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Aerospace Information Research Institute(AIR)
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Tips on country analyses

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On-job training on the use of CropWatch Cloud and the model calibration for Nigeria
19th February, 2024





Workflow

- Before start, collect information and know the general situation
- When CropWatch Products are ready, make up **a good, consistent story** for the country but **DO NOT copy or steal analysis text from others**
- **Review CropWatch Indicators/products, if unusual behavior on the products**, please contact with the trainers familiar with the system
- **Spend half day focusing on your analysis**, carefully check your draft analysis before submission on the platform before the due date
- Modify your analysis according to feedback and submit again
- Finish your work when approved by trainers



1. Read current version of profile & look up phenology.
2. Verify county and subcountry EI departure from tables
3. Compare
 - ✓ VCIx
 - ✓ Season NDVI development, rainfall development
 - ✓ NDVI clusters
 - ✓ NPP dep from 5YA by pixel and some other maps
 - ✓
4. Make up your mind & write up description and make sure everything is consistent



Key points

- The main line is to tell a story for analysis of each country with 2-3 pages including the graphs and maps.
- The first paragraph presents an overall situation at national level, and then the writer can include a few paragraphs to introduce the regional analysis results;
- After the analysis, the last paragraph shall provide a summary of all the analysis.
- When severe issue occurred, the analyst can include satellite images to show the abnormal patterns along with text;



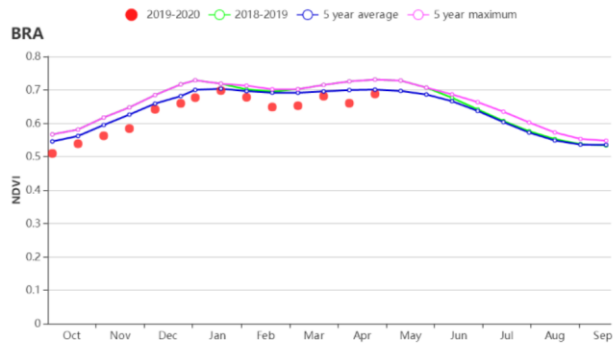
Key points

- Sub-regional analysis will be carried out for all countries if sub-national boundaries are reasonable based on the sub regions boundary file and corresponding statistical data, including rainfall, temperature, radiation, VCI, CALF, biomass.
- Write several sentences for each region. **Avoid repeating same expression, use synonyms.** End of regional description paragraph to be summary for region- Phrase like **Overall situation is.... OR The region has overall high/good/moderate/poor prospect for(Name of the season)season crops like.....(Take from crop phenology/crop calendar).**

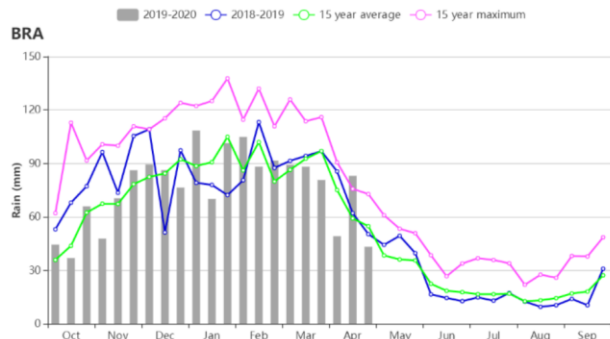
Figure 3.8. Brazil crop condition, January - April 2020



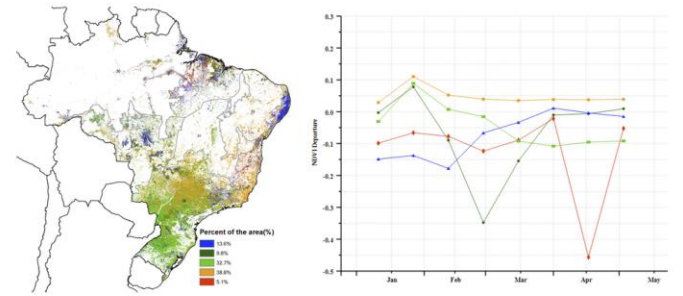
(a) Phenology of major crops



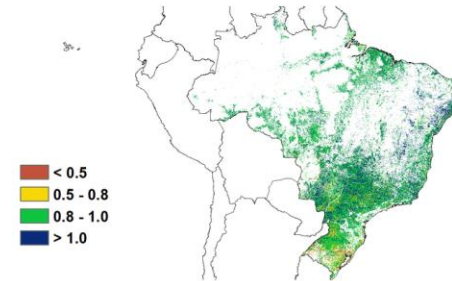
(b) Crop condition development graph based on NDVI_Brazil



