LifeWatch
E-Science European Infrastructure for Biodiversity and Ecosystem Research

Bulletin of Land Surface Dynamics
Second half of 2015

The second part of the year 2015 shows similar patterns than 2014 in Europe :

- High temperatures and low precipitations affected the Dombes NATURA 2000 zone in France.
- Threat on the Volga valley: hydric stress.
- Exceptionally low snow cover occurred in main mountain range of Europe in December 2015.

Ecological Implications of the drought in July and August in the Ain (France):

The NATURA 2000 region of the Dombes, like other regions of France, suffered from an unusual lack of precipitations durin the summer 2015, especially during the first part of July (Figure 1a)

In addition to the low precipatations, temperatures from July to August were above the 1981-2010 mean climatology. More particularly, the mean temperature anomaly was around +5°C during the fisrt part of July in the region above Lyon (Figure 1b).

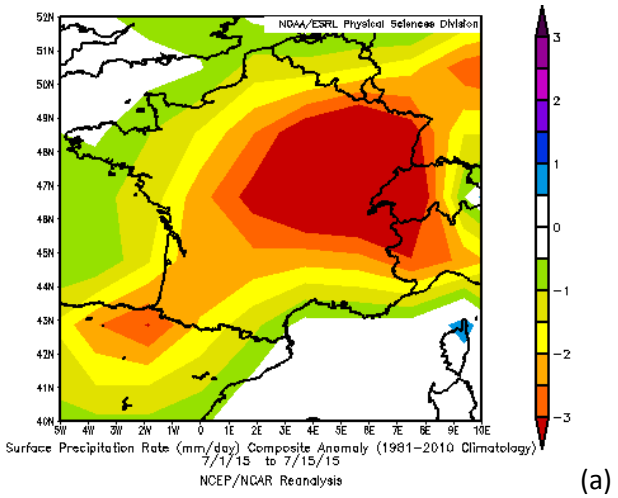


Figure 1: (a) surface precipitation rate anomaly and (b) surface air temperature anomaly between the 01/07/2015 and the 15/07/2015 in France. This figure comes from the NCEP/NCAR Reanalysis 1981-2010 Climatology.

These climatic conditions lead to lower than usual vegetation greenness values in main France regions and more particularely in the Dombes NATURA 2000 region where the phenomenon lasted for two months (Figure 2). This region has been listed as NATURA 2000 region because of its humid habitats and its biodiversity of local and migratory birds species. The drought lead to shallow waters in much ponds and favored accessibility to fishes for a large range of bird species. Despite the mild autumn, there was however no big trends on the bird surveys in mid-January.

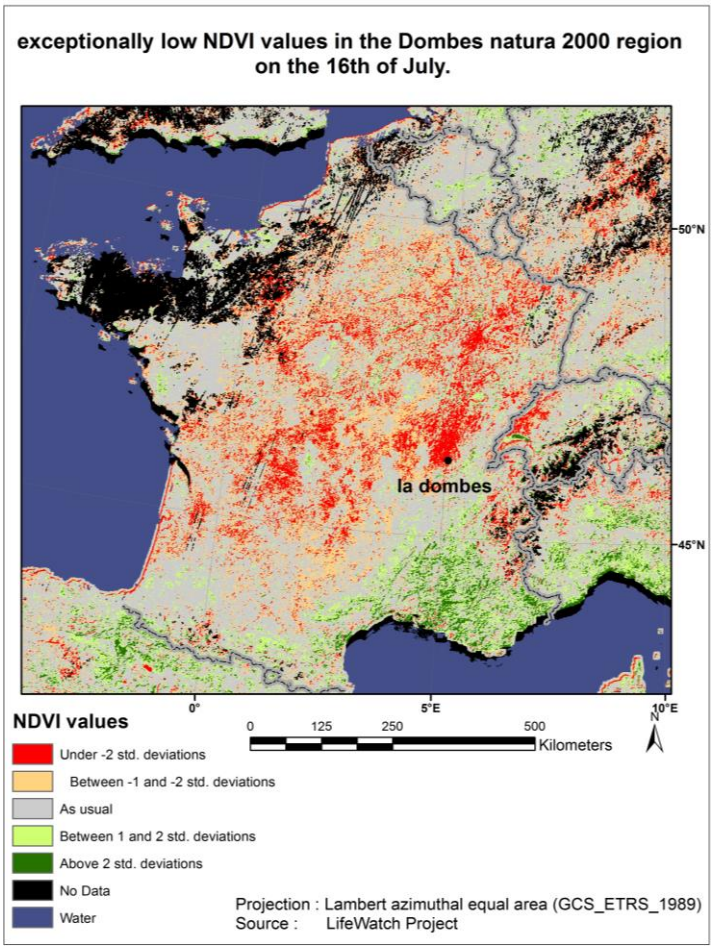


Figure 2: Anomaly of vegetation (NDVI) in France on the 16th of July 2015. Exceptional low NDVI values in red were widespread in the

