Global Water Monitor & Forecast Watch List

October 13, 2017

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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 September 2017 and an ensemble of forecasts issued the last week of September 2017. 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.

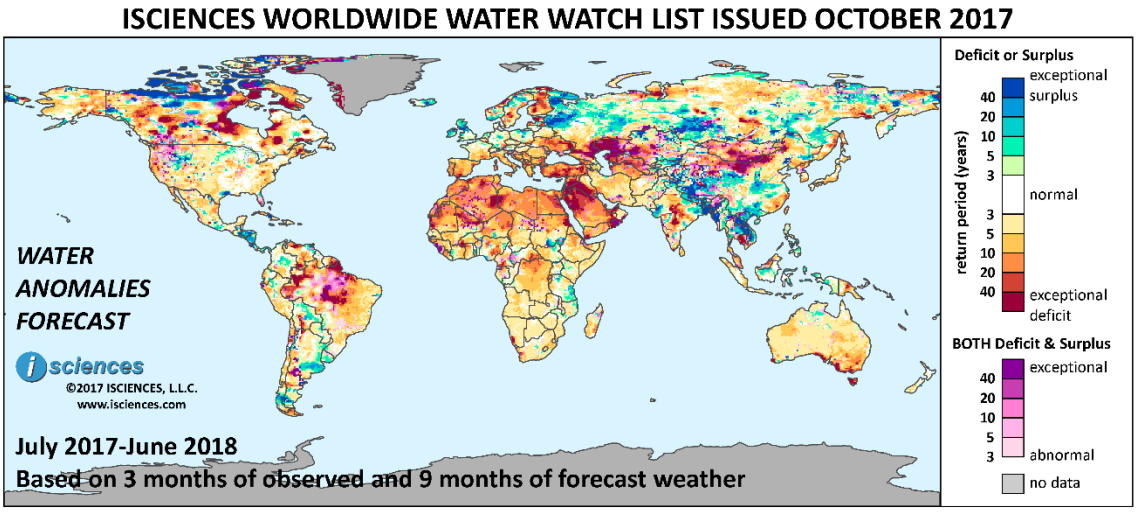
Deficits and surpluses are stated in terms of return period – a measure that characterizes the rarity of an anomaly. For example, a return period of 10 years indicates an anomaly that would occur, on average, once every ten years. Higher return periods indicate more extreme and, therefore, more disruptive 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.

Worldwide Water Watch List

This map presents a selection of regions likely to encounter significant water anomalies during the one year period beginning in July 2017 and running through June 2018 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: Widespread water deficits are forecast in much of the eastern half of the US through December and may be exceptional in the Virginias and Pennsylvania. Moderate to exceptional surpluses are predicted in central Minnesota. Surpluses will continue to emerge in northwestern Wisconsin, the western Upper Peninsula of Michigan, Florida, and Idaho and its neighbors. After December deficits in the East are expected to diminish, but intense deficits will persist in the Carolinas and southern Louisiana. Intense surpluses will continue to emerge in much of Minnesota.

Canada: The near-term forecast through December indicates intense water deficits along the northern Ontario-Quebec border into southern Nord-du-Québec, and in Sherbrooke (Quebec), New Brunswick, southern Nova Scotia, southeastern Newfoundland, northeastern Manitoba into Quebec, and from Glacier National Park in British Columbia into Alberta. Deficits will retreat in the Prairie Provinces. Exceptional surpluses are forecast west of Lake Winnipeg in Manitoba into Saskatchewan; from Churchill Lake in SK past Ft. McMurray, Alberta; and, near Kelowna, BC.

Mexico, Central America, and the Caribbean: Exceptional water deficits in Cuba are forecast to retreat through December, and moderate to severe deficits are forecast for Tamaulipas, Mexico, and other pockets across the north. The extent of exceptional surpluses in Central America is expected to shrink, but surpluses remain in the forecast and may be especially intense in Honduras. After December

moderate deficits will continue to emerge in northern Mexico with more severe deficits in Tamaulipas. Surpluses will persist in Central America but will begin to transition to deficits in El Salvador.

South America: A significant retreat of water deficits is forecast October through June, but through December exceptional deficits are expected in northernmost Brazil and into neighboring countries. Deficits are also forecast north of Lake Titicaca in Peru through La Paz and Cochabamba, Bolivia and into Argentina. Widespread, primarily moderate deficits are predicted in much of eastern Brazil, which may be more severe along the coast of the State of São Paulo. Surpluses are forecast in central Colombia, northern Peru, northern Bolivia, eastern Argentina, Uruguay, and O'Higgins Lake in Patagonia. After December widespread moderate surpluses are forecast in the northern Amazon Basin

Europe: Exceptional water deficits are expected to nearly disappear from October on, but pockets will remain through December in central Finland and the Norwegian Sea coast. Moderate to severe deficits are forecast for the remainder of Finland and moderate deficits for much of Southern Europe. A vast expanse of surpluses is forecast in European Russia, and surpluses are also predicted in Poland, Slovenia, Croatia, UK, and southern Norway. From January through March surpluses are forecast to increase across Northern Europe, particularly in European Russia, while deficits persist across Southern Europe.

Africa: Exceptional water deficits are expected to diminish considerably, leaving severe conditions across the north but relatively moderate conditions in the south. Some intense deficits are forecast for western Mauritania, southwestern Burkina Faso, the Chinko Nature Reserve in Central African Republic, southwestern Namibia, and Cape Town, South Africa. Surpluses are forecast for southeastern Sudan, northeastern South Sudan, the Niger Delta, Gabon, north-central Uganda, eastern Tanzania, Okavango Delta in Botswana, and the central border between Botswana and South Africa.

Middle East: Exceptional water deficits are forecast to nearly disappear after September leaving primarily moderate or severe deficits across the region. However, more intense deficits are expected in Georgia; along Turkey's northern coast; surrounding the city of Basrah, Iraq; western Yazd Province, Iran; and eastern Yemen. Severe deficits are forecast for the Euphrates River. Overall, water deficits will continue to diminish through March, with mild deficits throughout much of the region. Severe deficits will continue to emerge in western Georgia and western Turkey.

Central Asia and Russia: Water surpluses reaching exceptional intensity are forecast in western European Russia, the Upper Ob River and Tom River Basins, and the Transvolga Region, where conditions of both deficit and surplus may emerge. Surpluses are also forecast for many parts of Kazakhstan, and in Kyrgyzstan. Severe to extreme deficits are forecast for the Yamal Peninsula and across the Gulf of Ob. Intense deficits in Turkmenistan and Uzbekistan are expected to diminish considerably leaving only mild deficits through December.

South Asia: Intense water deficits are forecast through June 2018 in India's central state of Madhya Pradesh. In the near-term, through December, severe to exceptional deficits are forecast for central states, and moderate deficits will extend north. Gujarat will transition to conditions of both deficit and surplus. Exceptional surpluses are forecast for Tripura, Mizoram, and Manipur, but surpluses are

expected to recede in other northeastern states and in West Bengal. Surpluses of varying severity are forecast for Nepal and western Bhutan. Primarily moderate deficits are forecast for Pakistan and western Afghanistan.

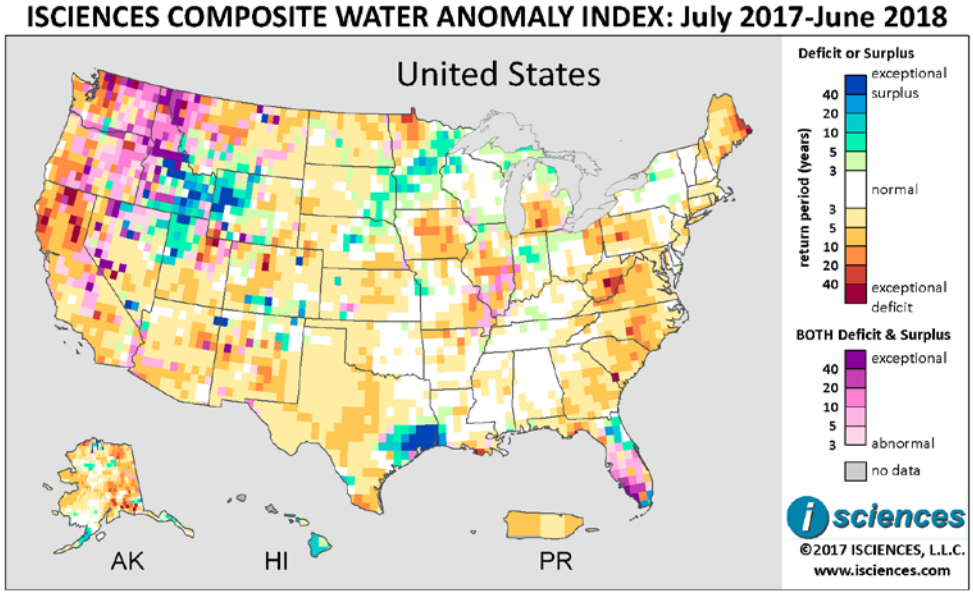
Southeast Asia and the Pacific: The forecast indicates a gradual transition from predominantly surplus conditions to deficit. Western Cambodia and eastern Papua New Guinea, however, show deficit conditions throughout the 12-month forecast. Surpluses will begin to downgrade in the near-term but exceptional surpluses remain in the forecast through December for western Myanmar, northern and southern Laos, and along the west side of the Mekong River in Cambodia down to Phnom Penh. After December severe deficits will begin to emerge in Malaysia and Indonesia.