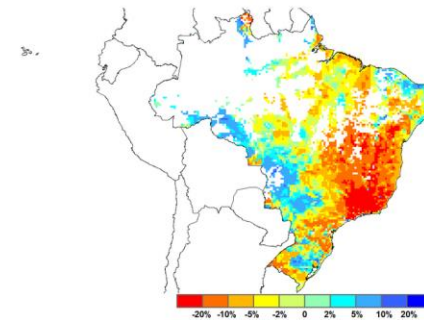
(c) Time series rainfall profile_Brazil



(d) Spatial distribution of NDVI departure profiles



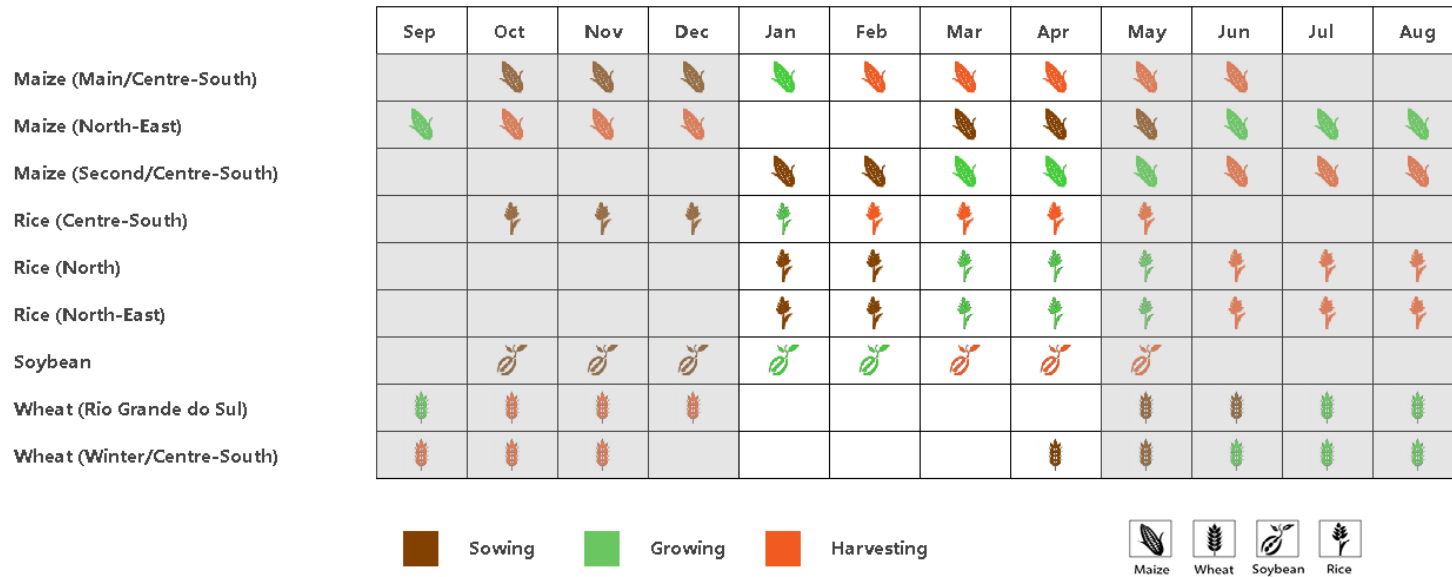
(e) Maximum VCI



(f) Potential biomass departure from 5YA



Analysis for Brazil



Paragraph 1: Crop phenology and overall crop condition

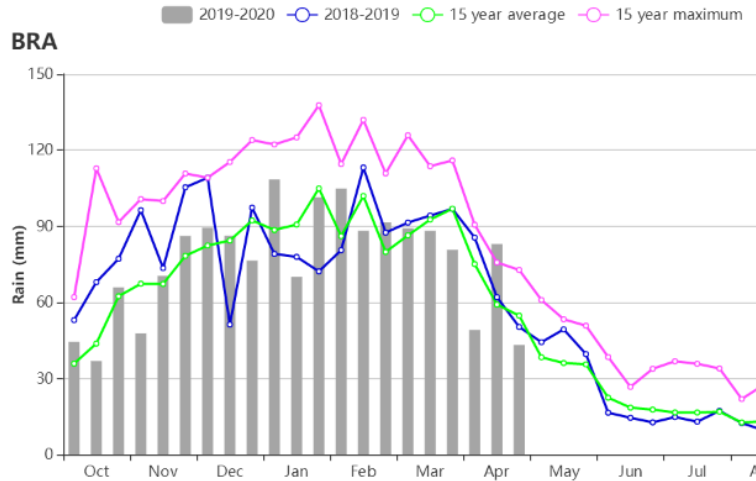
During this reporting period, the **rice and main season maize in Central and Southern Brazil as well as soybean** reached maturity stage and the harvests almost concluded by the end of April. **Rice in north and northeast and second maize in Central and Southern Brazil** were still at the peak growing stage. **The sowing of maize in the northeast and wheat in the south** started in April. **Generally, crop conditions in Brazil were close to average compared to the previous five years.** (This overall situation could be summarized after finish the analysis) www.aircas.ac.cn



