Global Water Monitor & Forecast Watch List

July 14, 2017

For more information, contact:
Thomas M. Parris, President, 802-864-2999, parris@isciences.com

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

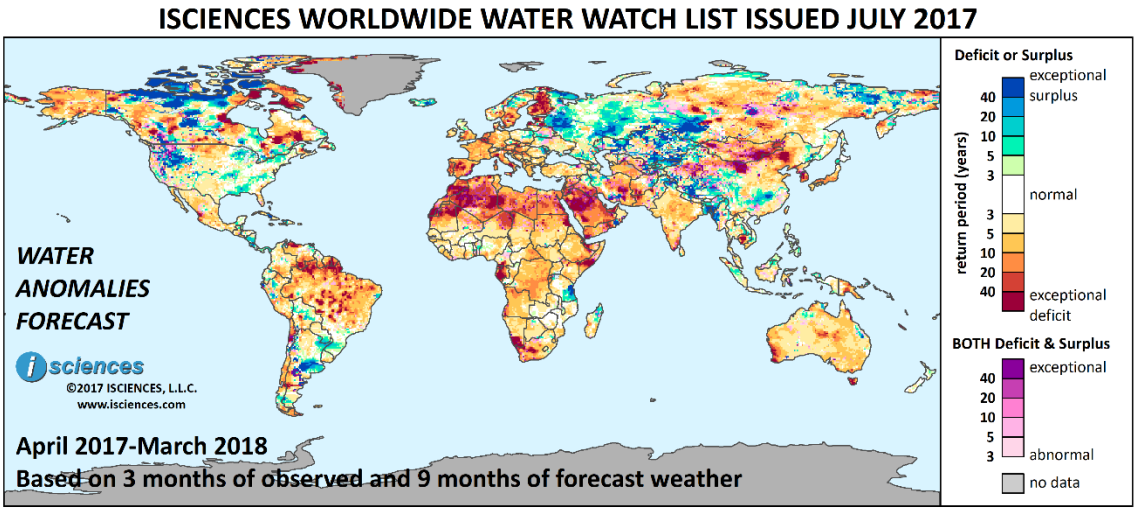
All maps have half-degree resolution and depict our composite water anomaly index, which is based on WSIM estimates of soil moisture, evapotranspiration deficit, runoff, and total blue water anomalies. Shades of red indicate deficits and shades of blue indicate surpluses. Since different variables are 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.

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 April 2017 and running through March 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: The near-term forecast through September shows a distribution pattern of water anomalies similar to the prior three months with some decrease in intensity. However, surpluses are forecast to increase in the central Gulf Coast. Beyond September water anomalies will continue to become less severe, though pockets of exceptional surplus will persist in Idaho and its neighbors. The forecast through March 2018 indicates the emergence of primarily moderate surpluses in many parts of the country.

Canada: Exceptional water surpluses in southern Ontario west of Toronto are forecast to persist through September, as are exceptional deficits in eastern Ontario and central Quebec. After September moderate drought conditions are expected to persist in northwest Ontario, northern Manitoba, and northern British Columbia. Recent exceptional surplus conditions in Manitoba west of Lake Winnipeg, and in northwestern Saskatchewan into Alberta are expected to continue throughout the forecast period into early 2018.

Mexico, Central America, and the Caribbean: Recent severe water deficits across Mexico and western Cuba are expected to diminish in the next few months, shifting toward the south and bringing moderate deficit conditions to Guatemala, El Salvador, Honduras, and western Nicaragua by October. Surplus conditions in southern Nicaragua and northern Costa Rica are forecast to subside after September.

South America: Recently observed conditions across the whole of South America are expected to persist through September with a slight decrease in the extent of exceptional water deficits in much of Brazil north of Rio de Janeiro. Surpluses in eastern Paraguay and southern Brazil should transition to near-normal conditions during this period, but exceptional surpluses are expected to persist in La Pampa and Buenos Aires Provinces in Argentina. After September conditions are forecast to improve across the continent though exceptional water deficits will persist in Amapá and northern Pará, Brazil and in nearby northern regions.

Europe: Water deficits will continue to dominate much of Europe through September but will diminish significantly thereafter. Through September, however, exceptional deficits will persist in Finland, Estonia, and many pockets of Western and Central Europe. Severe to exceptional deficits are expected along many rivers including the Danube, the Drava, the Rhine, the Rhône, and the Loire. Surpluses in Western Russia will persist through September but diminish in extent and severity except in Murmansk, where exceptional surpluses will continue to emerge. Exceptional surpluses are forecast for eastern Romania and Moldova which will persist through December.

Africa: The extent of exceptional water deficits is expected to diminish considerably after September, though deficits of varying severity will remain in the forecast and will likely be more severe in the northern half of the continent. In the near-term, July through September, severe to exceptional deficits are forecast in the desert regions of the northern nations, Algeria, Libya, Egypt, northern Niger, and northern Sudan; and also in Equatorial Guinea and Gabon. Exceptional deficits will retreat in southern Namibia during this period but will emerge in the northeastern portion of the country, eastward into neighboring Botswana and across the border into South Africa. Exceptional surpluses are forecast to continue in eastern Tanzania though September but will retreat to the coast by December.

Middle East: Widespread intense water deficits are forecast for the Arabian Peninsula through September, gradually diminishing in extent and severity thereafter. From July through September exceptional deficits will persist across central Saudi Arabia, in southern Iraq, and in Lebanon, and severe to extreme deficits are forecast for Qatar, United Arab Emirates, Yemen, Iraq west of the Euphrates, and North Khorasan, Iran. Surpluses in Fars and near Tehran, Iran will transition to conditions of both deficit and surplus, receding by early next year. Surpluses along the northern Iran/Iraq border will persist through December, and a pocket of exceptional surplus in central Oman will persist through March 2018.

Central Asia and Russia: In Russia large pockets of exceptional surplus conditions are forecast for the Volga River Basin and from the Lower Ob River to the Tom River, persisting through March 2018. Deficits will continue to emerge in much of eastern Russia through March, though they are not expected to reach exceptional severity beyond September. Moderate to severe surpluses will emerge from the Ural Mountains to the western edge of the Central Siberian Plateau from October through March. Surpluses will persist in many parts of Kazakhstan and throughout Kyrgyzstan. Moderate to severe deficits are forecast for Turkmenistan and Uzbekistan through December, diminishing thereafter.

South Asia: The forecast through September indicates the emergence of moderate to extreme water deficits throughout much of India, which may be most intense from Madhya Pradesh to Odisha, and from southern Maharashtra down through Karnataka into Tamil Nadu. Severe to exceptional deficits are expected to persist in southwestern Afghanistan. Surpluses are forecast east of Kabul, Afghanistan, along the Indus River north of Islamabad, northeastern Jammu and Kashmir, along the Gandaki River in Nepal, and in Bangladesh. From October through December primarily moderate deficits are forecast for India's northern half, and near-normal conditions in the south. In early 2018 intense deficits may develop in Gujarat and Madhya Pradesh.

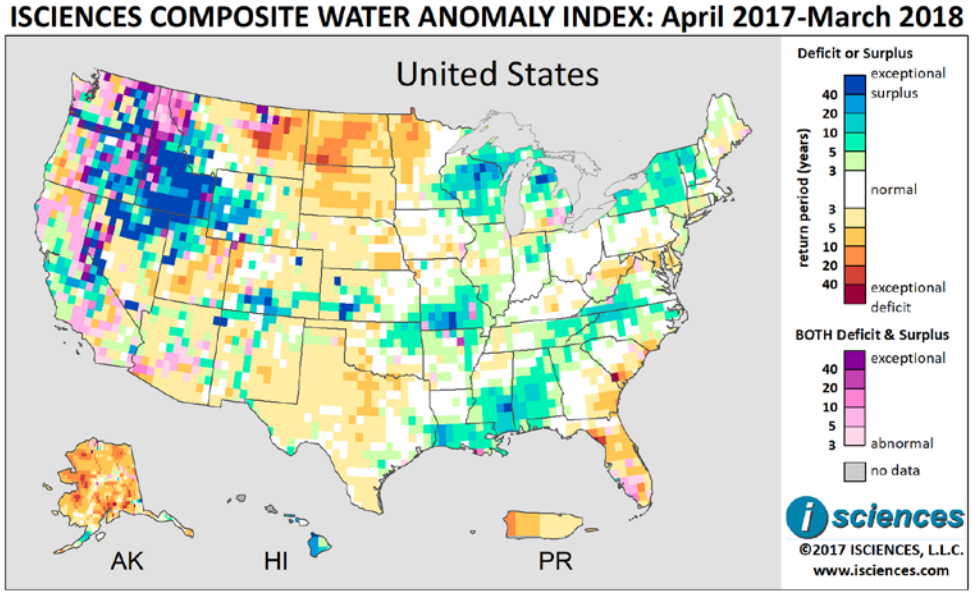
Southeast Asia and the Pacific: The July through September forecast shows the near absence of widespread surpluses observed in prior months. However, exceptional surpluses are forecast for western Myanmar; northern Prachuap Khiri Khan Province, Thailand; the extreme southeastern region of Sulawesi; and Flores Island in Indonesia. Severe to exceptional deficits are indicated in much of Cambodia, in Vietnam's Mekong Delta, and in central Papua New Guinea. In the October-December timeframe moderate deficits are indicated in many parts of the region, and thereafter deficits in Southeast Asia may intensity.

