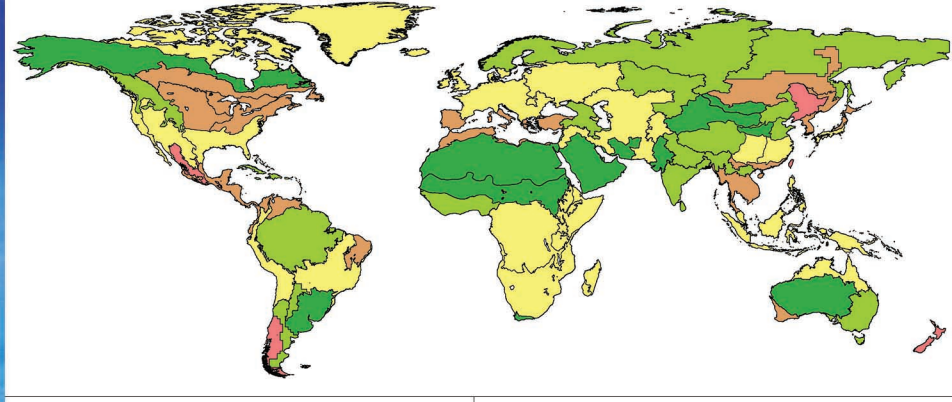

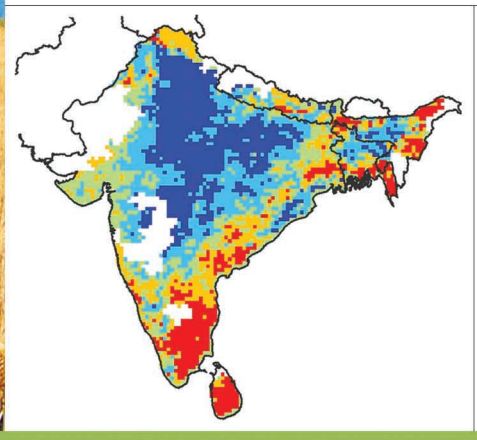

CropWatch bulletin

QUARTERLY REPORT ON GLOBAL CROP PRODUCTION

Monitoring Period: January-April 2014

May 31, 2014
Volume 14, No. 2 (Total No. 93)

Institute of Remote Sensing and Digital Earth (RADI)
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May 2014
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CropWatch Online Resources: This bulletin along with additional resources is also available on the CropWatch Website at http://www.cropwatch.com.cn.

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Note: CropWatch resources, background materials and additional data are available online at www.cropwatch.com.cn.

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Abbreviations

5YA	Five-year average, the average for the January-April periods between January 1 2009 and April 30 2013; one of the standard reference periods and referred to as “recent past.”
13YA	Thirteen-year average, the average for the January-April periods between January 1 2001 and April 30 2013; one of the standard reference periods and referred to as “last decade.”
CALF	Cropped Arable Land Fraction
CAS	Chinese Academy of Sciences
CPSZ	Crop Production System Zone
CWSU	CropWatch Spatial Units
DM	Dry matter
EC/JRC	European Commission Joint Research Centre
NCDC	National Climatic Data Center
NDVI	Normalized Difference Vegetation Index
PAR	Photosynthetically active radiation
Ton	Thousand kilograms
W/m^2	Watt per square meter
FAO	Food and Agriculture Organization of the United Nations
GAUL	Global Administrative Units Layer
ha	hectare
MPZ	Major Production Zone
RADI	CAS Institute of Remote Sensing and Digital Earth
VCIx	Maximum Vegetation Condition Index
VHI	Vegetation Health Index

Quick reference guide to CropWatch indicators and spatial units

Bulletin overview and reporting period

This CropWatch bulletin presents a global overview of crop stage and condition between January 1 and April 30, 2014. It is the 93nd bulletin produced by the CropWatch group at the Institute of Remote Sensing and Digital Earth (RADI) at the Chinese Academy of Sciences, Beijing. CropWatch analyses are based mostly on several standard and new ground-based and remote sensing indicators, following a hierarchical approach and covering large global zones; major producing countries of maize, rice, wheat, and soybean; and detailed assessments of Chinese regions.

