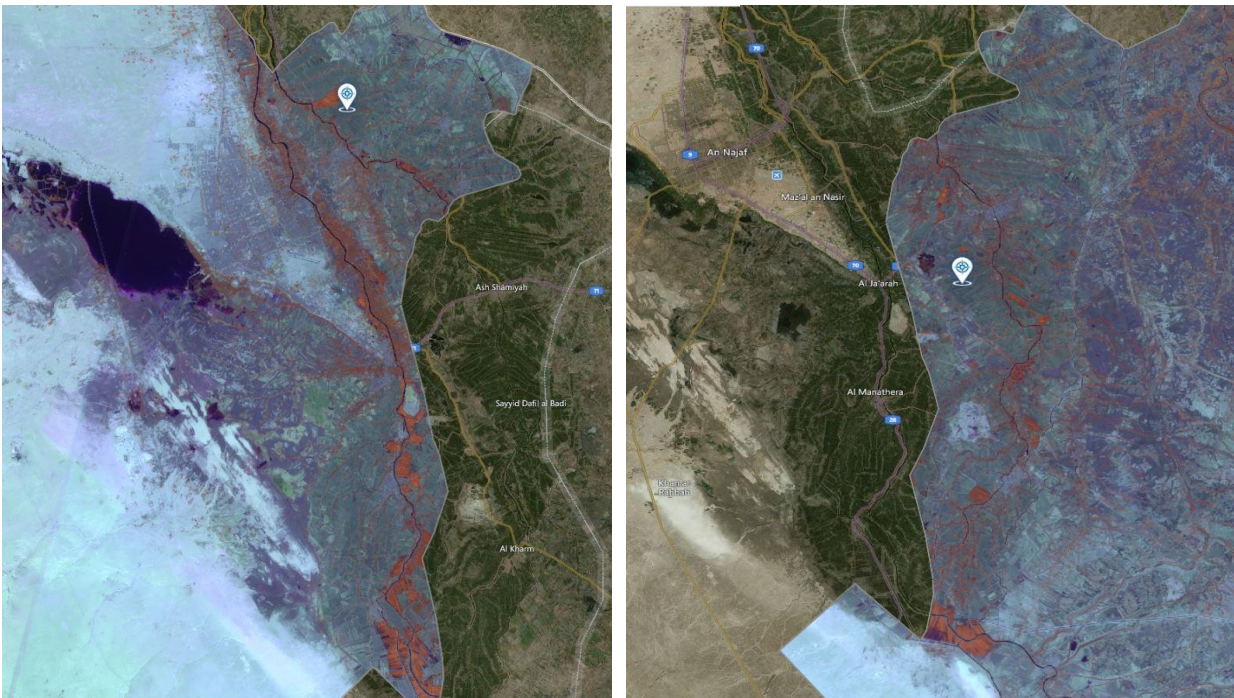


SPECIAL FOCUS – October 2018

Low summer crop areas due to water scarcity in Iraq and Pakistan and drought effects on cereal production in Yemen in October 2018

Iraq. As a result of water scarcity leading to a government ban on water-intensive summer crops (rice, corn...), less than 3% of the 2017 rice area was sown in 2018 in Iraq's rice belt area (Najaf and Qadissiya provinces; see also <https://nypost.com/2018/07/05/iraq-bans-farming-because-theyre-running-out-of-water>). The effect of the ban is clearly visible in Figure 1 when comparing the Sentinel 2 (S2) NIR/R/G colour composites taken in October 2018 (top images) and in October 2017 (bottom images) for Najaf (left images) and Qadissiya (right images) provinces (drastic reduction in active crops in red).