East Asia: Recent widespread exceptional deficits in Mongolia into northeastern China, around the Bohai Sea, and on the Korean Peninsula are forecast to moderate. Severe to exceptional deficits will persist in western Inner Mongolia through early 2018, joined by a broad band of intense deficits that will develop across southern Mongolia westward through central Xinjiang from September on. Moderate to severe deficits will emerge July through September in northeast China, trailing southwest into eastern Sichuan, and in southern Yunnan. Severe to exceptional surpluses are forecast for the southern Yangtze River Basin through September, moderating thereafter.

Australia: Widespread exceptional water deficits from Northern Territory into Queensland are expected to dissipate. However, intense deficit conditions will persist through September in the southwestern extents of Western Australia, Darwin, Tasmania, coastal Victoria into New South Wales, and New Caledonia, and may persist into early 2018 from Perth south. Observed surpluses in the northwest and eastern Queensland will moderate but persist through December.

Watch List: Regional Details

United States



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

The 12-month forecast through March 2018 (above) indicates a pattern of water conditions very similar to the 12-month forecast reported last month with one noticeable difference: current projections show the presence of significant water surpluses in southern Mississippi and in Alabama where normal conditions were previously forecast.

Widespread and exceptional surpluses are forecast throughout Idaho and radiating outward from there to pockets of neighboring states such as Nevada, Utah, Wyoming, Oregon, and Washington. Both deficits and surpluses are forecast for the Pacific Northwest and California, and some pockets of exceptional surplus along the central border of California and Nevada. Moving eastward, surpluses are forecast for southern Colorado, southwestern Kansas, northwestern Oklahoma, and southern Missouri, where surpluses may be especially intense. Surpluses are also forecast for: nearly all of Wisconsin, which may reach extreme to exceptional severity; Michigan's Upper Peninsula and the northern half of Michigan's Lower Peninsula; New York; and Vermont. Aforementioned surplus conditions in Mississippi and Alabama join a trail of water surpluses forecast from southern Louisiana reaching northeast through Mississippi, Alabama, eastern Tennessee, and western Virginia and West Virginia, which could include pockets of extreme to exceptional surplus.

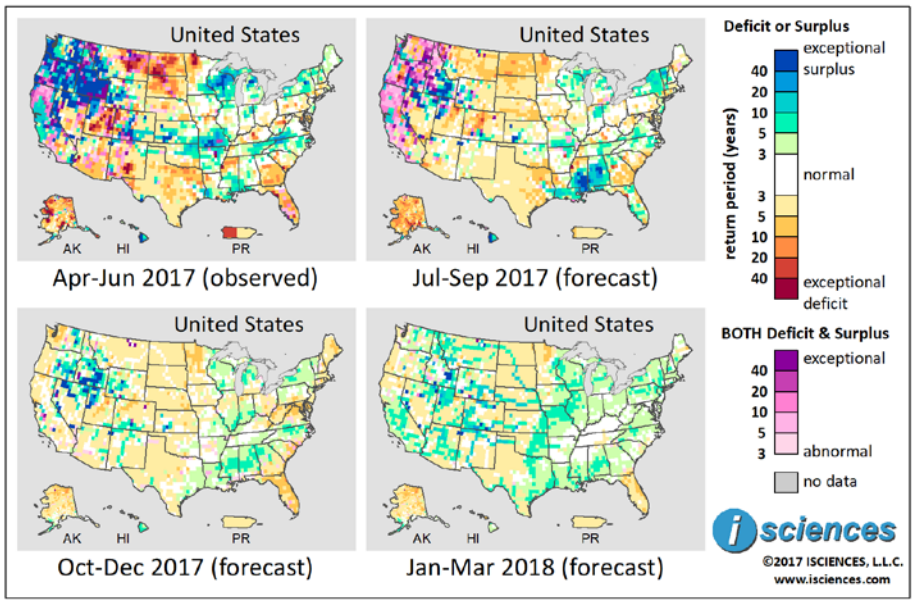
Severe to exceptional water deficits are forecast for parts of the Northern Plains including eastern Montana, the Dakotas, and western Minnesota. Deficits are also forecast for Florida and coastal regions of Georgia and South Carolina.

Outside the contiguous US, deficits are forecast for Alaska and Puerto Rico, and surpluses are forecast for Hawaii.

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

The near-term forecast (July through September) shows a distribution pattern of water anomalies similar to the prior three months with some decrease in the intensity of surpluses in Idaho and the Northwest, and in the intensity of deficits in Montana, the Dakotas, and western Minnesota. Surpluses are forecast to increase in extent and severity in southern Louisiana, Mississippi, and Alabama. Florida is expected to continue a transition from deficit to normal or moderate surplus conditions.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018



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

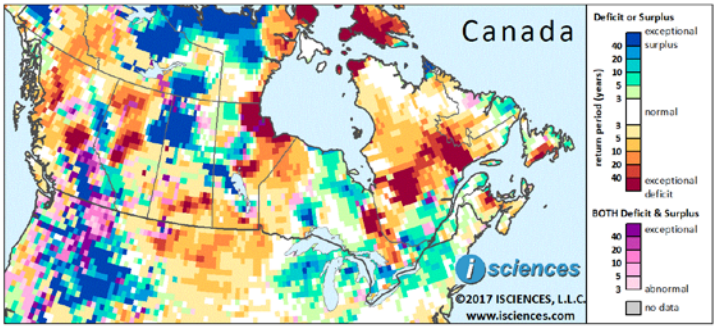
Beyond September both surplus and deficit water anomalies are projected to become less severe, though moderate deficits may re-emerge in Florida and pockets of exceptional surplus will persist in Idaho and neighboring states. The forecast for the latter months – January through March – indicates the emergence of primarily moderate surpluses in many parts of the country.

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

Canada

The 12-month outlook for Canada through March 2018 (right) indicates exceptional deficits in a wide band through the center of Quebec, in eastern Ontario, and in northeastern Manitoba along Hudson Bay. Moderate to exceptional deficits are forecast in central and northwestern regions of Alberta and British Columbia, and southern Saskatchewan and Manitoba.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018

