

Global Water Monitor & Forecast Watch List

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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 1-9 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 is 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 April 2018 and an ensemble of forecasts issued the last week of April 2018. 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.

All maps have half-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 in a given month. 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 anomaly. For example, a return period of 10 years indicates an anomaly that would occur, on average, once every ten years. Higher return periods indicate more extreme and, therefore, more disruptive anomalies. 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. Return period is computed by comparison to cell-specific distributions of data from 1950 through 2009.

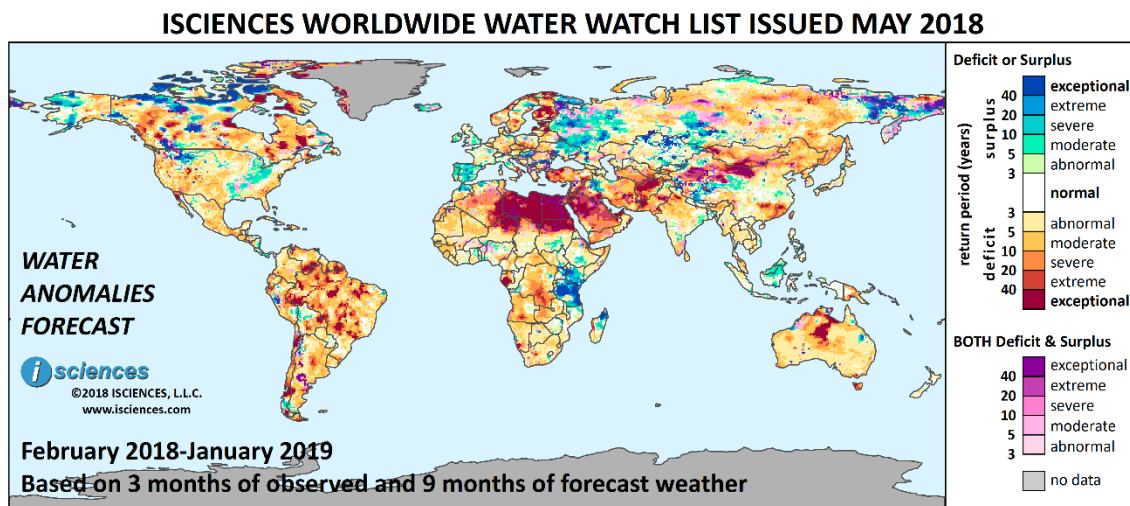
Please note that the WSIM model makes use of seasonal temperature and precipitation forecasts produced by the U.S. National Oceanic and Atmospheric Administration (NOAA) Climate Forecast System Version 2 (CFSv2). These forecasts predict broad temperature and precipitation patterns, but do not effectively predict singular events such as tropical storms. Detailed outlooks and analyses of tropical storms are available from 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 judgement on the legal status of any territory, or any endorsement or acceptance of disputed boundaries on the part of ISciences or our data providers.

The user assumes the entire risk related to user's use of information in ISCIENCES, L.L.C. Global Water Monitor & Forecast: Watch List, including information derived from Water Security Indicators Model (WSIM). This information may include forecasts, projections and other predictive statements that represent ISCIENCES, L.L.C.'s assumptions and expectations in light of currently available information and using the highest professional standards. Actual results may differ from those projected. Consequently, no guarantee is presented or implied as to the accuracy of specific forecasts, projections or predictive statements contained herein. ISCIENCES, L.L.C. provides such information "as is," and disclaims any and all warranties, whether express or implied, including (without limitation) any implied warranties of merchantability or fitness for a particular purpose. In no event will ISCIENCES, L.L.C. be liable to you or to any third party for any direct, indirect, incidental, consequential, special or exemplary damages or lost profit resulting from any use or misuse of this data.

Worldwide Water Watch List

This map presents a selection of regions likely to encounter significant water anomalies during the one year period beginning in February 2018 and running through January 2019 using 3 months of observed temperature and precipitation data and 9 months of forecast data.



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 water surpluses in the Ohio River Valley and the Lower Mississippi Basin will retreat considerably. Surpluses in western Montana and northern Idaho will remain intense. Exceptional deficits will persist in Utah and increase in southwest Colorado, but deficits in surrounding states will moderate. On the East Coast deficits will retreat, except in South Carolina and Georgia. Southern Florida will transition from deficit to surplus. Moderate deficits are forecast for Nebraska, eastern North Dakota, Minnesota, and northern Wisconsin.

Canada: Two transitions stand out in the near-term forecast: a change from water surplus to deficit in northern Quebec, and the emergence of widespread, exceptional surpluses in southeastern British Columbia. Deficits will diminish overall but are forecast along Ontario’s eastern border; in northeastern Manitoba and north of Lake Winnipeg; in northwest Alberta and north and west of Edmonton; around Prince George, BC, and in northwest BC. Surpluses will emerge in eastern Quebec near the mouth of the St. Lawrence River, and will increase along the northern border of Alberta and Saskatchewan.

Mexico, Central America, and the Caribbean: In the next few months water deficits in Baja will downgrade somewhat. Moderate deficits are forecast for Chihuahua, Coahuila, Tamaulipas, central Mexico, and along the Gulf from Veracruz into Yucatan. Surpluses in Central America will shrink

considerably. Intense surpluses are forecast for Jamaica; deficits are forecast for Haiti and Dominican Republic. After July, intense deficits will emerge in southern Mexico and northern Central America.

South America: Water deficits will diminish somewhat in South America over the next several months, but large pockets of exceptional deficit are forecast for Brazil in Acre, Rondônia, Pará, Maranhão, Tocantín, Goiás, western Minas Gerais, northern Mato Grosso do Sul, and São Paulo. Intense deficits are also forecast for: southeastern Venezuela; southernmost Ecuador; along a path from Lima, Peru through northern Chile; southern Bolivia; and Tierra del Fuego. Deficits in the Argentine Pampas will downgrade but remain severe.

Europe: Water surpluses will retreat in Central Europe and the Balkans as deficits emerge. Deficits are also forecast for Northern Europe with exceptional deficits in Finland, Estonia, and Latvia. Intense surpluses are forecast for Hungary and for eastern Ukraine into Russia, with both deficits and surpluses in European Russia. Surpluses will persist on the Iberian Peninsula but retreat in France, with deficits emerging in Auvergne. Moderate surpluses will persist in Ireland, England, and Normandy.

Africa: The forecast through July indicates that exceptional water deficits across northern Africa will diminish, but intense deficits will persist in Libya, Niger, Egypt, and Sudan. Deficits will downgrade in Gabon and southern DRC but remain severe. Deficits will persist in western Zambia and are expected to be extreme on the Kafue River. Relatively mild deficits are forecast for southern Africa. Intense surpluses will persist in Tanzania, Kenya, northern Uganda, and northern Madagascar.

Middle East: Over the next few months exceptional water deficits will diminish overall in the region but persist in southern Iraq, Kuwait, northern Saudi Arabia, and Iran near the Strait of Hormuz. Deficits will spread in Turkey, and intense deficits will emerge in Gaza, Israel, West Bank, and Lebanon. After July, deficits in Turkey will moderate overall, but deficits of varying severity are forecast for many parts of the region and are expected to be especially intense in Saudi Arabia, southern Iraq, Kuwait, Qatar, United Arab Emirates, southern Iran, and West Bank.

Central Asia and Russia: Through July, water surpluses will shrink in European Russia. The Lower Ob will transition from surplus to mild deficit, moderate to exceptional deficits will develop in the Middle Ob region, and surpluses in the Upper Ob region will downgrade. Surpluses will downgrade in the Tom River Basin, upgrade on the Ishim River, and persist on the Irtysh. Intense surpluses are forecast for northern Kazakhstan. Deficits are forecast for Turkmenistan, eastern Uzbekistan, southern Kyrgyzstan, and Tajikistan, and may be severe along the Amu Darya and Zaravshan Rivers.

South Asia: Exceptional water deficits will remain widespread in Afghanistan, while decreasing slightly. Deficits in Pakistan will generally moderate. India will transition from widespread water deficits to milder conditions. However, exceptional deficits are forecast surrounding Chandigarh, moderate deficits in Rajasthan, and intense deficits in the Far Northeast. Surpluses are expected in Jammu and Kashmir, northern Odisha, West Bengal, and along the Tapi River. Intense surpluses are forecast for the Gandaki River in Nepal. Moderate to extreme surpluses are forecast for northern Bangladesh.

Southeast Asia and the Pacific: The forecast indicates a transition away from water surplus to deficit. Moderate deficits are forecast for northern Cambodia, southern Vietnam, northern Luzon, and pockets of Sumatra and Java. More intense deficits are forecast for peninsular Thailand and Malaysia, eastern Papua New Guinea, western Timor Leste, and West Nusa Tenggara. Surpluses are expected in north-central Vietnam, northern Borneo, northern Sumatra, central Philippines, North Sulawesi, East Nusa Tenggara, and Pulau Sumba.