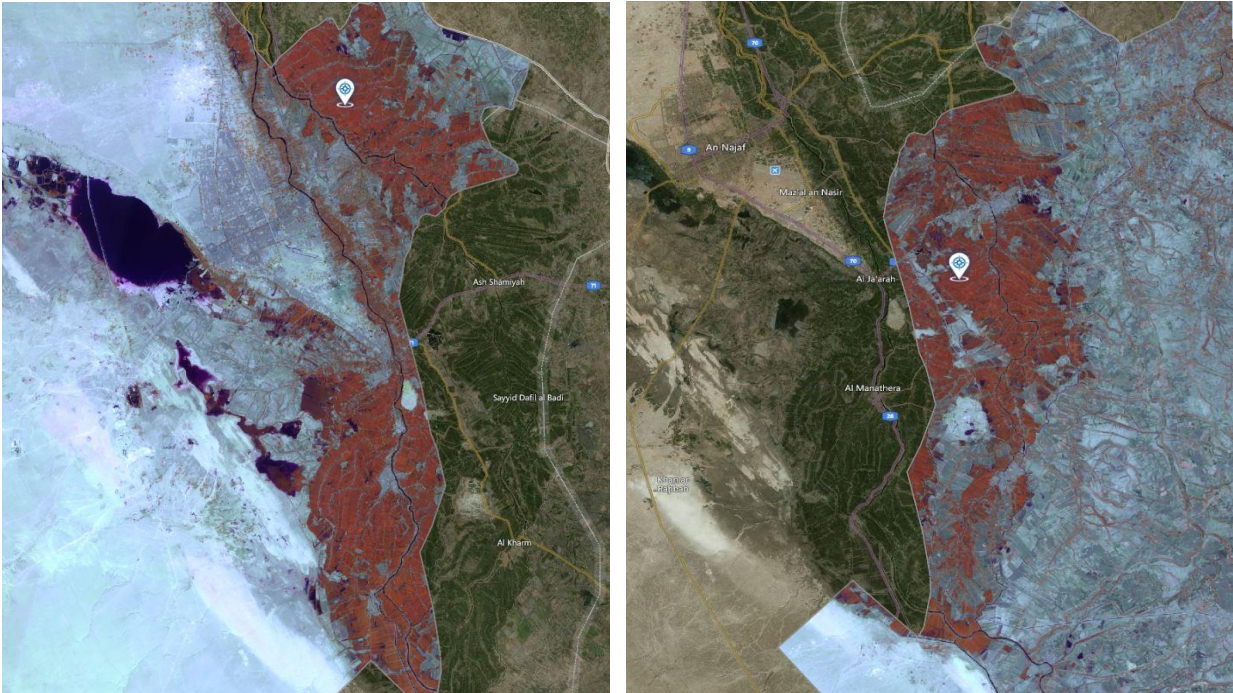


Figure 1. Sentinel 2 false colour composite showing a strong decrease in summer crops (Red) in October 2018 (top images) as compared to October 2017 (lower images) for Najaf (left images) and Qadissiya (right images) provinces (drastic reduction in active crops in red).

The field in Figure 2 in Qadissiya (indicated by the blue pointer) has been monitored from August 1 2017 to October 31 2018 using MODIS imagery at 250 m resolution (green dots in the NDVI profiles time series shown below, Figure 3), 30m Landsat 8 imagery (black diamond) and 10 m S2 imagery (blue squares). Images chips (NIR/R/G S2 colour composites) corresponding to each S2 NDVI point are shown below the NDVI profile and confirm the absence of crops after May 2018, in contrast with 2017.



Figure 2. cluster of fields in Qadissiya region showing a negative NDVI difference (in red) in October 2018 as compared to October 2017.

