Chapter 1. Global agroclimatic patterns

1.1 Introduction to CropWatch agroclimatic indicators (CWAIs)

This bulletin describes environmental and crop conditions over the period from October 2020 to January 2021, ONDJ, 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 C and serve the purpose of identifying global climatic patterns. Refer to Annex A for definitions and to table A.1 for 2021 ONDJ 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.

We also stress that the reference period, referred to as “average” in this bulletin covers the 15-year period from 2006 to 2020. Although departures from the 2006-2020 are not anomalies (which, strictly, refer to a “normal period” of 30 years), we nevertheless use that terminology. The specific reason why CropWatch refers to the most recent 15 years is our focus on agriculture, as already mentioned in the previous paragraph. 15 years is deemed an acceptable compromise between climatological significance and agricultural significance: agriculture responds much faster to persistent climate variability than 30 years, which is a full generation. For “biological” (agronomic) indicators used in subsequent chapters we adopt an even shorter reference period of 5 years (i.e. 2016-2020) but the BIOMSS indicator is nevertheless compared against the longer 15YA (fifteen-year average). This makes provision for the fast response of markets to changes in supply but also to the fact that in spite of the long warming trend, some recent years (e.g. 2008 or 2010-13) were below the trend.

Correlations between variables (RAIN, TEMP, RADPAR, BIOMSS) at MRU scale derive directly from climatology. For instance, the positive correlation between rainfall and temperature results from high rainfall in equatorial, i.e. in warm areas.

Considering the size of the areas covered in this section, even small departures may have dramatic effects on vegetation and agriculture due to the within-zone spatial variability of weather. It is important to note that we have adopted a new calculation procedure of the biomass production potential in the August 2019 bulletin. The new approach includes sunshine (RADPAR), TEMP and RAIN. Readers are referred to the August 2019 bulletin for details.

1.2 Global overview

2020 secured the rank of second warmest year since 1880, when the reference data set starts. Its sea and land surface temperature was 0.02°C cooler than 2016, which so far, has been the warmest year on record. Taking only land surface temperatures into account, 2020 was the warmest year. In the October of 2020, a La Niña period started. It has been forecasted to last at least until March 2021. La Niña has a big impact on the global distribution of rainfall. It tends to bring drier conditions to western Australia, equatorial East Africa and the coastal regions of Peru and Chile. Precipitation tends to be higher in Eastern Australia, Southern Africa, Malaysia, the Philippines, Indonesia and the North-East of Brazil.

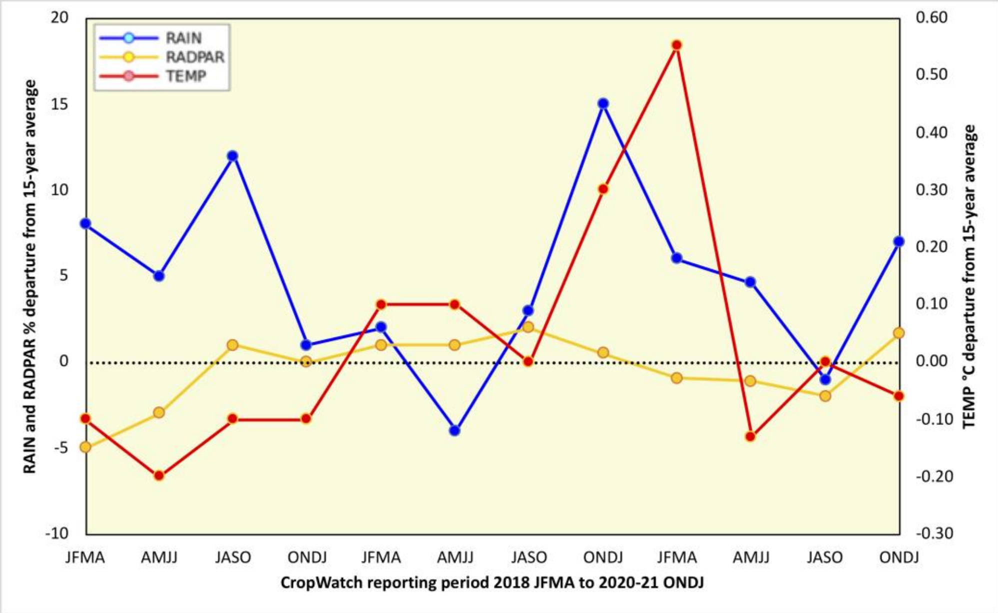

Figure 1.1 Global departure from recent 15-year average of the RAIN, TEMP and RADPAR indicators since 2018 JFMA to 2020-21 ONDJ period (average of 65 MRUs, unweighted)

Figure 1.1 shows unweighted averages of the CropWatch Agro-climatic Indicators, i.e. the arithmetic means of all 65 MRUs, which are relatively close to average. CWAIs are computed only over agricultural areas, and they display a relatively average situation, globally.

