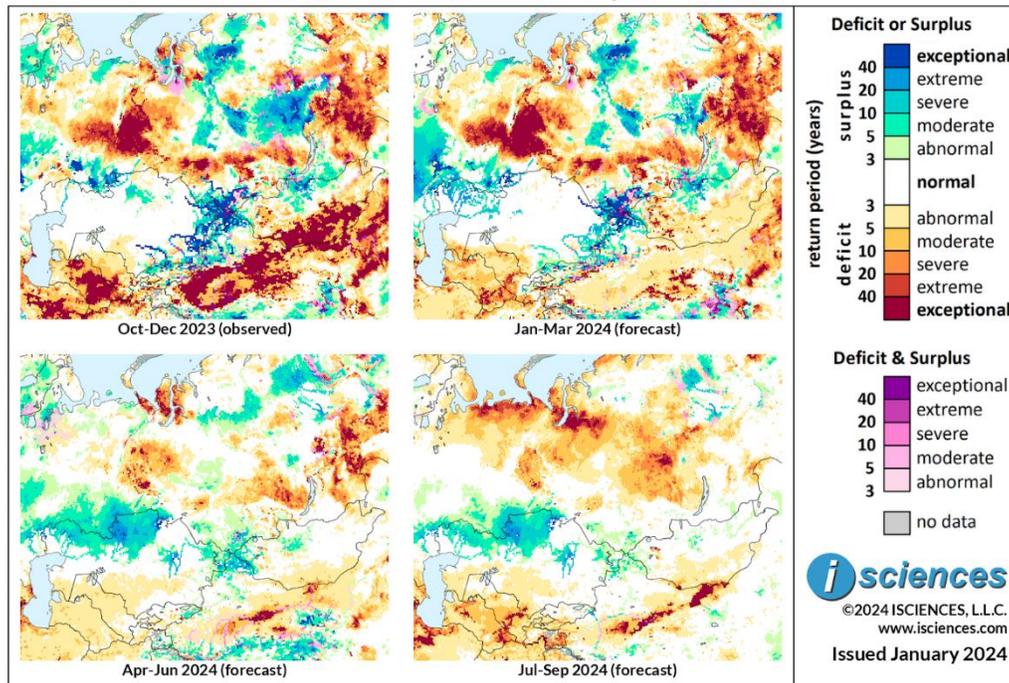
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through December 2023 and forecasts through September 2024

The map on top depicts long-term deficit and surplus anomalies as of December 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of September 2024.

**ISciences Water Anomalies Forecast
Central Asia: October 2023 - September 2024**



Based on observed data through December 2023 and forecasts through September 2024

The forecast through March 2024 anticipates that exceptional deficits will remain widespread in central portions of the Western Siberian Plain and regions north of the Altai Krai. These deficits continue east into southern regions of the Krasnoyarsk Krai and the Irkutsk Oblast, as well as throughout most of the Sakha Republic. Extreme to exceptional surplus is expected to occur in regions north of Lake Baikal and northern portions of the Taymyrsky Dolgano-Nenetsky District. Further south, similar surpluses are anticipated in the Altai Republic and northwestern Kazakhstan.

From April through June 2024, intense surpluses are expected to reappear in northwestern to northern Kazakhstan, along with deficits further north in the Yamalo-Nenets and Khanty-Mansi Autonomous Okrugs. Some deficits are expected to linger in Irkutsk Oblast, near the city of Irkutsk. Surpluses are expected to continue in northeastern Russia in the Olenyoksky District of the Sakha Republic, as are regions further south in the Altai Republic.

The forecast for the final months – July 2024 through September 2024 – expects most anomalies in the area to further dissipate. Northern coastal regions of Yamalo-Nenets Autonomous Okrug and along the coast of the Pechora Sea are expected to observe exceptional deficits. Similarly intense deficits are expected in southeastern regions of the Katangsky District. Deficits are expected to remerge in eastern Turkmenistan and Uzbekistan, while severe to extreme surpluses are expected to continue in northwestern Kazakhstan.

Please note that WSIM forecast skill declines with longer lead times.

South Asia

The 12-month forecast ending in September 2024 anticipates moderate surplus to spread across much of India, with exceptional surplus expected to expand in size in southernmost regions. Exceptional deficits are expected to persist in regions of Afghanistan and Pakistan.