Analysis for Brazil

Paragraph 2:

Agro-climatic condition (rainfall, temperature, PAR, potential biomass)



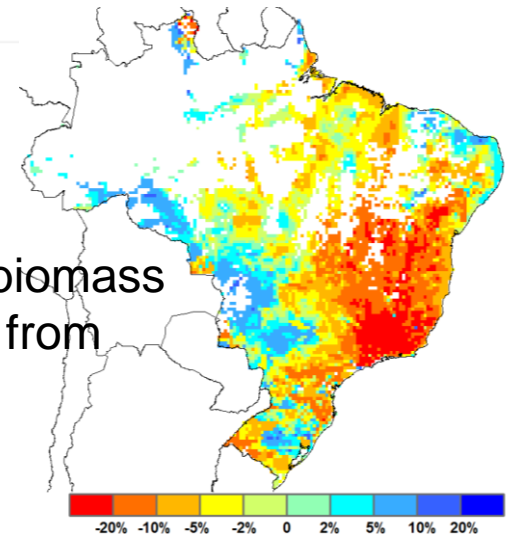
Region	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m ²)	Departure from 15YA (%)	Current (gDM/m ²)	Departure from 15YA (%)
Amazonas	1213	-11	25.3	0.3	1080	2	712	-1
Central Savanna	1139	30	23.4	0.0	1160	-6	722	-12
Coast	847	34	23.2	0.0	1146	-7	721	-12
Northeastern mixed forest and farmland	1495	13	25.0	0.1	1116	-2	745	-4
Mato Grosso	1154	-12	24.5	0.4	1146	5	754	1
Nordeste	750	83	25.3	-0.3	1205	-4	772	-7
Parana basin	777	-18	21.9	-0.2	1213	4	710	-6
Southern subtropical rangelands	181	-63	23.0	0.5	1224	5	709	-4

Regions

Provinces

Ceara	964	60	25.5	-0.6	1250	1	836	
Goiias	1070	0	22.9	0.1	1197	-2	741	
Mato Grosso Do Sul	692	-20	24.6	0	1278	7	821	3
Mato Grosso	1159	-9	24.4	0.3	1153	4	757	0
Minas Gerais	1123	23	21.5	-0.2	1113	-7	651	-17
Parana	502	-41	21.1	-0.4	1257	9	695	-5
Rio Grande Do Sul	215	-61	22.2	0.4	1240	6	707	-2
Santa Catarina	435	-42	19.2	-0.5	1212	9	623	-5
Sao Paulo	898	-17	21.7	-0.6	1186	4	694	-6

Potential biomass departure from 15YA





Analysis for Brazil

Paragraph 2:

Agro-climatic condition (rainfall, temperature, PAR, potential biomass)

Agro-climatic indicators present **generally close to average conditions** with 2% lower rainfall, 0.1°C higher temperature and 1% above average RADPAR. **Slightly below average rainfall resulted in 4% reduction of potential biomass** compared with the 15YA. According to the **national rainfall profiles**, the 10-days accumulations of rainfall also show **overall average conditions from January to April 2020**. However, significant differences were identified among the provinces or agro-ecological zones (AEZs). Rainfall among the provinces ranged from **215 mm in Rio Grande Do Sul to 1451 mm in Para**. **Largest rainfall departure** from the 15YA was also observed **in Rio Grande Do Sul**. Santa Catarina, Parana, Mato Grosso Do Sul, and Sao Paulo also suffered from **water shortage with 42%, 41%, 20% and 17% less rainfall**, respectively. Temperature was **overall close to average except for Rio De Janeiro with 1.0 degree lower** than the 15YA. Among the **major agricultural producing provinces**, large departures were observed in **Parana and Santa Catarina (+9%)** and **Minas Gerais (-7%)**. **Radiation was the most limiting factor for biomass accumulation** during the reporting period, **reflected by negative radiation departures resulting in below average biomass**. Large negative departures of rainfall also hampered the biomass accumulation and resulted in low biomass compared with the 15YA in **Sao Paulo, Rio Grande Do Sul, Parana and Santa Catarina**.