Large anomalies of vegetation greenness in the Volga valley during the summer 2015.

The Volga delta is one of the richest ecosystems in the world concerning water bird species and was therefore classified as a RAMSAR. It is subject to a natural cycle of flooding and dry periods. At the end of the winter, snow melts in the north and provides a large amount of water to the Volga and finally to the Volga delta. This water allows plants and fishes to grow. This rich environment promotes the reproduction of many animals and provides space for migratory birds.

In 2015, a lack of vegetation in the Volga valley (Figure 3) was detected from the time series analysis. A long lasting anomaly was indeed observed during 3 months in this region (Figure 4). The location of these anomalies, the pluviometry and temperatures in the region suggest that these anomalies are likely due to a lack of water due to the dam management. The effects of these long lasting vegetation greenness anomalies have not been studied yet, but his is likely to have had an impact on the fall migration. At long term scale, this could bring to a loss of biodiversity and perturbations in bird migrations in this region.

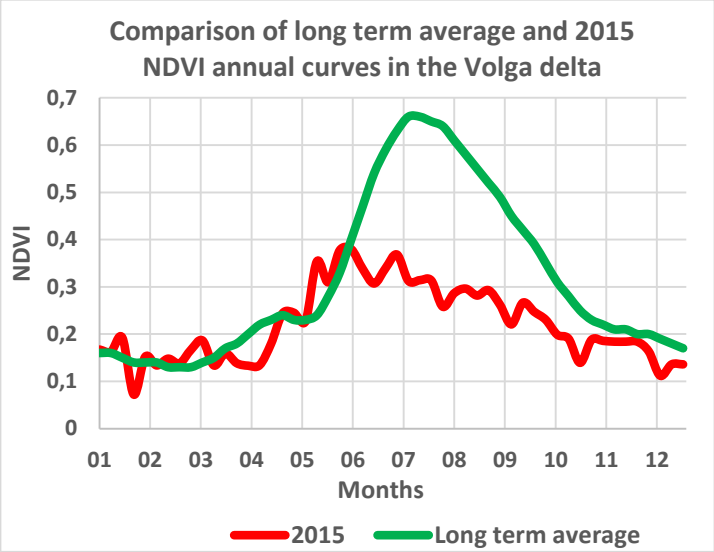


Figure 3: Differences between mean Normalized Difference (Green) and observed NDVI

Evolution of anomalies of vegetation in the delta of the Volga from end of June to early October 2015