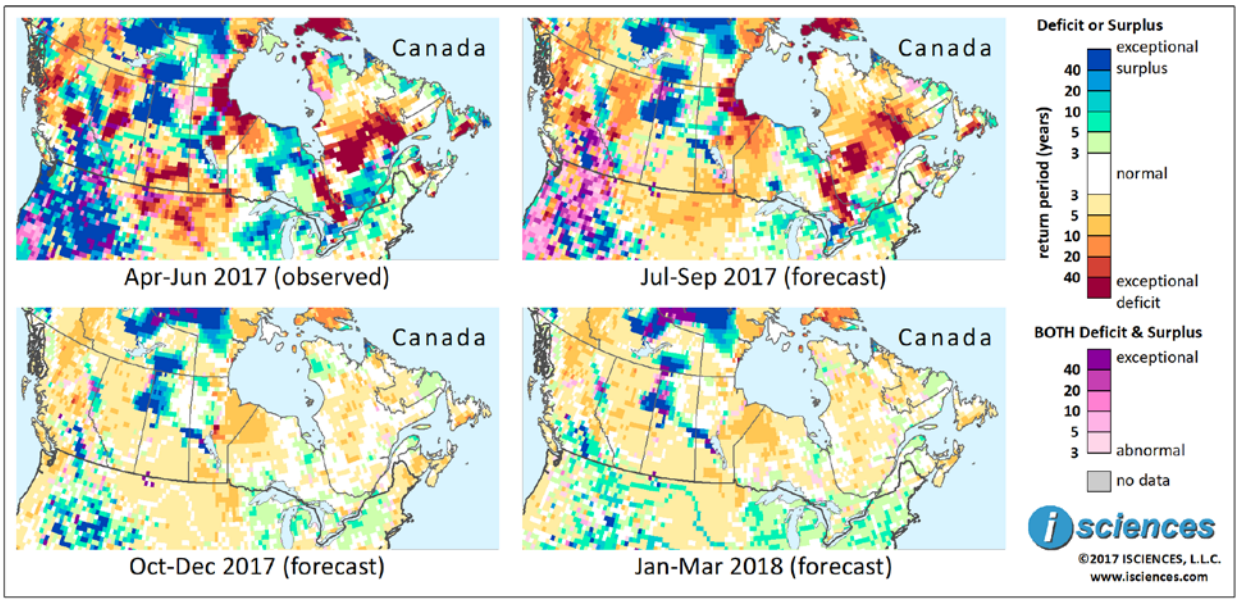


Based on observed data through June 2017 and forecasts issued June 24-30, 2017.

Exceptional surpluses are forecast for central Manitoba west of Lake Winnipeg; a large block of northwestern Saskatchewan into Alberta; along the central border of Alberta and British Columbia, and in southeastern BC.

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018



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

The near-term forecast – July through September – indicates the persistence of extreme to exceptional water deficits in central Quebec, eastern Ontario, northeastern Manitoba, and northern Alberta and British Columbia. Exceptional surpluses will persist in Manitoba west of Lake Winnipeg, from northwestern Saskatchewan into Alberta, and in southern Ontario west of Toronto. In general,

conditions are expected to become less extreme with longer lead times (October through March), with near normal conditions for much of Ontario and Quebec.

However moderate drought conditions are expected to persist in northern British Columbia, northern Manitoba, and northwest Ontario. Pockets of exceptional surplus will persist in central Manitoba west of Lake Winnipeg; northwestern Saskatchewan into Alberta; and southeastern British Columbia.

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

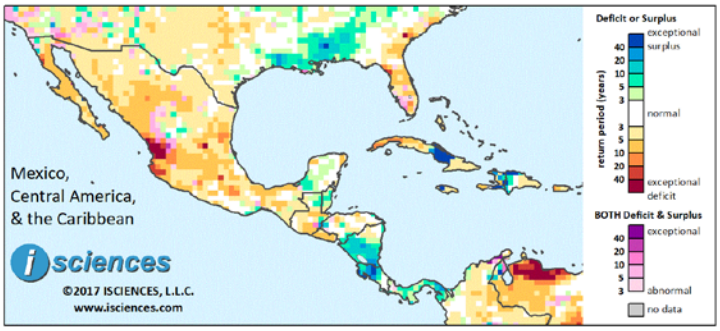
Mexico, Central America, and the Caribbean

The 12-month forecast ending in March 2018 (right) generally shows moderate drought throughout much of Mexico, El Salvador, portions of Guatemala, western Cuba, and western Puerto Rico. Deficits are expected to be stronger in Nayarit on Mexico's central Pacific coast.

Surpluses are forecast for eastern Haiti, southern Nicaragua, northern Costa Rica, and portions of Panama, with extreme to exceptional surpluses in Costa Rica.

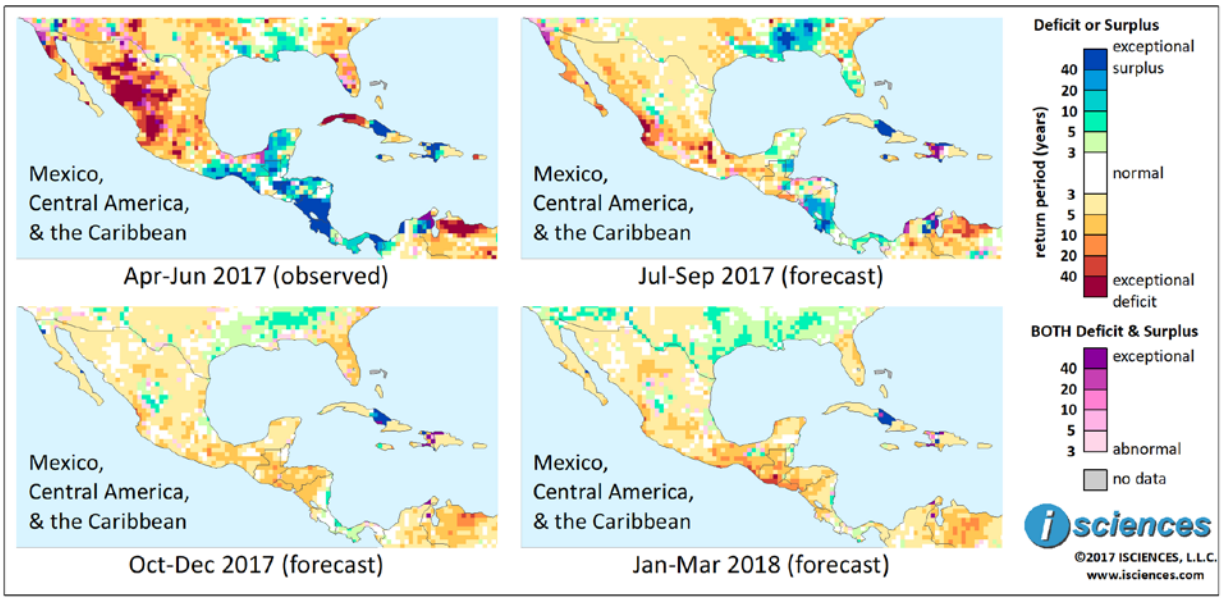
The 3-month maps (below) show the evolving conditions in more detail.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018



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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018



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

While the July through September forecast shows a significant retreat of intense deficits in Mexico and western Cuba, exceptional deficits are forecast along Mexico's central Pacific coast in Nayarit and Puerto Vallarta, and in pockets of Puebla and near Mexico City. Conditions in Haiti are forecast to transition from surplus to both deficit and surplus. Surpluses will diminish in southern Mexico and Central America, transitioning to deficits in southern Mexico, southern Guatemala, and El Salvador.

Beyond September deficits in Mexico will continue to diminish to primarily mild, but moderate deficits will emerge throughout much of Central America and may increase in intensity in the later months.

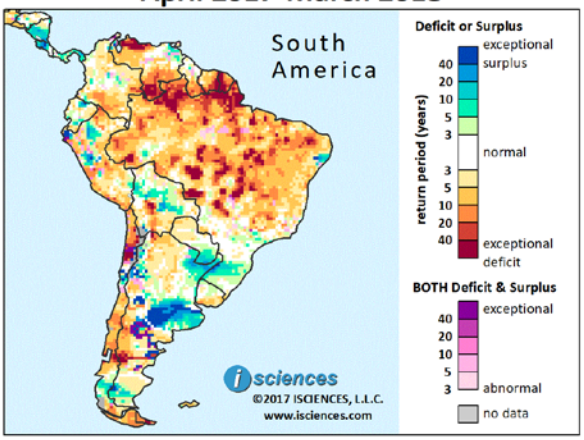
(It should be noted that forecast skill declines with longer lead times.)

South America

Water deficits are forecast for much of Brazil in the 12-month forecast through March 2018, with scattered pockets of exceptional deficits. Deficits reaching exceptional severity are also forecast for: northwest and southern Venezuela; Suriname; French Guiana; northern Chile; near the Gulf of Corcovado; and the Chubut River in Argentina.

Exceptional surpluses are expected in Mendoza, La Pampa, and Buenos Aries Provinces in Argentina; and surpluses of slightly lesser severity are forecast for the border area between Argentina, Paraguay and Brazil.