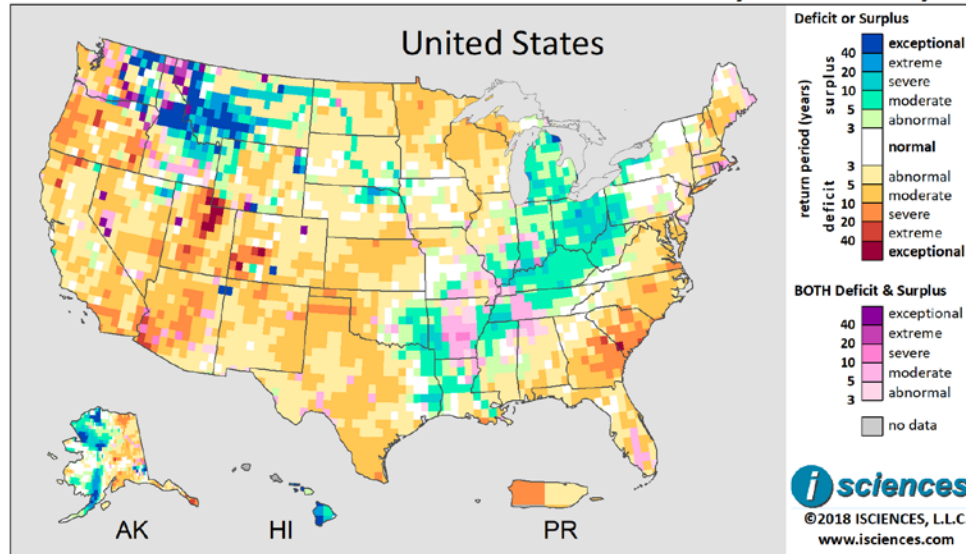
East Asia: The extent of exceptional water deficits in Mongolia, Inner Mongolia, and Xinjiang will diminish considerably though widespread deficits of varying severity are expected. Moderate to severe deficits will increase in Northeast China. Moderate surpluses are forecast for much of the Yellow River. Exceptional surpluses in eastern Qinghai will begin to moderate, and surpluses in the Yangtze River Basin will diminish and downgrade. Though exceptional deficits will shrink in Southeast China, intense deficits are forecast. Deficits will downgrade in North Korea and moderate surpluses will expand in South Korea.

Australia: Exceptional water deficits that have dominated southern Australia are expected to disappear, but deficits are forecast for northern Australia, the southwest, the southeast, and Tasmania. These deficits may be intense in Tasmania and in pockets of other aforementioned areas. Moderate deficits are expected along the Darling, Lachlan, and Macquarie Rivers in New South Wales. Surpluses will shrink but persist in the Mackenzie River region of Queensland and in southwest Kimberley region of Western Australia.

Watch List: Regional Details

United States

ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

The 12-month forecast indicates deficits in the US West, Southwest, Southern Plains States, and South Atlantic States. Deficits are expected to reach exceptional intensity – a return period of over 40 years – in pockets of northeastern Utah and southwestern Colorado, with deficits of varying severity in Oregon, California, Nevada, and New Mexico. Primarily moderate deficits are forecast for Kansas, western Oklahoma, and Texas, though conditions may be severe the Panhandles of Texas and Oklahoma. In the East, deficits will be severe in South Carolina and eastern Georgia. Areas of moderate deficit also include northeastern North Dakota through the western half of Michigan’s Upper Peninsula, and Maryland, Delaware, and southern Maine.

Moderate to severe surpluses are forecast along the Missouri and Yellowstone Rivers leading to a block of extreme to exceptional surpluses in western Montana and central Idaho. Pockets of surplus are also forecast for eastern Washington. Moderate to severe surpluses are expected in Michigan’s Lower Peninsula, the Ohio River Valley, and in parts of the Lower Mississippi where conditions of both deficit and surplus may appear as transitions occur. Moderate to severe surpluses are also forecast in a broad path along the borders of Oklahoma and Arkansas, and Texas into Louisiana.

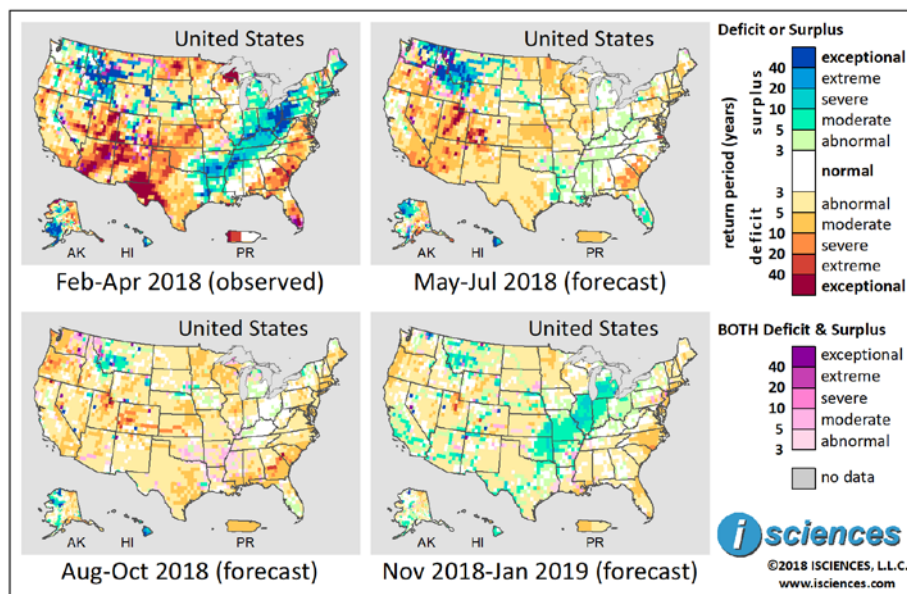
Outside the contiguous US surpluses are forecast for northwestern Alaska and the northern half of the Alaskan Peninsula trailing well into the interior; deficits are forecast in patches of the eastern half of the state. Intense surpluses are forecast for Hawaii, and severe deficits are expected in western Puerto Rico.

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

The near-term forecast through July indicates that widespread surpluses stretching from Michigan's Lower Peninsula through the Ohio River Valley and the Lower Mississippi Basin will retreat considerably, leaving nearly normal conditions. Surpluses will persist on the Missouri and Yellowstone Rivers, and surpluses reaching exceptional intensity will persist in western Montana, northern Idaho, northwestern Wyoming, and into eastern Washington.

Deficits observed in prior months are expected to downgrade. In the East, deficits in the South Atlantic states will retreat, though moderate to severe deficits remain in the forecast for eastern South Carolina and southern Georgia. Southern Florida will transition from deficit to moderate surplus. In the West, much of California's northern half will transition to relatively normal conditions; moderate to severe deficits are forecast for the state's southern half. Deficits will increase in Oregon, though primarily of moderate intensity. Exceptional deficits will persist in Utah from the northeast through the southwest, and will emerge in greater extent in southwest Colorado, but deficits in surrounding states will moderate, leaving some isolated pockets of intense deficit. Moderate deficits are forecast for Nebraska, eastern North Dakota, Minnesota, northern Wisconsin, and pockets of other Upper Mississippi Basin states. The US Northeast will transition from surplus to normal conditions with some moderate deficits.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

From August through October water anomalies are expected to downgrade overall. Moderate to severe deficits are forecast along the Arkansas and Colorado Rivers and in western Colorado and northern Utah, with some isolated pockets of greater intensity. Moderate to severe deficits are also forecast for western Oregon and western Washington. In the East, deficits in South Carolina and southern Georgia will downgrade to primarily moderate intensity though some pockets of extreme deficit will emerge. Conditions of moderate deficit are forecast for Minnesota and Wisconsin. Prior surpluses along the Missouri and Yellowstone Rivers will return to normal conditions. In western Montana surpluses will

downgrade to primarily moderate; Idaho and eastern Washington will transition from surplus to relatively normal conditions.

The forecast for the final months – November through January – indicates the emergence of widespread moderate to severe surpluses from Michigan’s Lower Peninsula southwest through Indiana, Illinois, Missouri, eastern Kansas, Oklahoma, and northern Arkansas.

(It should be noted that forecast skill declines with longer lead times.)

Canada

The 12-month outlook for Canada through January 2019 (right) indicates water deficits of varying intensity in many parts of the country, with the exception of southeastern British Columbia and the northern border shared by Alberta and Saskatchewan, where intense surpluses are expected.

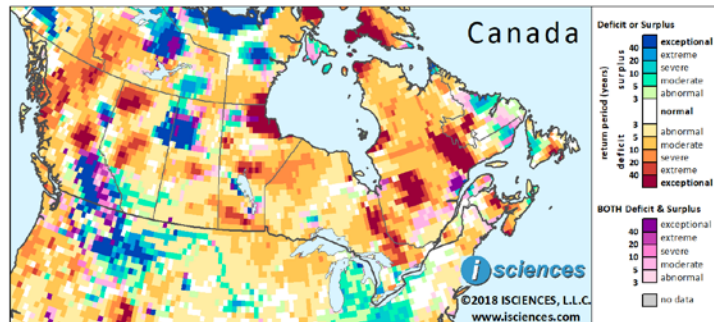
Deficits are forecast to be intense in: a large block of eastern Quebec from the Caniapiscau Reservoir to the St.

Lawrence River, and around Lake Mistassini in central Quebec; Ontario's eastern border; and northeastern Manitoba, north of Lake Winnipeg, and southern Manitoba. In the West, significant deficits are forecast for central Alberta north and west of Edmonton, northwestern Alberta, a large pocket in British Columbia surrounding Prince George, and northern BC.

Surplus conditions are expected in a large block of northwestern Saskatchewan around Churchill Lake westward to Fort McMurray, Alberta; and surrounding Kamloops and Kelowna, BC.