East Asia: Widespread intense deficits will emerge in Zhejiang, Fujian, Guangdong, and Taiwan. Widespread intense surpluses are forecast for a vast stretch of the Upper and Middle Yangtze River, with exceptional surpluses in the Han River watershed. Aforementioned deficits may persist through March and surpluses may persist longer. Severe surpluses will continue to emerge along the Middle and Lower Yellow River through December. Surpluses in the western Pearl River watershed and around the Gulf of Tonkin are forecast to diminish slowly through March. Intense surpluses will continue to emerge in eastern Qinghai while intense deficits are forecast in the west.

Australia: Exceptional deficits observed in recent months over much of Australia are forecast to diminish considerably in the near-term and through June 2018. Through December, however, exceptional deficits are forecast for Tasmania and the southwest tip of Western Australia. Moderate to extreme deficits are forecast from Adelaide through Victoria and into the eastern Murray-Darling Basin in New South Wales. Moderate deficits are expected in New Caledonia and South Island, New Zealand. Surpluses are forecast for the Ord River Basin, northeastern Queensland, and Christchurch, New Zealand.

Watch List: Regional Details

United States



Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

The 12-month forecast above indicates some pockets of intense water deficits in northwest Washington, diminishing somewhat through western Oregon and regaining strength in Northern California. Moderate to extreme deficits are forecast for northwestern Minnesota, the southern half of Michigan's Lower Peninsula, West Virginia, and eastern Maine. Primarily moderate deficits are expected from northeastern Ohio and western Pennsylvania southward through the Virginias, Carolinas, Georgia, and into the Florida Panhandle. Drier than normal conditions are also forecast for Iowa, central Illinois, southernmost Texas, northern Montana, central Colorado, and scattered pockets in Utah, Arizona and New Mexico.

Exceptional surpluses are forecast for southeastern Texas, and surpluses ranging from moderate to exceptional are forecast for southwestern Idaho into western Wyoming and northwestern Utah. Both deficits and surpluses are predicted in northern Idaho, eastern Washington and Oregon, and northwestern Montana.

Moderate to severe surpluses are forecast from northeastern Minnesota leading southwest through eastern South Dakota. Some moderate to extreme surpluses are forecast for southernmost Florida and in the northeast, with both deficits and surpluses across the southern part of the state.

Outside the contiguous US, deficits are forecast for eastern Alaska, particularly in the Copper River Basin in the southeast. Surpluses are forecast for Hawaii.

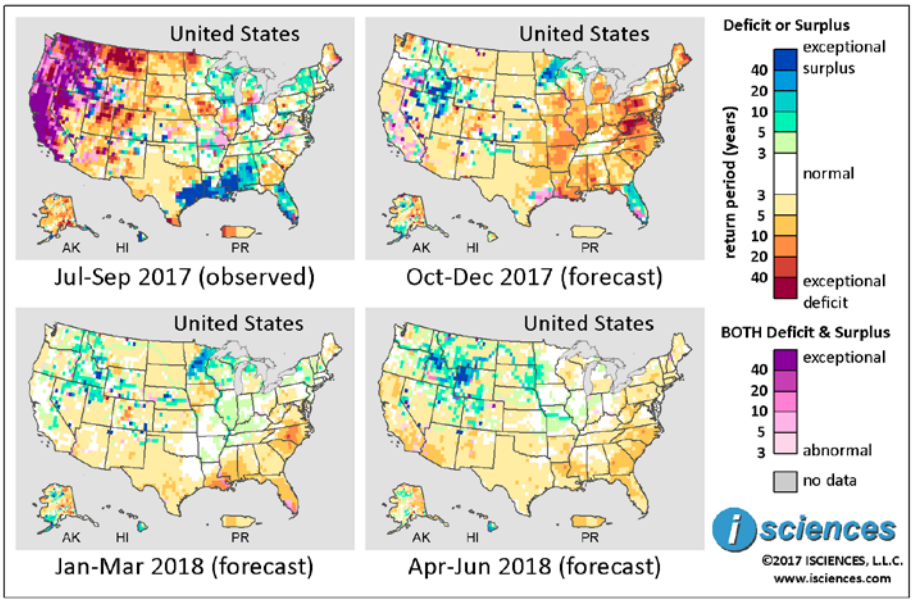
The 3-month maps (below) show the evolving conditions in more detail.

Please note that we are well aware of the recent devastation wrought by hurricanes. Readers are advised that inputs used in our Water Security Indicator Model (WSIM), the model used to generate "Global Water Monitor and Forecast Watch List," have been proven reliable in forecasting broad precipitation patterns, but are not effective for predicting singular events such as tropical storms. Detailed outlooks and analyses of tropical storms are available from NOAA National Hurricane Center.

The map series clearly indicates the increasing emergence of deficits throughout much of the eastern half US which are expected to be exceptional in the Virginias and Pennsylvania, and severe to extreme in southwestern Wisconsin, Iowa, Missouri, Illinois, Indiana, Michigan, eastern Ohio, Arkansas, Louisiana, western Alabama, the Florida Panhandle, the Carolinas, New Jersey, Connecticut, Massachusetts, and Maine.

Moderate to exceptional surpluses are forecast to emerge in central and eastern Minnesota and surpluses will continue to emerge in northwestern Wisconsin, the western Upper Peninsula of Michigan, and in Florida. Surpluses of varying severity including exceptional are forecast for Idaho and nearby areas of surrounding states, and pockets in central Nebraska, southeastern Colorado, and southwestern Kansas. Moderate surpluses may emerge along the Canadian River through the Texas Panhandle and New Mexico.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018



Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

After December deficits in the eastern half of the US are expected to diminish considerably in extent and severity, but severe deficits will persist in the Carolinas and southern Louisiana. Intense surpluses will continue to emerge in much of Minnesota, with surpluses of lesser severity in Wisconsin and northern Michigan. Some moderate surpluses are forecast in New York and southern New Hampshire. Deficits in the Ohio River Valley will transition to mild surpluses. Primarily moderate surpluses will continue in

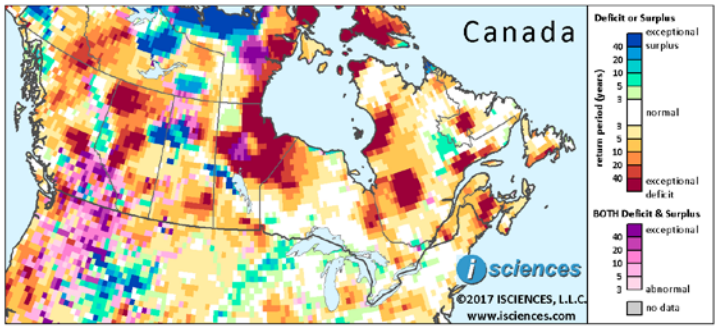
Idaho and surrounding states, and moderate surpluses are expected to emerge along the Platte River in Nebraska.

The forecast for the final months – April through June – indicates surpluses in the Northern Rockies and along the Missouri and Yellowstone Rivers. (It should be noted that forecast skill declines with longer lead times.)

Canada

The 12-month outlook for Canada through June 2018 (right) indicates large blocks of exceptional water deficit in central Quebec, central and northeastern Manitoba into Ontario, central and northwestern Alberta, and surrounding Prince George, British Columbia.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018

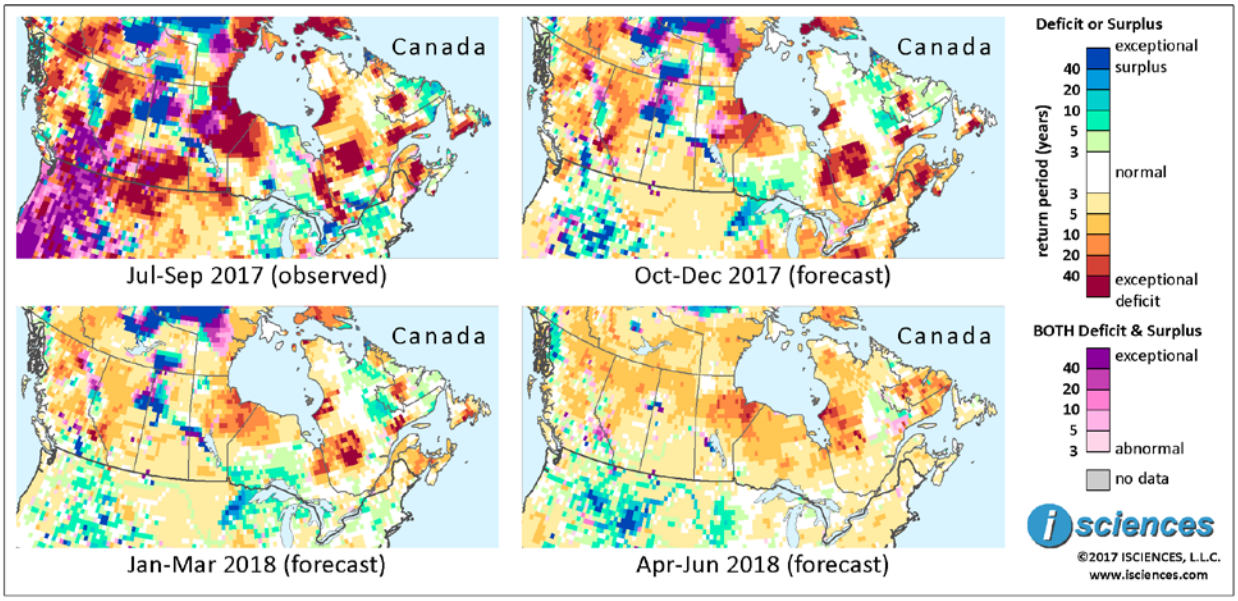


Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

Exceptional surpluses are forecast for central Manitoba west of Lake Winnipeg and into Saskatchewan, and a large block of northwestern Saskatchewan around Churchill Lake westward past Ft. McMurray, Alberta.

