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). A complete list of values for the MRUs is included in Annex A, table A.1. A map of the MRUs and more detail about the indicators is included in Annex C.

1.1 Overview

During the reporting period, several large areas were affected by a combination of unusual, and sometimes extreme, values of rainfall and temperature, usually accompanied by correlated changes in radiation (RADPAR) and biomass (BIOMSS).

The largest temperature anomaly (TEMP, +2.6°C) occurred in the North American western coast (MRU-16) and was accompanied by rainfall (RAIN) 12% over average and low radiation.

Large areas of south America experienced a heat wave (temperatures between 2.0 and 2.4°C above average), including central-eastern Brazil (MRU-23; RAIN +10%, TEMP +2.0°C, RADPAR -1%), central north Argentina (MRU-25; +18%, -0.5, +3%), and south-east Brazil-Concepciòn-Bahia Blanca (MRU-26; +24%,+2.2°C, +1%) where high temperatures were accompanied by 15-25% above average rainfall. The adjacent area of the Brazilian Nordeste (MRU-22; -23%, +2.4°C, -1%) suffered from excess heat and drought (RAIN down 23% compared with average), while the central northern Andes (MRU-21; +1.6°C) experienced high temperature with close to average rainfall.

Some areas in Europe and Asia suffered from a combination of low rainfall and low temperature, especially Eastern central Asia (MRU-52; RAIN -4%, TEMP -0.7°C, RADPAR +3%), eastern Siberia (MRU-51; -17%, -0.5°C, +3%), the area from Ukraine to the Ural mountains (MRU-58; -28%, -0.4°C,-5%), and Mediterranean Europe and Turkey (MRU-59; -5%, -0.5°C,-4%).

The areas with the largest absolute negative rainfall departures include New Zealand (MRU-56; -65%), the Western Cape area in South Africa (MRU-10, -58%), areas in Australia (MRU-54, -43%, Queensland to Victoria; MRU-53, -56%, North Australia), and Taiwan (MRU-42, -36%). Large positive departures affected the Northern Great Plains (MRU-12, +61%) in North America, Gansu-Xinjiang in China (MRU-32, + 198%) and the Mongolia region (MRU-47; +255%).

1.2 Rainfall

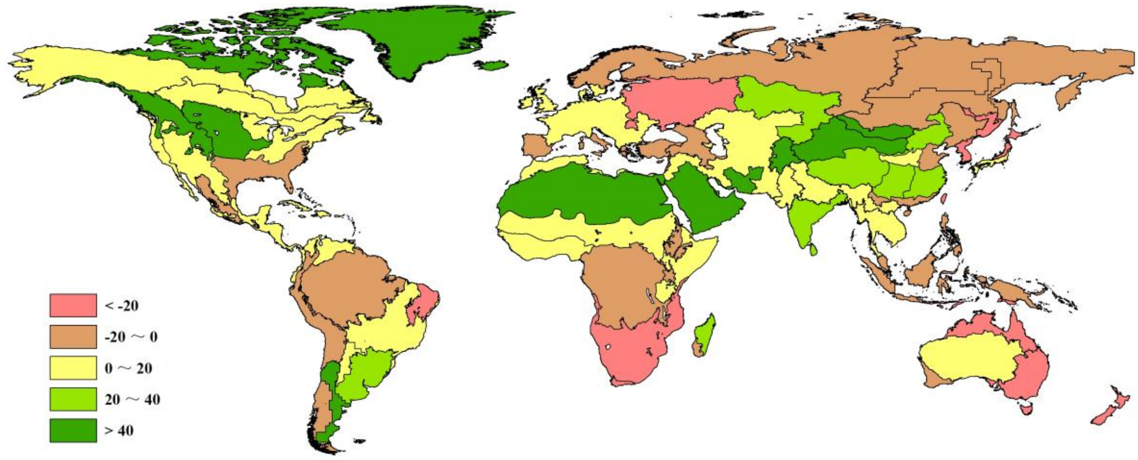
During the current July to October 2014 monitoring period, rainfall showed large variation across regions (figure 1.1). As an important maize growing zone of the United States, abundant rainfall fell over the northern great plains (MRU-12, +60.56%) and the major rice growing zones of China (lower Yangtze, MRU-37, +28.16%; southwest China, MRU-41, +21.39%). Excess rainfall also affected some dryer areas in Asia, where it favored rangeland development (Xinjiang region in Gansu, China, MRU-32, 198.43%; Mongolia region, MRU-47, +184%). Among the major soybean and wheat growing regions in the world, southeast Brazil and northeast Argentina (MRU-26, +23.64%) received abundant rainfall in this monitoring period as well. The drought in British Columbia to Colorado (MRU-11) eases with a rainfall increase of +44.51% over average. Some extreme climate zones received excesses rainfall, such as the