In parallel to the increasing spatial precision of the analyses, indicators become more focused on agriculture as the analyses zoom into smaller spatial units. CropWatch uses two sets of indicators: (i) agroclimatic indicators—RAIN, TEMP, and RADPAR, which describe weather factors; and (ii) agronomic indicators—BIOMASS, VHI, CALF, and VCIx, describing crop condition and development. For details on data sources and methodologies, see the CropWatch bulletin online resources at www.cropwatch.com.cn. In the table and text below, CWSU stands for CropWatch Spatial Unit.

Chapter	Spatial coverage: CWSU	Key indicators
Chapter 1	World, using Crop Production Systems Zones (CPSZ), 60 large, agro-ecologically homogeneous units covering the globe	RAIN, TEMP, RADPAR, BIOMASS
Chapter 2	Major Production Zones (MPZ), six of the regions which contribute most to global food production	As above, plus VHI, CALF, VCIx
Chapter 3	31 key countries (main producers and exporters)	As above plus NDVI
Chapter 4	China	As above plus cropping structure, according to season.
Chapter 5	*Special topics and outlook*	
Online Resources	*www.cropwatch.com.cn*	

CropWatch indicators

The CropWatch indicators are especially designed to assess the condition of crops and the environment in which they grow and develop; the indicators (despite their names) RAIN (for rainfall), TEMP (for temperature), and RADPAR (for photosynthetically active radiation, PAR) are therefore not identical to the corresponding weather variables. Instead, they are value-added indicators computed only over crop growing areas (thus excluding deserts and rangelands, for instance) and spatially weighted according to the agricultural production potential, with marginal areas receiving less weight than productive ones. The indicators are expressed using the usual physical units (e.g., mm for rainfall) and were thoroughly tested for their coherence over space and time.

For all indicators, high values indicate "good" or "positive."

INDICATOR			
Type/ source	*Unit, spatial scale*	*Description*	*Presentation and legend*
BIOMASS			
Biomass accumulation potential			
Crop/ Ground and satellite	grams dry matter/m^2, pixel or CWSU	An estimate of biomass that could potentially be accumulated over the reference period given the prevailing rainfall and temperature conditions.	Biomass is presented as maps by pixels, maps showing average pixels values over CWSUs, or tables giving average values for the CWSU. Values are compared to the average value for the last five years (2009-13), with departures expressed in percentage.
CALF			
Cropped arable land and cropped arable land fraction			
Crop/ Satellite	[0,1] number, pixel or CWSU average	The area of cropped arable land as fraction of total (cropped and uncropped) arable land. Whether a pixel is cropped or not is decided based on NDVI twice a month. (For each four-month reporting period, each pixel thus has 8 cropped/ uncropped values).	The value shown in tables is the maximum value of the 8 values available for each pixel; maps show an area as cropped if at least one of the 8 observation is categorized as "cropped." Uncropped means that no crops were detected over the whole reporting period. Values are compared to the average value for the last five years (2009-13), with departures expressed in percent points, i.e. the difference between two percentages.
NDVI			
Normalized Difference Vegetation Index			
Crop/ Satellite	[0.12-0.90] number, pixel or CWSU average	An estimate of the density of living green biomass.	NDVI is shown as average profiles over time at the national level (cropland only) in crop condition development graphs, compared with previous year and recent five-year average (2009-2013), and as spatial patterns compared to the average, showing both the time profiles, where they occur, and the percentage of pixels concerned by each profile.
RADPAR			
CropWatch indicator for Photosynthetically Active Radiation (PAR), based on pixel based PAR			
Weather/ Satellite	W/m^2, CWSU	The spatial average (for a CWSU) of PAR accumulation over agricultural pixels, weighted by the production potential.	RADPAR is shown as the percent departure of the RADPAR value for the reporting period compared to the recent 13-year average (2001-13), per CWSU. For the MPZs, regular PAR is shown as typical time profiles over the spatial unit, with a map showing where the profiles occur and the percentage of pixels concerned by each profile.
RAIN			
CropWatch indicator for rainfall, based on pixel-based rainfall			
Weather/ Ground and satellite	Liters/m^2, CWSU	The spatial average (for a CWSU) of rainfall accumulation over agricultural pixels, weighted by the production potential.	RAIN is shown as the percent departure of the RAIN value for the reporting period, compared to the recent 13-year average (2001-13), per CWSU. For the MPZs, regular rainfall is shown as typical time profiles over the spatial unit, with a map showing where the profiles occur and the percentage of pixels concerned by each profile.
TEMP			
CropWatch indicator for air temperature, based on pixel-based temperature			
Weather/ Ground	°C, CWSU	The spatial average (for a CWSU) of the temperature time average over agricultural pixels, weighted by the production potential.	TEMP is shown as the departure of the average TEMP value (in degrees Centigrade) over the reporting period compared with the average of the recent 13 years (2001-13), per CWSU. For the MPZs, regular temperature is illustrated as typical time profiles over the spatial unit, with a map showing where the profiles occur and the percentage of pixels concerned by each profile.

