



# STATISTICHE

UNDERSTANDING VENETO IN FIGURES AND DIAGRAMS

# FLASH

This issue of Statistiche Flash deals with climate change, firstly by providing a brief picture of how nations are working to combat this phenomenon. This is followed by an analysis of the climate trend in Veneto over the last 20 years, based on the thermo-pluviometric data collected from

ARPAV's observational network of automatic stations. Scientists estimate that it is highly likely that human activities are at least partially responsible for the increase in global temperatures during the current industrial era. Global warming is caused by increased greenhouse gas emissions (primarily carbon dioxide) from fossil

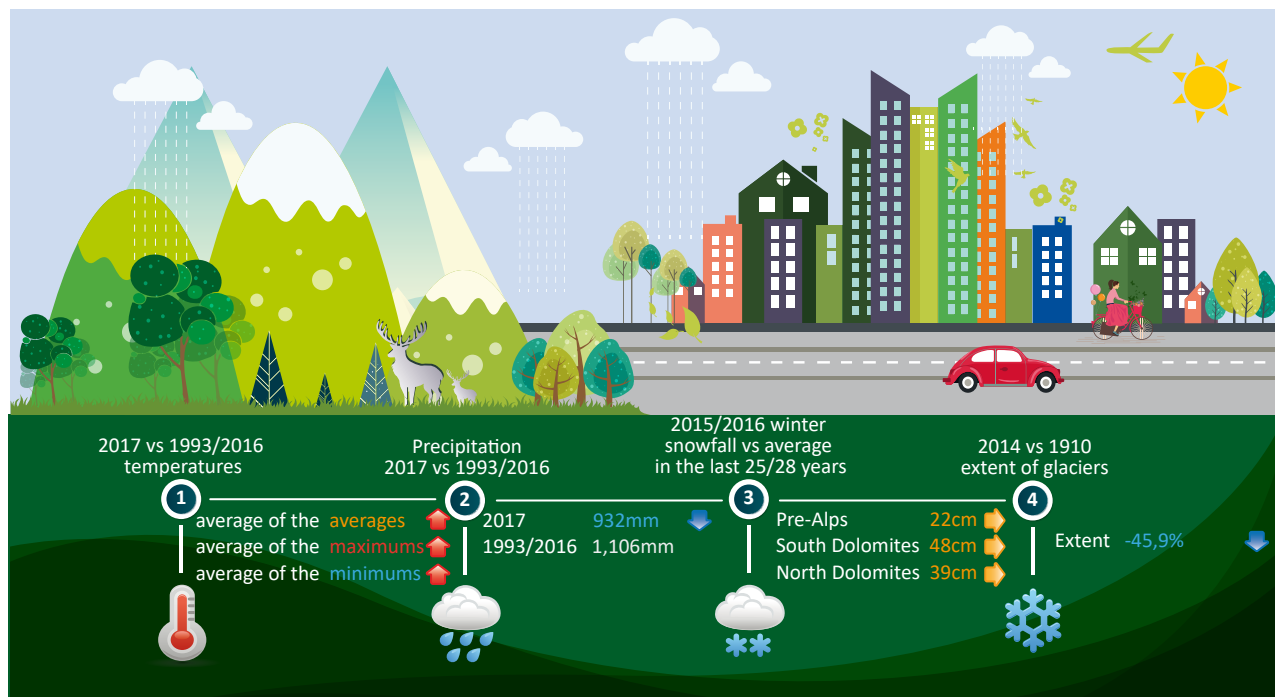
fuel use, deforestation and intensive agriculture. The most reliable scientific reference in this field is the IPCC (Intergovernmental Panel on Climate Change), an UN organisation that produces periodic reports on information and trends regarding climate change on a global scale, not through independent research but

by collecting and reviewing all available studies on the subject. As early as 1992, at the United Nations Conference on Environment and Development (UNCED), informally the Earth Summit, held in Rio de Janeiro, an international environmental treaty was drawn up called the United Nations Framework Convention on Climate Change. This treaty's objective was to reduce greenhouse gas emissions and therefore limit global warming. Since 1995, its signatory countries meet annually at the "Conferences of the Parties" (COP) to analyse the progress made so far; in 1997 the Kyoto Protocol was signed, which imposed limits on emissions for all the signatory countries. In 2015, COP21 was held in Paris, where the Paris Agreement was adopted, whereby the countries committed to limiting global warming to 1.5°C compared to pre-industrial levels.