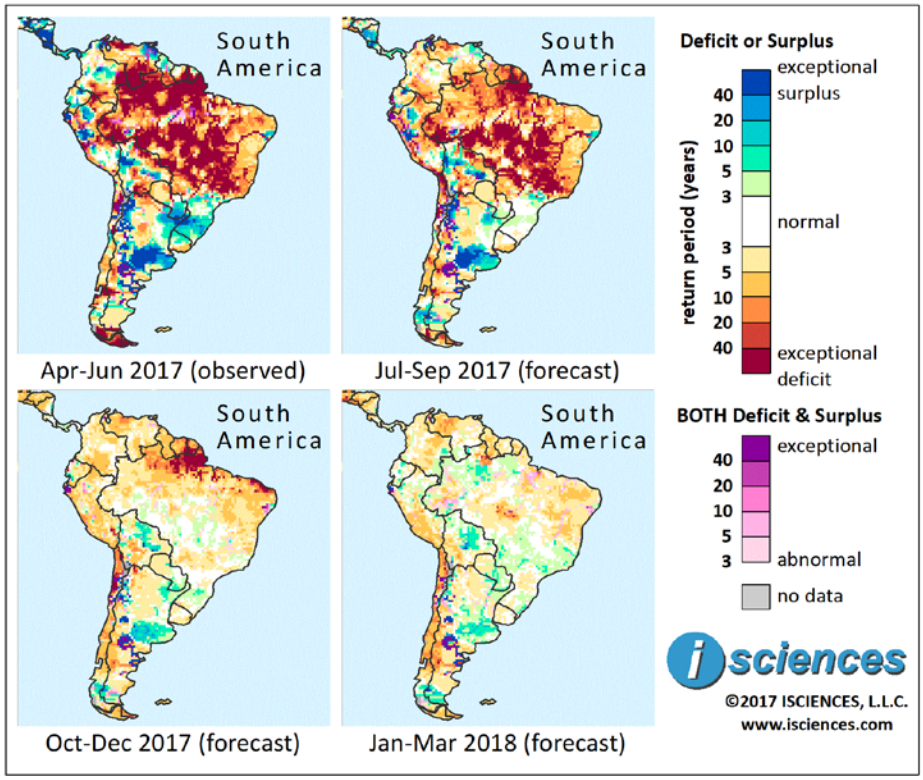
ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018



Based on observed data through June 2017 and forecasts issued June 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: April 2017-March 2018



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

The forecast map for July through September shows the persistence of widespread deficits across Brazil though the extent of exceptional deficits is expected to decrease slightly. Severe to exceptional deficits are forecast for: Guyana, Suriname, French Guiana, pockets of northwestern and southern Venezuela, a path from western Peru down through Chile, from Cochabamba southward in Bolivia, and pockets in Tierra del Fuego.

Surplus conditions in eastern Paraguay, southern Brazil, and northern Uruguay will transition to near-normal conditions during this period. Exceptional surpluses are forecast to persist in La Pampa and Buenos Aires Provinces in Argentina, and a pocket of extreme surpluses will persist in northern Argentina near Paraguay.

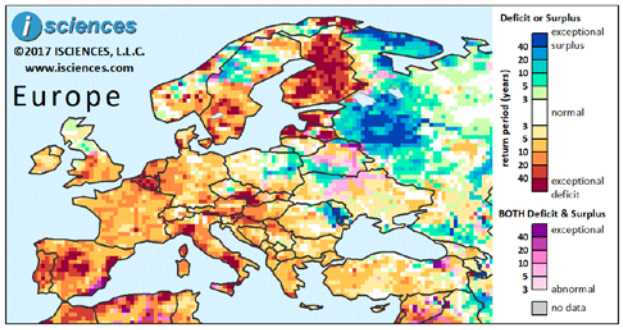
In general, conditions are forecast to return to near normal from October through March. Exceptional drought in Brazil is forecast to recede from south to north, and most regions with exceptional surpluses will improve to moderate surpluses. From October through December, however, exceptional deficit conditions will persist in: Amapá and northern Pará, Brazil; French Guiana; scattered along the northern coast of Brazil; and, northern Chile. Deficits ranging from severe to exceptional are forecast in Roraima, Brazil and Suriname from October through December. (It should be noted that forecast skill declines with longer lead times.)

Europe

The 12-month forecast through March 2018 indicates a predominance of water deficits of varying severity in Western, Central, Northern Europe, and the Baltics. Deficits are expected to be exceptional throughout Finland, in central Spain, Belgium, and in pockets throughout Europe.

Exceptional water surpluses are forecast in western Russia, and eastern Romania and Moldova. Surpluses of lesser severity are forecast in northeastern Poland, Kaliningrad, southern Belarus, and northwestern Ukraine.

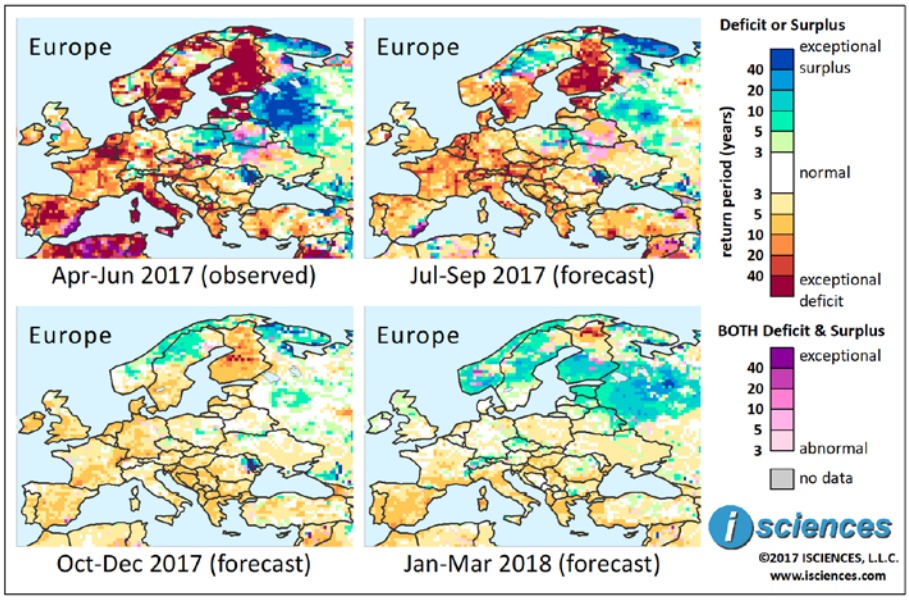
ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018



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

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018



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

As is clear in the map progression, water deficits will continue to dominate much of Europe through September but are expected to diminish significantly thereafter, leaving moderate deficits or near-normal conditions. The extent of exceptional water deficits will begin to diminish somewhat from July through September, though exceptional deficits will persist in Finland, Estonia, and in many pockets of Western and Central Europe. Severe to exceptional deficits are expected along many rivers including the Danube, the Drava, the Rhine, the Rhône, and the Loire. Exceptional surpluses are forecast for eastern

Romania and Moldova, and surpluses of generally lesser severity will persist in eastern Poland. Surpluses in Western Russia will persist but diminish in extent and severity except in Murmansk, where exceptional surpluses will continue to emerge. Surpluses will also emerge in northern Sweden.

After September, both deficits and surpluses throughout Europe will diminish significantly in most regions. The forecast for the final months of the forecast period – January 2018 through March 2018 – indicates the widespread emergence of surpluses in Norway, Sweden, southern Finland, and Western Russia.

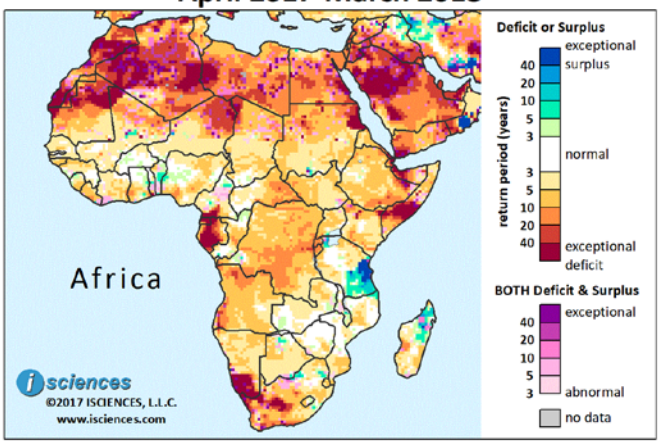
(It should be noted that forecast skill declines with longer lead times.)

Africa

The 12-month forecast (right) indicates widespread severe to exceptional deficits across northern Africa, Gabon, western Somaliland, southern Somalia, and southern Namibia extending into western South Africa. Deficits of lesser severity are forecast for many other parts of Africa.

Exceptional surpluses are indicated for eastern Tanzania and more moderate ones for northern Madagascar.