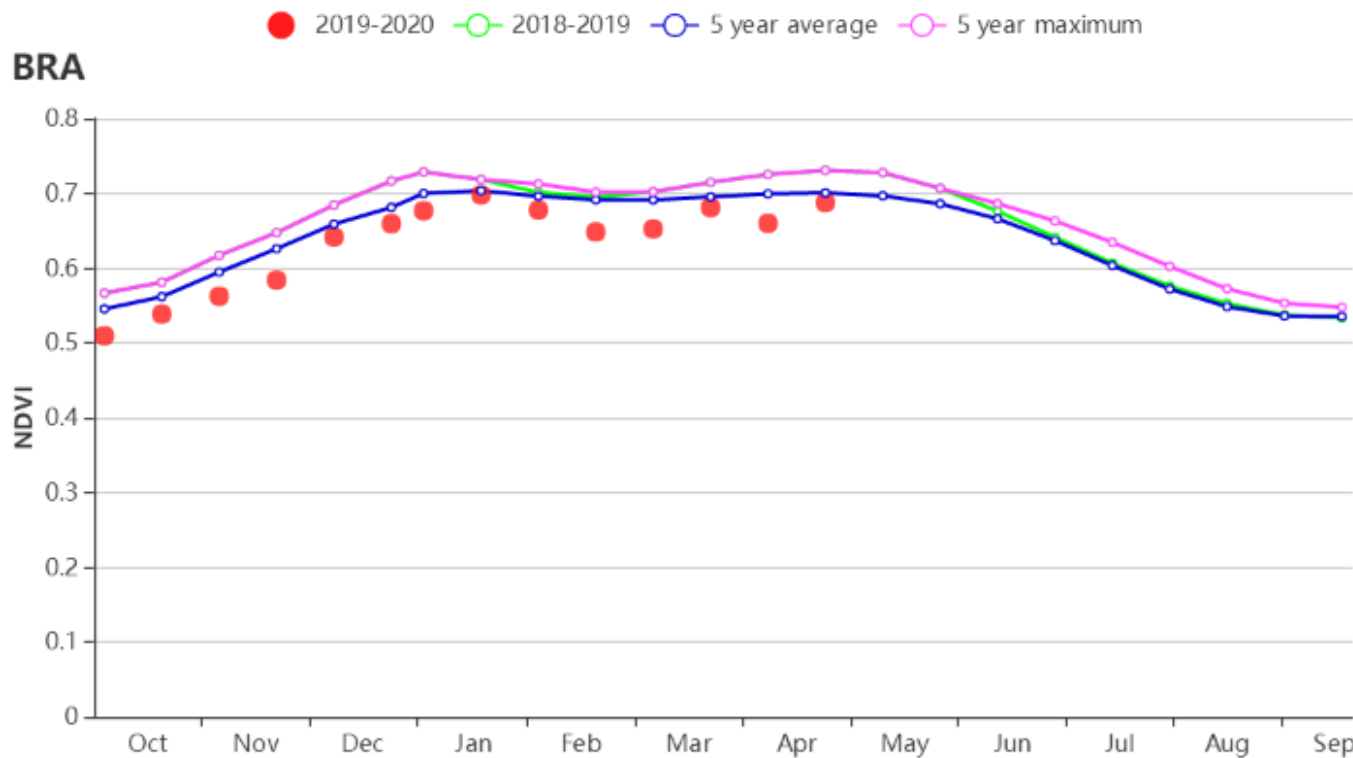


Analysis for Brazil

Paragraph 3: Agronomic condition

(1) Time series of NDVI across the growing season to demonstrate the crop-growth profiles

To be simple, NDVI is an indicator of the greenness of vegetation, the higher value, the greener the vegetation is.