In 2016, COP22 was held in Marrakesh and in 2017, COP23 was held in Bonn, where the United States took a step backwards from the Paris Agreement and refused, together with Canada, Australia and the EU, to provide its own assessment data on CO<sub>2</sub> emissions. Returning to a more local context, on 27 May 2016 Regione Veneto signed the international protocol "Subnational global climate leadership memorandum of understanding" (Under 2 MOU). This MOU is the result of collaboration between California and the German province of Baden-Württemberg with the aim of uniting nations, regions, provinces, cities and municipalities committed to reducing greenhouse gas emissions and supporting the fight against climate change.

## CLIMATE CHANGE

### CLIMATE AND WEATHER TREND IN VENETO



Source: Processing of data from ARPAV by the Statistics Office of Regione Veneto

# WEB

Flash

ALSO AVAILABLE:

- Result indicators of ROP Veneto ERDF 2014 - 2020
- International trade, final data for 2016 and provisional data for the entire 2017
- Cassa Integrazione Guadagni (Italian Redundancy Fund). Veneto and the Italian regions - Year 2017

<http://www.regione.veneto.it/web/statistica>

Based on the analysis of data from about 160 ARPAV pluviometric stations, it is estimated that in Veneto in 2017 rainfall was 932 mm, equivalent to about 17,170 million m<sup>3</sup> of water. The average annual rainfall for the 1993:-2016 period is estimated at about 1,106 mm and therefore 2017 shows a rainfall deficit of 16%. The maximum rainfall is found in the central-eastern Pre-Alps and in the central-southern Dolomites with absolute maximum values of 1996 mm on Mount Grappa (Seren del Grappa, Belluno province), 1,774 mm at Rifugio la Guardia (Recoaro Terme, Vicenza province) and 1,739 mm at Soffranco (Longarone, Belluno province). The minimum annual rainfall was recorded on the central southern plain at the stations of Balduina (Sant'Urbano) with 452 mm, San Bellino (Rovigo province) with 490 mm and S. Elena (Padua province) with 490 mm. When analysing the rainfall measured in Veneto since 1993, it can be seen that 2017, although with less than average rainfall, is not a special case, as there have been as many as 9 years with less than the current rainfall; in particular, it can be seen that the year with the greatest drought was 2015, followed by 2003,

## RAINFALL IN THE LAST 24 YEARS...

1997 and 1993.

The two maps of Veneto at the bottom of this page show the difference of rainfall in 2017 from to the 1993:-2016 average; on the left values are in mm and on the right in percentages.

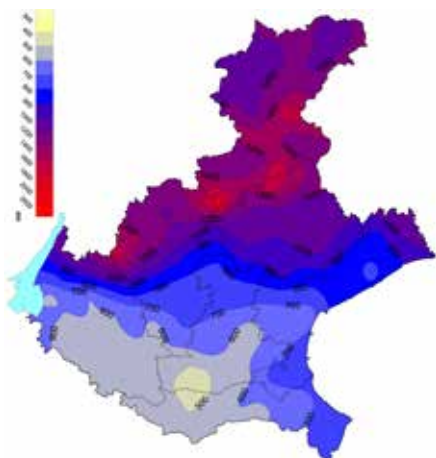
The pluviometric deficit is unevenly distributed over the region, with some areas presenting in the norm (Po River Delta, Portogruaro area, Longarone area and part of Cadore) and others with a marked deficit (central-southern area of the Padua province, central areas of the Vicenza and Verona provinces).

In terms of the distribution of rainfall over the year, the monthly contributions were:

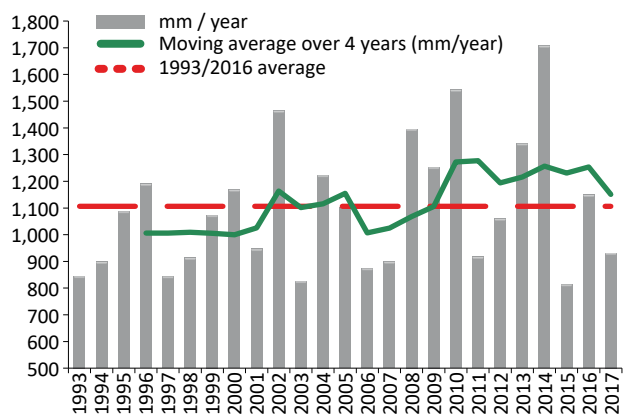
- well below the average in January, March, May, August and October;
- well above average in February, September and December;
- Average values in April, June, July and November.