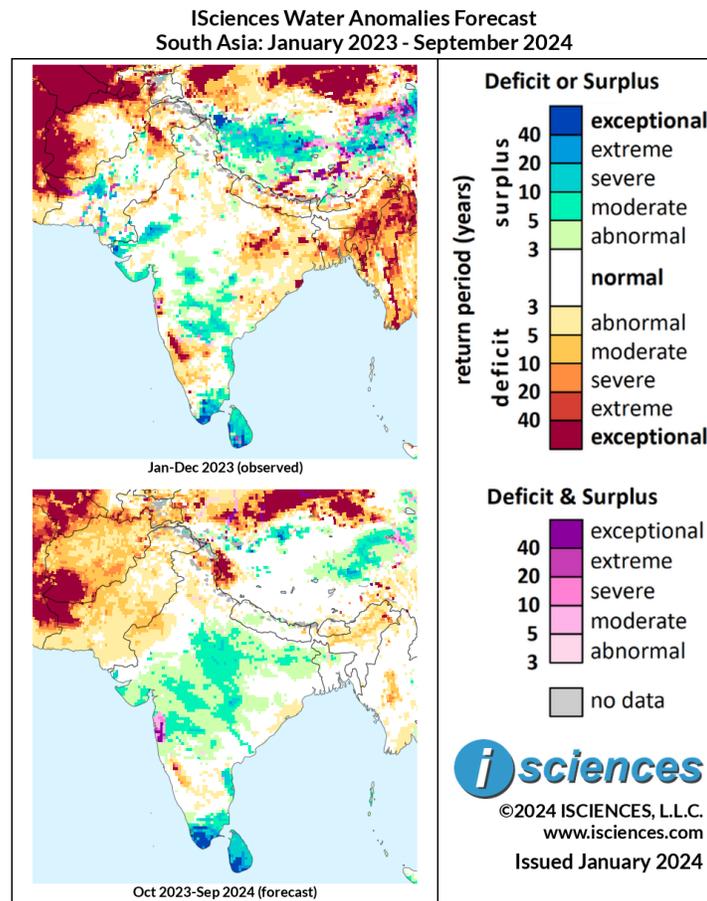
Severe to exceptional deficits are anticipated in:

- Southern **Afghanistan**, widespread throughout the provinces of Nimruz, Farah, and Helmand.
- Western regions of **Pakistan**, widespread throughout the Balochistan province.
- Northernmost areas of **India**, in the central to easternmost region of the state of Uttarakhand.

Severe to exceptional surpluses are expected in the following regions:

- Southernmost regions of **India**, throughout most regions of the state of Tamil Nadu.
- **Sri Lanka**, widespread throughout the country, with the highest concentrations appearing in southwestern regions near the coastal city of Galle.

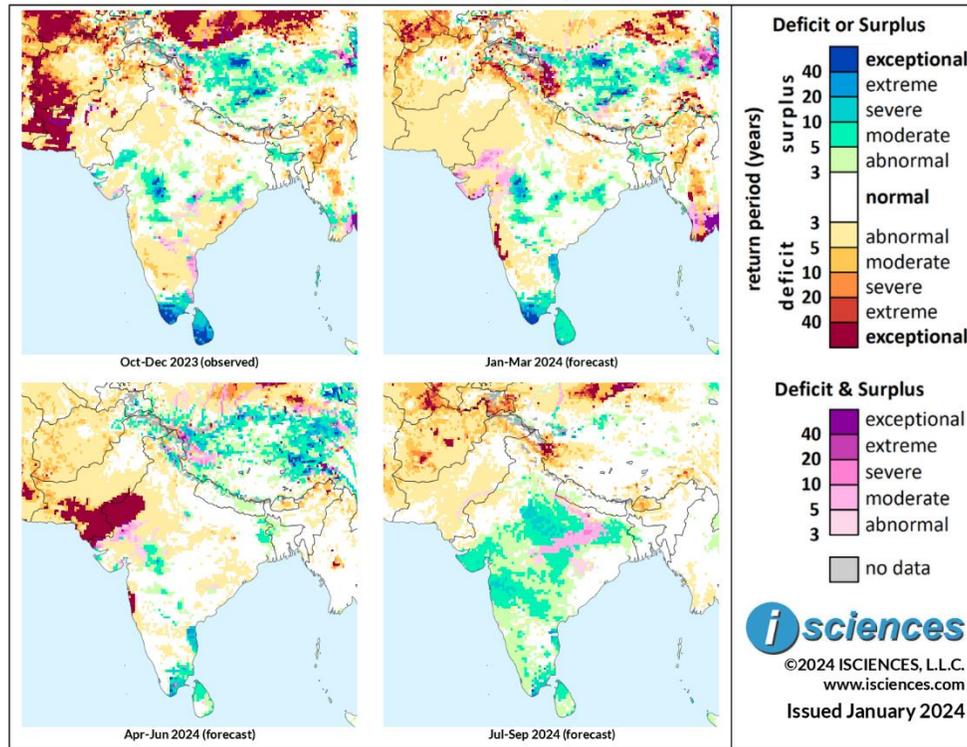
The 3-month maps (below) show the evolving conditions in more detail.