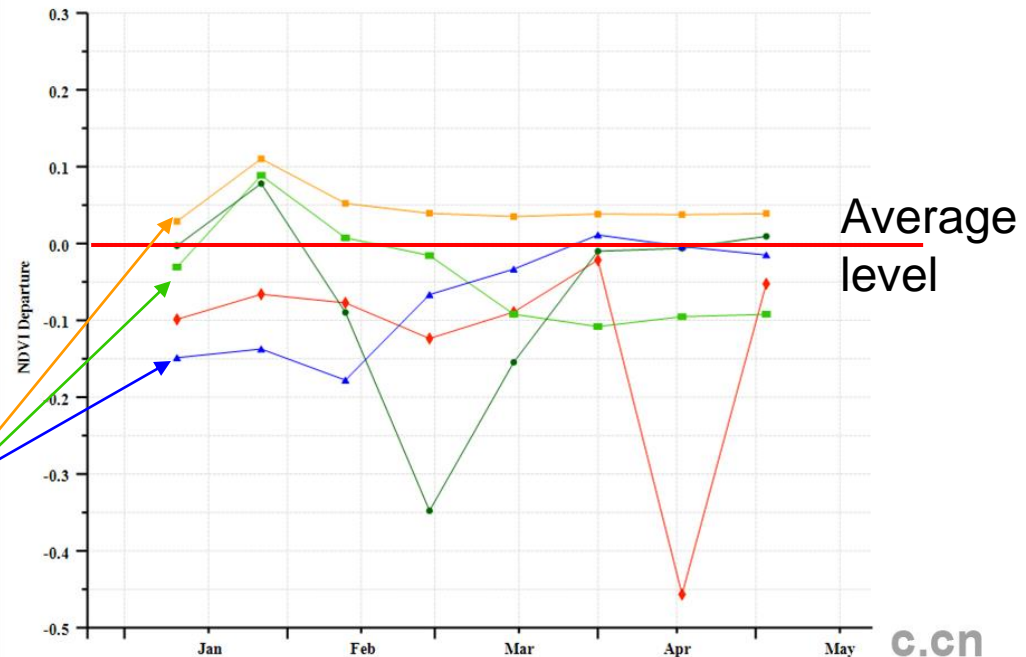
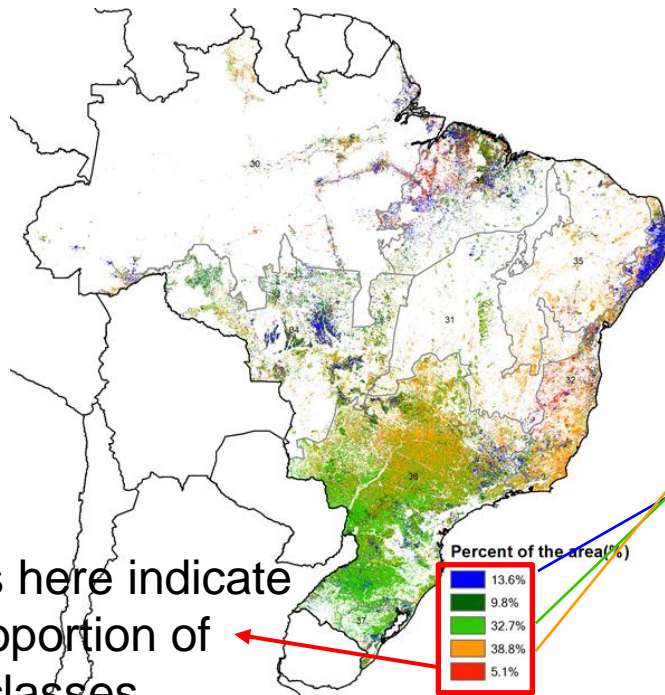


Analysis for Brazil

Paragraph 3: Agronomic condition

(2) Time series clustering using ISODATA algorithm

- It compares the time profiles of all pixels and categorizes them into a limited number of different behaviors that can be mapped
- The method has the advantage of very synthetically describing the spatial distribution of typical time profiles





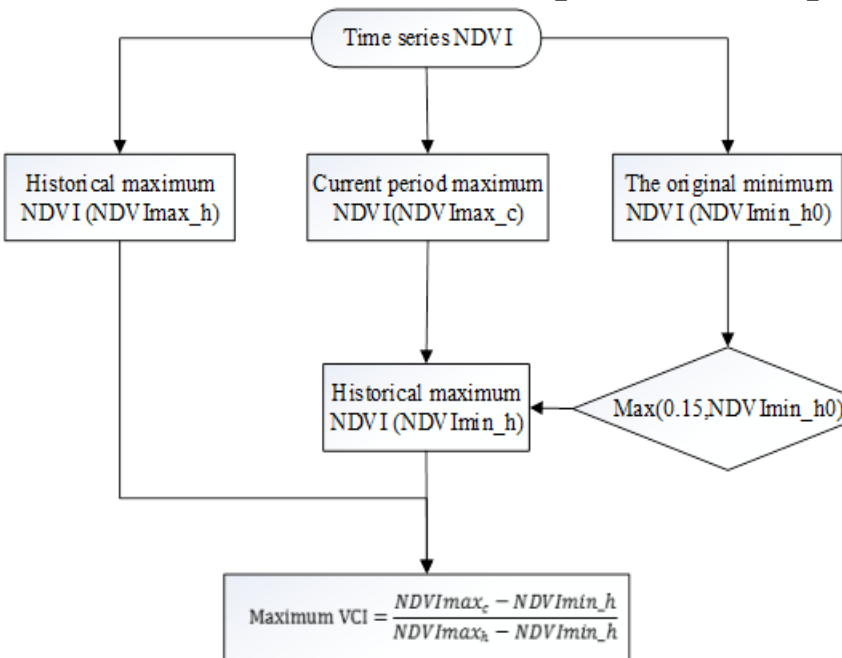
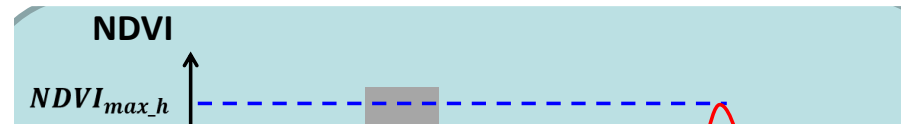
Analysis for Brazil