### 2017, A YEAR WITH LITTLE RAINFALL

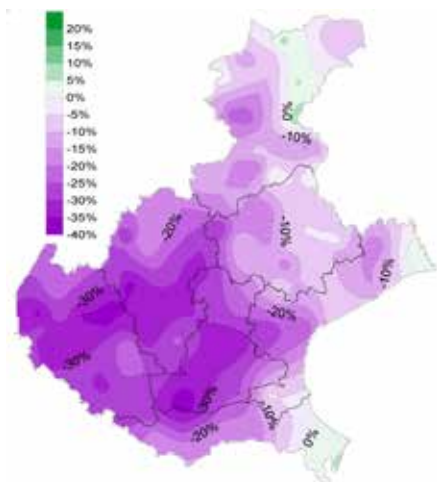
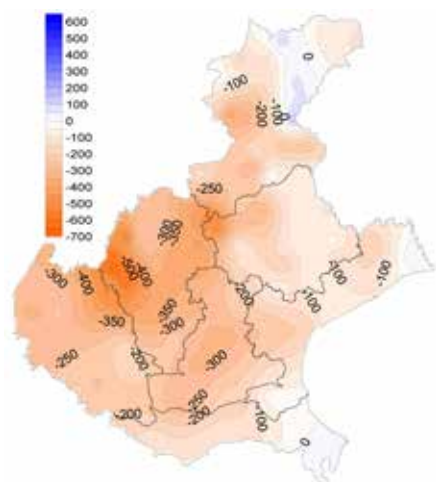
Annual rainfall in Veneto (total rainfall in millimetres) - Year 2017



Annual rainfall in Veneto (total rainfall in millimetres)



Differences in rainfall between 2017 and the 1993/2016 average in Veneto (in millimetres and % values)



For the analysis of the thermometric data, the observations from 134 ARPAV automatic thermometric stations operating since 1993 were used. In particular, the average temperature of the averages was considered, which comes from the annual average of the 96 thermometric measurements carried out daily (1 every 15 minutes) by each ARPAV automatic station. The 134 ARPAV thermometric stations were divided into 8 altimetric bands, and the average of the values of the station of each altimetric band was given a weight proportional to the regional surface area affected by the respective altimetric band. Based on this analysis, the average temperatures of the annual reference averages for Veneto have been estimated as follows:

- the annual average for the period 1993-2016 is 11.4 °C,
- the average for 2017 is 11.8 °C.

Therefore, 2017 presents higher thermal values than the average and very similar to 2016 (11.9 °C).

The warmest years of the period were (in descending order) 2014, 2015 and 2011. In general, from 2007 to 2017, all years except 2010 had thermal values above or equal

to the average (10 years out of 11), whereas in the previous 14-years' period there were 4 above average values (2003, 2002, 2000 and 1994) and 10 years with lower temperatures.

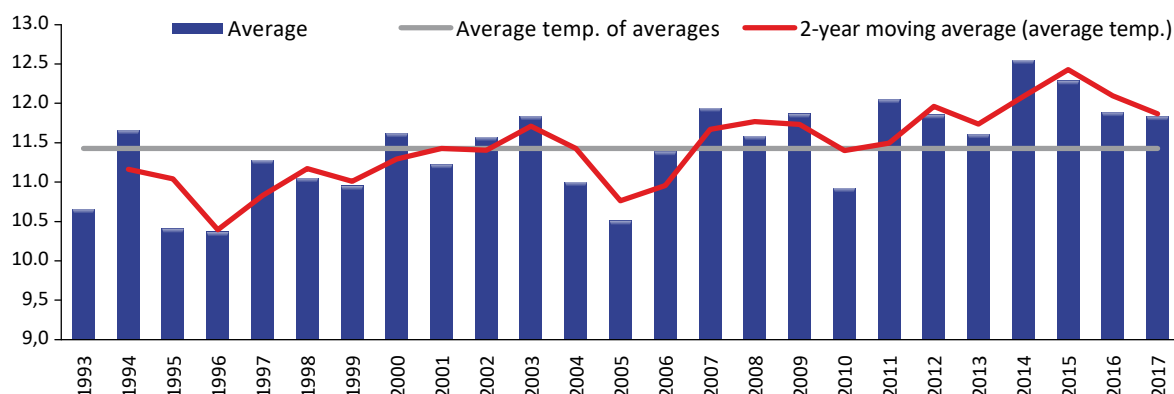
The coldest years in the series were (in ascending order) 1996, 1995, 2005 and 1993.