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018



Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

The near-term forecast through December indicates the persistence of exceptional deficits along the northern Ontario-Quebec border and into southern Nord-du-Québec; surrounding Sherbrooke (Quebec); and in New Brunswick. Exceptional deficits will diminish somewhat in Newfoundland but increase in southern Nova Scotia. Extreme to occasionally exceptional deficits will persist in northeastern Manitoba, diminishing slightly in severity across the border into Quebec.

A significant retreat of exceptional deficits is forecast in the Prairie Provinces. Exceptional deficits will emerge in British Columbia surrounding Glacier National Park and into Alberta, and deficits leading north through Alberta will diminish in intensity becoming moderate to severe, as will deficits in central and northern British Columbia.

Surpluses in Southern Ontario north of Kitchener and in Ottawa are expected to retreat, and primarily moderate surpluses are expected to emerge in Northern Ontario from Lake of the Woods through the center of the province. Exceptional surpluses are forecast to persist west of Lake Winnipeg in Manitoba and into Saskatchewan, and from Churchill Lake in Saskatchewan past Ft. McMurray, Alberta. Exceptional surpluses are forecast to re-emerge near Kelowna, BC.

From January through March the distribution of water anomalies is expected to be similar to the pattern for October through December, though the intensity of deficits is forecast to diminish overall.

The forecast for the final three months – April through June – indicates a retreat of exceptional surpluses and an overall increase in the extent of deficits.

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

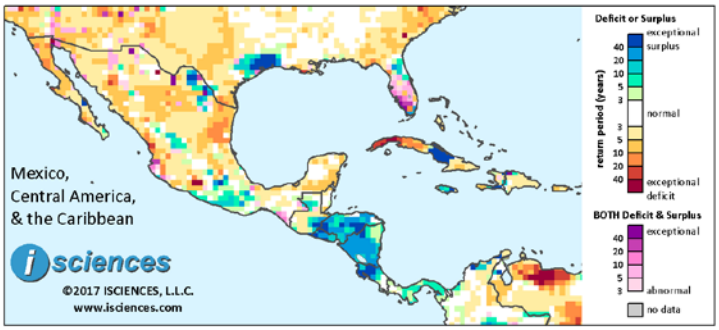
Mexico, Central America, and the Caribbean

The 12-month forecast ending June 2018 (right) indicates severe to exceptional deficits in western Cuba and in isolated pockets of Nayarit and Michoacán, Mexico; severe deficits in Tamaulipas; and moderate deficits in Baja and scattered across northern Mexico.

Surpluses are forecast for southeastern Guatemala, El Salvador, Honduras, Nicaragua, northern Costa Rica, Panama, central Cuba, and Jamaica.

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018



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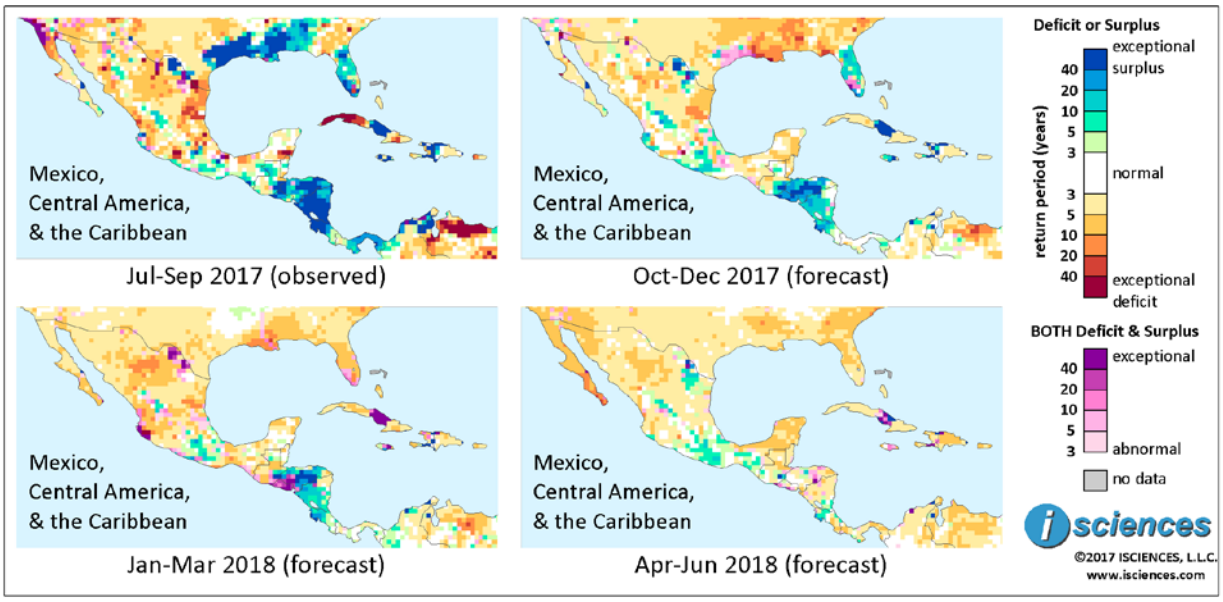
ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018



Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

The October through December forecast indicates a significant retreat of exceptional deficits in Cuba. In Mexico, deficits are expected to diminish in intensity in Tamaulipas, leaving moderate to severe deficits. Deficits of similar severity will continue to emerge in pockets of northern Mexico and moderate deficits are expected to emerge in parts of Yucatan.

While the overall extent of exceptional surpluses in Central America is expected to shrink, surpluses ranging from moderate to exceptional remain in the forecast for: southeastern Guatemala, El Salvador, Honduras, Nicaragua, northern Costa Rica, Jamaica, central Cuba, and Haiti. Surpluses may be especially intense in Honduras. Some pockets of exceptional surplus are also forecast for northern Coahuila and northern Nuevo Leon, Mexico, along with pockets of moderate to severe surplus scattered throughout the central part of the country, particularly along the Pacific coast.

After December primarily moderate deficits will continue to emerge in Mexico's northern bulk but deficits may be severe in southern Tamaulipas and southeast Chihuahua into Coahuila. Some aforementioned surpluses in Mexico will transition to both deficit and surplus as deficits move in, but surpluses of varying severity are expected to persist during this time in Morelos, Puebla, and Oaxaca. Surpluses are expected to persist in many parts of Central America but will begin to transition to deficits in El Salvador and parts of the Caribbean.

The forecast for the final three months – April through June – shows the emergence of deficits on the Baja and Yucatan Peninsulas.

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

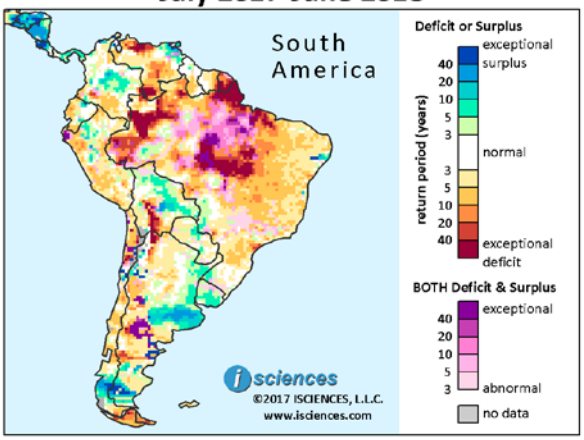
South America

Water deficits of varying intensity are forecast across much of Brazil for the 12-month period ending June 2018, with large pockets of exceptional deficits in Amapá, western Amazonas, southern Pará, northern Mato Grosso, and Tocantins.

Deficits reaching exceptional severity are also forecast for northwest and southern Venezuela, French Guiana, and in a north/south line through Bolivia beginning at Cochabamba.

Surpluses are expected in Buenos Aires and La Pampa Provinces, Argentina, and in southern Patagonia. Surpluses of generally lesser intensity are forecast for central Colombia, eastern Bolivia, and southern Uruguay.

