Chapter 1. Global agroclimatic patterns

Chapter 1 describes the CropWatch agroclimatic indicators for rainfall (RAIN), temperature (TEMP), and radiation (RADPAR), along with the agronomic indicator for potential biomass (BIOMSS) for sixty-five global Monitoring and Reporting Units (MRU). Rainfall, temperature, and radiation indicators are compared to their average value for the same period over the last fourteen years (called the “average”), while BIOMSS is compared to the indicator’s average of the recent five years. Indicator values for all MRUs are included in Annex A, table A.1. For more information about the MRUs and indicators, please see Annex C and online CropWatch resources at ww.cropwatch.com.cn.

1.1 Overview

The most remarkable feature of the current January to April 2015 reporting period was the above average temperatures for almost all the CropWatch global mapping and reporting units (MRU), with temperatures for the MRUs usually about 1.0 to 1.5°C above average. Record temperatures occurred in the Brazilian Nordeste (MRU-22) and southern Mongolia (MRU-47)—both with temperatures of +2.7°C above the recent average—and in eastern Siberia (MRU-51) and the U.S. West Coast (MRU-16) where the departure was +2.5°C. Significant negative temperature departures from average were observed in very limited areas of the eastern United States (especially the Corn Belt, MRU-13) with temperatures of 2.7°C below average.

Compared to temperature, rainfall and PAR show more spatial variability. In the United States West Coast, the high temperatures were accompanied by below average rainfall (-40%) and a decrease in the biomass production potential of 26%. In most other areas, the typical correlations between the variables are not observed.

Below average rainfall occurred in most tropical areas across all continents, including Southeast Asia and Central and South America. In Central and South America, especially the Caribbean (MRU-20, -29%) and western Patagonia (MRU-27, -55%) were affected, with the drop in rainfall affecting range-land development in Patagonia. In Africa, a rainfall deficit in the west (signaling a late onset of rains in the southern Sahel) is of minor relevance, but the rainfall deficits in the Horn of Africa (MRU-04) and the east African highlands (MRU-02), where radiation also increased above average, could be important and deserve increased monitoring at a finer spatial scale. Other rainfall deficit areas include much of western Europe (MRU-60) and especially the northern Mediterranean (MRU-59) where both rainfall deficit and biomass production potential for the reporting period were close to -29%.

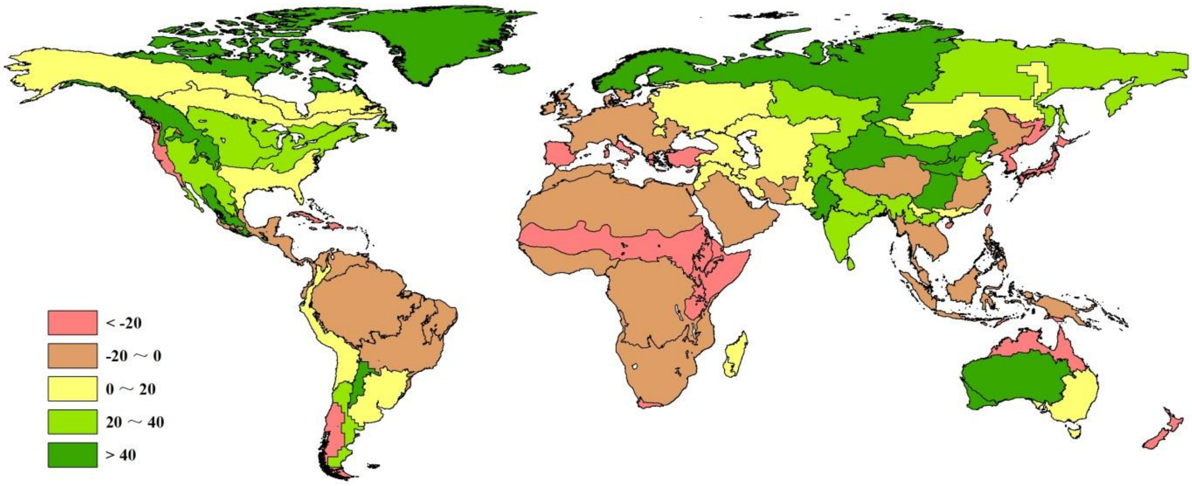
East Asia (MRU-43) and the southernmost areas in China (MRU-33 Hainan and MRU-42 Taiwan) all suffered a water deficit close to or in excess of -40%, but the resulting biomass production drop is more severe in the areas in China (-36% to -52%) than in East Asia where the biomass potential was reduced but remained closer to average due to more favorable temperature.

