Chapter 1. Global agroclimatic patterns

Chapter 1 describes the CropWatch Agroclimatic Indicators (CWAIs) rainfall (RAIN), temperature (TEMP), and radiation (RADPAR), along with the agronomic indicator for potential biomass (BIOMSS) in sixty-five global Monitoring and Reporting Units (MRU). RAIN, TEMP, RADPAR and BIOMSS are compared to their average value for the same period over the last fifteen years (called the "average"). Indicator values for all MRUs are included in Annex A table A.1. For more information about the MRUs and indicators, please see Annex B and online CropWatch resources at **www.cropwatch.cn**.

1.1 Introduction to CropWatch agroclimatic indicators (CWAIs)

This bulletin describes environmental and crop growth conditions over the period from January 2022 to April 2022, JFMA, referred to as "reporting period". In this chapter, we focus on 65 spatial "Mapping and Reporting Units"(MRU) which cover the globe, but CWAIs are averages of climatic variables over agricultural areas only inside each MRU. For instance, in the "Sahara to Afghan desert" MRU, only the Nile Valley and other cropped areas are considered. MRUs are listed in Annex B and serve the purpose of identifying global climatic patterns. Refer to Annex A for definitions and to table A.1 for 2022 JFMA numeric values of CWAIs by MRU. Although they are expressed in the same units as the corresponding climatological variables, CWAIs are spatial averages limited to agricultural land and weighted by the agricultural production potential inside each area.

1.2 Global overview

Temperatures keep raising, though at a slightly slower pace thanks to La Niña. While the global average increase in March was "only" 0.95ºC over the 20th-century average, it nevertheless caused much larger increases at the regional scale. Temperatures in the northwest of India, as well as in the Punjab of Pakistan were close to 40ºC during the grain filling stage of wheat in March. This caused terminal heat stress and a yield reduction by 15-20%. An analysis by the World Weather Attribution (WWA) initiative concluded that the probability of such an event has increased by a factor of about 30 due to climate change. They also warn that "Rising temperatures from more intense and frequent heat waves will render coping mechanisms inadequate as conditions in some regions meet and exceed limits to human survivability." Not only urban dwellers, but farm workers as well are getting more and more exposed to life threatening conditions.

The analysis of the CropWatch Agroclimatic Indicators (CWAIs) at the global level showed that temperatures were 0.26ºC warmer, solar radiation was 0.2% above average, but rainfall was reduced by 1.8% when compared to the 15YA (Fig 1.1).

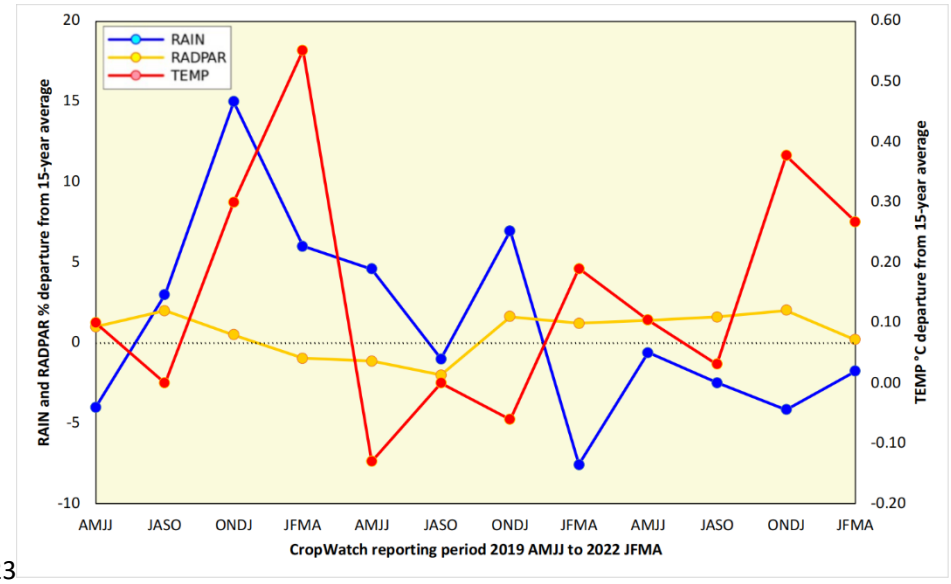

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Figure 1.1 global departure from recent 15-year average of the RAIN, TEMP and RADPAR indicators. The last period covers January to April (JFMA) 2022 (average of 65 MRUs, unweighted).