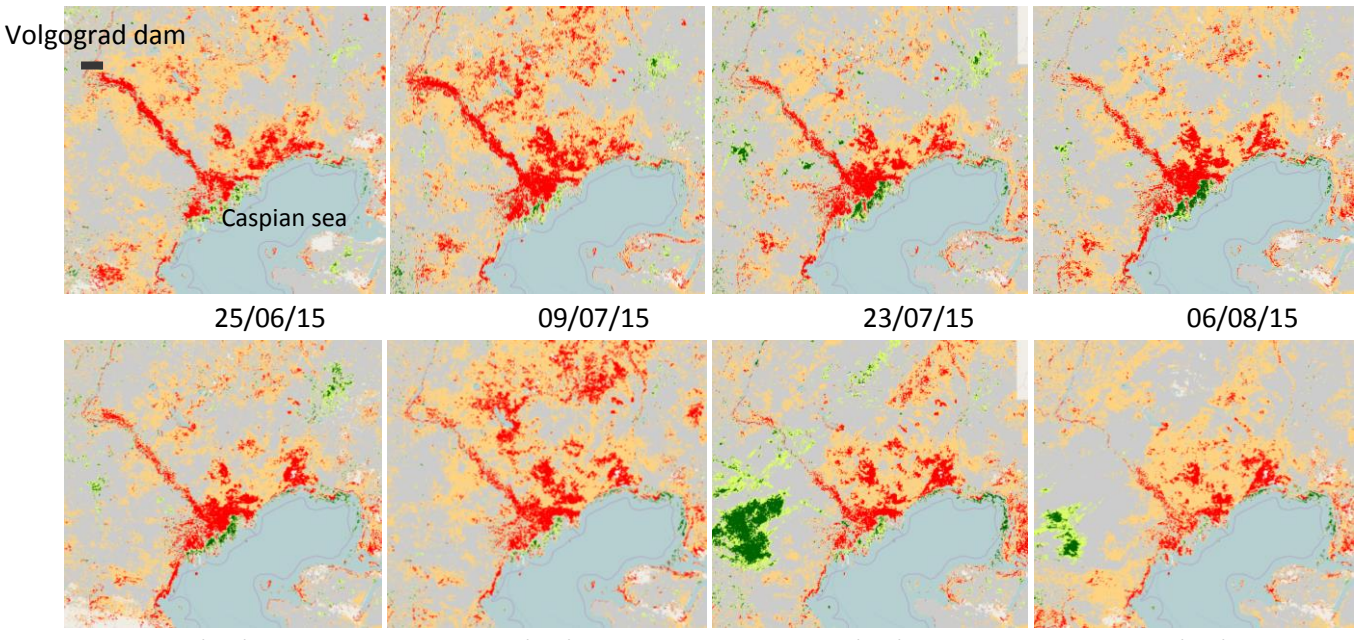


Figure 4: Evolution of vegetation anomalies in the delta of Volga from end June to early October on a two week basis. Anomalies are mainly located in downstream of the Volgograd dam (well represented on the 25/06/2015).

Low snowfall in European Mountains in December 2015:

In December 2015, mild temperatures have induced low snow precipitations in Europe (Figure 5), which was particularly unusual in European mountains like the Alps (Figure 6), the Dinaric Alps, the Carpathian and the Balkan.

These anomalies were present during the whole month of December with a maximum extent on the third week of December. In mid-January 2016, these anomalies had totally disappeared thanks to the important snowfall of the week before.

The lack of snow that has been detected thanks to snow cover anomalies had affected plant and animal lifecycles among other things by extending their period of activity. Moreover, it has obliged ski stations to produce artificial snow which could influence mountain ecosystems at a hydrological point of view.

Meanwhile, exceptional snow cover presence has been detected in Istanbul (Turkey) during the two first weeks of January with a snow depth up to thirty centimeters at some places (Huffington Post, 2016).