As far as the monthly temperature trend is concerned, it can be seen that, in general, in Veneto:

- the average temperature values for January 2017 were the lowest recorded since 1993;
- September was also below normal levels;
- conversely, temperatures in February and March were significantly higher than the average;
- the June-August period was also characterised by temperatures higher than normal;
- the thermal values in the remaining months were close to the average.

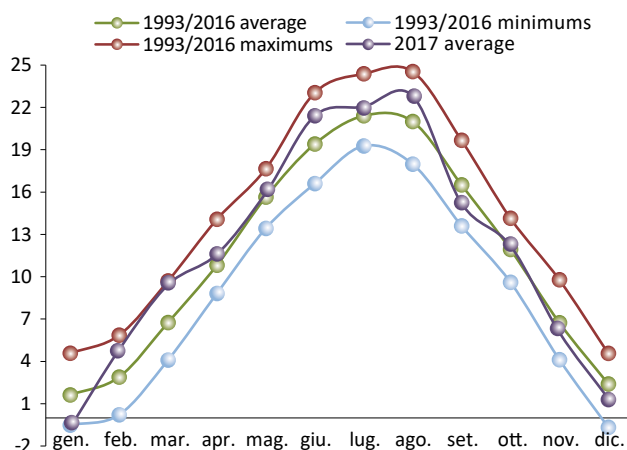
### THE COLD JANUARY AND HOT SUMMER OF 2017

Weighted average\* annual temperatures of the 134 thermometric stations in Veneto

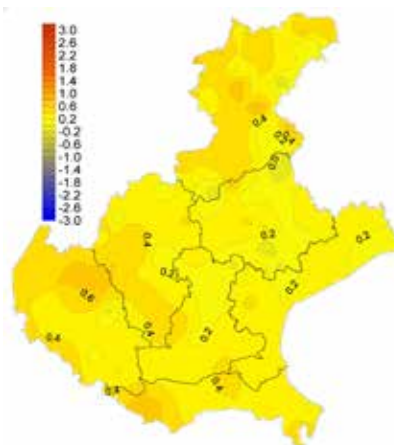


(\*)The weighting is made according to the altimetric bands and the related surfaces areas compared to the regional total.

Average monthly temperatures of the averages in Veneto - Year 2017 and 1993:2016 period



Average annual temperature in 2017 and anomaly compared to the average for the 1993:2016 period



The integration of the historical temperature data series monitored by the Hydrographic Office (in the 1955-2004 period) and by ARPAV (since 1993), has made it possible to calculate the average temperature trend in some stations of the Veneto Plain over the last 62 years. The data analysis shows an increase of almost 2 °C during this period.

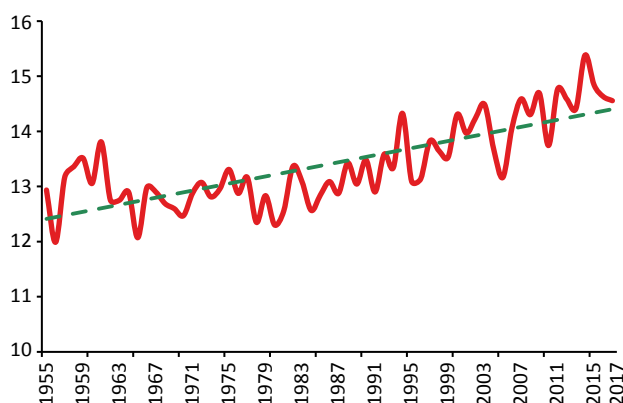
## GLI EFFETTI DEI CAMBIAMENTI CLIMATICI