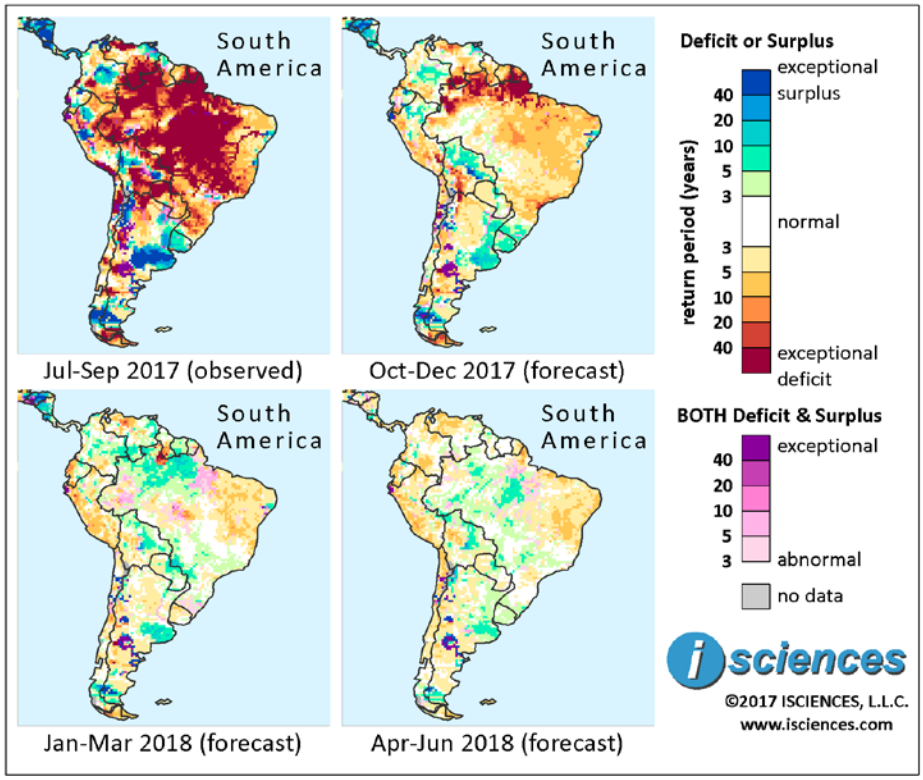
ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018



Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018



Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

Noticeable at a glance in the map progression is the significant retreat of exceptional deficits – shown in dark red – in the October through June forecasts. However, from October through December exceptional deficits remain in the forecast for northernmost Brazil, particularly Amapá, from French Guiana into Suriname, and in Venezuela's southern extreme. Deficits ranging from severe to exceptional are forecast in an arc from north of Lake Titicaca in southern Peru through La Paz and Cochabamba, Bolivia and south across the border into northern Argentina; and, in Tierra del Fuego. Widespread, primarily moderate deficits are predicted in much of eastern Brazil, but may be more severe along the coast of the State of São Paulo. Moderate deficits are also forecast for southern Peru.

Surpluses are forecast in: Trinidad and Tobago; central Colombia; Piura, Peru and rivers in northeast Peru; northern Bolivia; eastern Argentina including Buenos Aires Province; Uruguay; and surrounding O'Higgins (San Martín) Lake in Patagonia. Surpluses may be especially intense in Piura, Peru; Santa Cruz de la Sierra, Bolivia; and O'Higgins Lake, Patagonia.

In the January through March map the emergence of widespread surpluses of moderate to severe intensity is evident in the northern Amazon Basin into southern Venezuela and Suriname. Surpluses are expected to retreat in northeastern Peru; Rio Grande do Sul, Brazil; the Iberá Wetlands of northeastern

Argentina; and Uruguay. Surpluses will persist, though diminish somewhat, in northern Bolivia; Buenos Aires Province, Argentina; and O'Higgins Lake region, Patagonia. Moderate surpluses are expected to emerge during this period in western Mato Grosso, Brazil and across the border into Paraguay. Deficits in eastern Brazil will diminish considerably, becoming mild; some moderate deficits will continue to emerge in Peru and western Ecuador. Deficits of greater severity are forecast for eastern Roraima, Brazil into southern Guyana, and surrounding the Guárico Reservoir in northern Venezuela.

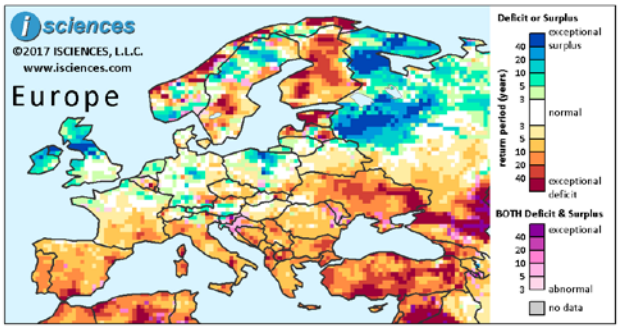
The forecast for the final months is similar to the January through March forecast.

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

Europe

The 12-month forecast ending June 2018 indicates widespread moderate to extreme water deficits across Southern Europe from the Iberian Peninsula, across the Mediterranean, through the Balkan Peninsula, reaching exceptional severity in eastern Ukraine. Deficits of similar intensity are forecast for Finland, Estonia, Latvia, southern Sweden, and along the Norwegian Sea coast.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018

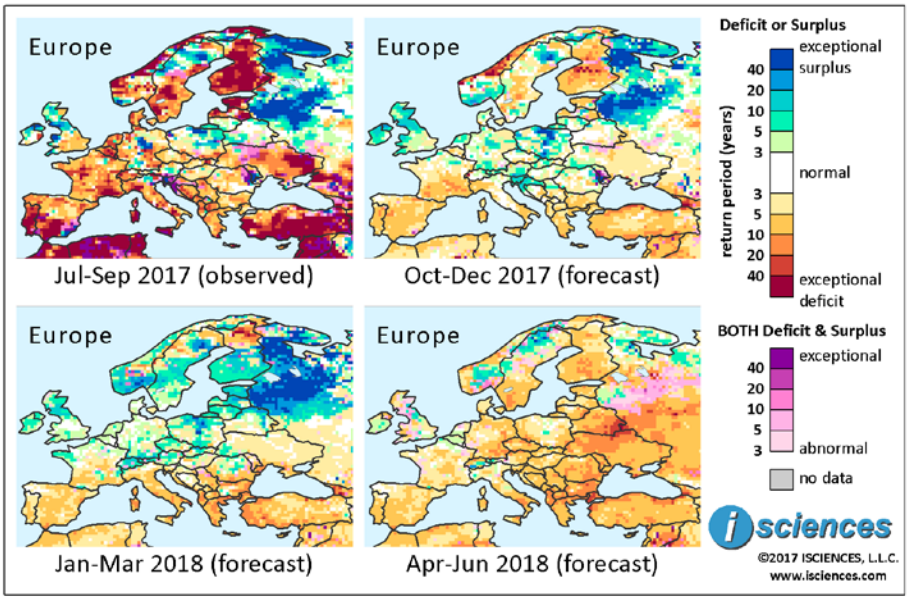


Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

Severe to exceptional water surpluses are forecast in western Russia and central United Kingdom, along with surpluses of varying intensity in Ireland, Scotland, Wales, northern Poland, and pockets of southern Norway and northern Sweden.

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018



Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

As is clear in the map progression, the extent of exceptional water deficits is expected to nearly disappear from October on, though pockets of exceptional deficit remain in the forecast through December in central Finland and along the Norwegian Sea coast. The near term forecast also indicates moderate to severe deficits for the remainder of Finland. Primarily moderate deficits are forecast for the

Iberian Peninsula, southern France, Italy west of Milan and south of Naples, northern Corsica, Sardinia, and the southern Balkan Peninsula.

A vast expanse of surpluses is forecast to persist in European Russia from Murmansk to Moscow and may be exceptional in a large block from Latvia to Lake Onega to Rybinsk Reservoir, and in northern Karelia. Exceptional surpluses are also predicted down the center of Poland, with surpluses of varying intensity radiating outward. Moderate to severe surpluses are forecast for southern Austria, Slovenia, Croatia, northern UK, southern Norway, Netherlands, and central and southwestern Germany.

From January through March surpluses are forecast to increase across Northern Europe, particularly in European Russia where the large block of exceptional surpluses will continue to expand. Moderate to extreme surpluses are forecast to persist in the UK, Poland, and Austria; to emerge in Norway, Sweden, southern Finland, the Baltics, Czech Republic (Czechia), and Switzerland; and to retreat from Slovenia and Croatia. Water deficits may diminish somewhat on the Iberian Peninsula and in southern France, but an uptick in intensity is expected in Italy and the southern Balkan Peninsula.