1.3 Rainfall

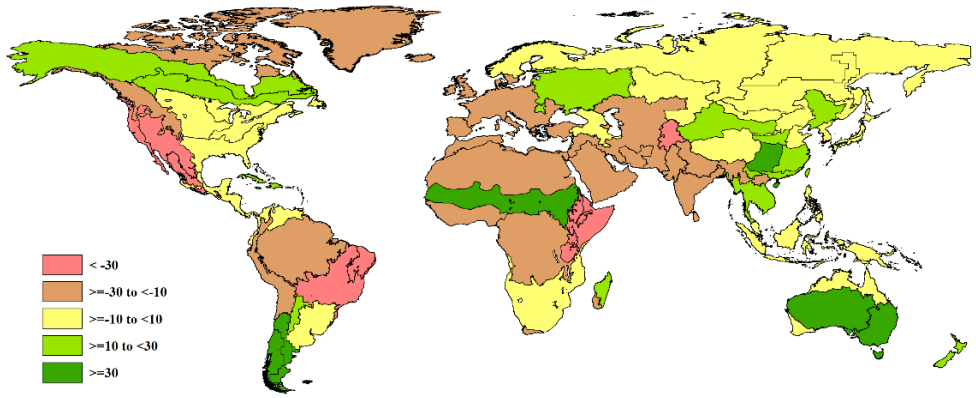

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Figure 1.2 Global map of rainfall anomaly (as indicated by the RAIN indicator) by CropWatch Mapping and Reporting Unit: Departure of January to April 2022 total from 2007-2021 average (15YA), in percent.

The rainfall departure map reflects the current La Niña conditions. The largest rainfall deficits, exceeding more than -30%, as compared to the 15YA, were observed for Central-Eastern Brazil, the West-Coast of North America, the Horn of Africa, as well as Afghanistan. Rainfall deficits ranging between -30% to -10% occurred in the Amazon basin and the adjacent Andean countries, as well as in western Europe. In Africa, the regions north and south of the Sahel were affected to a similar degree, as well as the Middle East, Central and South Asia. Rainfall was average in the eastern half of the USA, Central America, as well as in the south of Brazil, Uruguay and the Pampas in Argentina, southern Africa and most of Siberia. Strong positive departures were observed for the southern tip of South America and a belt just south of the Sahel stretching across all of Africa. Most of the European part of Russia, most of China, as well as South-East Asia and Australia experienced rainfall that was at least 10% above average.

1.4 Temperatures

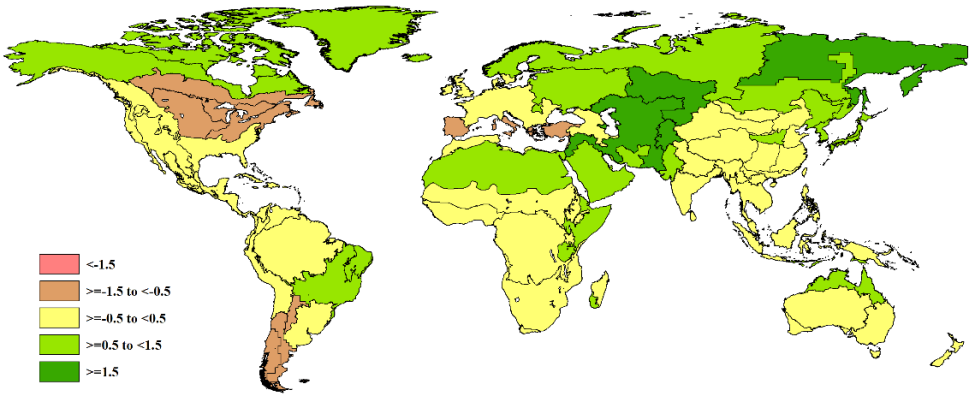

Figure 1.3 Global map of temperature anomaly (as indicated by the TEMP indicator) by CropWatch Mapping and Reporting Unit: departure of January to April 2022 average from 2007-2021 average (15YA), in °C.

Cooler temperatures, in the range of -1.5 to -0.5ºC as compared to the 15YA, were observed near the southern tip of South America, the North of the USA, the Canadian Prairies, the Iberian Peninsula, Italy, Greece and Turkey. Close to average temperatures were recorded for the south and west of the USA, Central America and the north of South America. Temperatures were near average for most of Africa south of the Sahel, except for the Horn of Africa, where temperatures were slightly warmer, western Europe, China, South and South-East Asia as well as most of Australia. Above average temperatures in the range of +0.5 to +1.5ºC were recorded for Mato Grosso, the Cerrados and North-East of Brazil, as well as the Middle East, and most of Russia. Although its region around the Caucasus, as well as Central Asia, Eastern Siberia experienced even warmer temperatures that exceeded the 15YA by more than 1.5ºC.