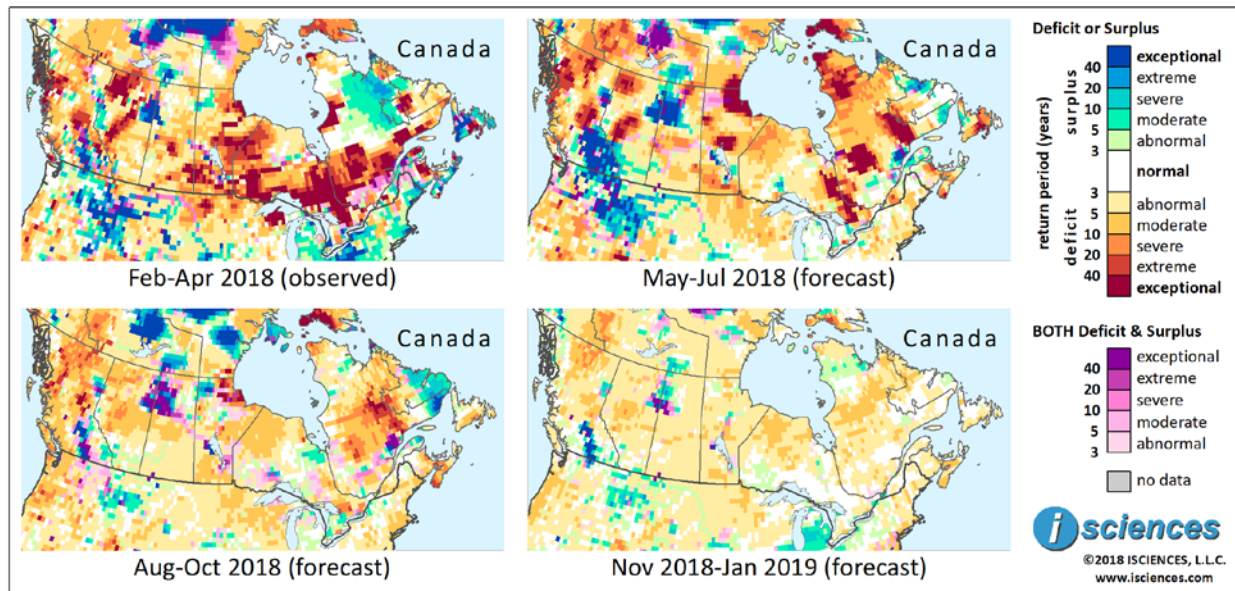
The 3-month maps (below) show the evolving conditions in more detail.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

Two noticeable transitions stand out in the near-term forecast through July: a change from surplus to deficit in northern Quebec, and the widespread emergence of exceptional surplus in southeastern British Columbia. Though deficits are forecast for much of Quebec, southeastern Quebec near the mouth of the St. Lawrence River is expected to transition from deficit to exceptional surplus. Deficits in Ontario will diminish considerably but will persist along the eastern border with exceptional intensity. Exceptional deficits will increase in northeastern Manitoba on Hudson Bay and in a large pocket north of Lake Winnipeg; deficits in the south will be severe.

Moving west, exceptional surplus conditions will increase from Churchill Lake, Saskatchewan to Fort McMurray, Alberta. Deficits of varying intensity are forecast for the remainder of Saskatchewan and large pockets of intense deficits are expected in Alberta north and west of Edmonton, and also in the far northwest corner of the province. Moderate to severe surpluses will emerge in southern Alberta along the South Saskatchewan River. In British Columbia, as previously mentioned, a large block of exceptional surplus is forecast in the southeast surrounding Kelowna and leading north well past Kamloops. Surpluses are also forecast in northeastern BC around Fort St. John; large pockets of severe to exceptional deficits are expected surrounding Prince George and in the northwest.

From August through October, surpluses are forecast in easternmost Labrador and directly south in easternmost Quebec. Deficits will shrink overall in Quebec but deficits of varying severity are forecast stretching from west of Lake Mistassini eastward into Labrador, and may be intense around the Caniapiscau Reservoir. Aforementioned anomalies elsewhere across the country will diminish. Some intense deficits will persist in northeastern Manitoba around Hudson Bay, deficits of varying severity will persist in northern BC, and surpluses in northern Saskatchewan and southern BC will begin to transition to both surplus and deficit.

The forecast for the final three months – November through January – indicates a significant downgrade in anomalies nationwide.

(It should be noted that forecast skill declines with longer lead times.)

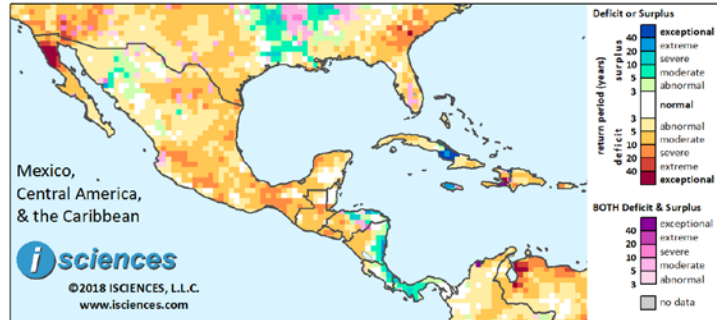
Mexico, Central America, and the Caribbean

The 12-month forecast ending January 2019 (right) indicates moderate to severe deficits in many parts of Mexico with exceptional deficits in northern Baja. Some surpluses are forecast along rivers in central and eastern Sonora. Primarily moderate deficits are forecast for Guatemala, El Salvador, western Honduras, western Nicaragua, and Hispaniola.

Surpluses are forecast for eastern Honduras, eastern Nicaragua, eastern Costa Rica, western Panama, Jamaica, and central Cuba.

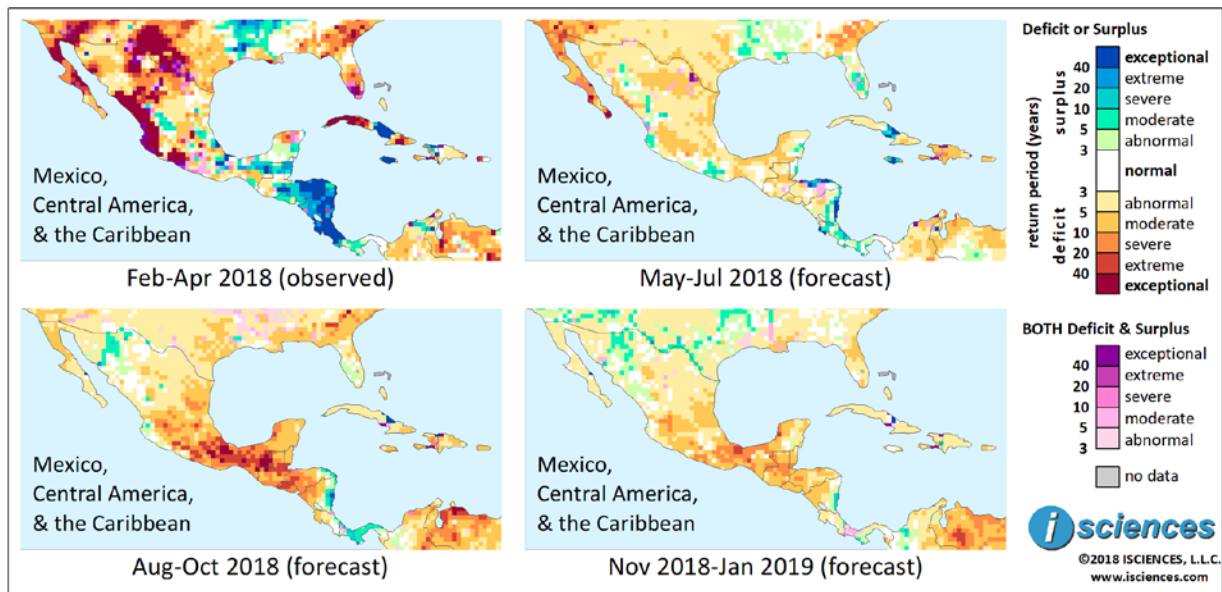
The 3-month maps (below) show the evolving conditions in more detail.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

In the next few months some pockets of intense deficits will emerge in southern Baja while deficits in the remainder of the Peninsula downgrade somewhat to severe. Across the Gulf of California moderate deficits are forecast along the coast of the mainland, in the north-central states of Chihuahua and Coahuila, in Tamaulipas in the east, in central Mexico from Jalisco to Michoacán encompassing Lago de Chapala, and along the Gulf of Mexico from Veracruz into Yucatan. Moderate surpluses are forecast in

southwestern Chihuahua, central Durango, near Puerto Vallarta, western Oaxaca, and eastern Quintana Roo.

Surpluses in Central America will shrink considerably but persist in northern Honduras, eastern Nicaragua, Costa Rica, and western Panama. Some moderate deficits are forecast for Guatemala and El Salvador. In the Caribbean, intense surplus conditions are forecast for Jamaica and central Cuba. Moderate to severe deficits are forecast for Haiti and Dominican Republic.

From August through October, deficits in Baja will nearly disappear, though moderate deficits will persist in the north. Moderate surpluses may emerge along the Rios Yaqui, Bavispe, and Batepito in Sonora, with nearly normal conditions in much of the rest of northern Mexico. Moderate to severe deficits are forecast in Nuevo Leon and Tamaulipas, becoming more intense in central and southern Mexico, particularly in Veracruz, Puebla, and Chiapas. Moderate to extreme deficits are forecast for Guatemala, El Salvador, western Honduras, and western Nicaragua. Surpluses are expected along Honduras' easternmost coast, in southeastern Nicaragua, and in much of Panama. Some moderate deficits are forecast for Jamaica, Haiti, and Dominican Republic.

The forecast for the final three months – November through January – indicates that deficits in the region will downgrade somewhat; surpluses will persist in Sonora and emerge along the Rio Grande.