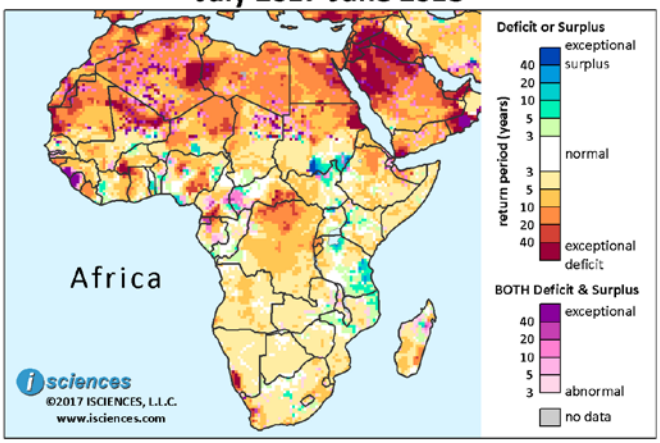
In the remaining months of the forecast – April through June 2018 – a transition to deficit conditions is forecast for nearly all of Europe.

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

Africa

The 12-month forecast (right) indicates moderate to extreme water deficits across northern Africa with a large pocket of exceptional deficits along the border of Algeria and Libya, and smaller pockets in coastal Mauritania, northeastern Niger, southwestern Burkina Faso, and along the Red Sea in Sudan. Surpluses are forecast for southeastern Sudan.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018

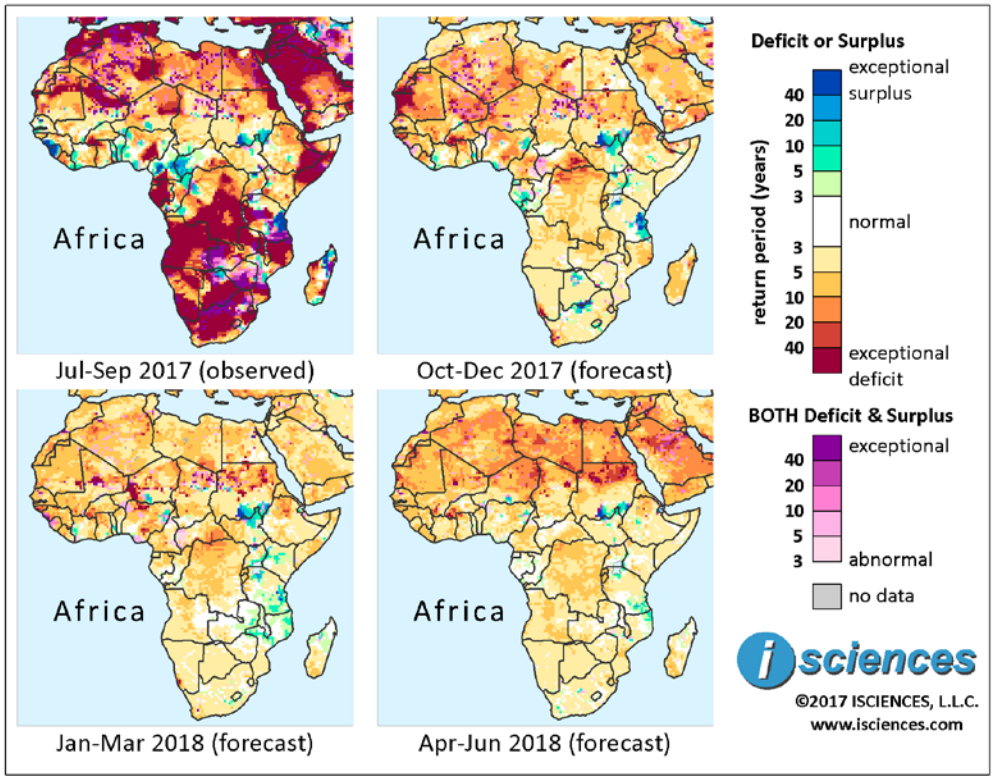


Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

In the southern half of the continent exceptional deficits are forecast for southwestern Namibia, and moderate to extreme deficits for Democratic Republic of the Congo and southeastern Central African Republic. Surpluses are predicted for eastern Tanzania and Mwanza in the north.

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018



Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

As is evident in the map progression above, the extent of exceptional water deficits – shown in dark red – is expected to diminish considerably, particularly in the southern half of the continent, where a transition to primarily mild deficits is predicted. From October through December moderate to extreme deficits are forecast across the northern half of the continent with a large pocket of exceptional deficit in western Mauritania and southern Western Sahara, and smaller, isolated pockets in southwestern Burkina Faso, the Chinko Nature Reserve in Central African Republic and across the border into northern Democratic Republic of the Congo. In the southern half of Africa primarily mild deficits are forecast, with severe to exceptional deficits in southwestern Namibia and around Cape Town, South Africa.

Severe to exceptional surpluses are forecast for southeastern Sudan into northeastern South Sudan, north-central Uganda, eastern Tanzania and Mwanza in the north, and along the central border between Botswana and South Africa. Surpluses of generally lesser severity are forecast for the Niger Delta, southern Gabon, and the Okavango Delta in Botswana.

The forecast for January through March indicates a continued reduction in the severity of deficits overall, leaving moderate deficits from the Mediterranean south through Democratic Republic of the Congo, and a scattered band of severe to exceptional deficits across the southern Sahara into the

northern Sahel. Moderate to exceptional surpluses are expected to persist in southeastern Sudan into northern South Sudan, along with surpluses of generally lesser intensity in eastern Tanzania and Mwanza in the north. Some moderate surpluses will continue to emerge in central Kenya and from Lake Turkana past Kampala, Uganda; and in northeastern Mozambique and along the Zambezi River.

The forecast for the final quarter – April through June 2018 – indicates a resurgence of severe deficits across northern Africa.

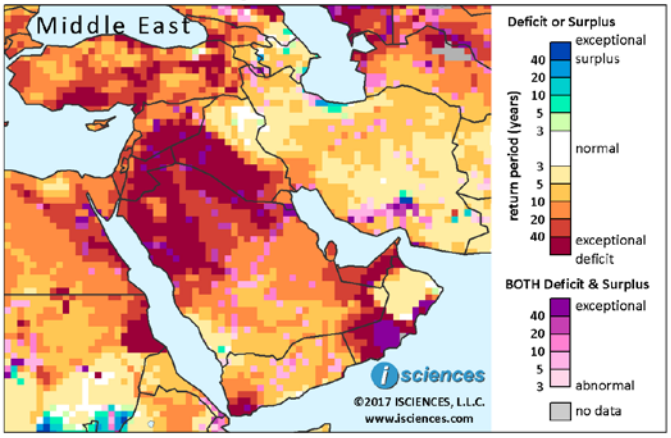
(It should be noted that forecast skill declines with longer lead times.)

Middle East

The forecast for the 12-month period ending June 2018 (right) indicates a distribution pattern of water deficits similar to the forecast issued last month with one significant difference: the current forecast includes widespread severe to exceptional deficits in Turkey and Georgia.

Extreme to exceptional water deficits are also forecast for Syria, Jordan, Iraq west of the Euphrates River, northern Saudi Arabia, United Arab Emirates, southern Oman, and southwestern Yemen.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018

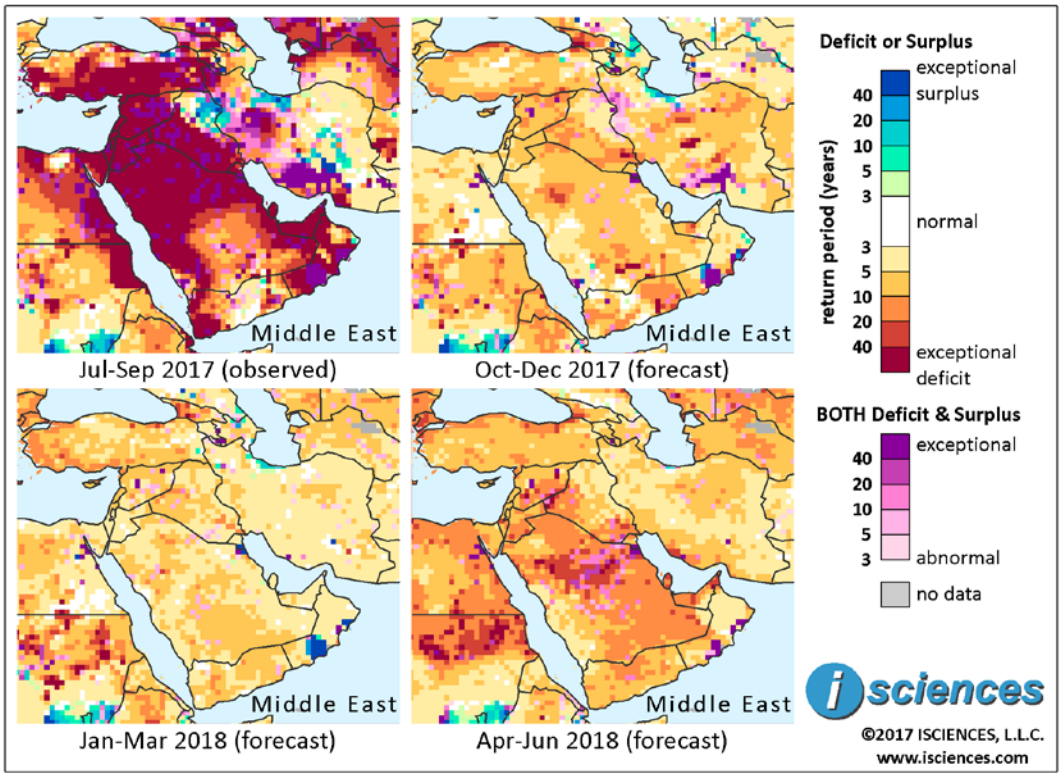


Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

Deficits of varying intensity are forecast for the remainder of the Arabian Peninsula, Lebanon, Israel, West Bank, and Iran.