Paragraph 3: Agronomic condition

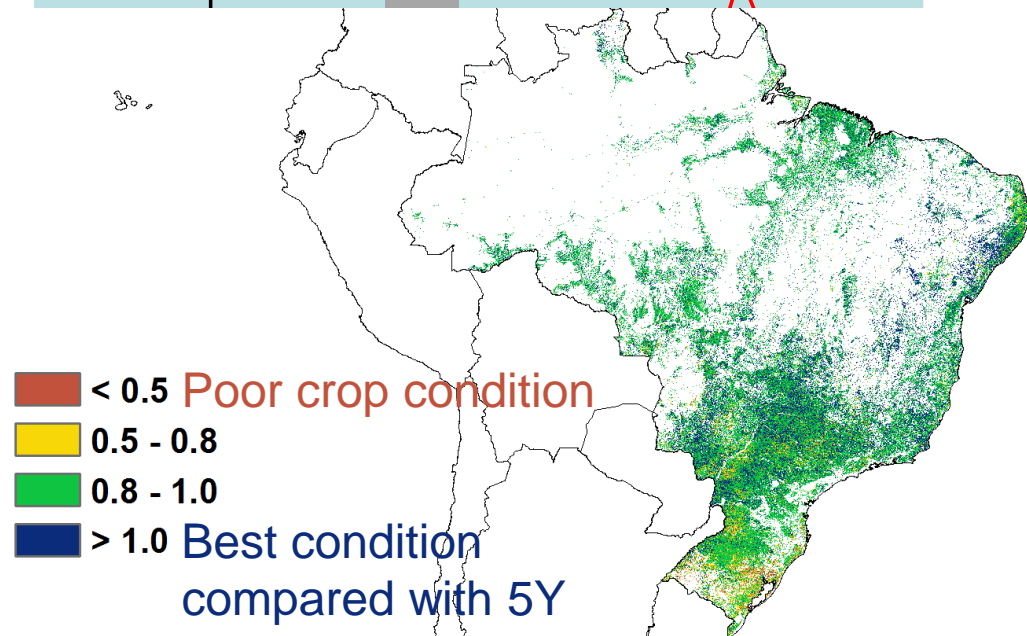
(3) Maximum Vegetation Condition Index (VCIx)

- VCIx is to compare the peak of growing season with the historic peak values over the same growing season

$$VCIx = \frac{NDVI_{max_t1} - NDVI_{min_h}}{NDVI_{max_h} - NDVI_{min_h}}, NDVI_{min_h} = \max(0.15, NDVI_{min_temp})$$



Algorithm of VCIx





Analysis for Brazil

Paragraph 3: Agronomic condition

The **crop condition development graph based on NDVI** for Brazil presents **slightly below-average values** throughout the reporting period mainly **because of drought situations** in southern Brazil. According to the **NDVI departure clustering maps** and