Based on observed data through December 2023 and forecasts through September 2024

The map on top depicts long-term deficit and surplus anomalies as of December 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of September 2024.

**ISciences Water Anomalies Forecast
South Asia: October 2023 - September 2024**



Based on observed data through December 2023 and forecasts through September 2024

The forecast through March 2024 anticipates exceptional surplus to continue in southern regions of India within the state of Tamil Nadu, as well as in eastern coastal regions of Andhra Pradesh. Further north, south-central regions of Madhya Pradesh can anticipate severe to extreme surplus. Areas near the region of Ladakh, in northernmost regions of Pakistan, are expected to observe moderate to severe deficits along Pakistan’s northern border, as well as in northwestern Afghanistan in the Badghis Province.

From April through June 2024, exceptional deficits are expected to emerge throughout southern Pakistan, continuing east into northwestern regions of India, throughout the state of Rajasthan. Isolated deficits of similar intensity are expected to emerge in western coastal regions of Maharashtra, near the city of Mumbai. Coastal regions of southern and eastern India, particularly southern Tamil Nadu and eastern Andhra Pradesh, can anticipate severe to extreme surplus to continue.

The forecast for the final months – July 2024 through September 2024 – indicates a large area of moderate to severe surpluses in western, north-central, and southern regions of India. Southernmost coastal regions of India can anticipate extreme surpluses.

Please note that WSIM forecast skill declines with longer lead times.

Southeast Asia and the Pacific

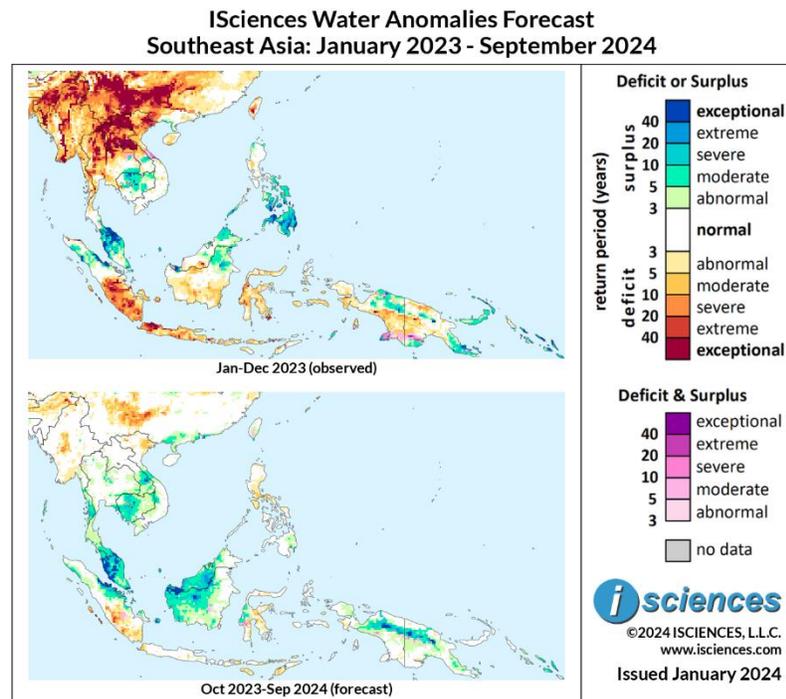
The 12-month forecast ending in September 2024 anticipates intense surpluses to persist in Maritime Southeast Asia, particularly in Peninsular Malaysia, various areas of Indonesia, Papua, and Papua New Guinea.