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018



Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

Exceptional water deficits are forecast to nearly disappear after September leaving primarily moderate or severe deficits across the region, as shown in the October through December map. However, more intense deficits remain in the forecast for a few regions. Severe to exceptional deficits are expected in Georgia; along Turkey's northern coast; surrounding the city of Basrah, Iraq; western Yazd Province, Iran; and eastern Yemen. Severe deficits are forecast for the Euphrates River.

Overall, water deficits will continue to diminish in extent and intensity from January through March, with mild to moderate deficits throughout much of the region. Western Georgia, however, will continue to experience severe to exceptional deficits, and moderate to severe deficits are forecast for Turkey, particularly in the west.

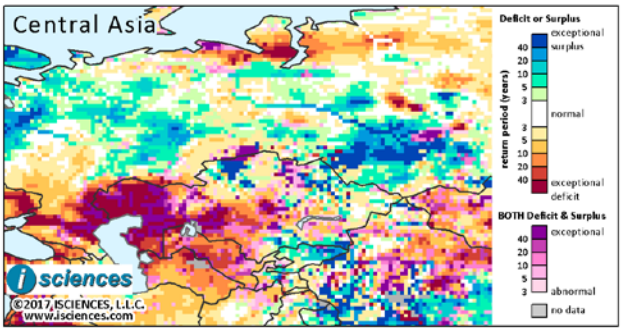
The forecast for the final quarter indicates an increase in the extent and intensity of deficits in the region, particularly on the Arabian Peninsula.

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

Central Asia and Russia

The 12-month forecast for the region indicates widespread water surplus anomalies reaching exceptional severity in European Russia from Murmansk Oblast on the Barents Sea southward to Moscow. Surpluses are also forecast for the Transvolga Region, along the Middle Ob River, the Upper Ob River Basin, and the Tom River Basin.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018



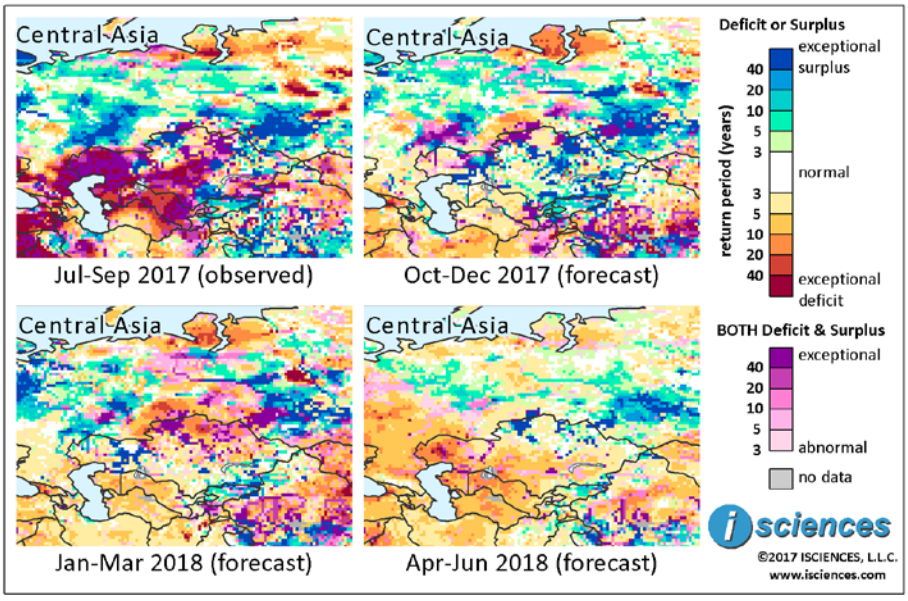
Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

Exceptional deficits are forecast in the southern Yamal Peninsula, with deficits of lesser severity trailing east across Siberia. Deficits are also forecast around Lake Baikal.

Intense deficits are expected in Turkmenistan, Uzbekistan, and western Kazakhstan. Exceptional surpluses are forecast in northern Kostanay Region, Kazakhstan, and surpluses of varying severity are forecast for eastern Kyrgyzstan.

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018



Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

As seen in the map series above, a large block of water surplus reaching exceptional intensity is forecast to persist through June 2018 in the Upper Ob River Basin and the Tom River Basin in Russia. In the near-

term, from October through December, the intensity of surplus on the Middle Ob River will increase to exceptional, matching that along the Upper Ob. Exceptional surpluses are forecast to emerge along the Vakh River, an eastern tributary of the Ob, and surpluses will emerge along the Yenisei River.

Surpluses in the Volga Upland and Transvolga will begin to transition to conditions of both deficit and surplus as some deficits emerge. Moderate to severe deficits are expected to emerge just east of Transvolga between Yekaterinburg and Tyumen, reaching south into Kostanay Region, Kazakhstan, where both deficit and surplus conditions may appear.

Widespread surpluses remain in the forecast for a vast area of western Russia (not pictured) from Murmansk Oblast through Tver Oblast, though surpluses are expected to retreat from Moscow.

Severe to extreme deficits are expected to spread on the Yamal Peninsula and across the Gulf of Ob.

Intense deficits in Turmenistan and Uzbekistan will downgrade considerably leaving only mild deficit conditions, and as deficits recede in western Kazakhstan surpluses will re-emerge. Surpluses will continue to emerge in Kyrgyzstan and may be exceptional near Bishkek.

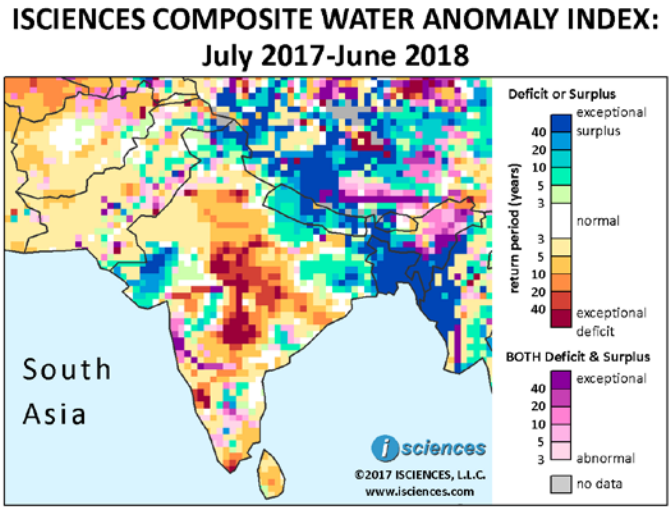
From January through March severe to extreme deficits are forecast to emerge across northern Kazakhstan and across the border into Russia. Surpluses in the Lower Ob will transition to both deficit and surplus conditions.

The forecast for the final months – April through June – indicates surpluses in the Upper Ob River Basin in Russia, and the emergence of deficits in Turkmenistan, Uzbekistan, western Kazakhstan, and the Don River Basin in Russia extending into the North Caucasus.

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

South Asia

The 12-month forecast ending June 2018 indicates intense water deficits in India's central states of Madhya Pradesh and Chhattisgarh trailing north into Uttarakhand, west along the Narmada River, east along the Mahanadi River, and south through Maharashtra into Telangana.



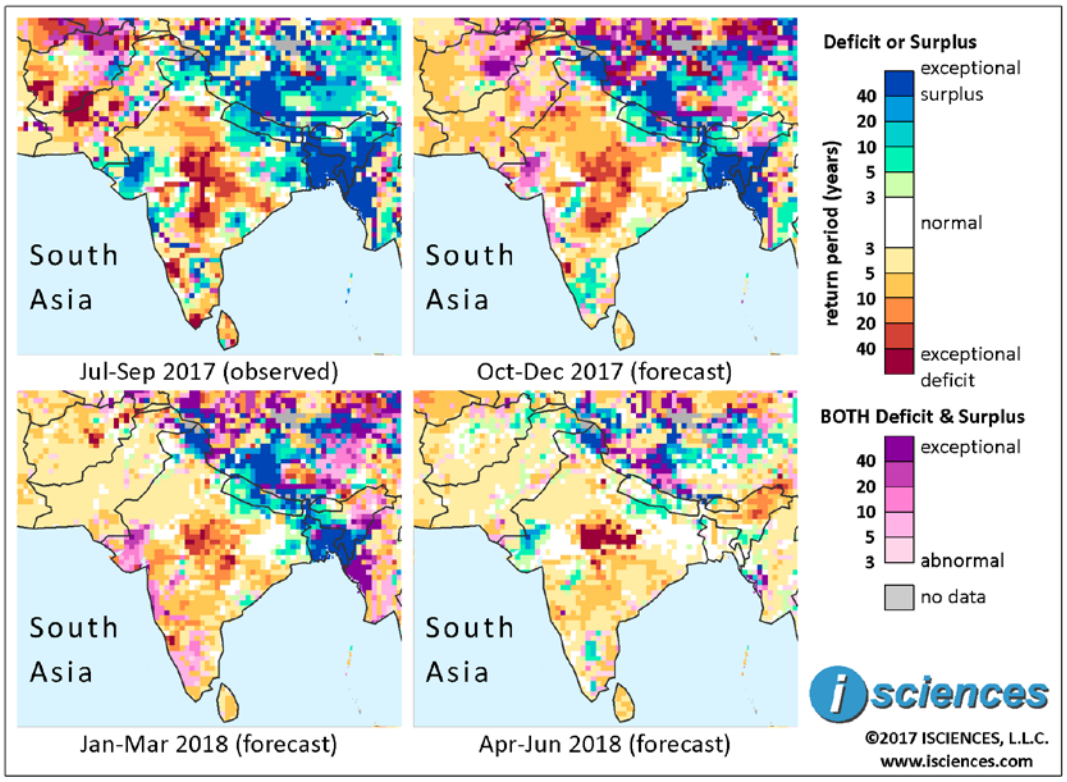
Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

Deficits of equal intensity are forecast in western Karnataka, tracing east along the Tungabhadra River.