1.5 RADPAR

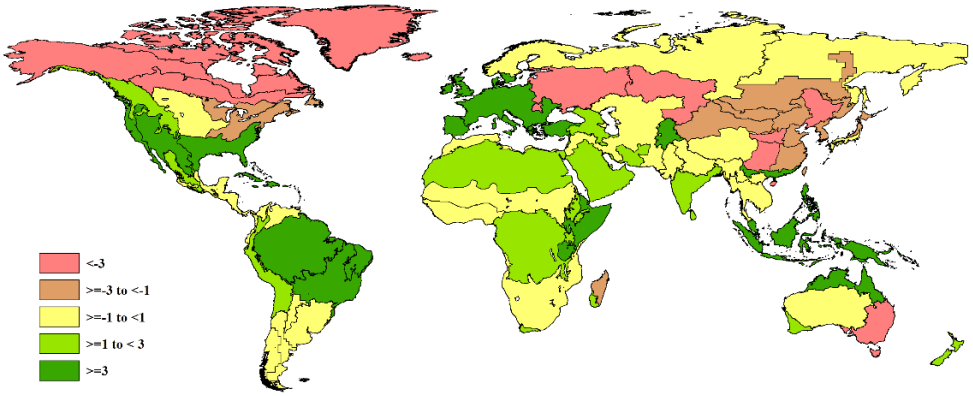

Figure 1.4 Global map of photosynthetically active radiation anomaly (as indicated by the RADPAR indicator) by CropWatch Mapping and Reporting Unit: departure of January to April 2022 total from 2007-2021 average (15YA), in percent.

As for the previous reporting period, solar radiation was above average for most of the Americas. Only the North-East of the USA as well as Ontario in Canada experienced a negative departure by -1 to -3%. Solar radiation was strongly reduced for most of the European part of Russia, southern Siberia and most of China. The Middle and Horn of Africa experienced above average solar radiation. In Western Europe, solar radiation levels exceeded the 15YA by more than 3%.

1.6 BIOMSS

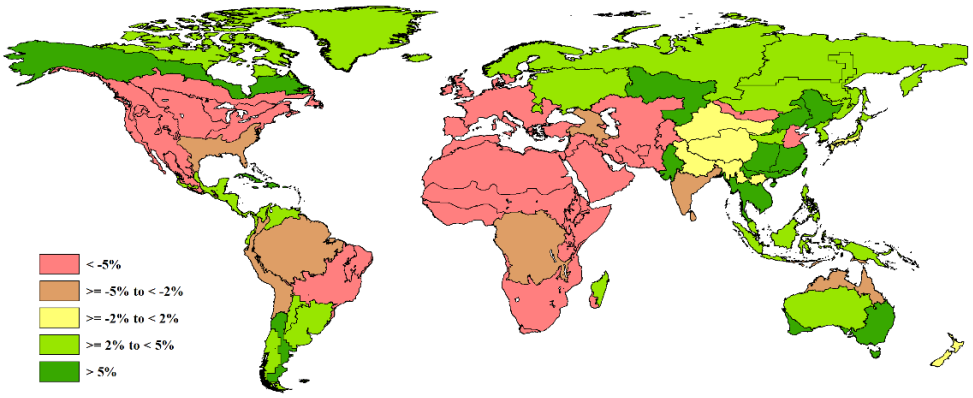

Figure 1.5 Global map of biomass accumulation (as indicated by the BIOMSS indicator) by CropWatch Mapping and Reporting Unit: departure of January to April 2022 total from 2007-2021 average (15YA), in percent.

Potential biomass production, which is calculated by taking rainfall, temperature and solar radiation into account, was more than 5% below the 15YA for most of North America, Mato Grosso, Cerrado, as well as the north-east of Brazil, Western Europe, near and middle East, Central Asia, as well as most of Africa, except for Equatorial Central Africa. The main reason for these departures was the rainfall deficit. For the Caucasus region and Southern India a negative departure by -2% to -5% had been estimated as well. Positive departures were estimated for the south of Brazil, most of Argentina, Central America and most of Russia, as well as most of China, South-East Asia and Australia.