Apart from the Sierra Madre (MRU-17, +139% rainfall and -8% solar radiation), the largest positive departures of rainfall from average all occurred in Asia, namely in the Punjab to Gujarat region (MRU-48, +63%) and China’s Loess (MRU-36, +75%), Gansu-Xinjiang (MRU-32, +86%), and Inner Mongolia (MRU-35, +91%) regions. The most favorable combination of rainfall and temperature anomalies happened in Southwest China (MRU-41), with an estimated increase in biomass production potential of 63%. All above-mentioned rainfall anomalies were accompanied by above average temperature and resulted in an increased biomass potential of the winter-crop season.

1.2 Rainfall

Over the reporting period, rainfall (as indicated by the CropWatch RAIN indicator) showed a large variation across regions. Figure 1.1 presents a global map. On the African continent, insufficient rainfall affected several areas, including the East African highlands (MRU-02; RAIN, -29%), the Horn of Africa (MRU-04, -27%), the Sahel (MRU -08, -29%), Equatorial central Africa (MRU-01, -13%), Western Cape (MRU-10,-43%), and North Africa-Mediterranean (MRU-07, -15%). Rainfall amounts in some of the major African production zones were close to normal or below average, including in the Gulf of Guinea (MRU-03, -8%) and Southern Africa (MRU-09,-7%). As a result of most of the agricultural production being rain-fed and practiced by smallholders, Africa's food security may be at risk if drought continues in next monitoring period, especially in the east African Highlands and the Sahel. Below average rainfall also occurred around the Mediterranean and in West Europe, including Mediterranean Europe (MRU-59,-29%) and Turkey, and non-Mediterranean Western Europe (MRU-60,-19%). Rainfall in continental Southeast Asia (MRU-50) and maritime Southeast Asia (MRU-49) showed values that were 10% below average. Some regions of Northeast Asia also suffered below average rainfall, including East Asia (MRU-43,-38%) and Southern Japan and Korea (MRU-46, -27%). South America experienced close to or below average rainfall, including in Brazil's Nordeste (MRU-22, -17%), Northern South and Central America (MRU-19,-10%), the Amazon (MRU-24,-7%), and central-eastern Brazil (MRU-23,-2%). Other regions where rainfall showed significant negative departures include the U.S. West Coast (MRU-16, -40%), China Hainan (MRU-33, -42%), the Lower Yangtze region in China (MRU-37, -16%), and China Taiwan (MRU-42, -45%).

Figure 1.1. Global map of rainfall anomaly (as indicated by the RAIN indicator) by MRU, departure from 14YA, January-April 2015 (percentage)



Note: Data for January-April 2015, compared with the fourteen-year average (14YA) for the same period 2001-2014.

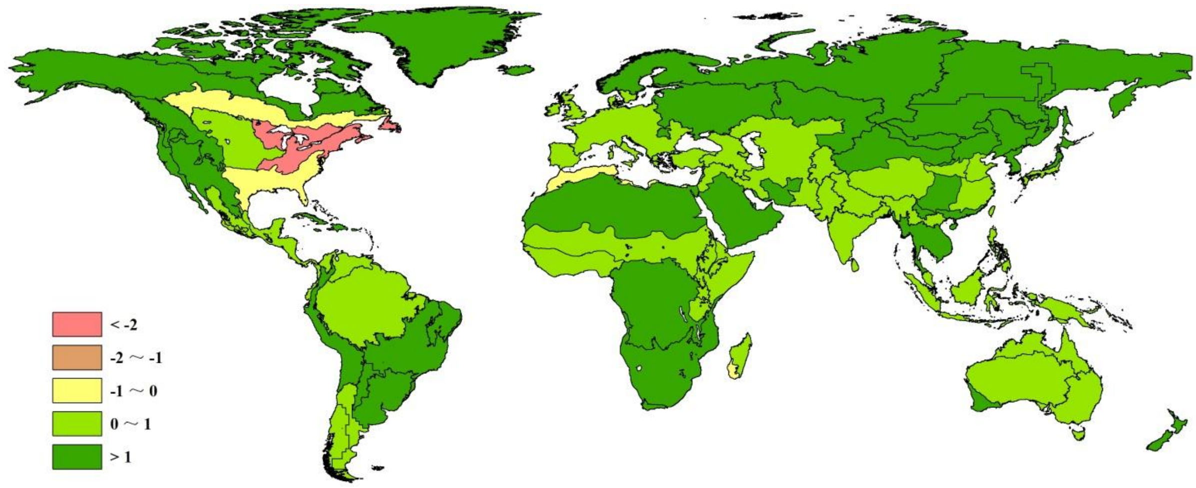
In North America, rainfall was above average in British Columbia to Colorado (MRU-11, +54%), Northern Great Plains (MRU-12, +37%), Corn Belt (MRU-13, +38%), Cotton Belt to Mexican Nordeste (MRU-14, +17%), Sub-boreal America (MRU-15, +18%), and Sierra Madre (MRU-17, +139%). Some regions of Southern America also received abundant rainfall, including central-north Argentina (MRU-25, +55%) and the Pampas (MRU-67, +10%). In Asia, some important crop zones received abundant rainfall, such as the southern Himalayas (MRU-44,+23%), Southern Asia (MRU-45, +35%), Punjab to Gujarat (MRU-48, +63%), and in China Huanghuaihai (MRU-34, +21%), Inner Mongolia (MRU-35, +91%), the Loess region(MRU-36, +76%), Southwest China (MRU-41, +59%), and Southern China (MRU-40, +9%). Other regions also received abundant rainfall, including Boreal Eurasia (MRU-57, +52%) and the Ural to Altai Mountains (MRU-62, +26%).