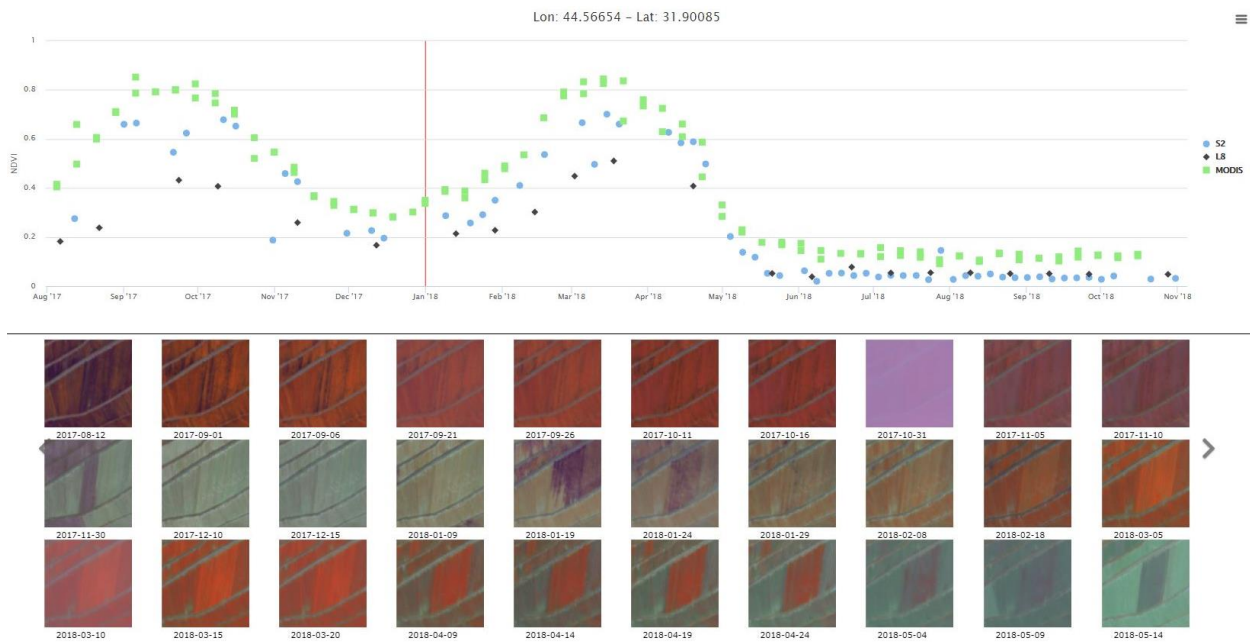


Figure 3. NDVI time series profile and false color image chips for the field in figure 2a showing the absence of vegetation from May 2018 onwards.

South Pakistan. Balochistan and Sindh provinces were consistently identified as critical in terms of biomass availability and rainfall since July 2018 by the ASAP system.

In Balochistan, the S2 NIR/R/G colour composites in Figure 4 clearly show a reduction in the kharif crop area (i.e. summer crop area) in September 2018 (top image) with respect to September 2017 (bottom image).

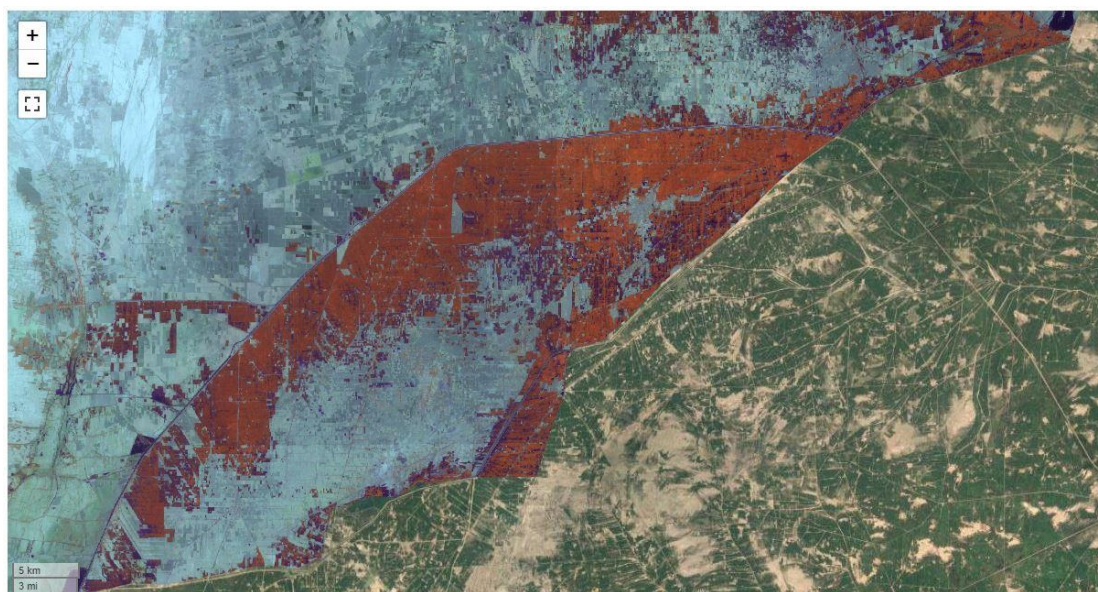




Figure 4. Sentinel 2 false colour composite showing a strong decrease in summer crops (Red) in September 2018 (top image) as compared to September 2017 (lower image) for a key crop area in Balochistan.