1.3 Rainfall (Figure 1.2)

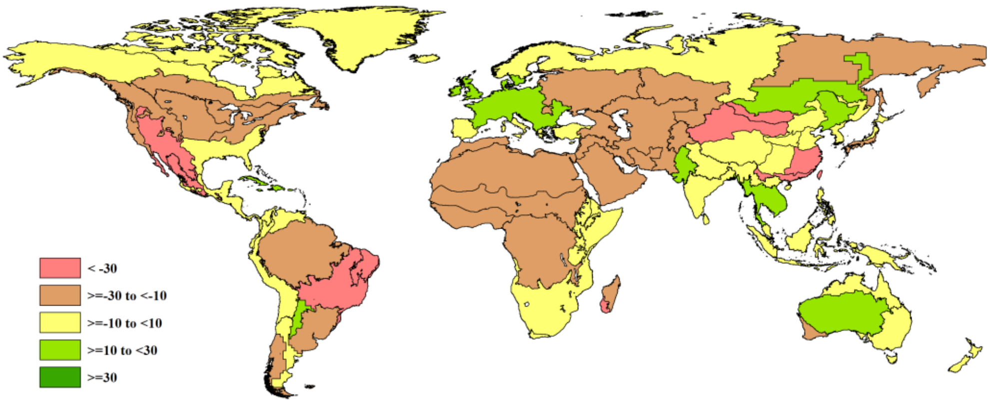

Figure 1.2 Global map of rainfall anomaly (as indicated by the RAIN indicator) by CropWatch Mapping and Reporting Unit: departure of October 2020 to January 2021 total from 2006-2020 average (15YA), in percent.

Rainfall positively departed from the 15-year average. This was mainly due to higher precipitation in Europe, eastern Siberia, north-eastern China and South East Asia. The latter two benefitted from several typhoons and their remnants that brought large amounts of moisture to these regions. The western USA, Central and Northern Mexico, the Pantanal, central and eastern Brazil, as well as Central Asia and South-East China and Taiwan were affected by much drier-than-normal conditions, i.e., rainfall was more than 30% below the 15YA. Moderate rainfall deficits occurred in the northern USA, Canada, Central and North Africa, Western Asia and Southern Russia, especially in the Caucasus region. South West Australia also experienced conditions that were between 10 and 30% below average.

1.4 Temperatures

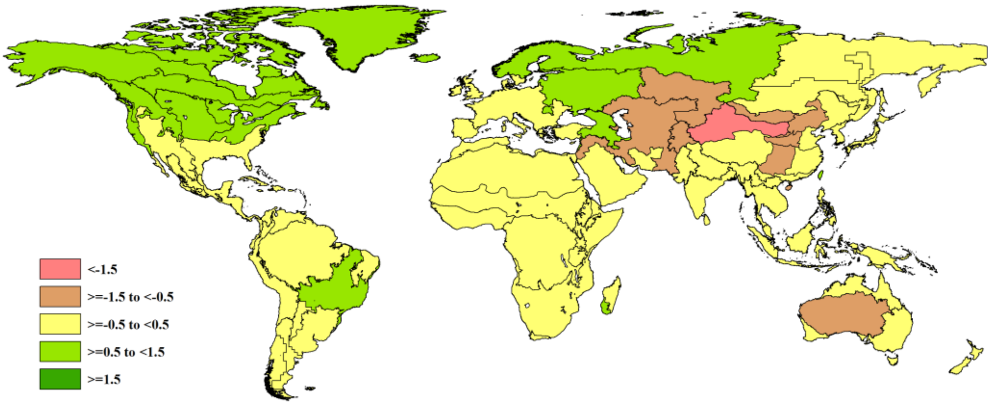

Figure 1.3 Global map of temperature anomaly (as indicated by the TEMP indicator) by CropWatch Mapping and Reporting Unit: departure of October 2020 to January 2021 average from 2006-2020 average (15YA), in °C.