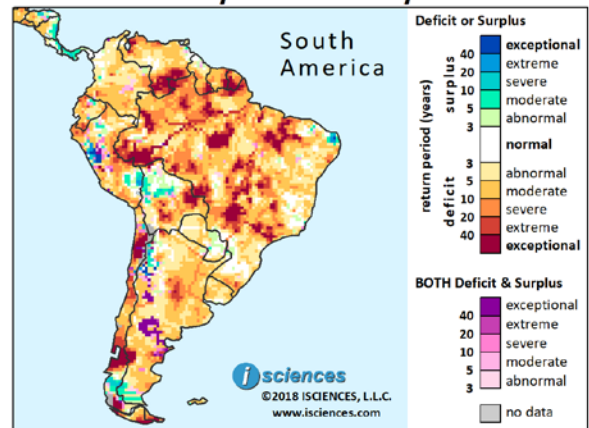
(It should be noted that forecast skill declines with longer lead times.)

South America

The 12-month forecast through January 2019 indicates water deficits of varying severity for much of the continent, with large pockets of exceptional deficit in Brazil, including the states of Amapá, Pará, Maranhão, Acre, northeastern Mato Grosso do Sul, and São Paulo. Intense deficits are also forecast for southern Venezuela, southern Guyana, Suriname, French Guiana, the Argentine Pampas, Chile, and along many rivers.

Surpluses are expected in Huánuco Region in central Peru, Peru's border with Bolivia and into central Bolivia, in Brazil's easternmost tip, and in Patagonia surrounding O'Higgins/San Martín Lake.

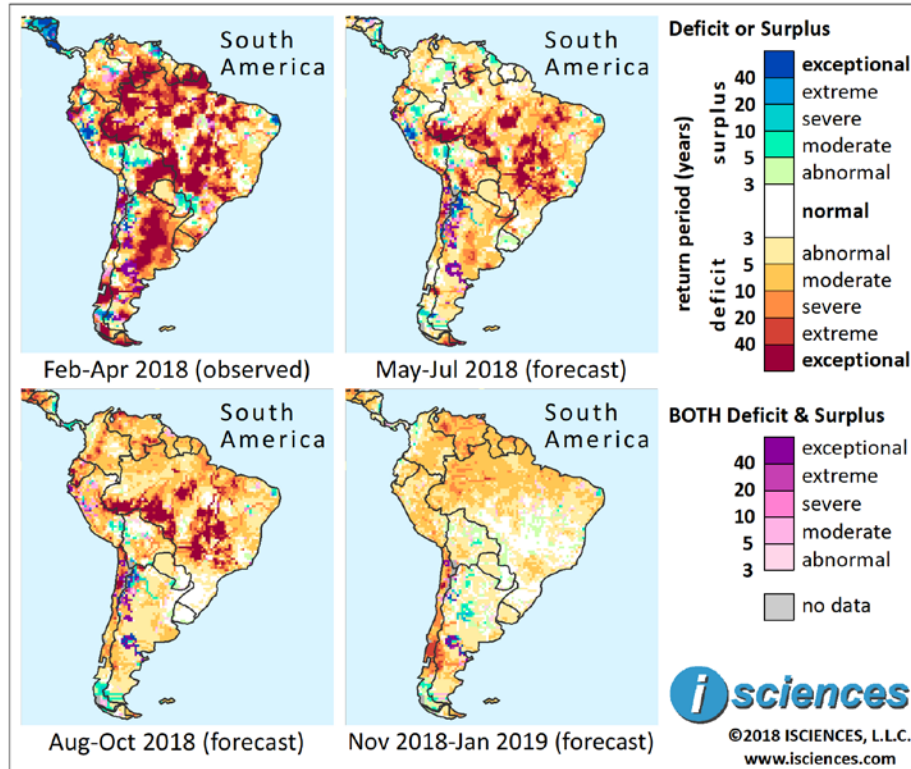
ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

The 3-month maps (below) for the same 12-month period show the evolving conditions in greater detail.

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Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

Though the extent of exceptional deficit is forecast to diminish in South America over the next several months, large pockets of intense deficit are forecast for Brazil in Acre, Rondônia, Pará, Maranhão, Tocantín, Goiás, western Minas Gerais, northern Mato Grosso do Sul, and São Paulo. Deficits are also expected to be intense along many rivers. Intense deficits are also forecast for southeastern Venezuela; southernmost Ecuador; along a narrow path from Lima, Peru through northern Chile; southern Bolivia; the Río Paraná in Paraguay; and Tierra del Fuego. Severe to extreme deficits are forecast in Córdoba, La Pampa, and southeastern Buenos Aires Provinces, Argentina. Uruguay will transition from deficit to mild surplus.

Intense surpluses will persist in Peru's Huánuco Region and moderate surpluses in Loreto. Primarily moderate surpluses are forecast for northern Guyana, Brazil's easternmost tip and southern Espírito Santo, the border between Peru and Bolivia, northwestern Argentina and along the Río Salado, and surrounding O'Higgins/ San Martín Lake in Patagonia.

From August through September moderate to severe deficits are forecast across the northern bulk of the continent, and large pockets of exceptional deficit are expected to persist in many of the aforementioned states of Brazil and in northern Chile. Deficits in the Argentine Pampas will downgrade.

Surpluses in Peru's Huánuco Region will transition to both deficit and surplus, and surpluses in eastern Río Grande do Norte, Brazil will downgrade. Surpluses of varying severity are forecast for southeastern Peru into Bolivia; northwestern Argentina and the Río Salado in northeastern Argentina; between the Ríos Colorado and Neuquén in southern Argentina; and surrounding O'Higgins/ San Martín Lake in Patagonia.

In the final quarter – November through January – deficits will moderate overall and much of southern Brazil will transition to near-normal conditions, but extreme deficits will emerge in Los Ríos Region in southern Chile.

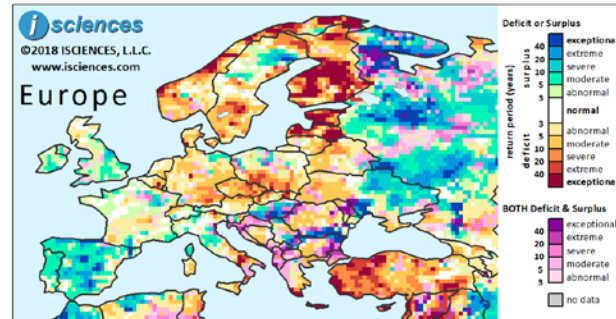
(It should be noted that forecast skill declines with longer lead times.)

Europe

The 12-month forecast indicates exceptional water deficits in Finland, Estonia, Latvia, Crete, and a band across southern Italy south of Naples. Deficits of varying severity are expected in parts of Norway, southern Sweden, and much of Central and Eastern Europe.

Surpluses are forecast for European Russia, eastern Ukraine, Hungary, southern Romania (the Danube River), the Iberian Peninsula, Ireland, England, and pockets of France and Italy.

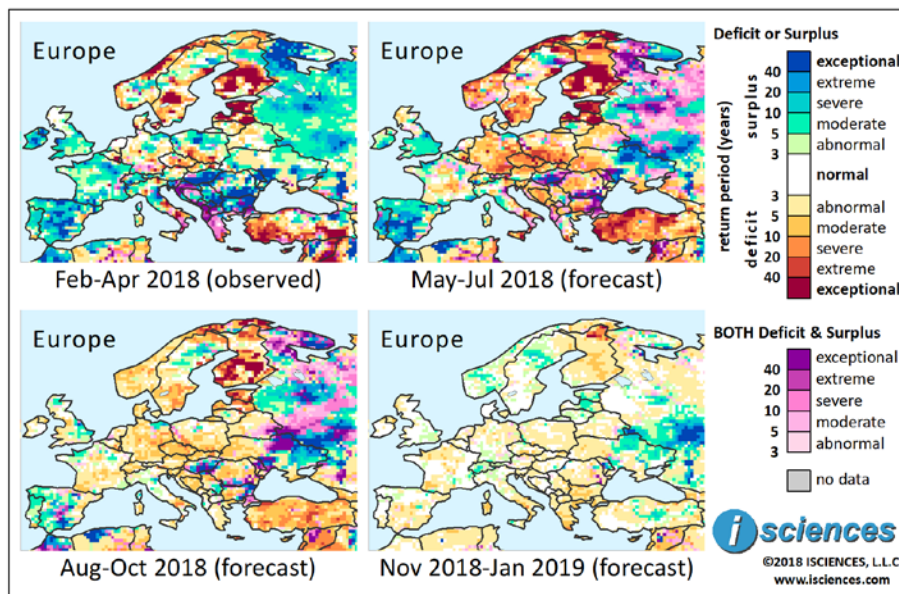
ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



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The 3-month composites (below) for the same 12-month time period show the evolving conditions.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

The forecast for May through July indicates that surpluses will retreat in Central Europe as moderate to extreme deficits emerge. Deficits will increase in Northern Europe as well, with exceptional deficits forecast for Finland, Estonia, and Latvia, and severe to exceptional deficits persisting in coastal Norway and increasing in southern Sweden. Deficits are also forecast for western Ukraine, Belarus, and the Balkans, where both deficits and surpluses will appear as transitions occur. Intense surpluses are forecast for northern and eastern Ukraine and into Russia, along with both deficits and surpluses in much of European Russia. Similarly, surpluses will remain intense in Hungary but conditions will begin to

transition. Surpluses are forecast to persist with some intensity on the Iberian Peninsula but will retreat in France, with deficits emerging in Auvergne. Moderate surpluses will persist in Ireland, England, and Normandy, France.