According to the Indus Rivers System Authority (IRSA), as of mid-August 2018, “the country had minus 28% rainfall from mid-July to mid-August” [i.e. during the first half of the monsoon season]. “Sindh and Balochistan are the most affected areas with Sindh province having minus 91% and Balochistan minus 66% rainfall during monsoon cycles” (<http://www.atimes.com/article/pakistan-facing-crisis-as-water-shortage-worsens>). This rainfall deficit (visible in the rainfall graph in Figure 5) for 2018 resulted in below average and below 2017 crop biomass, as shown by the NDVI profile in Figure 6 and the S2 false colour composites (Figure 7) of a part of Sindh in September 2018 (top) compared to September 2017 (bottom), where the prevailing dark red colour indicates early “maturation”, i.e. dryness of crops.

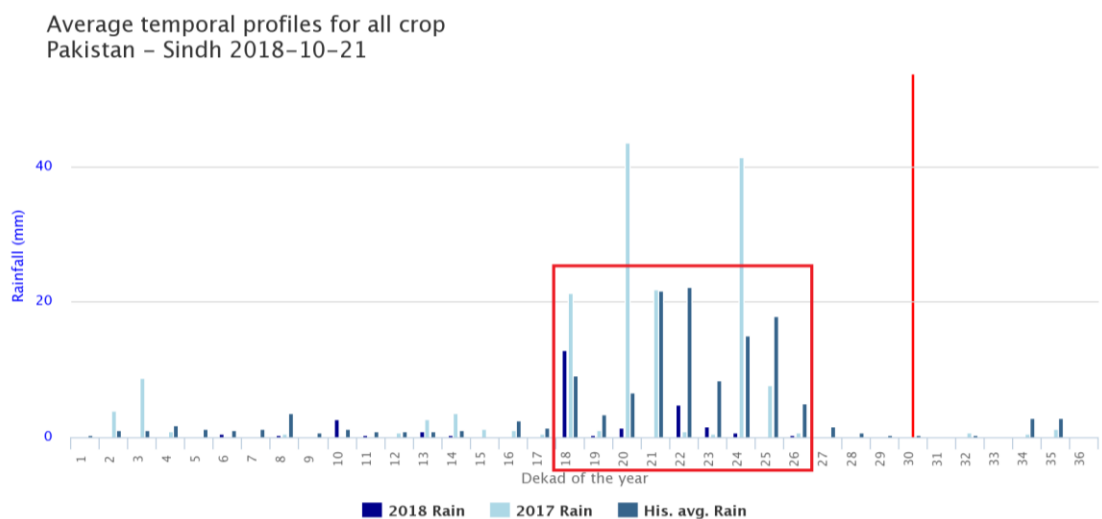


Figure 5. Rainfall time series profiles for crops in Sindh province showing rainfall deficit in June to August 2018.