INDICATOR			
Type/ source	*Unit, spatial scale*	*Description*	*Presentation and legend*
VCIx			
Maximum vegetation condition index			
Crop/ Satellite	Number, pixel to CWSU	Vegetation condition of the current season compared with historical data. Values usually are [0,1], where 0 is "NDVI as bad as the worst recent year" and 1 is "NDVI as good as the best recent year." Values can exceed the range if the current year is the best or the worst.	VCIx is based on NDVI and two VCI values are computed every month. VCIx is the highest VCI value recorded for every pixel over the reporting period. A low value of VCIx means that no VCI value was high over the reporting period. A high value means that at least one VCI value was high. VCI is shown as pixel-based maps and as average value by CWSU.
VHI			
Vegetation health index			
Crop/ Satellite	Number, pixel to CWSU	The average of VCI and the temperature condition index (TCI), with TCI defined just like VCI but for temperature. VHI is based on the assumption that "low temperature is bad" (crops develop and grow slowly) but ignore that fact that high temperature may be equally "bad".	Low VHI values indicate unusually poor crop condition, but high values, when due to high temperature, may be difficult to interpret. VHI is shown as typical time profiles over Major Production Zones (MPZ), where they occur, and the percentage of pixels concerned by each profile.

Note: Type is either "Weather" or "Crop); Source specifies if the indicator is obtained from ground data, satellite readings, or a combination; Units: in the case of ratios, no unit is used; Scale is either pixels or large scale CropWatch spatial units (CWSU). Many indicators are computed for pixels but represented in the CropWatch bulletin at the CWSU scale.

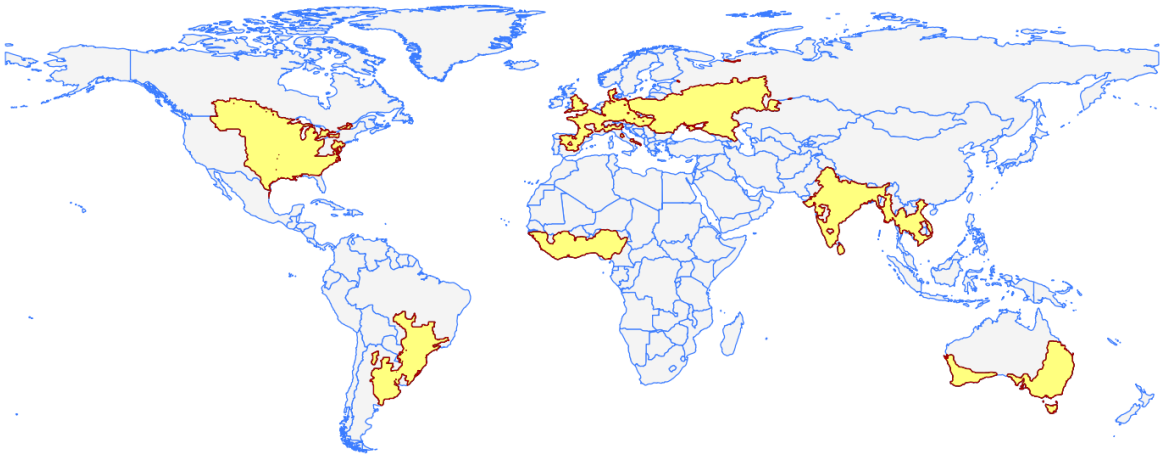
CropWatch spatial units (CWSU)