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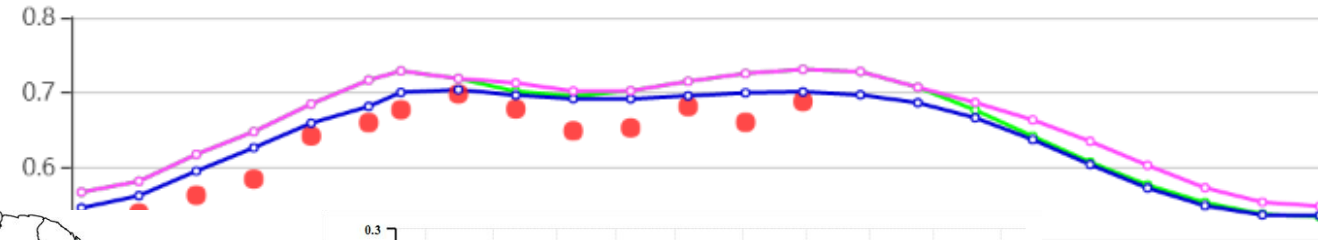
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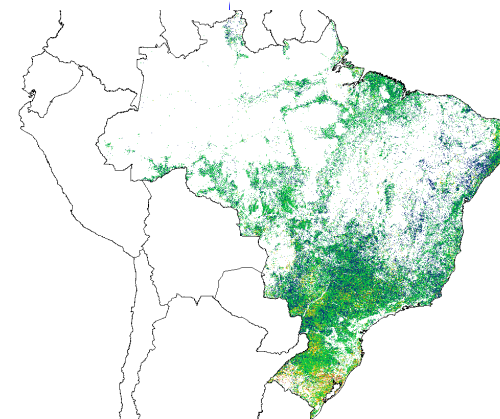
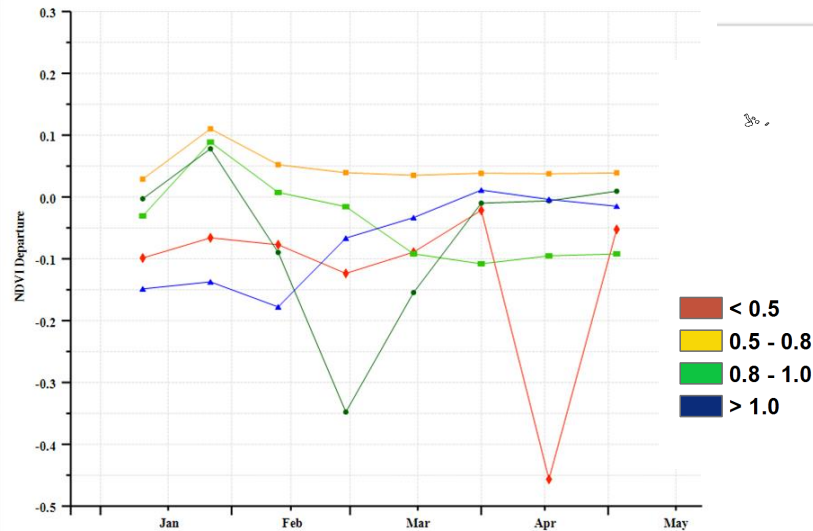
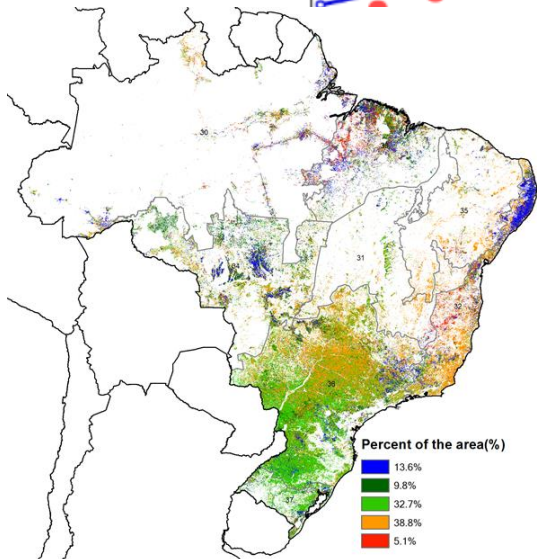
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● 2019-2020 ○ 2018-2019 ○ 5 year average ○ 5 year maximum



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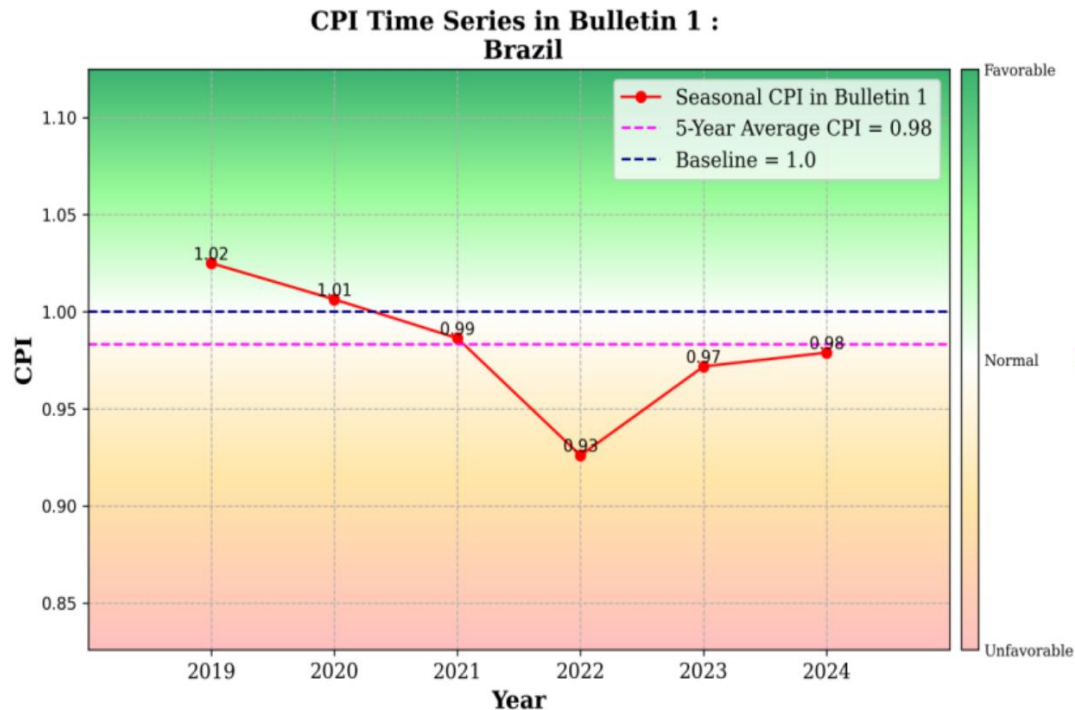