From August through October deficits are expected to moderate overall. However, deficits will remain intense in Finland, Estonia, and Latvia, decreasing somewhat. Surpluses will persist in Hungary and eastern Ukraine but both surpluses and deficits are forecast for northern Ukraine. Conditions in European Russia will be similar to the prior three months' forecast but intense surpluses will re-emerge west of the Rybinsk Reservoir. Surpluses will retreat considerably in the UK and will diminish on the Iberian Peninsula.

The forecast for the remaining months – November through January – indicates nearly normal conditions in Europe with surpluses in eastern Ukraine and in Russia between the Don and Volga Rivers.

(It should be noted that forecast skill declines with longer lead times.)

Africa

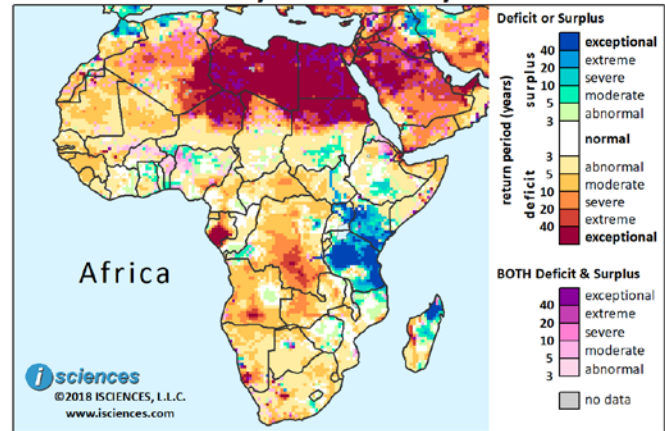
The 12-month forecast (right) indicates exceptional water deficits from southeast Algeria and northern Niger, across Libya, Egypt, and northern Sudan. Farther south, deficits of equal intensity are expected in Gabon and a pocket in southwest Namibia. Deficits nearly as intense are forecast for southern Democratic Republic of the Congo (DRC), south-central Angola, and along Madagascar's west-central coast.

Severe deficits are expected in Zambia, particularly in the west, and throughout much of Angola.

Exceptional surplus conditions are forecast for much of Tanzania and surpluses nearly as intense in Kenya, northern Uganda, and northern Madagascar. Surpluses are also forecast for: northern Morocco, the central coast of Algeria, southern Sudan, the White Nile, south-central Ethiopia, and central Madagascar.

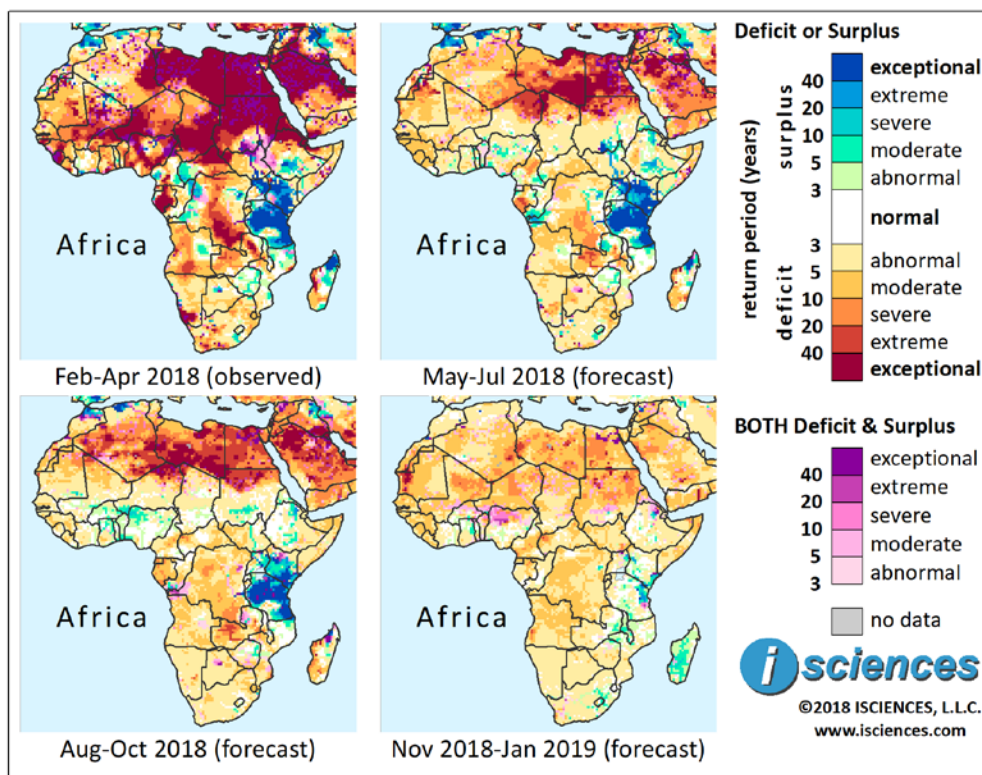
The 3-month maps (below) show the evolving conditions in greater detail.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

The forecast through July indicates that the extent of exceptional deficits across northern Africa will diminish, but severe to exceptional deficits are forecast for Libya, northern Niger, Egypt, and northern Sudan. Deficits will shrink and downgrade in Gabon but remain severe, as will deficits in southern DRC. Deficits will persist in western Zambia, and are expected to be extreme on the Kafue River; northwestern Zambia will transition from deficit to moderate surplus, but deficits will persist further east between the Chambeshi River and the borders with Malawi and Mozambique. Relatively mild deficits are forecast for southern Africa.

Exceptional surpluses will persist in Tanzania, Kenya, and northern Uganda, but will diminish somewhat in northern Madagascar. Surpluses will continue to emerge near Kinshasa in DRC but will also emerge to the west approaching the coast, and may be extreme. Extreme surpluses are also expected along the White Nile through South Sudan. Surpluses will persist in south-central Ethiopia, emerge in north-central Ethiopia, and re-emerge in south-central Sudan.

From August through October severe to exceptional deficits will continue in northern Africa, reaching farther west through Algeria and into the northern corner of Mali. Conditions across the Sahel are expected to be relatively normal, with some pockets of moderate surplus south of the Sahel in northwest Nigeria and southern Sudan. Deficits will remain extreme in western Zambia. Moderate deficits are forecast for most of DRC, with severe deficits in the southeast. Deficit in Gabon will continue

to downgrade, becoming moderate. Aforementioned surpluses in East Africa will remain intense, and surpluses in Ethiopia will diminish somewhat.

The forecast for the final quarter – November through January – indicates that deficits across northern Africa will moderate and surpluses in East Africa will retreat considerably.

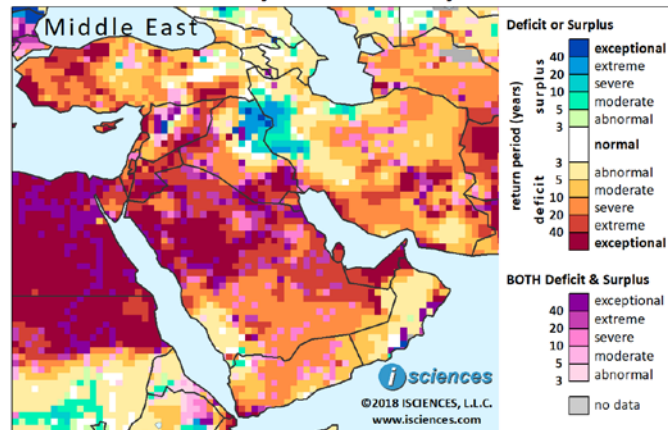
(It should be noted that forecast skill declines with longer lead times.)

Middle East

The forecast for the 12-month period ending January 2019 (right) indicates exceptional deficits in Jordan, northern Saudi Arabia, southern Iraq, and United Arab Emirates. Extreme deficits are forecast for West Bank and Qatar. Deficits will also be intense in Cyprus, western Turkey, Lebanon, Israel, Jordan, Syria, and southern Iran. Primarily severe deficits are expected in Iraq west of the Euphrates and Yemen. Generally mild deficits are forecast for Oman and Georgia.

Surplus conditions are forecast across the northern border between Iraq and Iran.

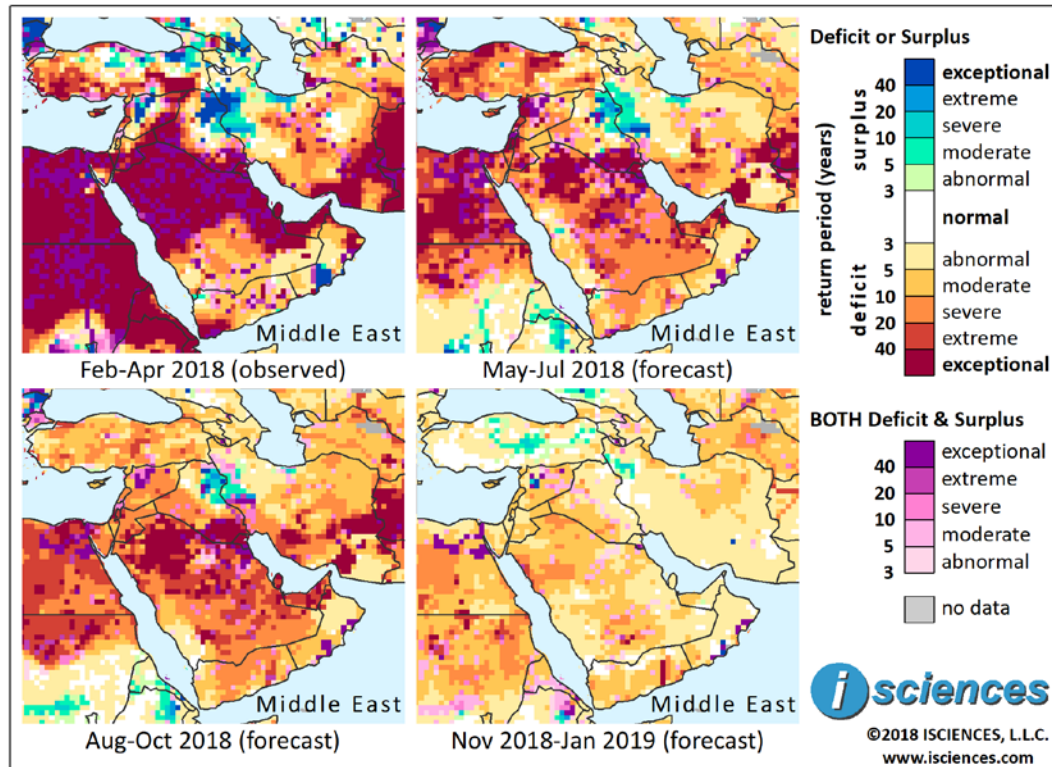
ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

