

WORLD METEOROLOGICAL DAY - 2019

The Sun, the Earth and the Weather



As every year since 1951, on 23 March the **World Meteorological Organization (WMO)** celebrates the **World Meteorological Day (WMD)**. In 2019, the chosen theme for this important event is *The Sun, the Earth and the Weather*. It is well known that the solar energy is the driving force behind weather, climate and life on the Earth. In the WMO's documents dedicated to the WMD 2019 (www.wmo.ch), many aspects of above mentioned theme are presented. Thus, there are more considerations regarding the Sun's importance for our planet, including the human life, such as: *The Sun's impact on the Earth; The Sun and the climate change; The Sun and renewable energy; The Sun, our well-being and health.*

1. The Sun's impact on the Earth. In this context can be mentioned, for example, the importance of solar radiation in generating the natural greenhouse effect, without that the Earth's average surface temperature would be one inhospitable: -18°C instead of the 14°C we experience today. Also, the Sun plays a key role in the hydrological cycle, constantly evaporating water into the atmosphere. This cycle moves enormous quantities of water about the globe, all thanks to the energy received from the Sun.

2. The Sun and climate change. According to the official meteorological data, the 20 warmest years on record have been in the past 22 years, with the top four in the past four years (in descending order: 2016, 2015, 2017, 2018). *The Global mean temperature* for the period January to October 2018 was $0.98 \pm 0.12^{\circ}\text{C}$ above the pre-industrial baseline (1850-1900). The average increase above the same baseline for the most recent decade 2009-2018 was $0.93 \pm 0.07^{\circ}\text{C}$, and the average for the past five years, 2014-2018 was $1.04 \pm 0.09^{\circ}\text{C}$. The rise in temperatures – which are melting ice and heating the oceans – is driven by long-lived greenhouse gases (GHG) in the atmosphere. The concentration of these GHG is growing, especially starting with the industrial era. Thus, the carbon dioxide (CO_2) concentrations reached 405.5 parts per million (ppm) in 2017 and continue to rise. If the current trend in greenhouse gas concentrations continues, we may see temperature increases of 3°C to 5°C by the end of the century. This is well above the target of the Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC), which aims to hold the global average temperature increase to below 2°C and as close as possible to 1.5°C .

On this background, *the frequency and intensity of meteorological and hydrological risk phenomena* remained very important also during 2018. *Heat waves and droughts* affected a large part of Europe through late spring and summer (Scandinavia, UK, Ireland, Portugal, Spain). Heat waves were registered in the Middle East, North Africa, East Asia, East Australia, Uruguay and Central Argentina, too.

Many times, these heat waves and droughts caused devastating *wildfires*: Greece, Sweden, Latvia, Norway, Germany, USA (California). *Cold waves* and important *snowfalls* were also registered in 2018. In late February and early March many countries of Europe were affected by these phenomena: Russia, Estonia, UK, France, Italy etc. Heavy *snow accumulations*, frequently followed by *avalanches*, are produced in much of the Alps Mountains, in Norway, etc. Severe *extratropical storms*, associated by *high winds* and generating important *floods* affected several countries of Europe in October 2018: Italy, Slovenia, Switzerland, Austria, Czech Republic, Poland. *Tropical cyclones* were active especially in the Northern Hemisphere, in all oceanic basins. In these regions, the number of tropical cyclones (70, until 20 November 2018) was above average (53/year). In the Southern Hemisphere, in the 2017-2018 Season, the number of tropical cyclones (22) was near average.

Romania also registered more meteorological and hydrological risk phenomena in 2018: a very important positive deviation of the monthly mean temperature in April, and a very warm period in late October and early November; cold waves (early March, late November); repeated snow storms (January, March, November); important snow falls (middle December); strong storms and floods (middle and late June, July); tornadoes (June); strong winds (early April); Saharan dust transport (late March, middle April).

3. The Sun and renewable energy. In principle, the solar energy can be used in two main ways: in *photovoltaic (PV)* or *solar cells* and, in *concentrated solar powers (CSP)*, respectively. The solar cells are electronic devices that convert sunlight directly into electricity, and can be seen everywhere – on roof and windows of houses and office buildings, battery chargers and computers, new cars, trains, boats and airplanes, solar farms, etc. The concentrated solar power systems use mirrors to concentrate solar rays. These rays heat water, which creates steam to drive a turbine and generate electricity in large-scale power plants. In the last decades, both of these technologies were strongly developed around the World, including many developing countries. The use of solar energy depends on the weather, especially in the temperate climate zone. For this reason, weather forecasts optimized for solar energy applications are required.

4. The Sun, our well-being and health. Sunlight plays a major role in human health and well-being. In this context, can be mentioned the risk of Vitamin D deficiency caused by too little Sun radiation received by the human body. In the same time, an overexposure to sunlight, respectively to UV (ultraviolet) radiations, causes harmful effects on the skin (sunburns, cancer), eyes, and immune system. For these reasons, the UV Index was developed, and many national meteorological services (including the Romanian NMA) provide information and alerts on UV levels, and work with health authorities to disseminate safety tips to the public. On the other hand, the presence of sunlight is very important for almost all human activities, including tourism.

All these above-mentioned subjects, along with many other aspects, will be discussed at the *Eighteenth World Meteorological Congress*, that will be held from 3 to 14 June 2019 at the International Conference Centre of Geneva.

In the end, we would like to greet all the people involved in the activity of meteorology and climatology, and wish them that year 2019 bring many satisfactions in their professional activity, so that they may contribute to achieving the objectives mentioned by WMO in the works dedicated to the World Meteorological Day 2019.

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