Analysis for Brazil

New Indicators and Graph

The Crop Production Index (CPI) in Brazil is **0.98**, presenting **close to previous five year average level** and **above the CPI of the same period during the last two years**. The output of summer crops is forecasted at higher than last year level although it still depends on the weather conditions in the coming months. If the dry and hot weather persists, the yield of summer crops will be below average.



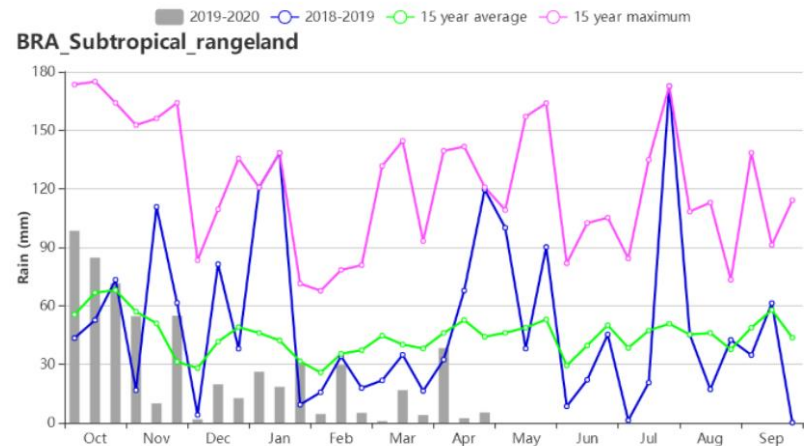
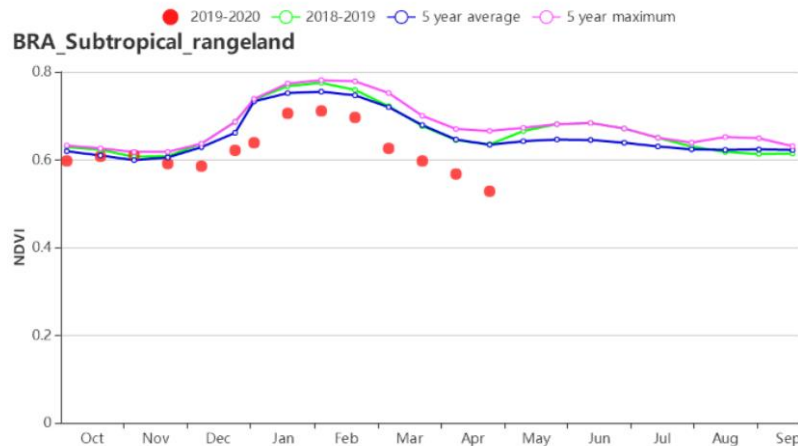


Analysis for Brazil

Paragraph 4: Sub-national analysis

Overall introduction of the sub-national zones:

Based on cropping systems, climatic zones and topographic conditions, eight agro-ecological zones (AEZ) are identified for Brazil. These include the Central Savanna, the east coast, Parana river, Amazon zone, Mato Grosso zone, Southern subtropical rangelands, mixed forest and farmland, and the Nordeste. Four zones received below-average rainfall, including Amazon, Mato Grosso, Parana Basin and Southern subtropical rangelands.





Other useful information

- Rainfall: Irrigated and rain-fed regions of the world to be treated as different class. Keep in mind about the irrigation proportions in the region.
- Temperature: Temperature is more critical parameter in temperate regions of world, than tropical regions. All the four crops do not have similar sensitivity to temperature. So, group the countries/regions in to Tropical and Temperate classes. Wheat is known to be sensitive to higher temperature.
- Radiation: Radiation is limiting only in high cloudy and cold regions. So, an approach similar to temperature needs consideration.
- Relate the crop phenology (Crop calendar) with period of data used in conjunction with crop mask to make comment about specific crop. Crop calendar need to be included in the database and ready to show in CropWatch Project website for each country when people make the country analysis.
- CALF area may be varying across the year- asia region will have higher CALF during monsoon season and low area in winter season. Low CALF in winter is also normal to specific region.