The forecast for the next several months, through July, indicates that the extent of exceptional deficits in the region will diminish but deficits in Turkey will increase in extent and severity, covering much of the nation. Exceptional deficits are expected to persist in southern Iraq, Kuwait, large pockets of northern Saudi Arabia, and in southern Iran near the Strait of Hormuz. Intense deficits will emerge in Gaza, Israel, West Bank, and Lebanon. Deficits will downgrade in western Iraq. In Iran, deficits in Fars Province east of the Persian Gulf will become more intense. Surpluses along the northern border of Iraq and Iran will downgrade, and the South Caucasus will transition out of surplus, with some pockets of intense deficit in Georgia. Moderate to severe deficits are forecast for Yemen.

After July, intense deficits remain in the forecast for Saudi Arabia, southern Iraq, and Kuwait, as well as Qatar, United Arab Emirates, southern Iran, West Bank, and Israel. Deficits in Turkey will moderate overall. Primarily severe deficits are forecast for Syria, Lebanon, western Iraq, and Yemen. Mild deficits are forecast for the South Caucasus.

The forecast for the final quarter – November through January – indicates that deficits will diminish in the regional overall and some areas of surplus will emerge in central Turkey.

(It should be noted that forecast skill declines with longer lead times.)

Central Asia and Russia

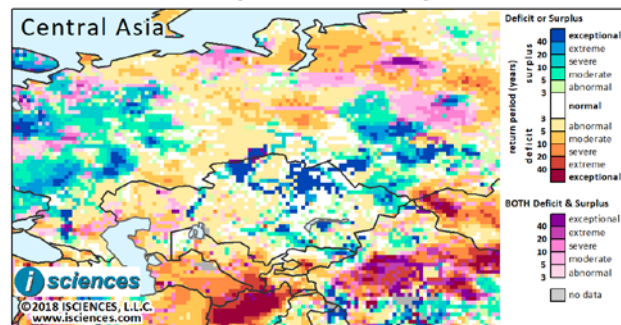
The 12-month forecast indicates intense deficits in Turkmenistan, eastern Uzbekistan, southern Kyrgyzstan, and Tajikistan. Deficits are expected to be severe along the Amu Darya River.

Surpluses reaching exceptional intensity are forecast in northern Kazakhstan and in parts of the south and eastern Kyrgyzstan. Moderate deficits are forecast along the Ural River from the Caspian Sea past Orenburg, Russia.

In European Russia surpluses are expected, with some areas of both surplus and deficit as conditions change. Moderate to severe deficit conditions are forecast for the Middle Ob River Basin, but severe surpluses are forecast along the Ishim and Irtysh Rivers to the south leading into Kazakhstan. Surpluses are also forecast for the Upper Ob region, the Vakh River Basin, and the Tom River Basin. Moderate to extreme deficits are forecast from the southern Yamal Peninsula into the Central Siberian Plateau.

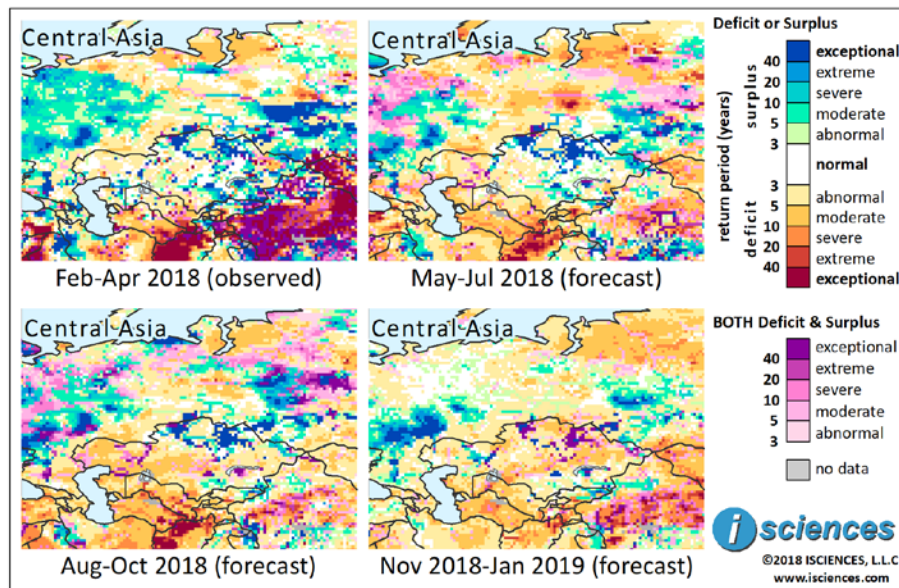
The 3-month composites (below) for the same 12-month period show the evolving conditions in more detail.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

The forecast through July in Russia indicates that surplus conditions will shrink in European Russia and transition to both deficit and surplus in the Northern European Plain. The Lower Ob will transition out of surplus to mild deficit, and moderate to exceptional deficits will develop in the Middle Ob region. Surpluses in the Upper Ob region and the Tom River Basin will downgrade somewhat; surpluses on the Ishim River will upgrade to extreme; and severe surpluses will persist on the Irtysh. Moderate to severe deficits are forecast for the Ural River around Orenburg.

In Kazakhstan, surpluses reaching exceptional intensity will continue in the north. Primarily moderate deficits are forecast for Turkmenistan, and moderate to extreme deficits in eastern Uzbekistan, southern Kyrgyzstan, and Tajikistan. Deficits are expected to be severe along the Amu Darya and Zaravshan Rivers.

From August through October, deficits on the Amu Darya and Zaravshan will upgrade to extreme. Surpluses will persist in northern Kazakhstan and moderate deficits will emerge in much of the western half of the country. In Russia, deficits near Orenburg will moderate, as will deficits in the Middle Ob. Surpluses will persist in European Russia with some areas exhibiting both surplus and deficit as conditions change. Surpluses are also expected to persist in the Lower Ob and Tom River Basins. Deficits in the Central Siberian Plateau will generally downgrade. A complicated patchwork of water conditions is forecast for the Yenisei Basin.

The forecast for the final months – November through January – shows the re-emergence of intense surplus conditions in the Lower and Middle Volga regions in Russia. Deficits are forecast to downgrade but persist in Turkmenistan and its neighbors.

(It should be noted that forecast skill declines with longer lead times.)

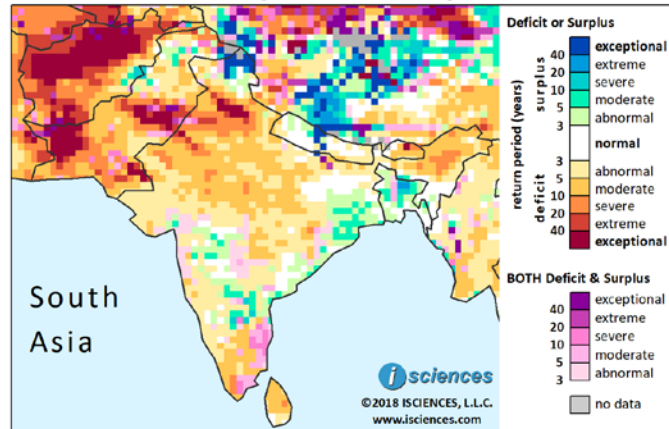
South Asia

The 12-month forecast indicates intense water deficits in much of Afghanistan with exceptional deficits blanketing half of the country north of the Helmand River. Deficits are also forecast for Pakistan and are expected to be intense in central Pakistan, western Baluchistan, and in the southeast.

In India, severe to exceptional deficits are forecast in the north spreading from Chandigarh, and severe deficits are expected in Assam in the Far Northeast. Moderate deficits are forecast for the center of the country in Madhya Pradesh reaching north into Uttar Pradesh and Rajasthan. Moderate deficits are also forecast in Tamil Nadu and Sri Lanka. Exceptional surpluses are forecast in Jammu and Kashmir; primarily moderate surpluses are forecast in the Penner River watershed and along the Bay of Bengal in Odisha and West Bengal.

Elsewhere in the region, deficits are expected in Bhutan, exceptional surpluses along the Gandaki River in Nepal, and moderate to extreme surpluses in northern Bangladesh.