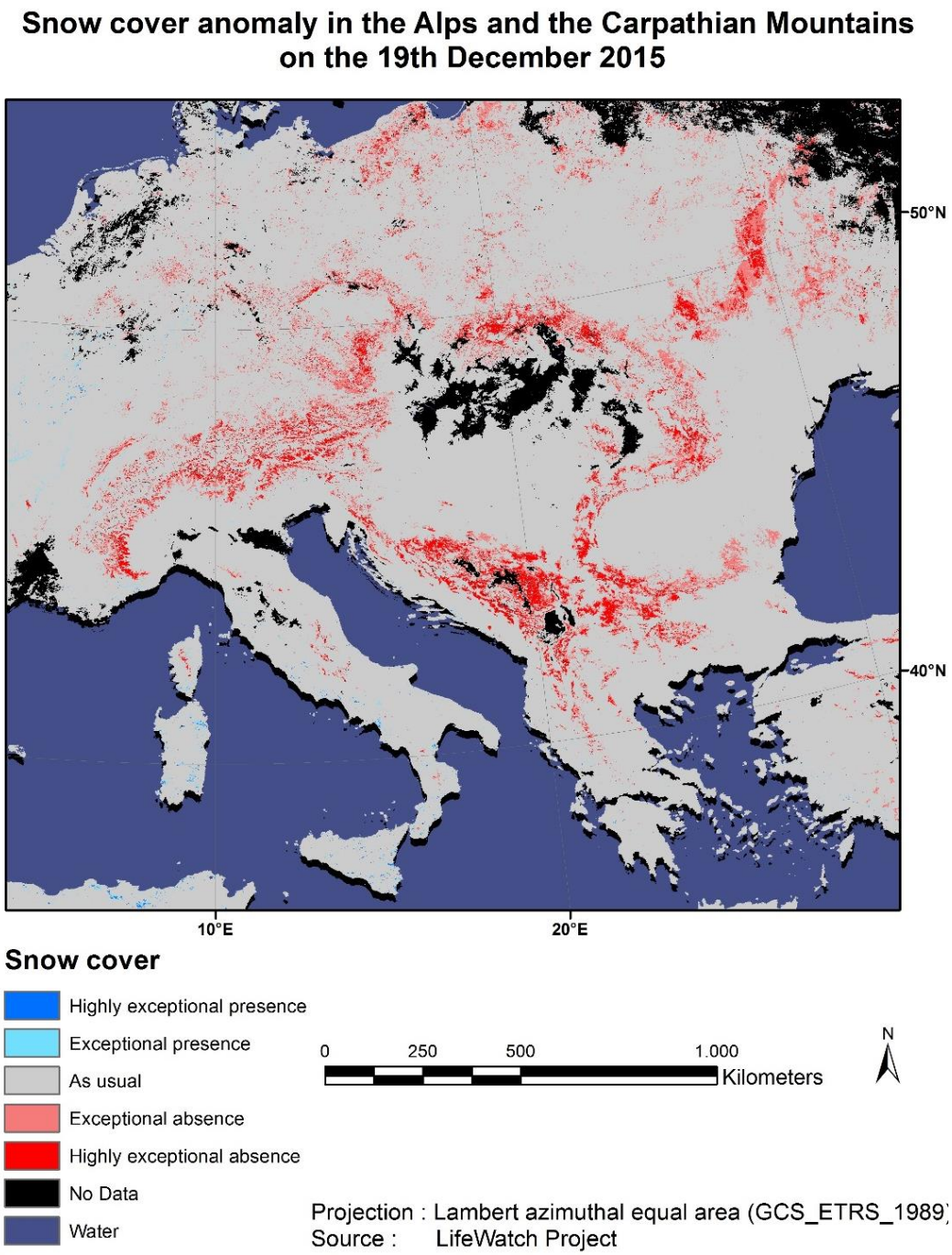


Figure 5: Snow anomalies in central Europe on the 19th of December 2015. Low snowfall implies highly exceptional absence of snow in Alps, Balkan and Carpathian mountains.