CropWatch analyses are applied to four kinds of CropWatch spatial units (CWSU): Countries, China, Major Production Zones (MPZ), and Crop Production System Zones (CPSZ). The tables below summarize the key aspects of each spatial unit and show their relation to each other. For more details about these spatial units and their boundaries, see the CropWatch bulletin online resources.

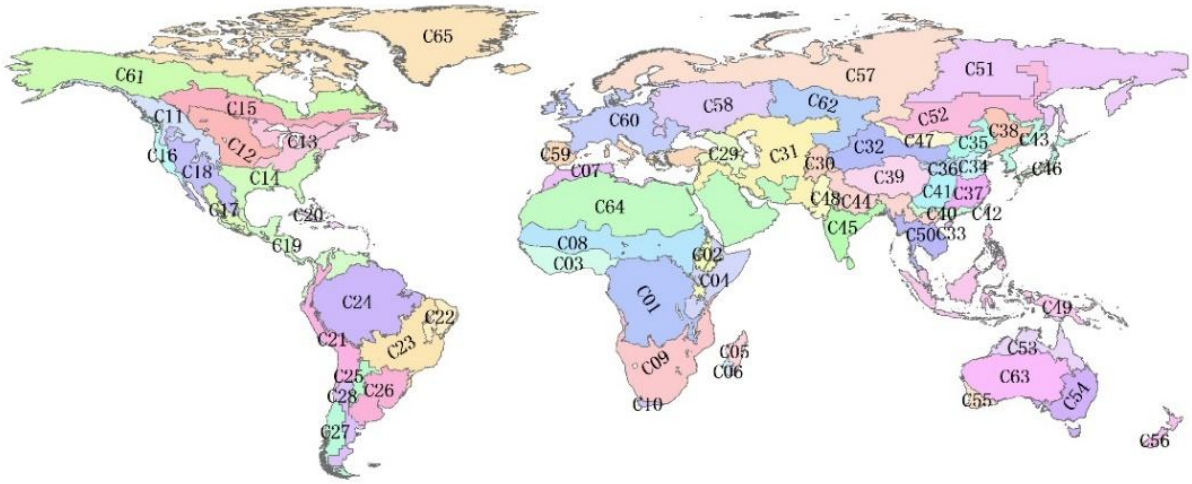
SPATIAL LUNITS	
CHINA	
Overview	*Description*
Seven monitoring regions	The seven regions in China are agro-economic/agro-ecological regions that together cover the bulk of national maize, rice, wheat, and soybean production. Provinces that are entirely or partially included in one of the monitoring regions are indicated in color on the map below.

Countries (and first-level administrative districts, e.g., states and provinces)	
Overview	*Description*
"Thirty plus one" countries to represent main producers/exporters and other key countries.	CropWatch monitored countries together represent more than 80 percent of the production of maize, rice, wheat and soybean, as well as 80 percent of exports. Some countries were included in the list based on criteria of proximity to China (Uzbekistan, Cambodia), regional importance, or global geopolitical relevance (e.g., four of five most populous countries in Africa). The total number of countries monitored is "thirty plus one," referring to thirty countries and China itself. For the nine largest countries—Canada, United States, Brazil, Argentina, Russia, Kazakhstan, India, China, and Australia, maps and analyses may also present results for the first-level administrative subdivision. The CropWatch agroclimatic indicators are computed for all countries and included in the analyses when abnormal conditions occur. Background information about the countries' agriculture and trade is available on the CropWatch Website, www.cropwatch.com.cn.