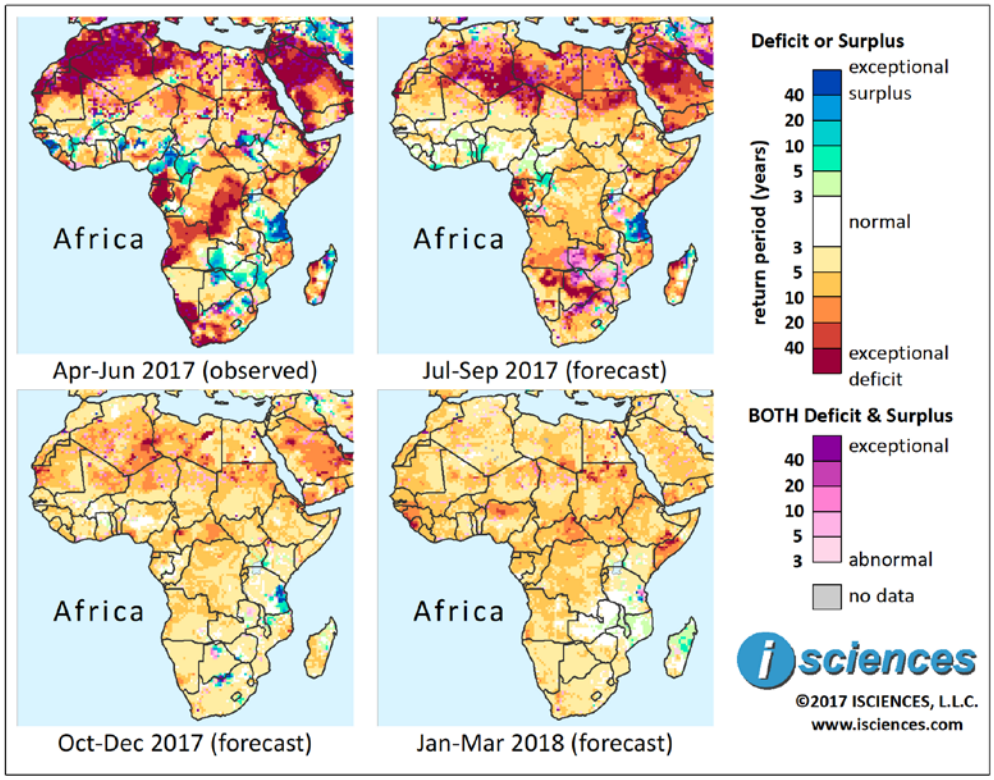
ISCIENCES COMPOSITE WATER ANOMALY INDEX:
April 2017-March 2018



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

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018



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

What is most apparent in the map progression above is that the extent of exceptional water deficits forecast through the first six months – April through September – is expected to diminish considerably thereafter. In the near-term though, severe to exceptional deficit conditions are forecast to continue July through September in the desert regions of the northern nations, Algeria, Libya, Egypt, northern Niger, and northern Sudan. Severe to exceptional deficits are indicated for Equatorial Guinea and Gabon. Exceptional deficits will retreat in southern Namibia but will emerge in the northeastern portion of the country, eastward into neighboring Botswana and across the border into South Africa. Moderate to extreme deficits are forecast for Angola, Democratic Republic of the Congo, central Zambia, Ethiopia, Somalia, northern Mozambique, and western and southern Madagascar.

Exceptional surpluses are forecast to continue in eastern Tanzania though September but will retreat to the coast by December. Prior surpluses in western Zambia and Zimbabwe will transition to conditions of both surplus and deficit July through September as deficits emerge. Likewise, an area around Mahikeng in northern South Africa will also transition to both surplus and deficit, but is forecast to return to surplus conditions from October through December. Moderate surplus conditions are indicated July through September in Benin, central Togo, and northern Republic of the Congo.

As mentioned previously, intense deficit conditions will ease over most of the continent from October 2017 through March 2018, with pockets of extreme to exceptional deficits indicated across the northern nations, and primarily moderate deficits elsewhere.

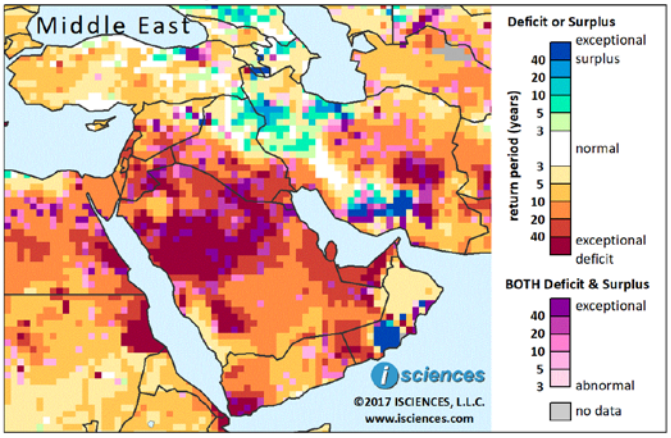
The forecast for the final quarter – January through March 2018 – indicates a slight uptick in the intensity of deficits in a band across the center of the continent from Guinea to Somalia, and slight downturn in deficits across the north.

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

Middle East

For the 12-month period ending March 2018 (right), the Arabian Peninsula is forecast to experience severe to exceptional deficits. The most intense conditions are expected across central Saudi Arabia, southern Iraq and Kuwait, Qatar, United Arab Emirates, in Yemen west of Aden, and in the border region of Yemen and Oman. Deficits are also forecast for the Kerman region in Iran.

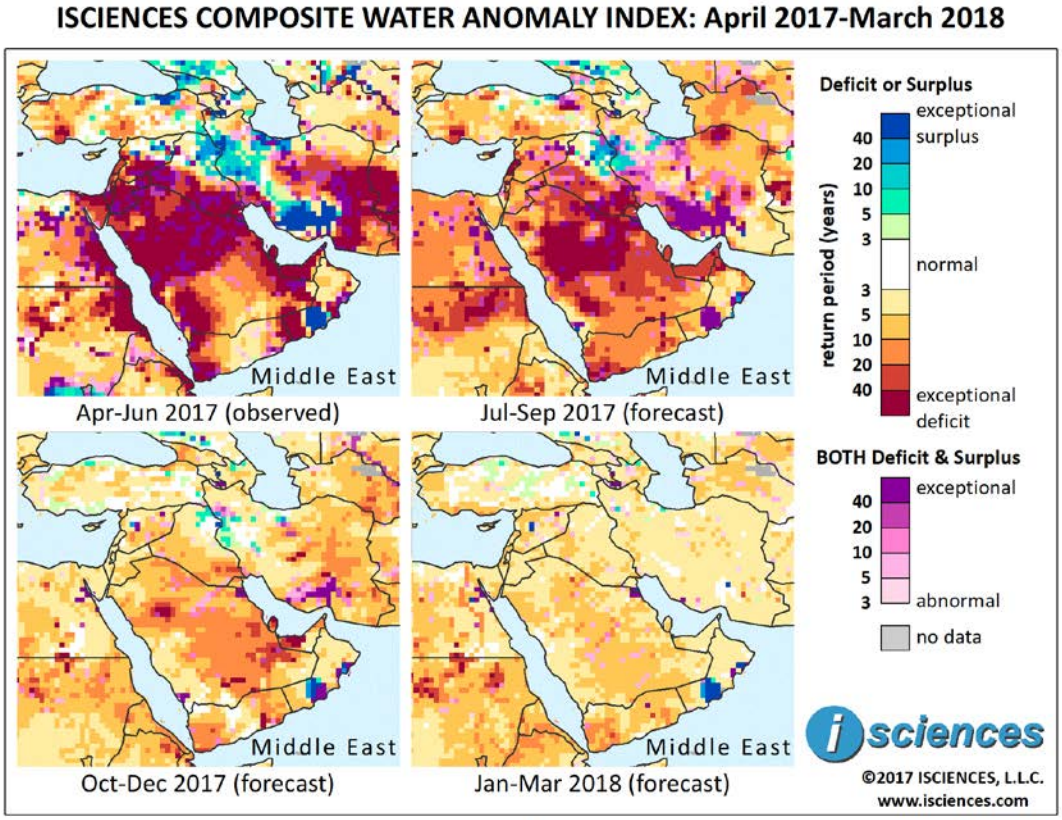
ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018



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

Exceptional surpluses are indicated for south-central Oman, and northern Hormozgan province in Iran, extending across southern Fars. A region of western Iran extending from Tehran into northern Iraq may experience moderate surpluses.

