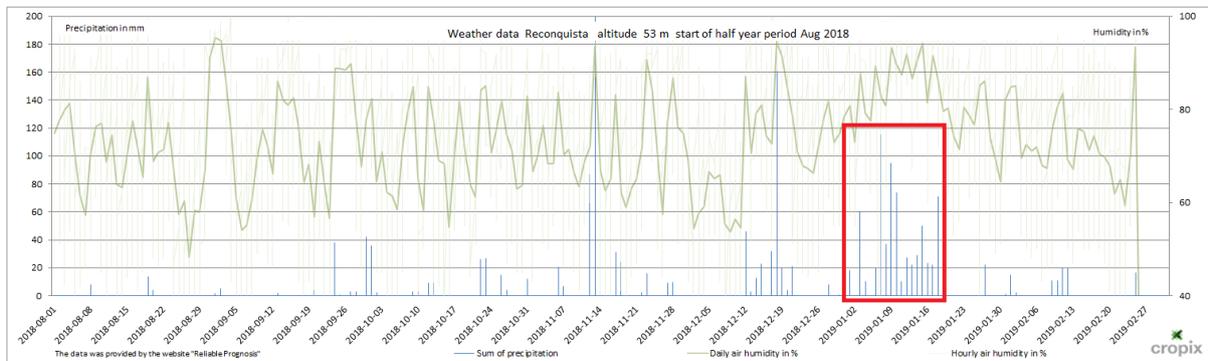


# Flood in Santa Fé Province Argentina

Heavy rains in late December and early January caused severe flooding in the Santa Fé province of Argentina. A lot of farmers were hit by the flooding and lost their crops for the main season.



Sentinel-1 satellites operated by the European Space Agency (ESA) acquires regularly at a global level every 12 days. The backscatter signal is independent from clouds. Especially in the rain season these satellites can deliver reliable data and observe the continuous evolution of cropland.

All of the following map products are purely derived from Sentinel-1 SAR data.

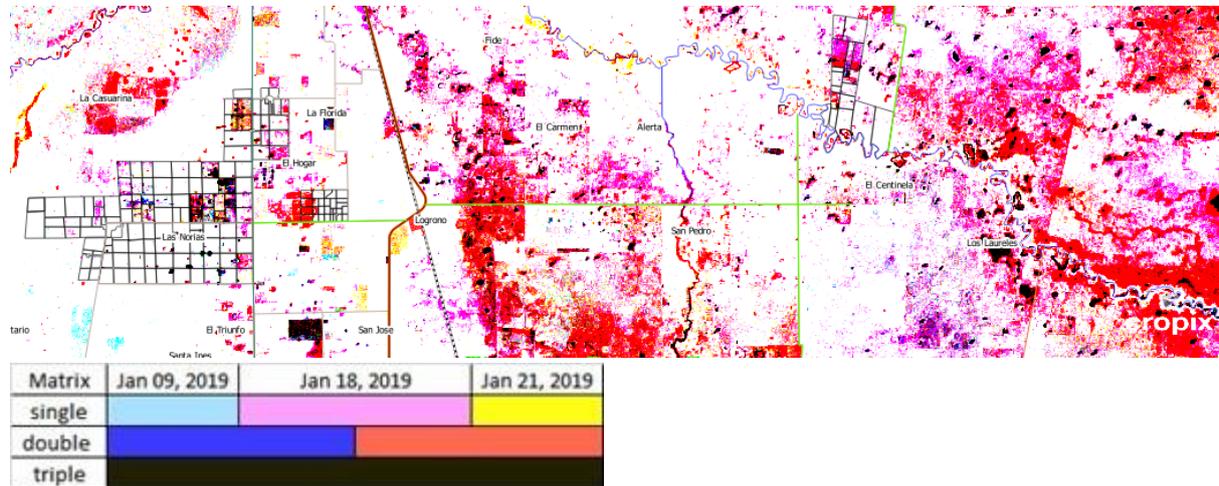
From time-series data we can generate various map products to demonstrate the state of the cropland over a certain time-period. The following image nicely demonstrates where flood took place and gives us an idea about the duration.

The deeper the blue color, the longer the water remained at those places.



Time-series composite from VH polarization over three different dates. Jan, 9, 18 and 21 2019.