Sahara desert (basically the Nile valley as CropWatch only covers agricultural areas in the CWAIs) and Arabian Peninsula (MRU-64, 60.14%) and the Pamir regions (MRU-30, +55.44%). Other areas are not relevant for crop agriculture and livestock, but may—marginally so—for forestry or as a source for river water (arctic region of North America, MRU-65, +194.58%).

Some important agricultural regions suffered insufficient rainfall during this monitoring period. Rainfall was below average (-28.21%) in the region from Ukraine to Ural Mountains (MRU-58), an important wheat cultivation area. Rainfall was low as well in parts of China (Taiwan, MRU-42, -36.05%) and maritime Southeast Asia (MRU-49, -14.85%), including Indonesia and the Philippines. Eastern Australia, Northeast Asia, and South Africa were all affected by droughts, including north Australia (MRU-53, -56.06%), Queensland to Victoria (MRU-54, -43.22%), New Zealand (MRU-56, -64.87%), southern Africa (MRU-9, -24.59%), and East Asia (MRU-43, -26.01%), especially affecting the Korean peninsula. Although the rainfall shortage was not so serious, it was nevertheless below average in two Chinese regions: Huanghuaihai plain (MRU-34, -6.16%) and northeast China (MRU-38, -3.12%)

Rainfall varied less in other agriculturally important regions: the American corn belt (MRU-13, +4.42%), American cotton belt and Mexican coastal plain (MRU-14, -2.3%), Western Europe (MRU-60, +7.03%), southern Himalayas (MRU-44, +14.9%), and continental south-east Asia (MRU-50, +0.5%).

Figure 1.1. Global map of rainfall anomaly (as indicated by the RAIN indicator) by MRU, departure from 13YA, July-October 2014 (percentage)



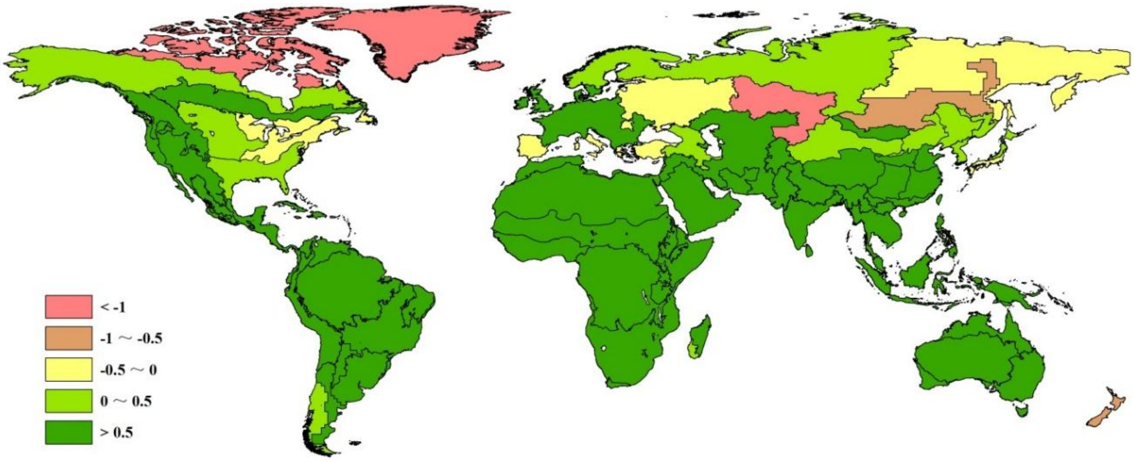
Note: Data for July-October 2014, compared with the thirteen-year average (13YA) for the same period 2001-2013.