Severe to exceptional surpluses are expected in the following regions:

- **Peninsular Malaysia**, throughout the majority of the region. These anomalies continue north into southern **Thailand**.
- **Cambodia**, in most regions near Tonle Sap. Similar anomalies are expected further north in regions of the Salavan Province in southern **Laos**.
- **Indonesia**, throughout central coastal regions of the Riau Province in Sumatra, as well as northwestern regions of Kalimantan and Sarawak.
- Central to eastern **Papua**, throughout regions near the Lorentz National Park, continuing east through the Sibil region into western to central regions of **Papua New Guinea**, near the April Salome Forest Management Area.

Moderate to severe deficits are anticipated in:

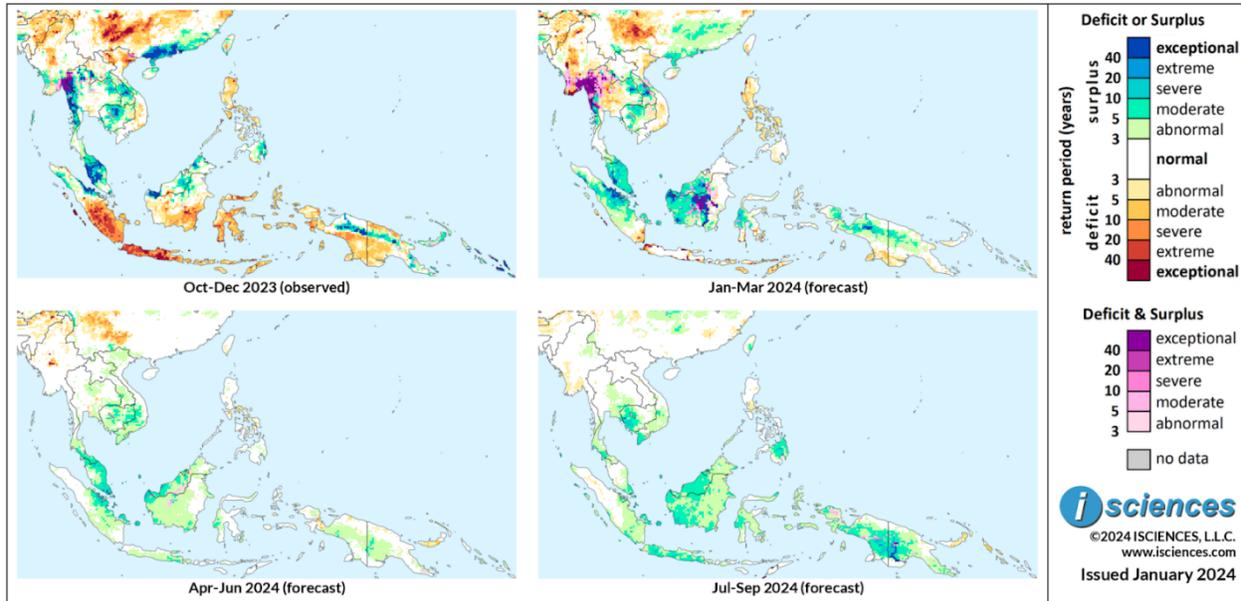
- **Indonesia**, in the southern to southwestern regions of Sumatra.



Based on observed data through December 2023 and forecasts through September 2024

The map on top depicts long-term deficit and surplus anomalies as of December 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of September 2024.

**ISciences Water Anomalies Forecast
Southeast Asia: October 2023 - September 2024**



Based on observed data through December 2023 and forecasts through September 2024

The forecast through March 2024 anticipates intense surplus to expand in eastern coastal regions of Sumatra and northwestern to central Kalimantan. Severe to extreme surplus is expected to persist in Peninsular Malaysia, as well as severe surplus in central Papua. Isolated regions of severe to extreme deficits are expected in eastern Thailand and southern Laos.

From April through June 2024, most regions are expected to observe near-normal conditions, as well as some moderate to severe surplus anomalies in Peninsular Malaysia, northwestern Kalimantan, eastern coastal regions of Sumatra, Thailand, and Laos. Some surplus anomalies are expected to continue north from Peninsular Malaysia into southern Thailand.

The forecast for the final months – July 2024 through September 2024 – anticipates near-normal conditions and moderate to severe surpluses to persist in most regions, though exceptional surplus may emerge in southern regions of Papua New Guinea. Additionally, moderate to severe surpluses may expand in Kalimantan, Java, and Sarawak.

Please note that WSIM forecast skill declines with longer lead times.