Major Production Zones (MPZ)	
Overview	*Description*
Seven globally important areas of agricultural production	The seven MPZs include West Africa, South America, North America, South and Southeast Asia, Western Europe, Central Europe to Western Russia, and Southern Australia. The MPZs are not necessarily the main production zones for the four crops (maize, rice, soybean, wheat) currently monitored by CropWatch, but they are globally or regionally important areas of agricultural production. The seven zones were identified based mainly on production statistics and distribution of the combined cultivation area of maize, rice, wheat and soybean.



Crop Production System Zones (CPSZ)	
Overview	*Description*
62 agro-ecological/agro-economic units across the world	CPSZs are reasonably homogeneous agro-ecological/agro-economic units spanning the globe, selected to capture major variations in worldwide farming and crops patterns while at the same time providing a manageable (limited) number of spatial units to be used as the basis for the analysis of environmental factors affecting crops. Zone numbers and names are shown in the figure below. A limited number of units (e.g. C63 to C65) are not relevant for the crops currently monitored by CropWatch but are included to allow for more complete coverage of global production. Additional information about the CPSZs is provided online under www.cropwatch.com.cn .



C01:Equatorial central Africa
C02:East African highlands
C03:Gulf of Guinea
C04:Horn of Africa
C05:Madagascar(main)
C06:SW Madagascar
C07:North Africa Mediterranean
C08:Sahel
C09:Southern Africa
C10:S. Africa Western Cape
C11:Boreal North America
C12:America northern great plains
C13:America corn belt
C14:America cotton belt-Mexican coastal plain
C15:Sub-boreal North America
C16:America West Coast
C17:Sierra Madre
C18:SW Mexico and N. Mexico highlands
C19:Northern South and Central America
C20:Caribbean
C21:Central-Northern Andes
C22:Brazil Nordeste
C23:Central-Eastern Brazil
C24:Amazon
C25:Central-North Argentina
C26:SE Brazil-Concepcion-Bahia Blanca
C27:SW Southern Cone
C28:Semi-arid Southern Cone
C29:Caucasus
C30:Central Asia Pamir mountains
C31:Western Asia
C32:China Gansu-Xinjiang
C33:China Hainan
C34:China Huang Huaihai
C35:China Inner Mongolia
C36:China Loess region
C37:China Lower Yangtze
C38:North East China
C39:China Qinghai-Tibet
C40:Southern China
C41:South-West China
C42:Taiwan
C43:East Asia
C44:Southern Himalayas
C45:Southern Asia
C46:Southern Japan and Korea
C47:Mongolia region
C48:S. Asia Punjab to Gujarat
C49:SE Asia islands
C50:SE Asia mainland
C51:Eastern Siberia
C52:Eastern Central Asia
C53:North Australia
C54:Australia Queensland to Victoria
C55:Australia Nullarbor-Darling
C56:New Zealand
C57:Boreal Eurasia
C58:Ukraine to URAL Mountains
C59:Mediterranean Europe and Turkey
C60:W. Europe(non-Mediterranean)
C61:British Columbia To Colorado
C62:URAL to Altai Mountains
C63:Australian Desert
C64:Old World Deserts
C65:Sub Arctic America

Newsletter and online resources

The bulletin is released quarterly in both English and Chinese. To sign up for the mailing list, please e-mail cropwatch@radi.ac.cn or visit CropWatch online at www.cropwatch.com.cn. Visit the CropWatch Website for additional resources and background materials about methodology, country agricultural profiles, and country long term trends.

Executive summary

The CropWatch May 2014 bulletin summarizes global crop condition developments and agroclimatic factors from January to April 2014, focusing on key crop producing and exporting areas and China. Large scale weather anomalies dominated the reporting period, although no major disasters seriously affected agriculture.