Slightly warmer-than-usual conditions were observed for central and eastern Brazil, the north of the USA, Canada and most of Russia except for the Ural and Altai mountains, as well as Scandinavia. Temperatures in these regions were between 0.5 and 1.5°C above the 15YA. Western and Central Asia, as well as the Loess Plateau in China experienced cooler-than-normal conditions, in the range of -0.5 to -1.5°C. Temperatures in most of the Americas, Africa, Western Europe, South-, South-East and East-Asia hovered around the long-term average.

1.5 RADPAR (Figure 1.4)

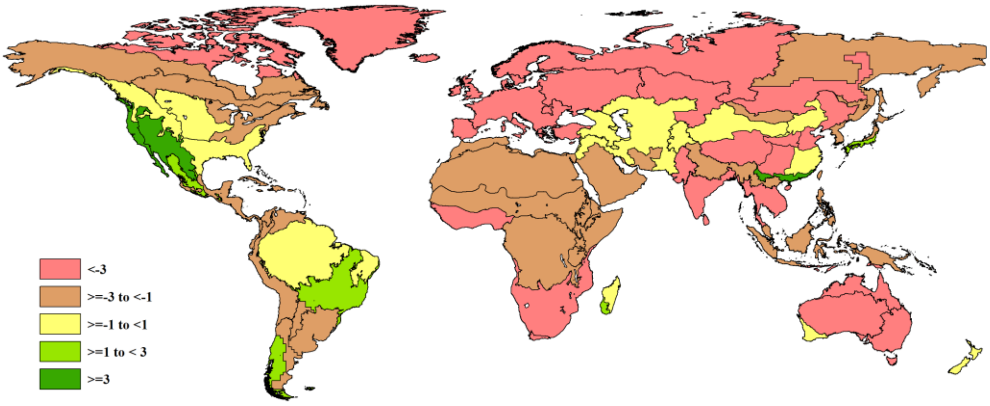

Figure 1.4 Global map of photosynthetically active radiation anomaly (as indicated by the RADPAR indicator) by CropWatch Mapping and Reporting Unit: departure of October 2020 to January 2021 total from 2006-2020 average (15YA), in percent.

The western USA as well as central-eastern Brazil received above average solar radiation, i.e., it was more than 3% above the 15YA. Most of Africa received slightly less sunshine than the 15YA, in the range of -1 to -3%. Southern Africa, Europe, most of Russia, Pakistan, India, south-east Asia and Australia experienced a drop in solar radiation by more than 3%.

1.6 BIOMSS (Figure 1.5)

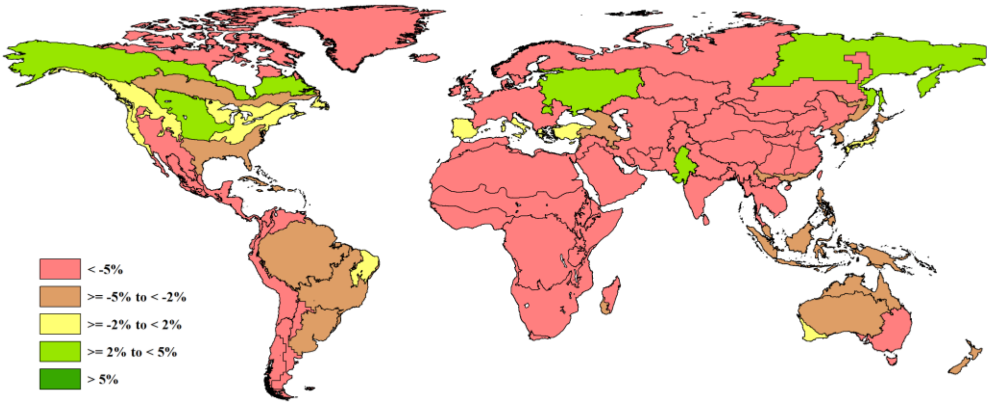

Figure 1.5 Global map of biomass accumulation (as indicated by the BIOMSS indicator) by CropWatch Mapping and Reporting Unit: departure of October 2020 to January 2021 total from 2006-2020 average (15YA), in percent.

Potential biomass production, which is calculated by taking rainfall, temperature and solar radiation into account, was more than 5% below the 15YA for the entire west coast of the Americas from Mexico to Chile. A large drop was also estimated for Africa, Europe and Asia, except for south-western Russia, where an increase by 2 to 5% was estimated. Conditions for biomass growth were also favorable in the northern USA.