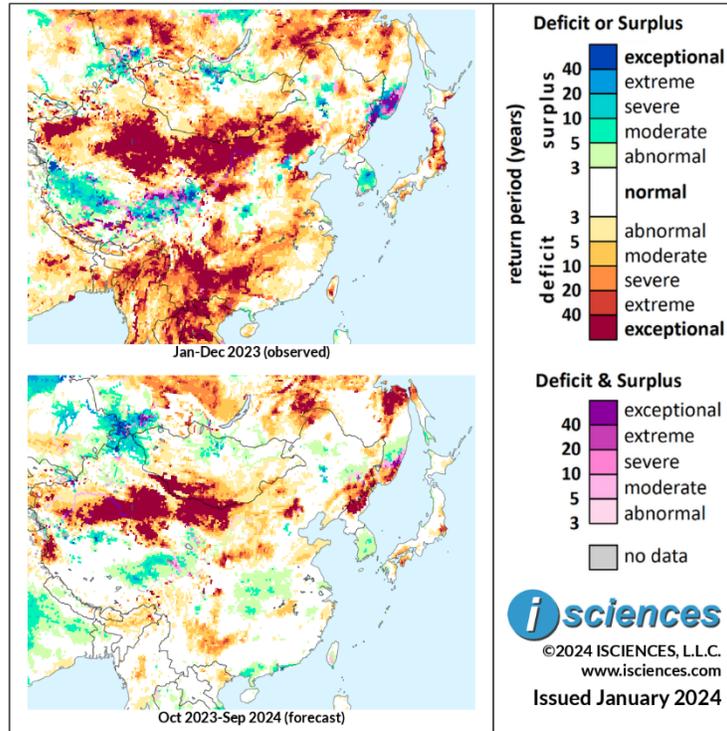
East Asia

The 12-month forecast ending in September 2024 anticipates widespread deficits to subside in southern regions of China, but remain in northern to northwestern regions.

Extreme to exceptional deficits are anticipated in:

- Northwestern **China**, throughout northern Qinghai, northern Gansu, and southeastern Xinjiang. Similarly intense deficits can be found further east in central areas of the Beijing region.
- Northern **China**, in western Inner Mongolia, in regions near the Alxa Left Banner.
- **North Korea**, throughout the country's northeastern regions.

ISciences Water Anomalies Forecast
East Asia: January 2023 - September 2024



Based on observed data through December 2023 and forecasts through September 2024

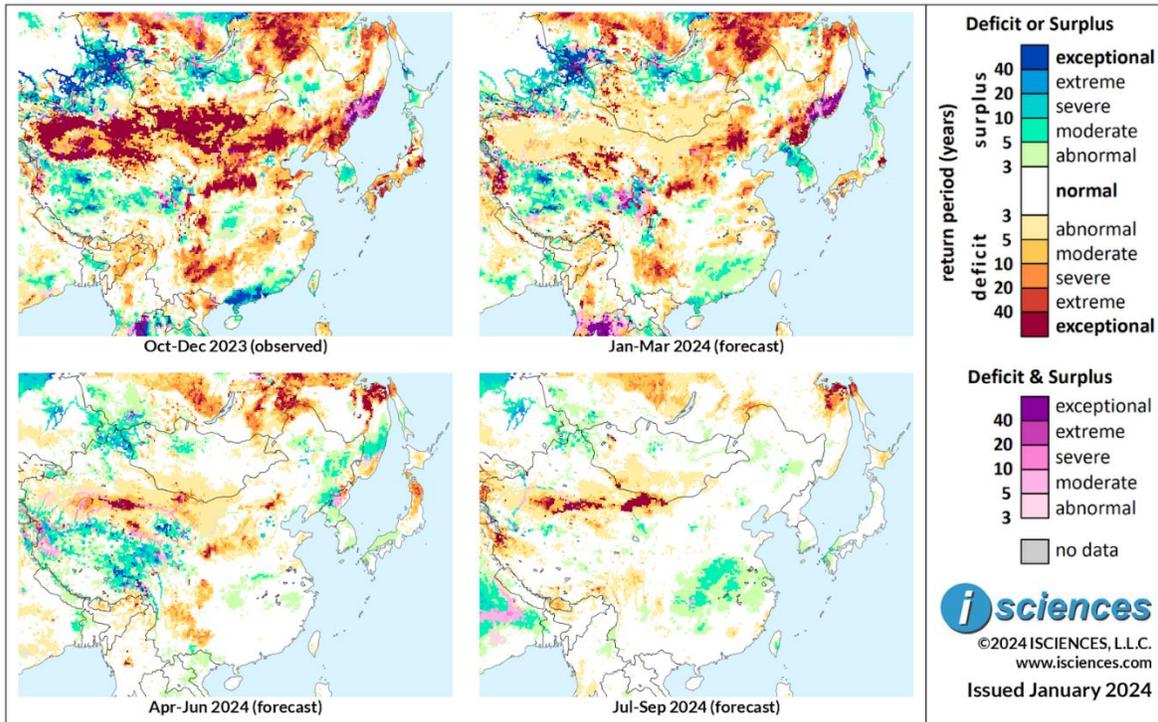
The map on top depicts long-term deficit and surplus anomalies as of December 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of September 2024.