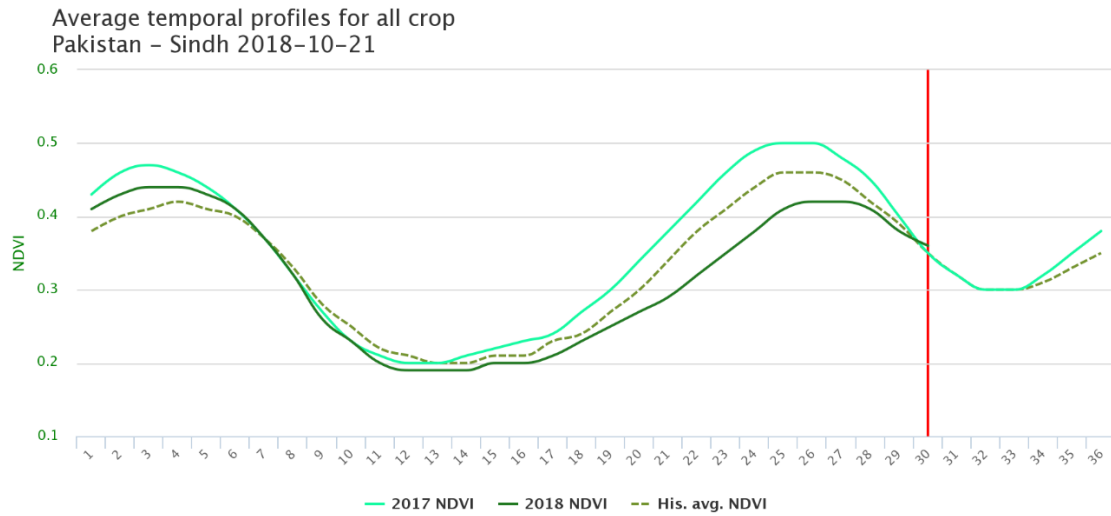


Figure 6. NDVI time series profiles for crops in Sindh province showing below average and below 2017 performance for 2018 crops.

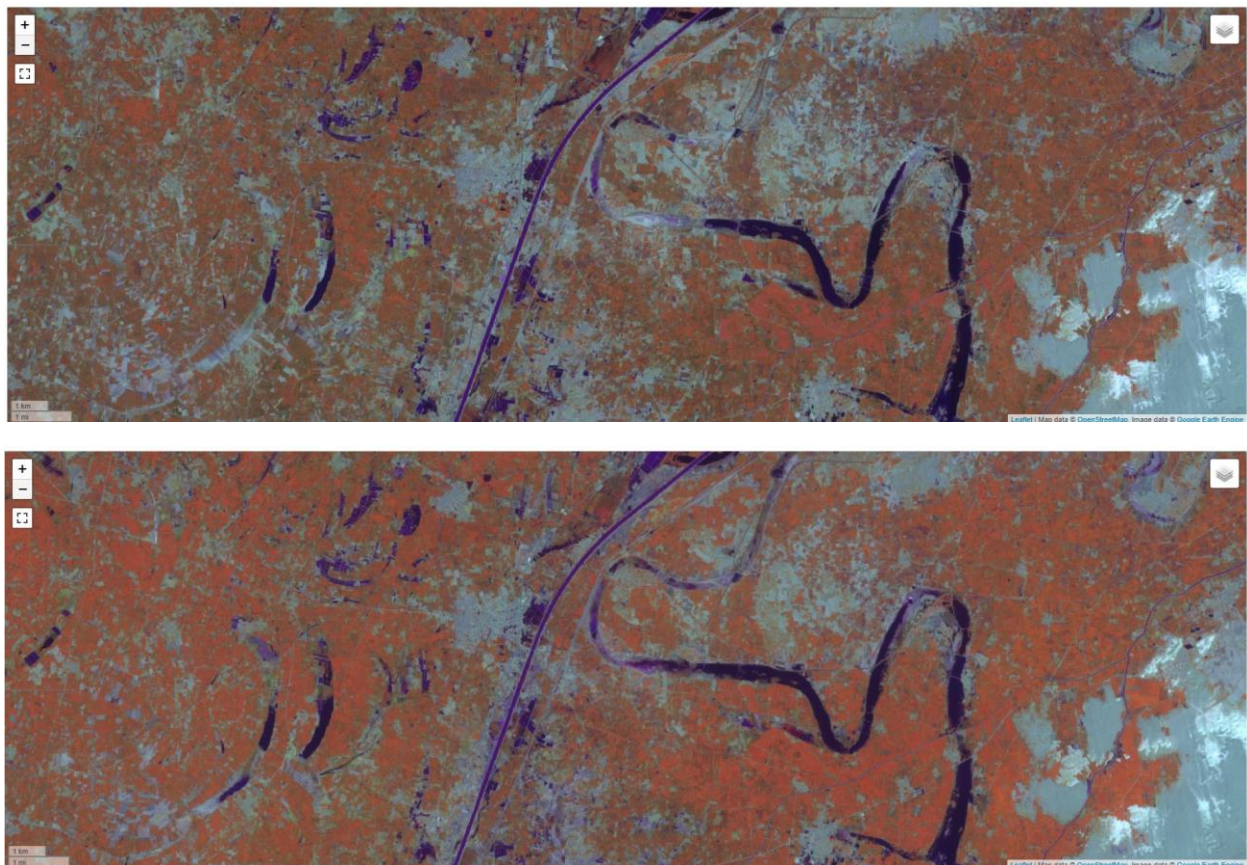


Figure 7. Sentinel 2 false colour composite showing early maturation of summer crops (dark red) in September 2018 (top image) as compared to September 2017 (bright red in the lower image) for a key crop area in Sindh province.