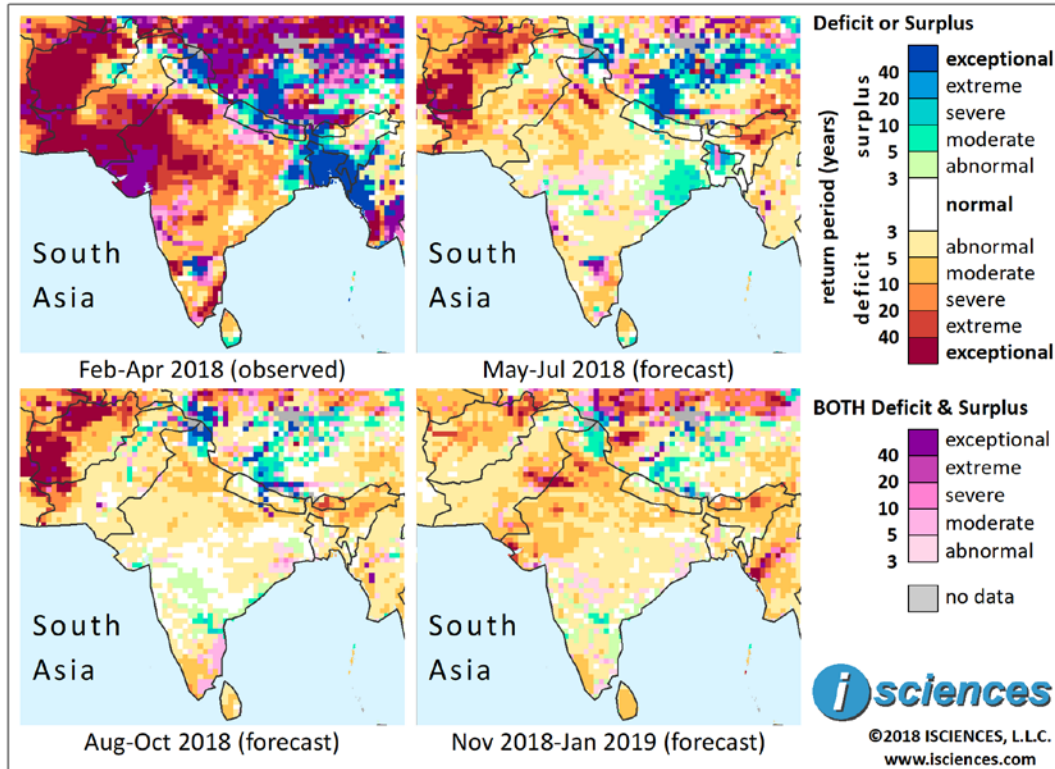
ISCIONES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

The 3-month composites (below) show the evolving conditions in greater detail.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

As is apparent in the map progression above, India is forecast to transition out of widespread deficit to milder conditions. However, exceptional deficits are forecast through July surrounding Chandigarh, with some moderate deficits trailing south through Rajasthan. Intense deficits will emerge in India's Far Northeast. Conditions of both deficit and surplus are forecast in the western Penner River watershed in Andhra Pradesh. Moderate surpluses are forecast for northern Odisha and West Bengal, and along the Tapi River in the west. Some intense surpluses are expected in Jammu and Kashmir.

Though the extent of exceptional deficits will decrease slightly in Afghanistan, deficits will remain widespread and intense. Deficits in Pakistan will generally moderate. Intense surpluses are forecast for the Gandaki River in Nepal. Moderate to extreme surpluses are forecast for northern Bangladesh.

From August through October, exceptional deficits will continue to emerge in Afghanistan, covering the south and northwest, while conditions in neighboring Pakistan are expected to be merely mild with some moderate surpluses emerging along the Indus River. Conditions in central India will be relatively normal. Moderate deficits are expected in northern Bihar, through Uttar Pradesh, and into the northern states. Surpluses are forecast for eastern Jammu and Kashmir. Moderate to severe deficits are expected in the Far Northeast. Moderate surpluses will emerge in northern Andhra Pradesh. Bangladesh will

transition to near-normal conditions, moderate to extreme deficits are forecast for Bhutan, and surpluses will persist on the Gandaki River in Nepal.

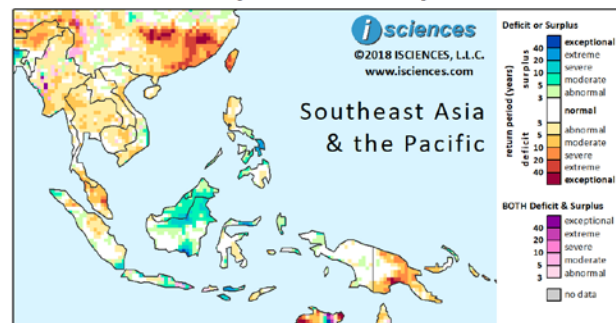
The forecast for the final period – November through January – indicates that deficits will moderate in Afghanistan and will emerge in northern and northwestern India.

(It should be noted that forecast skill declines with longer lead times.)

Southeast Asia and the Pacific

The 12-month map (right) indicates pockets of mild to moderate water deficit in Southeast Asia which may reach extreme intensity in a small pocket of eastern peninsular Malaysia. Though conditions will be normal in much of western Papua New Guinea, severe deficits are forecast elsewhere in the country and may be exceptional around the Gulf of Papua.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019

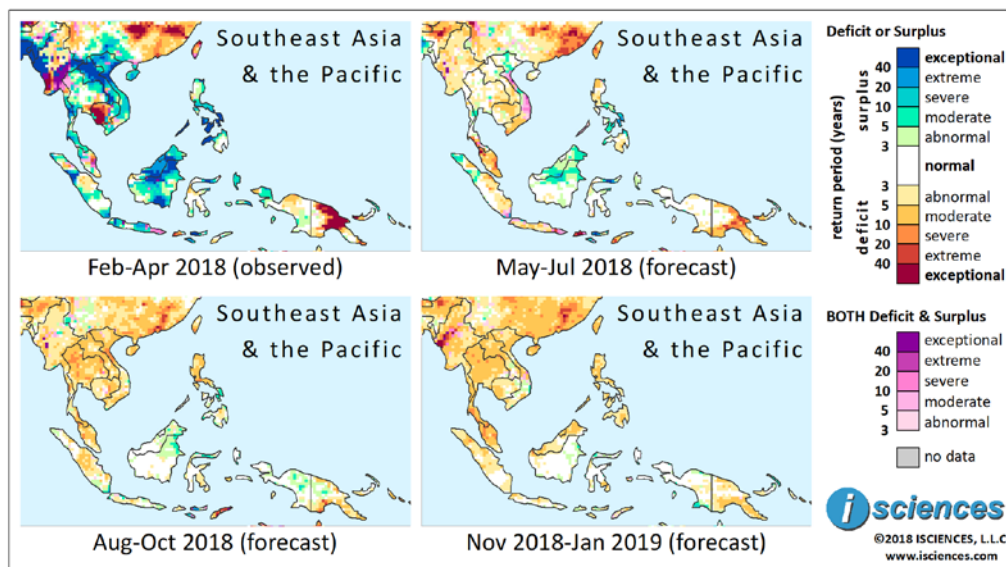


Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

Extreme surpluses are forecast for central Philippines and some moderate deficits in the north. Primarily moderate surpluses are expected across northern Borneo; surpluses are also expected in South Kalimantan and may be extreme along the coast. Extreme surpluses are forecast for North Sulawesi, East Nusa Tenggara, and Pulau Sumba. Some small pockets of moderate surplus are forecast for Sumatra's northern and southern tip, and in Java.

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

The near-term forecast through July indicates a transition away from widespread, intense surplus to deficit. Mild deficits are forecast for Myanmar; moderate deficits for northern Cambodia, southern Vietnam, northern Luzon (Philippines), and pockets of eastern Sumatra and of Java. Moderate to extreme deficits are forecast for peninsular Thailand, peninsular Malaysia, eastern Papua New Guinea, and western Timor Leste. Exceptional deficits are forecast for West Nusa Tenggara. Moderate surpluses are expected to linger in north-central Vietnam and across northern Borneo and northern Sumatra.

Extreme surpluses are forecast for central Philippines, North Sulawesi, East Nusa Tenggara and nearby Pulau Sumba.

From August through October, moderate deficits will emerge in northern Vietnam, Laos, and Thailand, with some pockets of severe deficit scattered throughout Thailand. Moderate deficits are also forecast for northern Philippines, peninsular Malaysia, and central Sumatra. Deficits will shrink in Papua New Guinea but persist along the southern coast; extreme deficits will spread in Timor Leste; and West Nusa Tenggara will transition from deficit to normal conditions. Some surpluses will persist in central Philippines, northeastern Borneo, North Sulawesi, East Nusa Tenggara and Pulau Sumba, and pockets will emerge in central Papua, Indonesia.

The forecast for the final months – November through January – indicates moderate deficits in Southeast Asia, Malaysia, the Philippines, and Papua New Guinea, with more intense deficits in western Myanmar.

(It should be noted that forecast skill declines with longer lead times.)

East Asia

The 12-month forecast for East Asia (right) indicates widespread, intense deficits reaching exceptional severity in western Inner Mongolia, stretching west through Xinjiang, south into Qinghai, and north into Mongolia. Conditions of both deficit and surplus are also indicated for these regions as transitions occur.

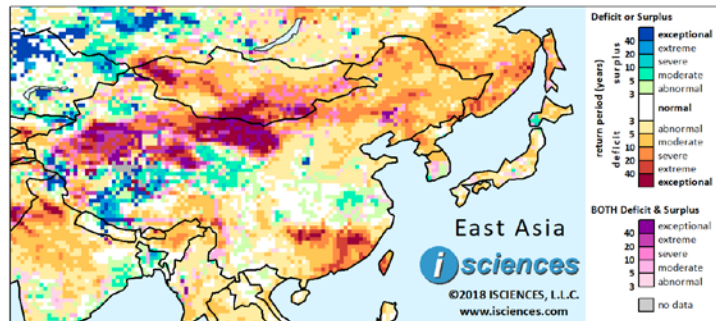
Moderate to extreme deficits are forecast across Northeast China. A vast stretch of Southeast China will experience deficits ranging from moderate to exceptional, including Fujian, Jiangxi, Guangdong, Hunan, and Taiwan.