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



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

The extent of exceptional deficits in the Middle East is forecast to diminish somewhat July through September, though exceptional deficits will persist in a wide band across central Saudi Arabia, in southern Iraq, and in all of Lebanon. Severe deficits will emerge throughout much of Yemen and more intense deficits – extreme to exceptional – will persist in the southwestern region of the country. Extreme deficits will persist in Qatar, United Arab Emirates, in Iraq west of the Euphrates, and will emerge in North Khorasan, Iran. Primarily moderate deficits will emerge in northern Syria and central and eastern Turkey, joining more severe deficits already present in Antalya and north of Ankara and Adana. Prior observed surpluses in south-central Iran near the Persian Gulf and from Tehran to the southern Iraqi border will transition to conditions of both deficit and surplus. Surpluses along the northern borders of the two countries are expected to persist.

From October through December deficits across the Middle East are forecast to diminish, leaving near-normal conditions in Turkey, along the northern border of Iran and Iraq, and central Yemen; moderate to extreme conditions in eastern Iran, Iraq west of the Euphrates, and southwestern and eastern Yemen; and extreme to exceptional deficits in southern Saudi Arabia, Qatar, and western UAE.

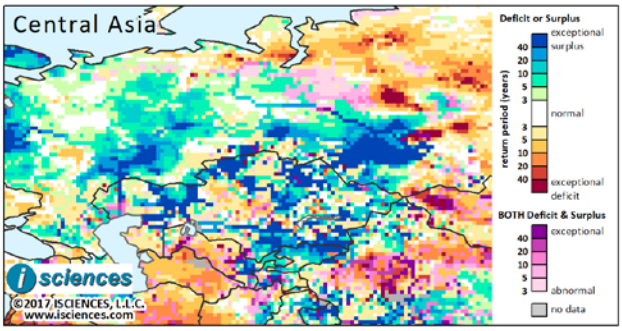
The forecast map for the final quarter, January2018 through March 2018, indicates moderate to severe deficits in Yemen, moderate deficits in Saudi Arabia, and mild deficit to normal conditions elsewhere in the region.

(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 anomalies in Russia reaching exceptional severity, with large pockets of surplus in the western half and deficits stretching east across the Siberian Plateau to the Kamchatka Peninsula. Moderate deficits are forecast for Turkmenistan extending into Uzbekistan.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018

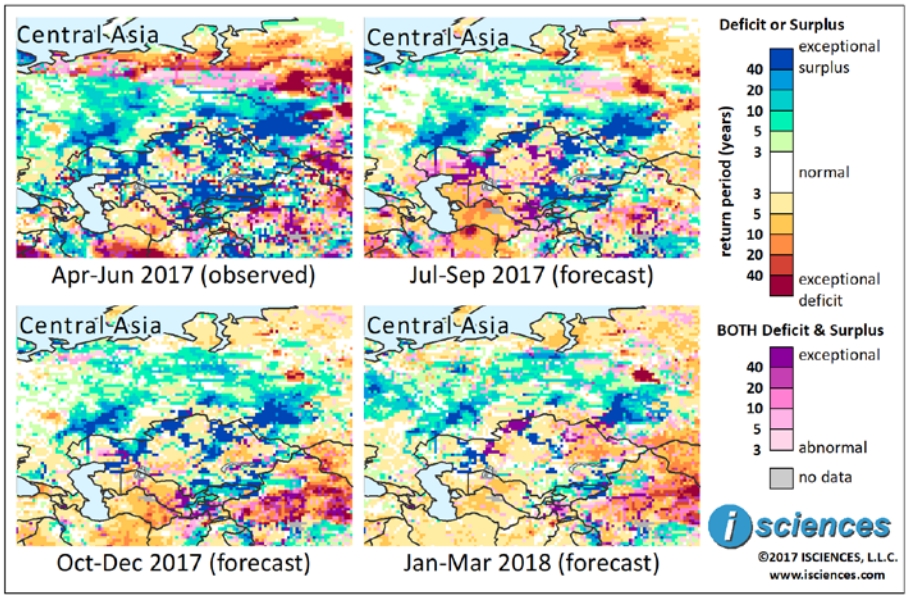


Based on observed data through June 2017 and forecasts issued June 24-30, 2017.

Pockets of surplus conditions include the Upper Ob and the Volga River Basins in Russia. Extreme surpluses are indicated in northern, western, and southern Kazakhstan, as well as Kyrgyzstan and Tajikistan.

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018



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

The near-term forecast (July through September) indicates the persistence of large pockets of exceptional surplus in Russia in the Volga River Basin and west of the Lower Ob River to beyond the Tom River in eastern Novosibirsk Oblast, while exceptional surpluses along the Middle Ob recede. Farther north, a band of intense deficits will persist across the southern Yamal Peninsula and eastward but conditions southwest along the Pechora Sea are expected to transition from deficit to moderate surplus.

Exceptional surpluses are expected to persist in Kazakhstan in northern Kostany, central Karagandy, east of Astana, and in southern Kazakhstan. Surpluses in Aktobe Region will begin to transition to both surpluses and deficits as deficits emerge. Likewise, both deficit and surplus conditions are forecast for the area west of Lake Tengiz in the center of the country. Moderate to severe deficits are expected to emerge throughout Turkmenistan and into Uzbekistan. Surpluses are forecast for Kyrgyzstan.

During the October through December forecast and extending into the January to March 2018 forecast period, deficits will continue to emerge in much of eastern Russia, though they are not expected to reach exceptional severity. Exceptional surpluses are expected to persist in the Volga Basin and between the Upper Ob and Tom Rivers. Moderate to severe surpluses will emerge from the Ural Mountains to the western edge of the Central Siberian Plateau.

Moderate to severe deficits are forecast for eastern Turkmenistan and Uzbekistan through December, diminishing thereafter. In Kazakhstan aforementioned regions of surplus will continue to exibit surplus conditions through December, along with regions that had begun to transition to deficit. In the later months – January through March – surpluses in Kazakhstan will diminish.

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

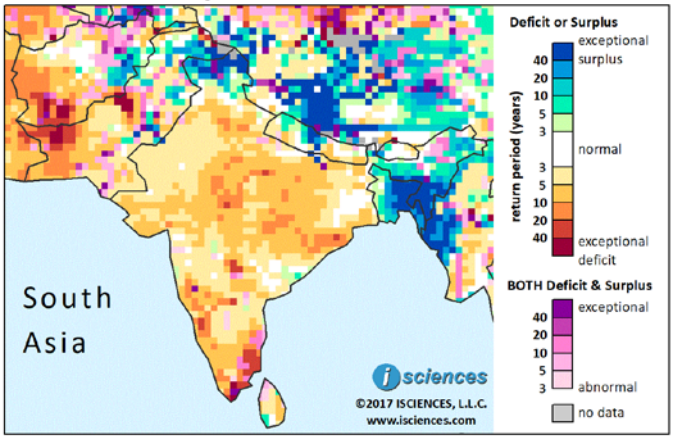
South Asia

South Asia is forecast to experience moderate to severe deficit conditions across much of the region over the 12-month forecast period (right). The most intense deficits will be in western Afghanistan and Pakistan, and in eastern Tamil Nadu, India.

Conditions of exceptional surplus are forecast in Jammu and Kashmir, central Nepal, and in Meghalaya extending into eastern Bangladesh.