1.3 Temperature

Over the reporting period, almost the entire world experienced above-average temperature (TEMP) conditions compared with the recent average (figure 1.2). The only area that experienced below-average temperature by more than 0.5°C was in the east of North America: the Corn Belt (MRU-13, -2.7°C) and Cotton Belt to Mexican Nordeste (MRU-14, -0.8°C).

In addition, in 32 MRUs across the world temperature anomalies exceed 1.0°C differences. The largest positive temperature departures are found in Brazil's Nordeste (MRU-22, +2.7°C), southern Mongolia (MRU-47, +2.7°C), the U.S. West Coast (MRU-16, 2.5°C), Eastern Siberia (MRU-51, +2.5°C), Boreal Eurasia (MRU-57, +2.5°C), and British Columbia to Colorado (MRU-11, +2.2°C).

Figure 1.2. Global map of air temperature anomaly (as indicated by the TEMP indicator) by MRU, departure from 14YA, January-April 2015 (degrees Celsius)



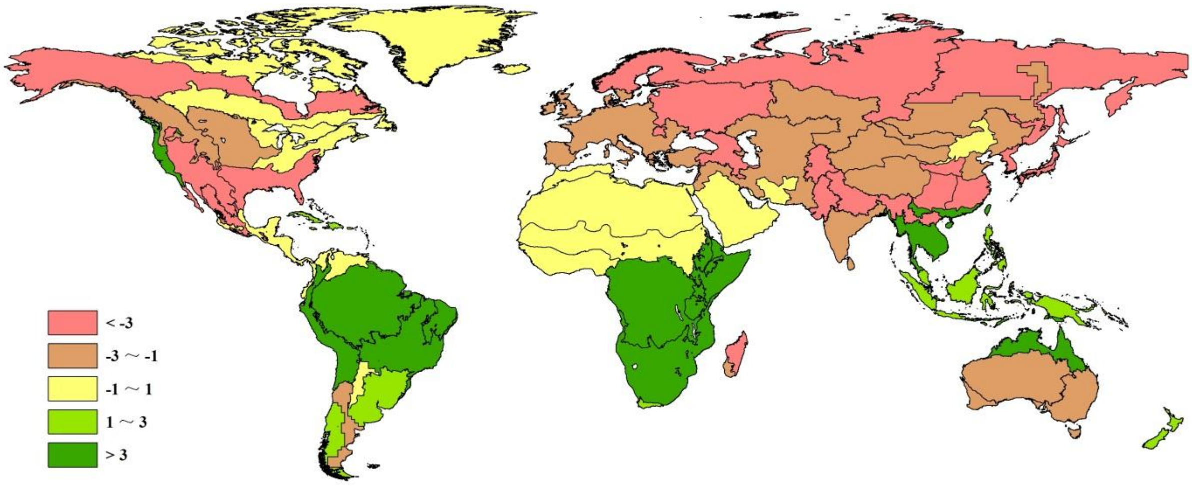
Note: Data for January-April 2015, compared with the fourteen-year average (14YA) for the same period 2001-2014.