Severe to exceptional surpluses are expected in the following regions:

- Southeastern **China**, in the east-central regions of Tibet, near the city of Nagqu.

The 3-month maps (below) show the evolving conditions in more detail.

ISciences Water Anomalies Forecast East Asia: October 2023 - September 2024



Based on observed data through December 2023 and forecasts through September 2024

The forecast through March 2024 indicates that exceptional deficits will notably decrease in size and severity in northern areas of China, though will continue in central areas of Inner Mongolia, southern Xinjiang, and portions of the Jilin region. Northernmost regions of North Korea can anticipate exceptional deficits to continue, as well as some transitional conditions further northwest in Heilongjiang. Surplus is expected to persist in southeastern China, throughout Tibet, as well as in central regions of North Korea.

From April through June 2024, surpluses of varying intensity are expected to spread further throughout Tibet, as well as further east in the provinces of Fujian and Guangdong. Deficits are expected to persist in northern areas of Shaanxi and near the city of Beijing. The majority of the rest of the country can anticipate near-normal conditions.

The forecast for the final months – July 2024 through September 2024 – anticipates near-normal conditions throughout much of China, though some deficits are expected to arise in northwestern and westernmost China.

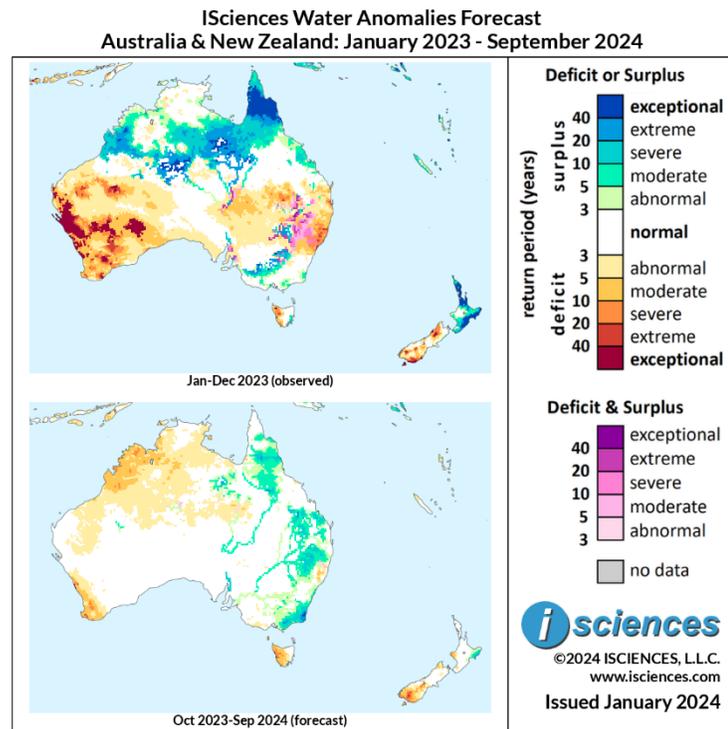
Please note that WSIM forecast skill declines with longer lead times.

Australia and New Zealand

The 12-month forecast ending in September 2024 anticipates that the most intense anomalies to resolve throughout most of Australia and New Zealand, though moderate to severe surpluses are expected to occur in eastern provinces of Australia.

Moderate to severe surpluses are expected in the following regions:

- Central and southeast **Queensland**, throughout the shire of Etheridge, the Tablelands region, and the Longreach Region.
- Northeast **New South Wales**, in northeastern areas of the New England region.
- Southern and eastern **Victoria**, in regions south of the Alpine National Park, as well as eastern coastal regions near the Bemm River.