The effects are evident with a trend towards an increase in the number and duration of heat waves and, more generally, with an increase in positive thermal anomalies. As a consequence, over the last century, the glacier surface area in the Dolomites has seen its extent decrease by almost half: as with all Alpine glaciers, the receding phase of the Veneto glaciers has been lasting since the end of the Small Ice Age (about 1850) and has accelerated significantly since around 1980. The Veneto glaciers, being small or very small, respond promptly to climate change and are therefore an important element in the study of the effects of global warming. The Marmolada, the largest glacier in the Dolomites, is an interesting case: its glacial front rapidly declined over the last century.

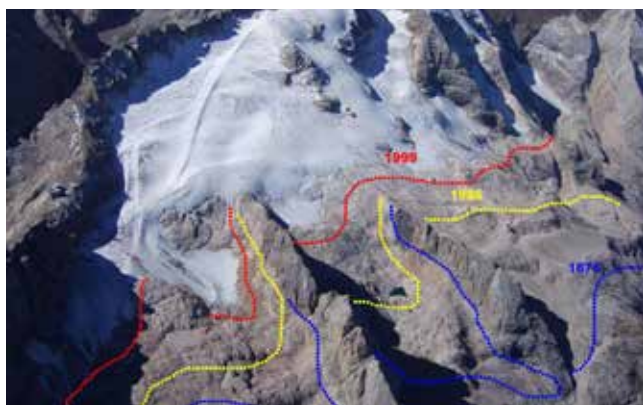
Even grapevines, one of the most widespread and monitored crops in Veneto, have seen their development cycles change: Phenology, the science that studies the relationship between climatic factors and seasonal manifestations of certain plant or animal life phenomena, shows us how the number of average days that elapse between budding and flowering has gone from 55 in the 1964-1990 period to 47 in the 1991-2014 period. Similarly, the interval between veraison and the ripening of the grapes has decreased from an average of 41 days to 37. As a result, compared to the historical average of the 1964-1990 period, harvesting in the last decade has been brought forward by a period ranging from two weeks to one month.

### GLACIERS ARE RETREATING AND THE HARVEST IS EARLY

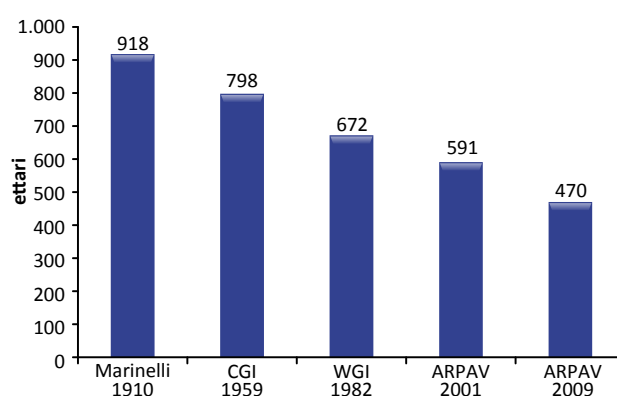
Average temperature per year in the Veneto Plain.



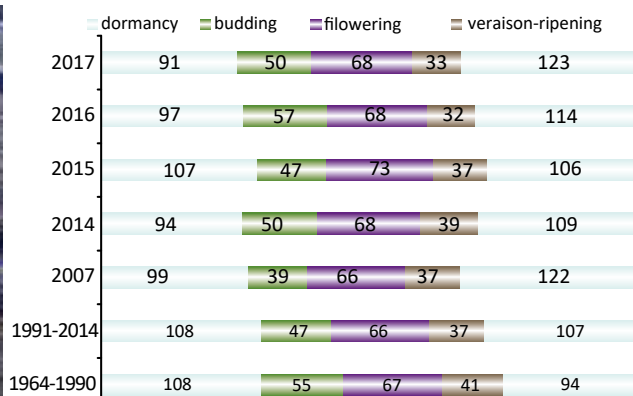
The Marmolada glacier front in 2007



The glacial surface area in the Dolomites



Grapevine phenology: average of the early, medium and late varieties in Veneto.



Source: Processing of ARPAV and CREA (Viticulture and Oenology Research Centre in Conegliano) data by the Statistics Office of Regione Veneto.