1.3 Temperature

Most parts of the world experienced warmer than average conditions compared with the recent thirteen years (figure 1.2). During this monitoring period, temperature in the whole southern hemisphere except New Zealand was higher than usual. This can be a favorable condition for crop cultivation during the cold season if sufficient water is available to cover increased demand, especially for the wheat growing areas in Australia (including North Australia (+0.5°C), Queensland to Victoria (+0.8°C), Nullarbor to Darling (+1.9°C)), Africa (including Southern Africa, +0.9°C and the Western Cape, +1.4°C), and South America (including Central Eastern Brazil (+2.0°C) and SE Brazil (Concepcion to Bahia Blanca, +2.2°C). In North America, the temperature varies from above average in the west to average in the east. In the corn belt of the United States, the temperature was close to usual (-0.1°C).

In northern Eurasia, higher than average temperature (> +0.5°C) benefited crops. In the Ukraine to Ural Mountains region and in Mediterranean Europe and Turkey, the temperature was half a degree lower than average, which would affect wheat and maize development. The Ural to Altai Mountains region experienced the most significant decrease in air temperature (-1.2^{o}C).

Figure 1.2. Global map of air temperature anomaly (as indicated by the TEMP indicator) by MRU, departure from 13YA, July-October 2014 (degrees Celsius)



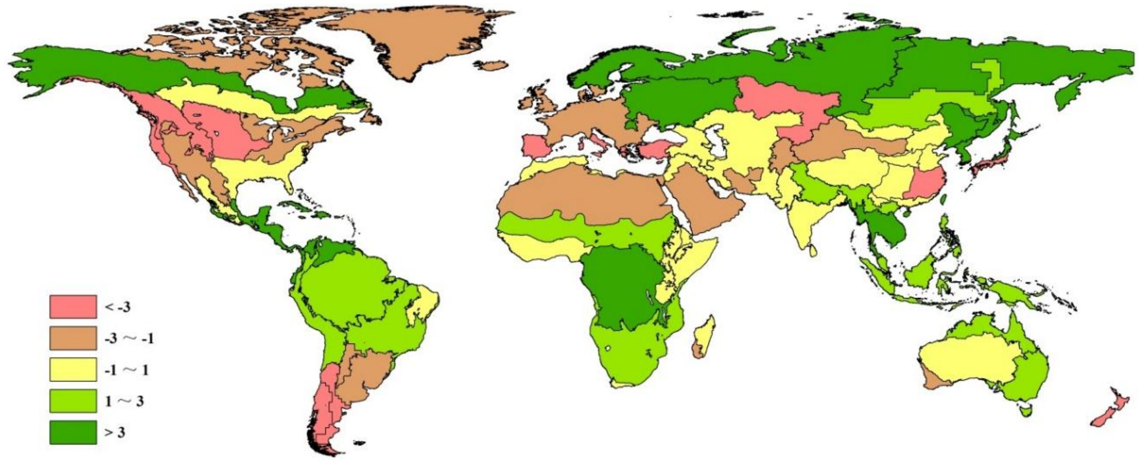
Note: Data for July-October 2014, compared with the thirteen-year average (13YA) for the same period 2001-2013.

1.4 Photosynthetically active radiation

Compared with the recent thirteen-year average, more than half of the 65 MRUs experienced above average photosynthetically active radiation (PAR), as measured with the RADPAR indicator. The highest departure from the recent reference period occurred in boreal North America (MRU-61), equatorial central Africa (MRU-01), and Ukraine to Ural mountains (MRU-58), with a +5% departure. Record low PAR departures were concentrated in several adjacent areas in north and south America, including (i) British Columbia to Colorado (MRU-11, -4%) and America's west coast (MRU-16, -4%) and (ii) the southwestern southern cone (MRU-27, -5%) and the semi-arid southern cone (MRU-28, -4%). The southern Japan and Korea (MRU-46) area is also one of the regions characterized by below average PAR, with a 6% decrease compared to average.