Based on observed data through December 2023 and forecasts through September 2024

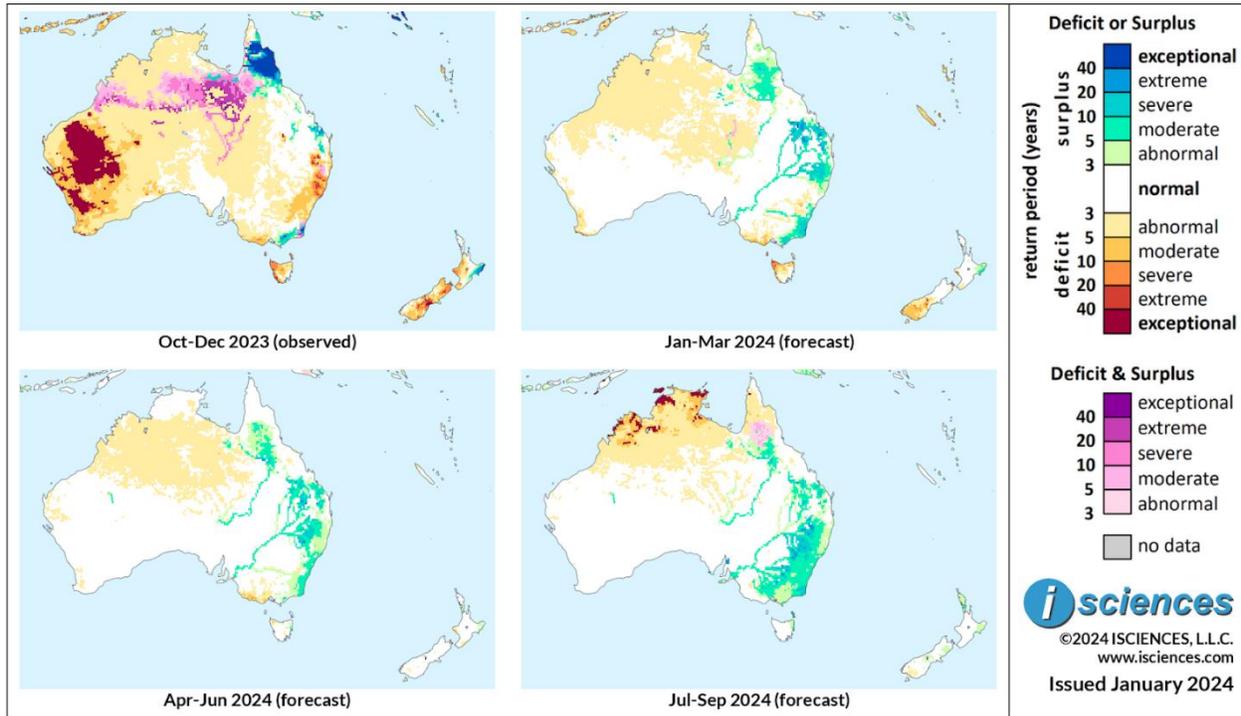
The map on top depicts long-term deficit and surplus anomalies as of December 2023, while the map on the bottom depicts a forecast of long-term deficit and surpluses as of September 2024.

Moderate to severe deficits are anticipated in:

- Northern **Western Australia**, in northern coastal regions of the Kimberley region.
- Western **Tanzania**, covering most of the region.
- Southern **New Zealand**, in the southernmost regions of South Island, near the town of Winton.

The 3-month maps (below) show the evolving conditions in more detail.

ISciences Water Anomalies Forecast Australia & New Zealand: October 2023 - September 2024



Based on observed data through December 2023 and forecasts through September 2024

The forecast through March 2024 anticipates moderate to severe surpluses to emerge in central Queensland, northeastern to eastern New South Wales, and southeastern coastal regions of Victoria. Outside of Australia, northwestern portions of Tanzania and southernmost regions of New Zealand’s South Island can anticipate moderate to severe deficits.

From April through June 2024, near normal conditions are expected to continue throughout the entirety of New Zealand and most of Australia. Surplus anomalies are expected to continue in south-central Queensland, northeastern New South Wales, and southern to southeastern coastal regions of Australia.

The forecast for the final months – July 2024 through September 2024 – indicates that moderate to severe surpluses are expected to expand in southwestern Australia, particularly in Victoria and New South Wales. Similar surpluses in Queensland are expected to shrink but remain. In northern Western Australia and Northern Territory, pockets of exceptional deficits are expected to emerge across the territories’ northern coasts.

Please note that WSIM forecast skill declines with longer lead times.