According to IRSA, “the two largest dams (Tarbela and Mangla) reached their dead level [the point at which their water cannot be drained by gravity, and can only be pumped out] in March 2018 for the first time in 15 years” (<https://www.reuters.com/article/us-pakistan-water-drought/water-pressures-rise-in-pakistan-as-drought-meets-a-growing-population-idUSKBN1JA2NW>).

The S2 images of October 2018 (left) and October 2017 (right) in Figure 8 clearly show a reduction of the edges of the Mangla dam (which according to the Water & Power Development Authority reached 45% of its storage capacity in mid-August 2018).

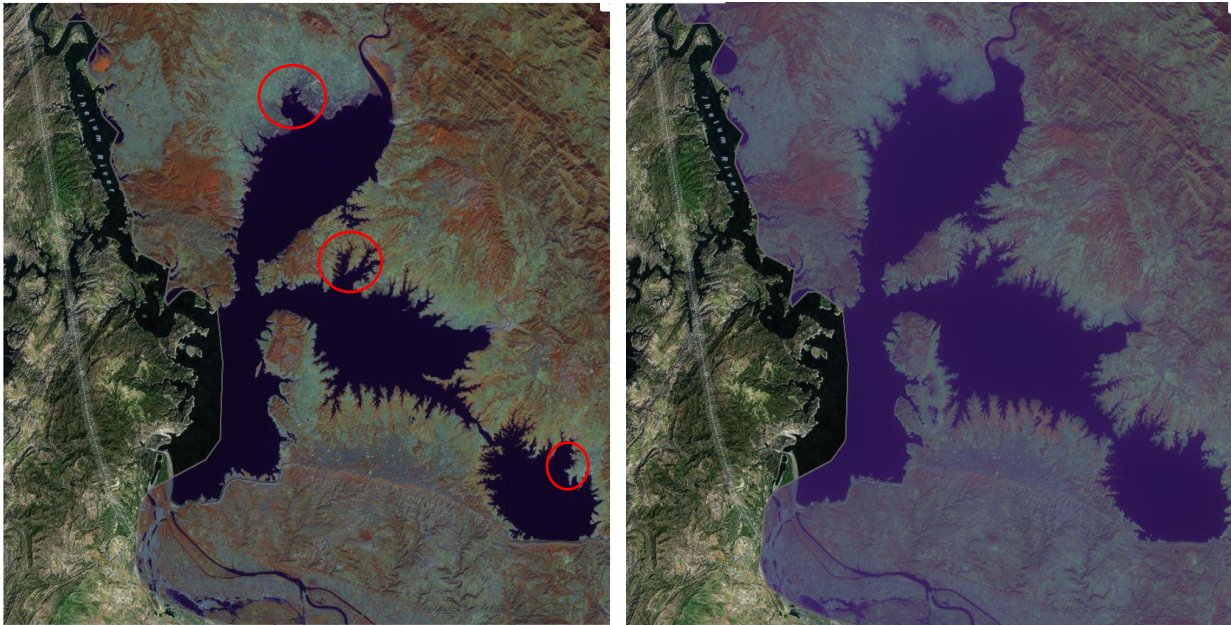


Figure 8. Sentinel 2 false colour composite showing a reduction of water content in 2018 (left image) as compared to September 2017 (right image).

Yemen. In the western coastal provinces, in particular Al Hudaydah with the main cropping areas, a one month dry spell (from 10 Aug to 10 Sept) at the start of the main rain season (Figure 9) negatively impacted rainfed crops (e.g. millet, as sorghum is sown around April-May and harvested in September-October) and pastures as shown on the MODIS NDVI profile in Figure 10. The S2 images of October 2018 and 2017 in Figure 11 show a contrasted situation with some areas affected and others less (as shown by the NDVI difference between 2018 and 2017 image), probably thanks to irrigation.