1.4 Photosynthetically active radiation

For the reporting period, particular mention must be made of radiation (RADPAR) decreases in most parts of the North American and Eurasian continents, which are paralleled by abundant rainfall in several areas, for instance Sierra Madre (MRU-17, -8%), Boreal Eurasia (MRU-57, -7%; though not a region of agricultural relevance), and Punjab to Gujarat in South Asia (MRU-48, -5%). The largest PAR decrease—of 10%—in the last four months occurred in the U.S. Cotton Belt to Mexican Nordeste (MRU-14). In contrast, in the Southern Hemisphere radiation in most MRUs is above or close to average. The areas with marked positive departures include (i) Central eastern Brazil (MRU-23, +6%) and the Amazon (MRU-24, -5%) in South America; (ii) Northern Australia (MRU-53, +4%) and Southeast Asian mainland (MRU-50, +4%); and (iii) Equatorial central Africa (MRU-01, + 8%), where the largest positive departure was recorded, as well as the adjacent MRUs including the East African highlands (MRU-02, +6%) and the Horn of Africa (MRU-04, +4%).

Most regions of China show a decrease in RADPAR, including three major grain producing regions: the Loess region (MRU-36, -4%), South West China (MRU-41, -5%), and the Lower Yangtze (MRU-37, -3%). Only Southern China (MRU-40) and Taiwan (MRU-42) received above average RADPAR (both at +3%), while the largest positive anomaly in China was recorded in Hainan (MRU-33) with +12%. Figure 1.3 presents the global map of PAR increases or decreases compared to average.

Figure 1.3. Global map of PAR anomaly (as indicated by the RADPAR indicator) by MRU, departure from 14YA, January-April 2015 (percentage)



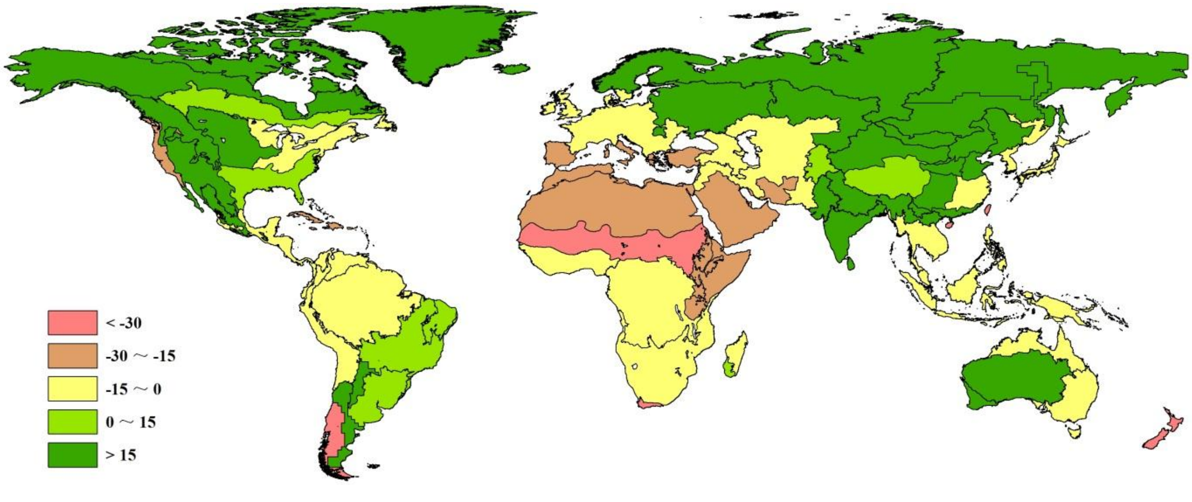
Note: Data for January-April 2015, compared with the fourteen-year average (14YA) for the same period 2001-2014.

1.5 Biomass

BIOMSS is a synthetic agro-climatic indicator that takes into account rainfall and temperature to estimate the potential biomass accumulation. Recent departures from average for the 65 global MRUs are shown in figure 1.4. As shown in the figure, as a result of the "favorable" temperature condition in this monitoring period, BIOMSS is above the five-year average in most parts of Asia, northern Europe, and North America. The greatest positive biomass departures are found in Punjab to Gujarat (MRU-48, 60%), China’s Inner Mongolia (MRU-35, 62%), Southwest China (MRU-41, 63%), Nullarbor to Darling (MRU-55, 63%), Gansu-Xinjiang (China; MRU-32, 79%), and Sierra Madre (MRU-17, 140%).

In most parts of Africa, South America, and western Europe, biomass expectations are below the recent five-year average. In Hainan (China; MRU-33, -52%), the Western Cape (South Africa; MRU-10, -43%), western Patagonia (MRU-27, -39%), New Zealand (MRU-56, -38%), Taiwan (China; MRU-42, -36%), and the Sahel (MRU-8; -35%), the biomass accumulation potential was more than 30% below average as a result of rainfall.

Figure 1.4. Global map of biomass accumulation (BIOMSS) by MRU, departure from 5YA, January-April 2015 (percentage)



Note: Data for January-April 2015, compared with the five-year average (5YA) for the same period 2010-2014.