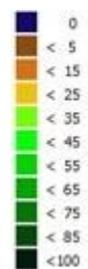
Another way to visualize the temporal evolution of the flooding is displayed in the next image, where the three acquisitions are color coded according to the flooding period.



The color-coding indicates single, double and triple date flooding at the same time. It shows when, where and how long the area was covered with water.

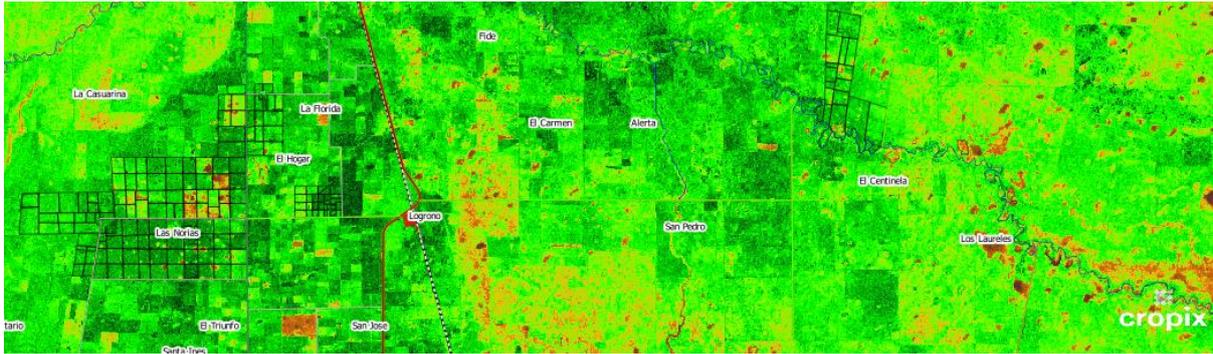
With single date data we can generate a vegetation index, which shows the evolution of biomass, bare soil condition and flooded areas.

The ESVI (enhanced SAR vegetation index) is a biomass index derived from Sentinel-1 SAR data. It indicates biomass in a natural color coding. The legend you see on the right side, indicates the range of values. The values are not absolute but relative.

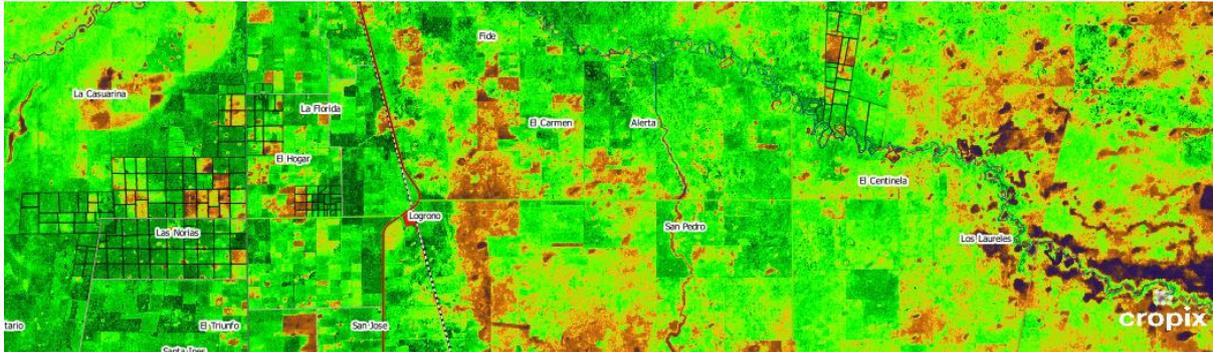


This means on one hand that ESVI cannot be transformed into dry biomass per hectare. The ESVI rather measures fresh biomass and the absolute value will differ between the crop-types.

Nevertheless all crops range within the scale from 0-100 and this scale is valid over different seasons. It is possible to say that crop development is better or worse than before or last year.



(1)



(2)



(3)

(1) ESVI from January, 9 2019, (2) ESVI January, 18 2019, (3) ESVI January, 21 2018.

The flood event itself has a certain dynamic of raise and fall. After the water disappears the cropland is typically covered with mud and the plants die back. The ESVI shows zones that are flooded in blue and zones, that were flooded most likely in brown. Green colour indicates vegetation.