Average temporal profiles for all crop
Yemen – Al Hudaydah 2018–10–21

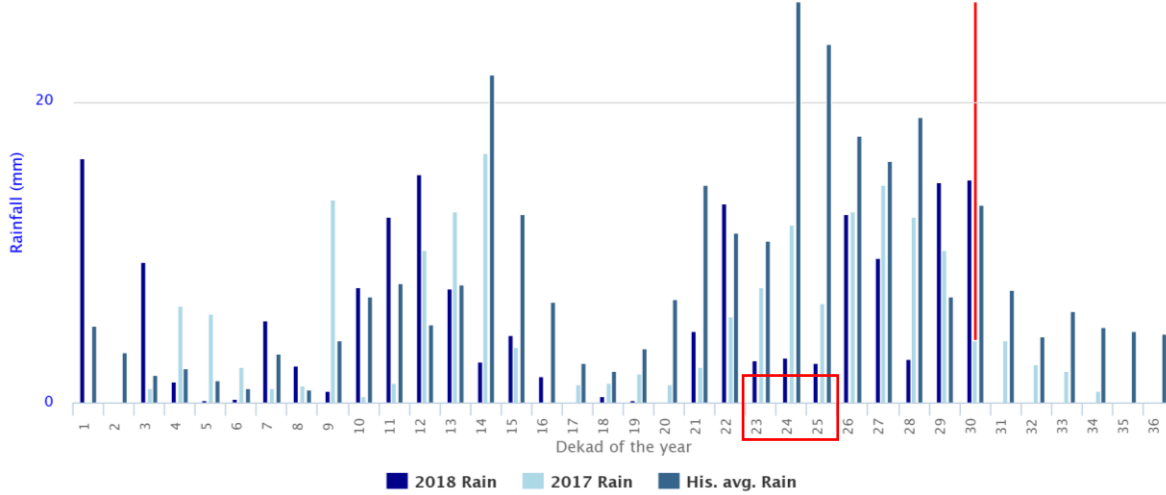


Figure 9. Rainfall time series profiles for crops in Yemen’s Al Hudaydah province showing a dry spell from dekad 23 to 25 followed by below average rainfall from dekad 26 to 28.

Average temporal profiles for all crop
Yemen – Al Hudaydah 2018–10–21

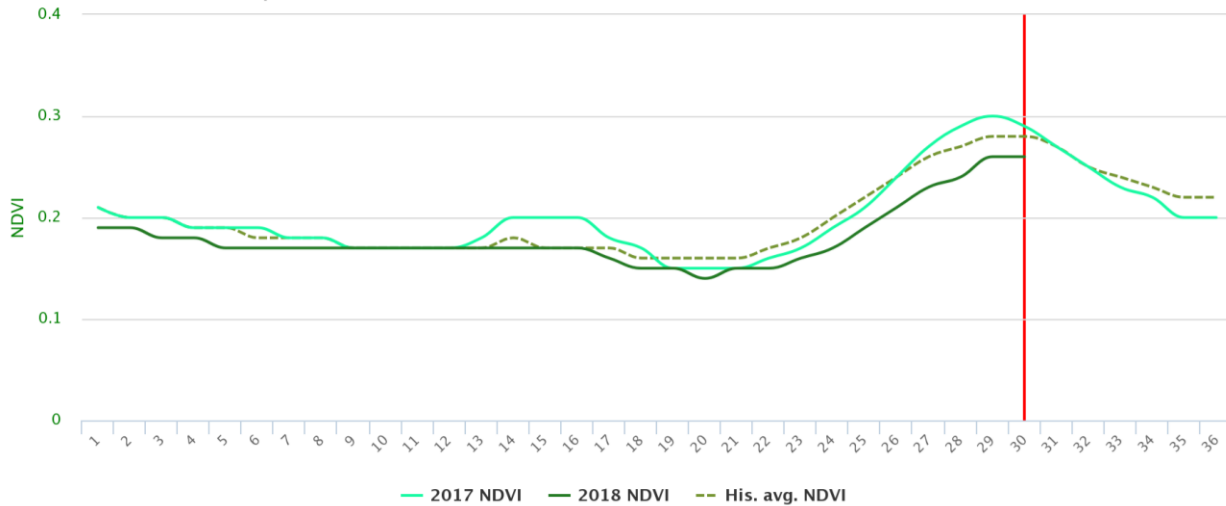


Figure 10. NDVI time series profiles for crops in Yemen’s Al Hudaydah province showing the NDVI low performance in 2018.