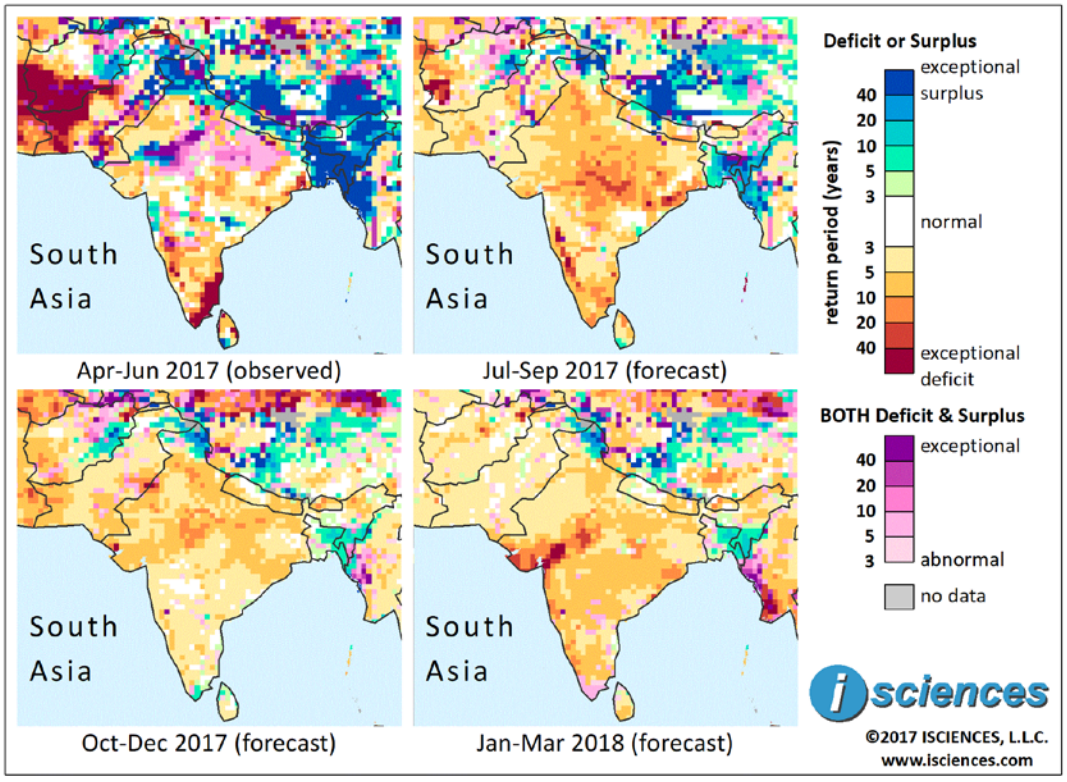
The 3-month composites (below) show the evolving conditions.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018



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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018



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

The forecast for July through September indicates a retreat of exceptional deficits in western Afghanistan and Pakistan and the widespread emergence of moderate to extreme deficits throughout

much of India. Severe to extreme deficits are expected in the center of the country in Madhya Pradesh, extending eastward into Chhattisgarh and southern Jharkhand, as well as Odisha, where small pockets of exceptional deficits may emerge. Likewise, deficits of similar intensity trace a path from southern Maharashtra down through Karnataka, veering eastward into Tamil Nadu. Moderate deficits will emerge across India's border into Nepal. Severe to exceptional deficits are expected to persist in southwestern Afghanistan.

Surpluses are forecast to persist east of Kabul, Afghanistan and along the Indus River in Pakistan north of Islamabad. Exceptional surplus conditions are forecast in northeastern Jammu and Kashmir and along the Gandaki River in central Nepal. India's Arunachal Pradesh and Assam will generally transition out of surplus, as will Bhutan. Observed surpluses in western Bangladesh and Tripura in the east, as well as in Manipur and Mizoram, India, will diminish in intensity, while exceptional surpluses will persist in central Bangladesh.

The forecast for October through December indicates primarily moderate deficits in India's northern half, near-normal conditions in the south, and a general moderating of aforementioned anomalous water conditions elsewhere in South Asia. Severe deficits may emerge in central Bhutan.

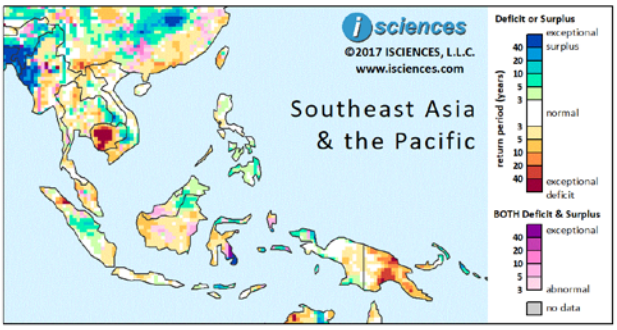
The forecast for the final period, January through March 2018, indicates severe to exceptional deficit conditions developing in southern Gujarat and into Madhya Pradesh, and moderate deficits re-emerging in India's vast southern half.

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

Southeast Asia and the Pacific

The 12-month composite (right) indicates a large pocket of exceptional water deficits in central Cambodia and a small pocket near Medan in northern Sumatra. Deficits reaching extreme severity are forecast for central Papua New Guinea.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018

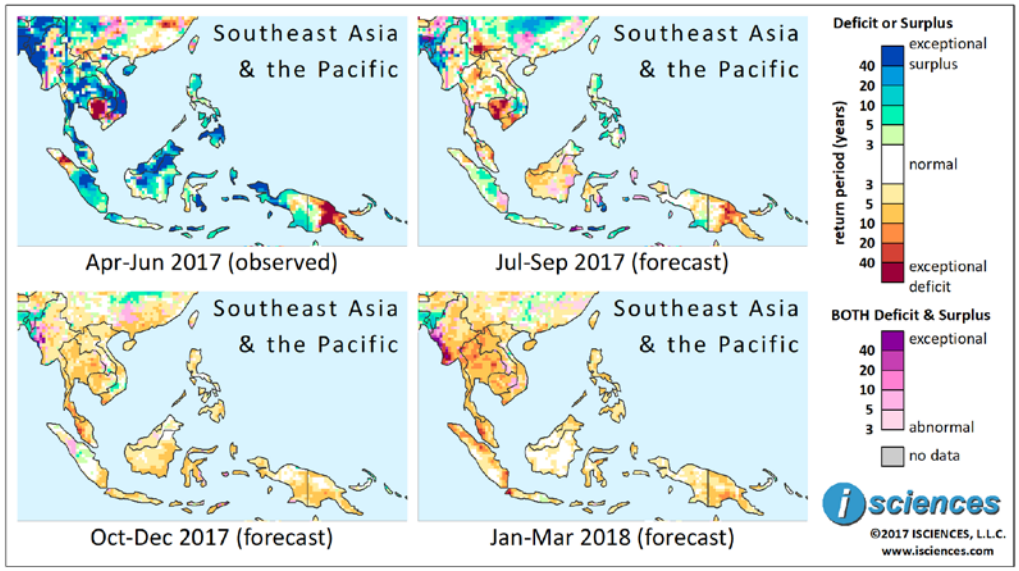


Based on observed data through June 2017 and forecasts issued June 24-30, 2017.

Exceptional surpluses are indicated for western Myanmar and the extreme southeastern region of Sulawesi. More moderate surpluses are forecast for Flores Island, Indonesia; southeast Laos; eastern Cambodia into Vietnam; the northern stretch of the Salween River in eastern Myanmar; and Riau, Sumatra.

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018



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

The July through September forecast map shows the near absence of widespread exceptional surpluses observed in prior months. However, exceptional surpluses are in the forecast for western Myanmar; northern Prachuap Khiri Khan Province, Thailand; the extreme southeastern region of Sulawesi; and Flores Island in Indonesia. Surpluses of lesser severity are forecast for Vietnam east of Cambodia, parts of the Philippines, central Sumatra, western Java, the island of Timor, and southeastern Papua, Indonesia. Severe to exceptional deficits are indicated in much of Cambodia, in Vietnam's Mekong Delta, and in central Papua New Guinea. Scattered moderate to extreme deficits will emerge in some parts of Thailand, Malaysia, and Borneo.

Conditions evolve in the October-December timeframe with moderate deficits indicated in many parts of the region. Severe to exceptional deficits in Cambodia and in the Mekong Delta will downgrade to moderate during this period, and primarily moderate deficits will emerge across Thailand, on the Malaysian Peninsula, and scattered throughout Indonesia. Papua New Guinea will transition to near-normal conditions in the north with moderate deficits in the south.

Deficits may intensify in Southeast Asia in the Jan-Mar 2018 period.

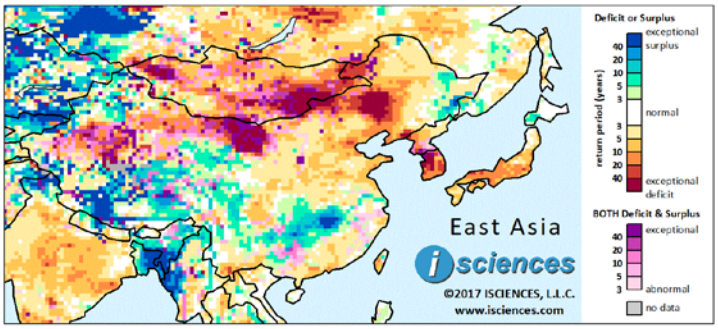
(It should be noted that forecast skill declines with longer lead times.)