In China, the major paddy rice production area, the Lower Yangtze (MRU-37), shows a significant PAR decrease of 5% compared to average. The Xinjiang area in Gansu (MRU-32) also experienced a 2% below average PAR, paralleled by abundant rainfall in this region. Areas with positive PAR departures include North-east China (MRU-38, +3%), Taiwan (MRU-42, +4%), and Hainan, where the largest positive departure in China was recorded (MRU-33, +5%). The remaining areas generally show an average level of PAR.

Figure 1.3. Global map of PAR anomaly (as indicated by the RADPAR indicator) by MRU, departure from 13YA, July-October 2014 (percentage)



Note: Data for July-October 2014, compared with the thirteen-year average (13YA) for the same period 2001-2013.

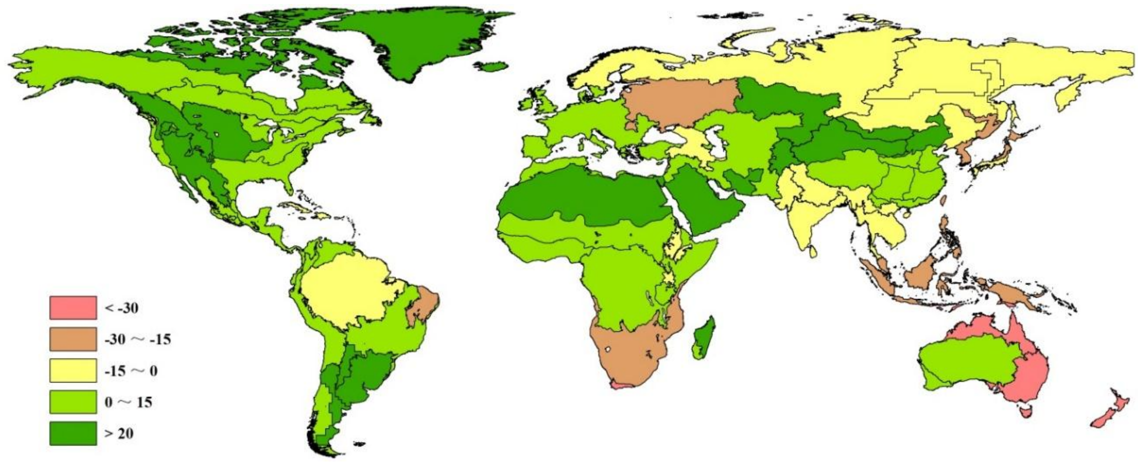
1.5 Biomass

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.

The potential biomass accumulation over the July to October monitoring period was higher than the five-year average for the same period in most of the world, usually due to the high temperature. The greatest positive biomass accumulations are found in the following MRUs: Mongolia (+142%), Gansu Xinjiang in China (+120%), the semi-arid southern cone in South America (+76%), British Columbia to Colorado (+34%), Madagascar (+33%), southwestern Mexico and North Mexico highlands (+32%), central north Argentina (+32%), America's northern great plains (+27%), and China's Inner Mongolia (+25%).

At the scale of the MRUs, unfavorable conditions for BIOMSS departures occurred mainly in the southern hemisphere, including North Australia (-51%), South Africa's Western Cape (-42%), Australia's Queensland to Victoria (-40%), Brazil's Nordeste (-28%), Taiwan (-20%), southern Africa (-17%), and East Asia (-16%). In the eastern hemisphere, areas with poor biomass condition are found in New Zealand (-59%) and Ukraine (-23%) due to insufficient rains.

Figure 1.4. Global map of biomass accumulation (BIOMSS) by MRU, departure from 5YA, July-October 2014 (percentage)



Note: Data for July-October 2014, compared with the five-year average (5YA) for the same period 2009-2013.