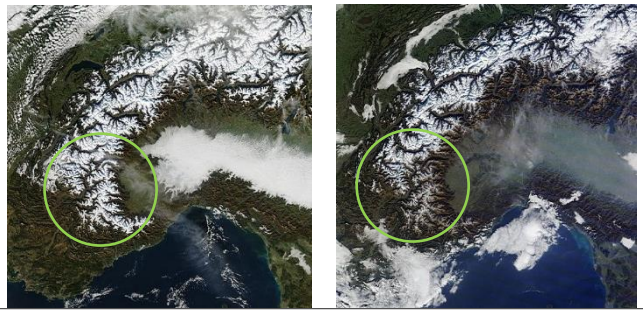
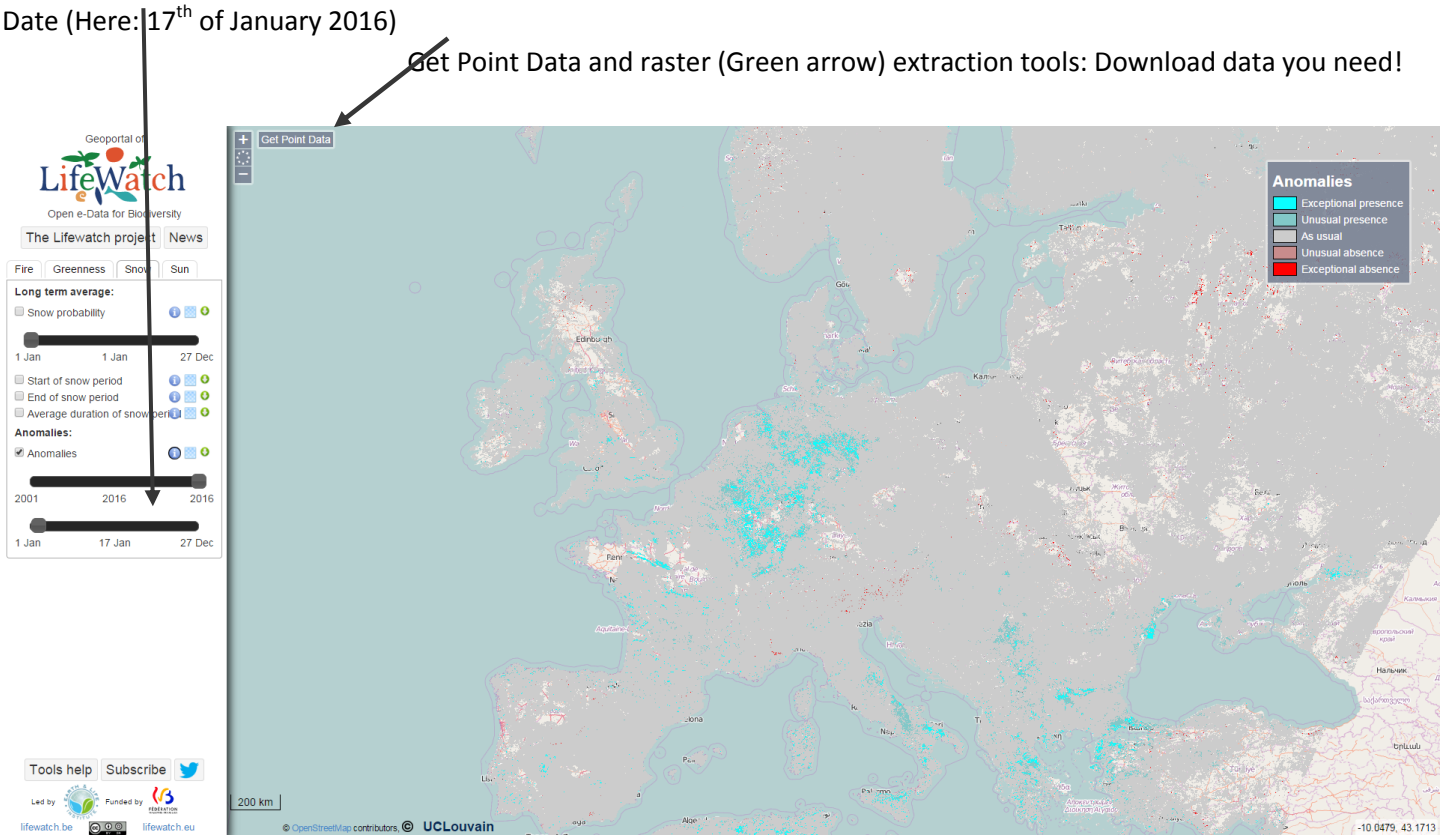


Figure 6: Comparison of Snow cover in the Alps between 18th of December 2014 on the left and 2015 on the right. Source: MODIS satellite, Earth Data portal.

Web portal to view and download data

All this information (and more) can be visualized from the web portal where a point based and a raster (.tif) extraction tools are also provided (see below): *www.uclouvain.be/lifewatch*. All data are available at least from 2001 to present and are regularly updated. Follow us on Twitter to get the latest news @LifeWatch_WB. For comments, suggestions or unusual data request, contact us at *lifewatch@uclouvain.be*



LifeWatch: Biodiversity and Ecosystem research

LifeWatch Wallonia-Brussels is one of the Belgian contributions to the European Research Infrastructure Consortium for Biodiversity and Ecosystem research (LifeWatch). It is funded by the Fédération Wallonie-Bruxelles. Information about the Belgian contributions to LifeWatch can be found on *www.lifewatch.be*

Lifewatch is one of the most ambitious European initiatives for the study of biodiversity and ecosystems. LifeWatch is not a research project, but an infrastructure that offers services and tools to the scientific community, the policy makers and the public. In addition, LifeWatch will provide opportunities to construct personalized 'virtual labs', also allowing entering new data and analytical tools. More information about LifeWatch can be found on: *www.lifewatch.eu*

Methods

The summarized land surface dynamics are developed from remote sensing time series of daily global observations by satellites. The times series allow to derive average state of variables at any given time of the year. Data can be compared to this average to highlight anomalies. The average state of variables is developed within the CCI Land Cover project *http://www.esa-landcover-cci.org*. Metrics and anomalies are then derived in the frame of the Lifewatch-WB project. Data from the Belgian satellite Proba-V are used to continue the vegetation greenness time series after the end of SPOT-VEGETATION.