East Asia

The 12-month forecast map for East Asia (right) indicates extreme to exceptional water deficit conditions in Mongolia, Inner Mongolia and northeastern China, and South Korea. Moderate to severe deficit conditions are expected from northern Gansu Province extending into Xinjiang, and in southern Yunnan, and Honshu, Japan.

Surpluses are forecast from the mouth of the Yangtze River through northwest Jiangxi, Hubei, Hunan, and Guizhou which may reach exceptional severity. Surpluses are also forecast in Tibet.

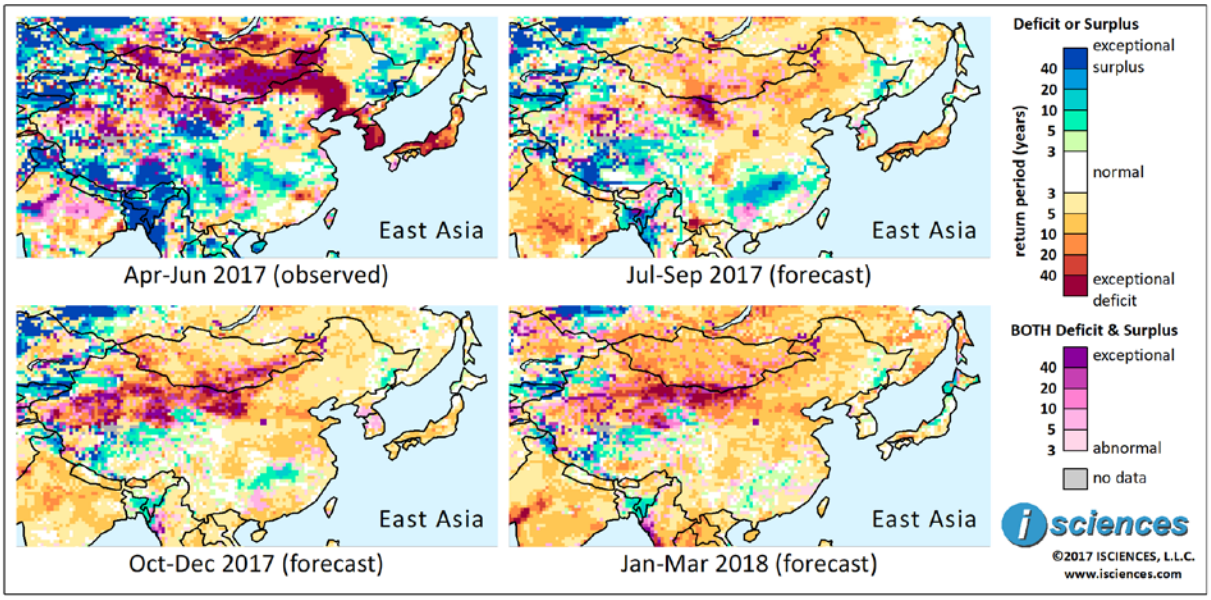
ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018



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

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018



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

Recent exceptional deficits in Mongolia into northeastern China, around the Bohai Sea, and on the Korean Peninsula are forecast to moderate over the coming months, but severe to exceptional deficits will persist in western Inner Mongolia. Moderate to severe deficits will emerge in northeast China, trailing southwest into eastern Sichuan, and in southern Yunnan. Deficits on Honshu, Japan will moderate but persist.

Observed surpluses along the Yellow River are expected to normalize or transition to mild deficit. From July through September severe to exceptional surpluses are forecast for the southern Yangtze River Basin, which will moderate thereafter.

Western China is expected to see continued mixed conditions with water surpluses continuing but moderating across western Tibet. To the north, however, severe to exceptional deficits are forecast to develop over a broad region stretching from southern Mongolia, through western Inner Mongolia, across northern Gansu, and into central Xinjiang. These deficits are expected to intensify into December and the early part of 2018.

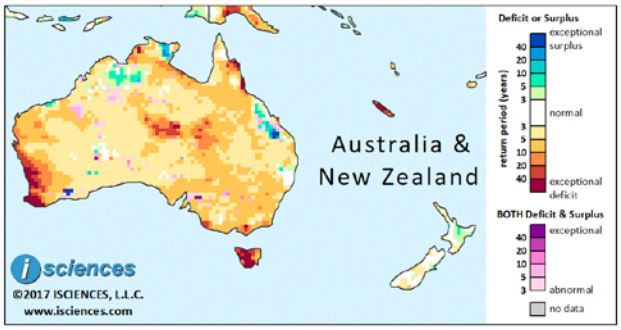
The later part of the forecast period (bottom right frame) indicates the development of moderate deficit conditions across the whole of Mongolia, northeastern China, and the eastern plains.

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

Australia & New Zealand

The 12-month composite map (right) indicates a forecast of severe to exceptional deficits in the far west reaches of Western Australia, including Perth; most of Tasmania; the center of the country south of the MacDonnell Ranges; and New Caledonia. Moderate deficits are forecast for much of Australia's eastern half.

ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018

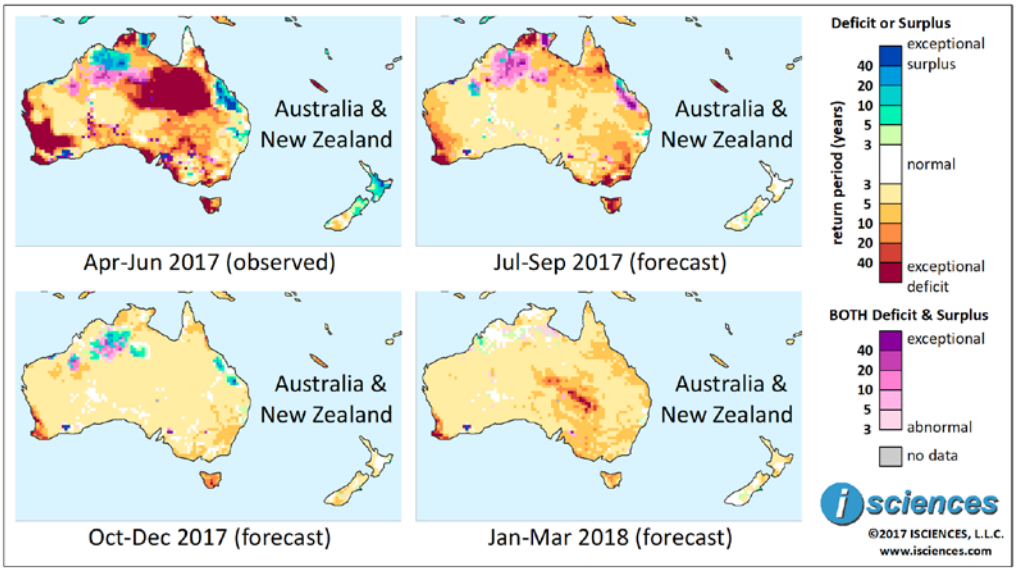


Based on observed data through June 2017 and forecasts issued June 24-30, 2017.

Surpluses are forecast for central Arnhem Land in Northern Territory; from the Kimberly Plateau to the Victoria River in the northwest; and west of Bundaberg in eastern Queensland, trailing north.

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

ISCIENCES COMPOSITE WATER ANOMALY INDEX: April 2017-March 2018



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

As the time series (above) indicates, conditions through central Australia should moderate in the coming months. A vast pocket of exceptional deficit stretching from Northern Territory into Queensland observed in prior months is expected to dissipate. However, severe to exceptional deficit conditions will continue through September in southwest Western Australia, Darwin in the north, Tasmania, coastal Victoria into New South Wales, and New Caledonia. Deficits from Perth south, over Tasmania, and in New Caledonia may linger into early 2018.

Observed surpluses reaching from the Kimberly Plateau to the Victoria River in the northwest, and west of Bundaberg in eastern Queensland will transition to both deficit and surplus through September but may transition back to surplus from October through December.

The final months of the forecast period – January through March 2018 – indicate persistent deficits near Perth and over Tasmania, as mentioned, along with the emergence of deficits at the intersection of Northern Territory, Queensland, New South Wales, and South Australia.

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