Agroclimatic indicators point to mostly cold spells, warm spells, and droughts for large areas

Agriculturally very significant climatic anomalies have affected the globe during the four-month reporting period. The anomalies covered large areas—virtually entire continents, including some of the major food producers in the world.

CropWatch agroclimatic indicators assessed at the level of global Crop Production Systems Zones (CPSZ) identify extreme cold conditions over two areas: (i) most of Canada and the eastern-central United States, and (ii) a large area with low temperatures covering Punjab to Gujarat, the Pamir mountains, and adjacent central Asian countries, even extending, with decreasing intensity, to the west as far as the eastern Caspian and, in the south, to the eastern Mediterranean.

Large positive temperature departures—when compared to the average of the past thirteen years (2001-13)—have affected most of the Eurasian continent, from north Japan and east China to the Atlantic Ocean in western Europe; eastern Australia; and north-east Brazil, to mention only the agriculturally most significant areas. The increased temperatures were mostly associated with precipitation shortfalls that affected Central America and northern South America (-57%), northeast Asia, and China down to Korea and eastern-central Asia (-50% in China's northeast), as well as New Zealand (-48%) and southwest Australia (-35%), East Africa (-38%), and northeast Brazil (-29%). Increased temperatures with precipitation shortfalls also took place in the southern and eastern Mediterranean (-52% rainfall), where the below average rainfall directly followed a water deficit period at the end of 2013.

Crop conditions and significant increases in the fraction of cropped arable land

Satellite-based agronomic indicators substantiate the impacts of the agroclimatic indicators: cropped arable land fractions are 8 percentage points below average in North America, while crop condition is slightly above average in the United States (a maximum Vegetation Condition Index (VCIx) of 0.65). Crop condition remains promising in Mexico, which largely escaped the cold spell but suffered from a moderate dry spell, as indicated by a VCIx of 0.86. A very large increase in cropped arable land, associated with high temperature and early phenology, occurred in central Europe and western Russia (an increase of 19 percentage points), although crop condition in this major production zone was only moderate (VCIx of 0.79 on average). Some high values for the maximum vegetation index, however, were observed in the west of this area, such as in Poland (0.98). In western Europe, several countries show excellent crop condition (e.g., Germany with a VCIx of 0.94), but close to average fractions of cultivated land. As major producers in the central Asian cold anomaly area, Pakistan and Kazakhstan are also mentioned here because of just average crop condition at VCIx values of 0.76 and 0.68, respectively.

Great regional differences in China

For China, overall conditions for the country can be described as average, with a slight biomass potential increase of 0.9% above the recent five-year average. Very contrasting conditions, however, are observed

for the different regions, ranging from moderate to good crop conditions (VCIx close to 0.85 everywhere) to excellent (Loess region and Inner Mongolia, both at 0.96), sometimes with marked increases of cultivated land. The fractions of cropped arable land in both the Loess and North-East regions increased in excess of 10 percentage points.

Total production for 2014 close to 2013 level

At the scale of the 30 major food producers and exporters, the initial production estimate of wheat (representing about 70% of the expected 2014 output) is up 4% compared with 2013, resulting from increases among the major producers: United States (+1.6%), India (+1.9%), and China (+1.3%). CropWatch puts the winter wheat production in China at just above 112 million tons, as a result of favorable yields in the Loess region and a combination of yield and area increases in the provinces of Jiangsu and Anhui in Huanghuaihai. Poland, France, and Russia also did well for wheat, with production increases of +5.9%, +9.6%, and +12.4%, respectively, compared to 2013. A very unfavorable output is expected for wheat in Turkey (-7.0%), Iran (-16.3%), and Kazakhstan (-5.8%).

Record crops of maize are expected in South Africa and Mexico (close to a 7% increase), while the output in Brazil and Argentina is best described as average (+0.3% and +0.9%). As for soybean, CropWatch puts the forecast at very close to last years' in Brazil (+0.1%) and 2.5% above 2013’s numbers in Argentina. In both countries, particularly for maize, major areas of production underperformed, but were compensated for by other regions.