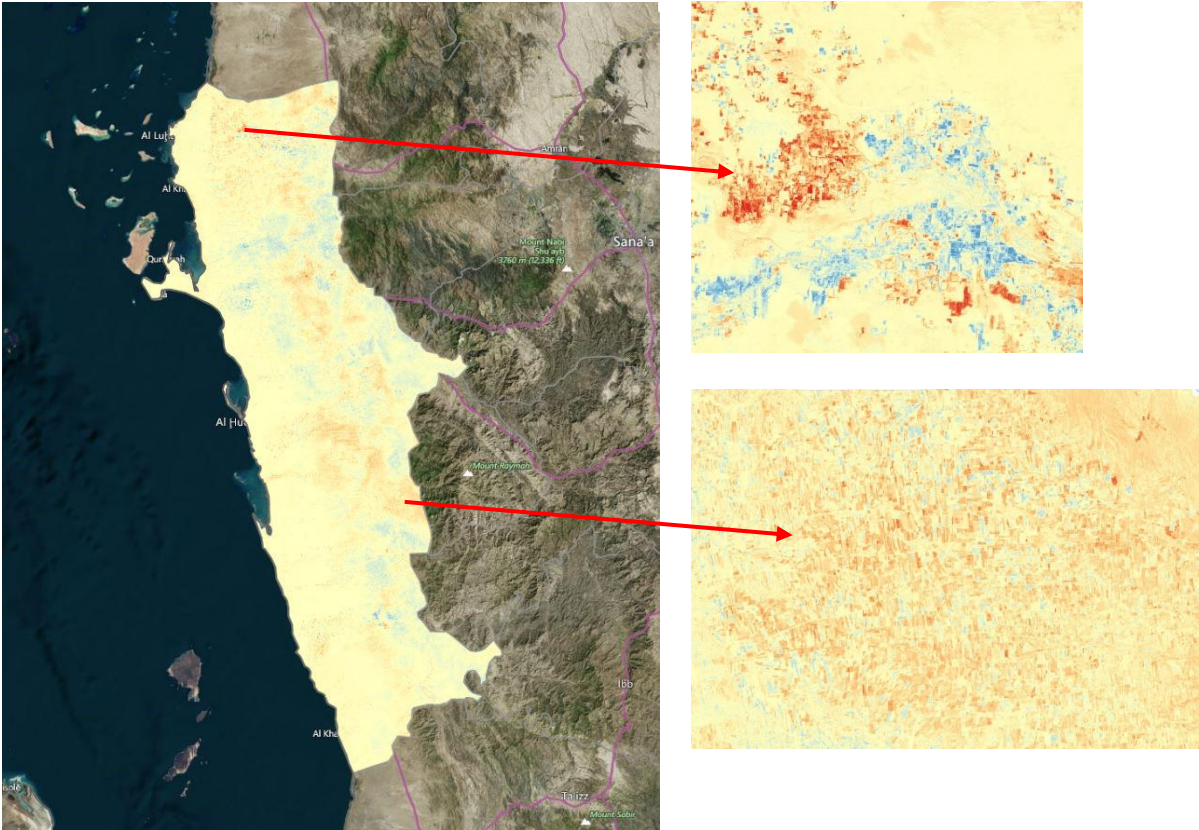


Figure 11. Sentinel 2 NDVI difference (in red) in October 2018 as compared to October 2017 with zooms on an irrigated area in the North and on a rain-fed area in the South both showing negative NDVI differences due to drought. Whereas the irrigated areas show a mixed performance, most of the rain-fed fields show low biomass in 2018.

NB: all figures have been produced with the ASAP Warning Explorer and the ASAP High Resolution Viewer.

For any feedback and questions please write to the address below.

Feedback can also be posted on Twitter by including the hashtag: #asapEU

JRC ASAP team

Jrc-asap@ec.europa.eu