Exceptional surpluses are expected in Bangladesh, Tripura, Mizoram, and Manipur, and surpluses of varying intensity are forecast in Gujarat, Jammu and Kashmir, West Bengal, western Bhutan, and Nepal.

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018



Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

As seen in the map progression above, the forecast for the region indicates the persistence of intense water deficits in India's central state of Madhya Pradesh through June 2018. The near-term forecast, October through December, shows severe to exceptional deficits in the central states and trailing west along the Narmada River, with moderate deficits extending north through Himachal Pradesh. A small pocket of exceptional deficits is expected to persist in western Karnataka, and Gujarat will transition to conditions of both deficit and surplus as deficits emerge. Surpluses along the western Krishna River will begin to transition as deficits emerge, and some moderate surpluses will continue to emerge in states to the south. Exceptional surpluses will persist in Tripura, Mizoram, and Manipur, but surpluses are expected to recede in other states in the northeast and in West Bengal.

Exceptional surpluses are forecast to persist in Bangladesh, though the intensity will diminish somewhat in the west. Surpluses of varying severity remain in the forecast for Nepal and western Bhutan. Primarily moderate deficits are forecast for Pakistan and western Afghanistan, with both deficits and surpluses predicted in eastern Afghanistan.

From January through March little change is expected in surplus conditions in Bangladesh, northeastern India, Nepal, and Bhutan. As previously noted, severe to exceptional deficits will persist in central India, with deficits of generally lesser severity extending to the west, east, and south. However, intense deficits will persist in a pocket of western Karnataka. North of Madhya Pradesh deficits are expected to

downgrade, becoming mild, as will deficits in Pakistan and most of Afghanistan. Some pockets of exceptional deficit are forecast to emerge during this period in eastern Afghanistan.

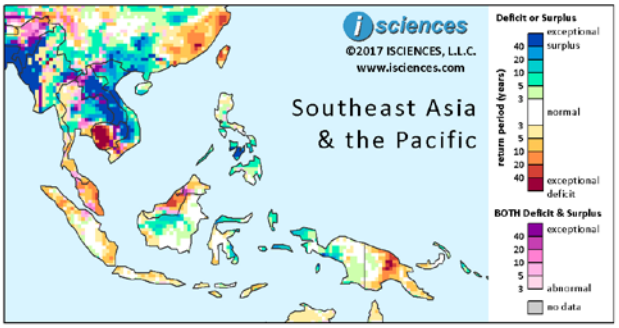
The forecast for the final period, April through June 2018, indicates an increase in the extent of exceptional deficits in Madhya Pradesh and the emergence of some surpluses in Gujarat.

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

Southeast Asia and the Pacific

The 12-month map (right) indicates exceptional surpluses in western Myanmar, eastern Thailand, Laos into Vietnam, and Negros Island, Philippines. Surpluses of lesser intensity are forecast for much of Vietnam, other parts of the Philippines, and in scattered pockets from northwestern Indonesian Borneo through western Papua.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018

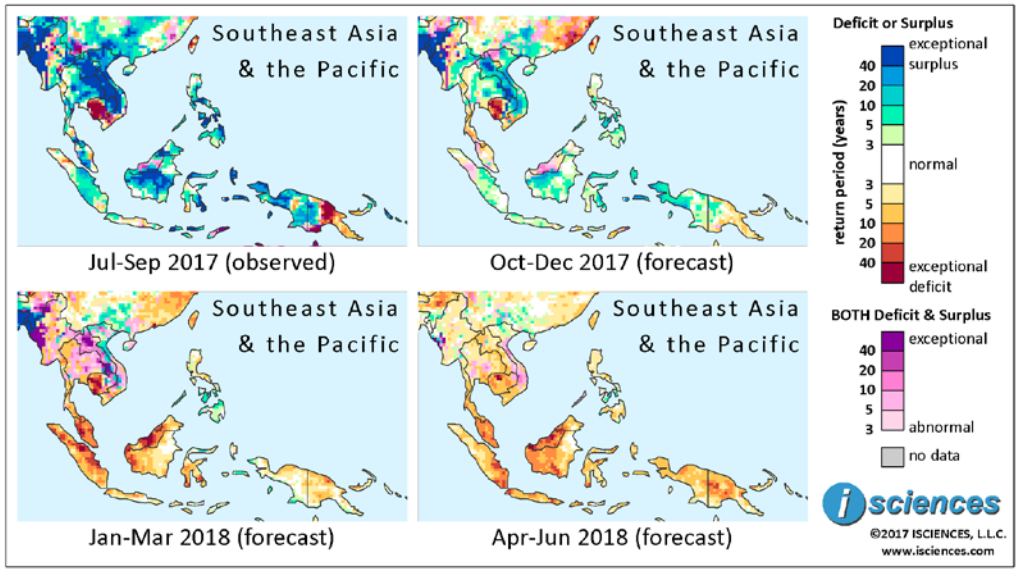


Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

A large block of exceptional water deficit is forecast for western Cambodia. Moderate to exceptional deficits are expected in the Highlands of central Papua New Guinea, and deficits of lesser severity are forecast for Malaysia and north and south regions of Sumatra.

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018



Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

Clearly indicated in the map progression above is a gradual transition in the region from predominantly surplus conditions to deficit. Note, however, that Cambodia and eastern Papua New Guinea show deficit conditions throughout the 12-month forecast period.

The October through December map shows a significant downgrade in the intensity of water surpluses. However, exceptional surpluses are forecast for western Myanmar, northern and southern Laos, and along the west side of the Mekong River in Cambodia down to Phnom Penh. Extreme surpluses are forecast for Vietnam's Central Highlands in the south, and surpluses of varying severity are forecast for

the remainder of Vietnam and for eastern Myanmar, mainland Thailand, Laos, central Sumatra, Indonesian Borneo, southern Philippines, and from Sulawesi through western Papua New Guinea.

Exceptional deficits remain in the forecast for a large block of western Cambodia, and moderate deficits are forecast surrounding Ho Chi Minh City in southern Vietnam. Intense deficits in Papua New Guinea are expected to disappear, leaving scattered mild deficits. Moderate deficits will emerge in southern Thailand and the Lesser Sunda Islands.

From January through March surpluses in western Myanmar, Thailand, Laos, and much of Vietnam will transition to conditions of both deficit and surplus as deficits emerge. The block of exceptional deficits in western Cambodia will diminish somewhat in extent but intense deficits will persist. Severe to occasionally exceptional deficits are expected to emerge in Malaysia, Brunei, western Indonesian Borneo, Sumatra, and southern Sulawesi. Surpluses on Papua will nearly disappear as deficits continue to emerge in the eastern half of the island and begin to emerge in the west.

After March the forecast indicates the continued presence of deficits in the region, particularly in Cambodia, Malaysia, Indonesia, and Papua.

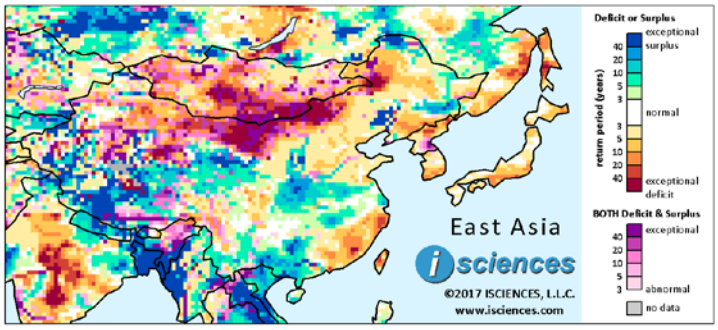
(It should be noted that forecast skill declines with longer lead times.)

East Asia

The 12-month forecast map for East Asia (right) indicates extreme to exceptional water deficit conditions in Mongolia and across the border into northern China. Moderate to severe deficits are forecast for a large block in southeastern China including Zhejiang, Fujian, Taiwan, and northern Guangdong, and, in Liaoning and North Korea.