A pocket of exceptional surplus is expected at the central border of Shaanxi and Shanxi along the eastern arm of the Yangtze River's Ordos Loop. Moderate surpluses are forecast in the lower and middle reaches of the Yangtze east of Wuhan, and much farther west in eastern Qinghai. Moderate to exceptional surpluses are forecast in western Tibet and along the Yarlung River (Brahmaputra) north of Nepal; deficits are forecast for eastern Tibet.

Moderate deficits are forecast for northern South Korea, North Korea, and eastern Hokkaido, Japan. Deficits may be severe north of Pyongyang, North Korea.

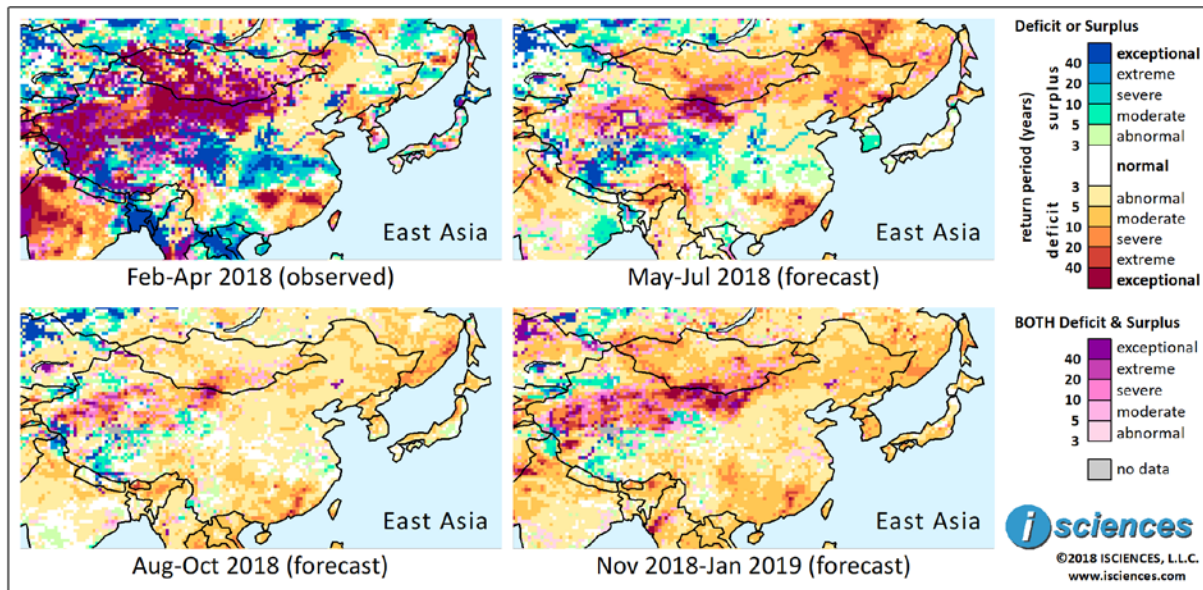
The 3-month time series maps below show the evolving conditions in more detail.

ISCIONES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



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ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



Based on observed data through April 2018 and forecasts issued April 24-30, 2018.

The near-term forecast through July indicates that the extent of exceptional deficits in Mongolia, Inner Mongolia, and Xinjiang will diminish considerably though widespread deficits of varying severity are expected and a large pocket of exceptional deficits will persist in western Inner Mongolia. Moderate to severe deficits will increase in Northeast China with some areas transitioning from surplus. Moderate surpluses are forecast for much of the Yellow River. Exceptional surpluses in eastern Qinghai will begin to moderate. Widespread, intense surpluses in the Yangtze River Basin will diminish and downgrade, leaving some areas of moderate surplus. In Southeast China, the extent of exceptional deficits will shrink, but severe to exceptional deficits remain in the forecast. Hainan will transition from surplus to near-normal conditions.

Deficits will retreat and downgrade in North Korea but severe deficits will persist north of Pyongyang. Moderate surpluses will expand in South Korea, covering much of the southern portion of the country. Near-normal conditions are forecast for Honshu, Japan, but Hokkaido will transition from surplus to deficit.

The forecast for August through October indicates that water anomalies throughout East Asia will downgrade overall. Some intense deficits will persist in western Inner Mongolia and throughout Xinjiang and northwestern Qinghai. Moderate to extreme deficits will persist in Southeast China, particularly in Guangdong. Moderate surpluses in the lower and middle reaches of the Yellow River are expected to retreat completely. Moderate deficits are forecast for Northeast China, much of the Korean Peninsula, areas of Japan along the Sea of Japan, and Hokkaido.

The forecast for the final months – November through January – indicates an uptick in the intensity and extent of deficits in the region.

(It should be noted that forecast skill declines with longer lead times.)

Australia & New Zealand

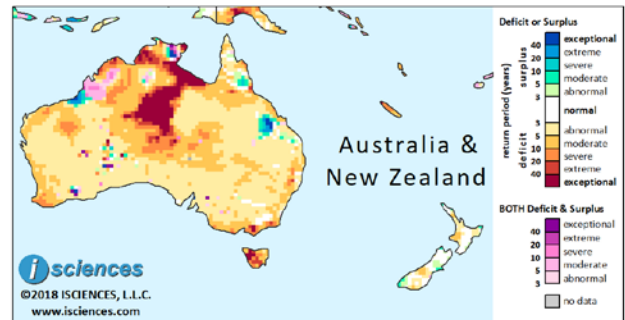
The 12-month forecast (right) shows a large block of exceptional water deficits in Northern Territory leading north and spreading along the southern shore of the Gulf of Carpentaria. Intense deficits are also forecast near Darwin in the north and the nearby Daly River region, in a few pockets along Victoria's coast, and in Tasmania.

Areas of moderate to extreme deficits include a large block in Australia's interior, northern and eastern Kimberley region in Western Australia, the country's southwest tip, and New Caledonia.

Surplus conditions are expected in a pocket of the southwest coast of Kimberley region, around the Mackenzie River in eastern Queensland (QLD), and in the Atherton Tablelands of northern QLD.

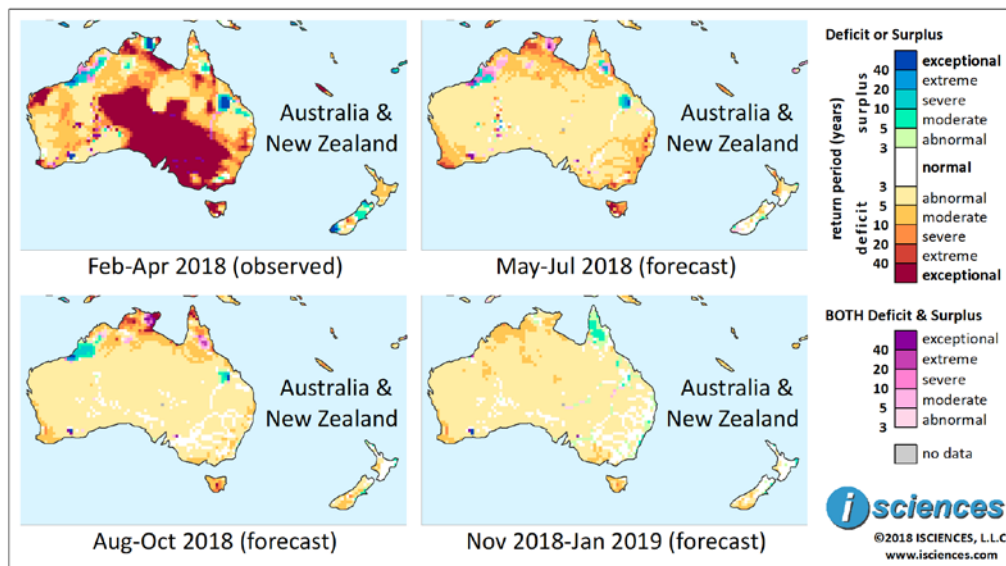
The 3-month maps (below) show the evolving conditions in greater detail.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: February 2018-January 2019



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As is apparent in the map series above, the forecast indicates that exceptional deficits which dominated a vast stretch of southern Australia in the prior three months will disappear. Deficits are forecast across northern Australia, in the southwest, in the southeast, and in Tasmania. These deficits are expected to be intense in Tasmania, the southwest tip of Australia, in Darwin and the Daly River region of Northern Territory (NT), along the southern shore of the Gulf of Carpentaria, and in pockets along the southeast

coast from Melbourne to Brisbane. Moderate deficits are expected along the Darling, Lachlan, and Macquarie Rivers in New South Wales. Moderate to severe deficits are forecast for New Caledonia. Surpluses will shrink but persist in the Mackenzie River region and the Atherton Tablelands of QLD, and in southwest Kimberley region of Western Australia (WA).

From August through October deficits will downgrade in Tasmania but remain intense in some areas, will shrink and moderate in southwestern Australia, and will nearly disappear in the southeast. Deficits remain in the forecast for northernmost regions of Australia and are expected to be intense around Darwin and eastern Arnhem Land in NT, and northern Cape York Peninsula QLD. Surpluses will continue in the Mackenzie River region QLD and will expand in southwest Kimberly region WA. Moderate to severe deficits will continue in New Caledonia, and some moderate deficits are expected to emerge in southern New Zealand.

The forecast for the final months – November through January – indicates primarily mild anomalies in the region.

(It should be noted that forecast skill declines with longer lead times.)