Primarily moderate deficits are forecast in southern South Korea, and in eastern Hokkaido and southeastern Honshu, Japan.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018

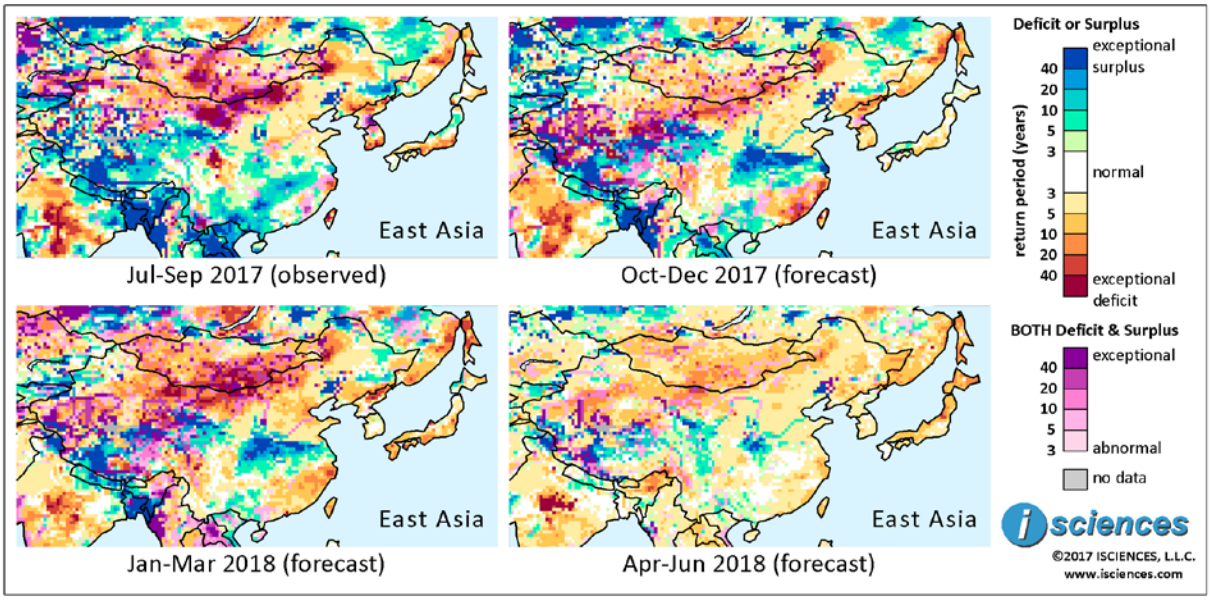


Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

Surpluses of varying severity are forecast for: the Han River (Hanjiang) watershed, an eastern tributary of the Yangtze; the Middle and Lower Yellow River (Huang He); Shanghai; northwestern Jiangxi; the western Pearl River (Zhujiang) watershed in the south and around the Gulf of Tonkin; Qinghai; Tibet; northeastern Jilin; and north of the Bohai Sea in far eastern Inner Mongolia.

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018



Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

Recent exceptional deficits in Mongolia and Inner Mongolia are expected to diminish somewhat in the near term – October through December – as will deficits on the Korean Peninsula and in Liaoning,

though severe deficits will persist in northern North Korea. Widespread severe to extreme deficits will emerge in Zhejiang, Fujian, Guangdong, and Taiwan. Exceptional deficits in northern Sichuan are expected to disappear, but moderate to severe deficits will emerge in western and eastern regions of the province.

Widespread intense surpluses are forecast for a vast stretch of the Upper and Middle Yangtze River through Shanghai, Jiangsu, Anhui, Hubei, Henan, and Shaanxi. Surpluses are expected to be exceptional in the Han River (Hanjiang) watershed. Severe surpluses will continue to emerge along the Middle and Lower Yellow River (Huang He). Surpluses in the western Pearl River watershed and around the Gulf of Tonkin are forecast to diminish somewhat. Intense surpluses will continue to emerge in eastern Qinghai while intense deficits are forecast in the west. Both surpluses and deficits are forecast for Tibet and Xinjiang as deficits emerge.

After December, severe to exceptional deficits are forecast to re-emerge across southern Mongolia and in China, reaching from Xinjiang through Inner Mongolia. The extent of extreme deficits in northern North Korea will increase, and deficits in southeastern China will diminish somewhat. Widespread surpluses will persist from Jiangsu through southern Shaanxi; surpluses along the Middle and Lower Yellow River will transition to conditions of both surplus and deficit as deficits emerge; and surpluses in the western Pearl River watershed will continue to diminish.

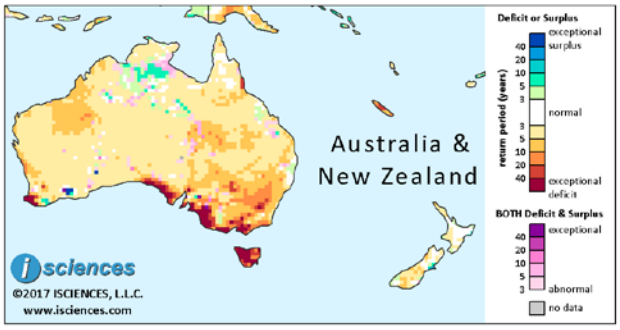
The forecast for the final months, April through June, indicates a similar pattern of water anomalies as in the prior three months but with diminished severity overall.

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

Australia & New Zealand

The 12-month map (right) indicates a forecast of exceptional deficits in the southwest tip of Western Australia and along the southern coast from South Australia through Victoria and into Tasmania. Moderate to extreme deficits are forecast for eastern Tasmania, New South Wales, inland Victoria, and New Caledonia.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018

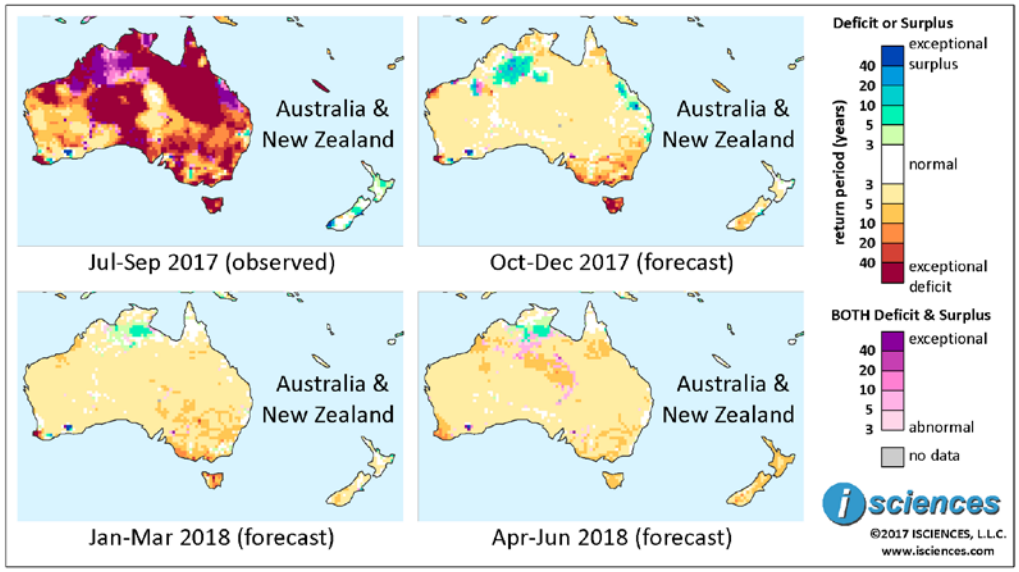


Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

Primarily moderate deficits are expected in southwestern Queensland and north-central Western Australia. Some mild surpluses are forecast in Northern Territory east of the Victoria River.

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: July 2017-June 2018



Based on observed data through September 2017 and forecasts issued September 24-30, 2017.

As is apparent in the time series above, exceptional deficits observed in recent months over much of Australia are forecast to diminish considerably in the near-term and through June 2018. Through December, however, exceptional deficits remain in the forecast for much of Tasmania, the southwest tip of Western Australia, and along a stretch of coast in northwestern WA near Cape Range. Moderate to extreme deficits are forecast from Adelaide through Victoria and into the eastern Murray-Darling Basin in New South Wales. Primarily moderate deficits are expected in New Caledonia and South Island, New Zealand.

Surpluses ranging from moderate to extreme are forecast for the Ord River Basin of Western Australia and Northern Territory; in northeastern Queensland surrounding Moranbah and also south of Rockhampton; and, Christchurch, New Zealand.

From January through March exceptional deficits are expected to persist in Busselton, WA. Exceptional deficits in Tasmania will nearly disappear but moderate to severe deficits will continue to emerge. Deficits in southeastern Australia will downgrade to primarily moderate, with some severe deficits along Victoria's coast. Aforementioned surpluses in the Ord River Basin will nearly disappear, but some moderate surpluses will emerge farther east surrounding Daly Waters, Northern Territory.

The forecast for the final months, April through June, indicates that deficits will diminish in Western Australia's southwestern tip, Tasmania, Victoria, and New South Wales.

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