WMO Statement on the State of the Global Climate
Preliminary conclusions for 2018
and
WMO Greenhouse Bulletin

Dr Elena Manaenkova
Deputy Secretary General
World Meteorological Organisation
Statement on the State of the Global Climate

• Complements IPCC Assessment Reports and Special Reports
• Includes assessment from the annual WMO Greenhouse Bulletins (14 years) on atmospheric concentrations of LL GHG – complements UN Environment annual GAP Report on Emissions
• Since 1993 (25 years) - annual updates on key climate climate indicators of changing conditions of the state of the climate; includes multi-year (5 and 10 years) trends
• Provides a snap shot on key climate indicators and extreme events with historical and geographical context
• Allows analysis of climate change signals separated more clearly from natural modes of variability (e.g. El Niño-Southern Oscillation)
• Final release in March 2019
Main contributors

• Lead experts (12)
• Member States direct contributions through the National Meteorological and Hydrological Services (64)
• International specialized institutions (17)
• United Nations organisations (7)

Structure of the Statement

• Key Climate Indicators
• Climate risks and associated impacts
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<tbody>
<tr>
<td>Global temperature</td>
<td>0.98 ±0.12°C</td>
<td>1.04±0.09°C</td>
<td>0.93±0.07°C</td>
<td>0.87°C</td>
<td>2015, 2016, 2017, 2018 four warmest years</td>
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<td>(change from 1850-1900 pre-industrial period)</td>
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<table>
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<tr>
<th>Greenhouse gases</th>
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<td>CO2 (ppm, atmospheric concentration)</td>
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<tr>
<th>Cryosphere – Sea Ice (vs 1981-2010)</th>
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<tr>
<td>March Arctic sea ice extent change %</td>
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<td>September Arctic Sea ice change %</td>
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<td>September Antarctic Sea ice change %</td>
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<tr>
<th>Sea Level</th>
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<tr>
<td>Global average rate/year</td>
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<tr>
<td>Total change since 1993</td>
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<td>SE-Asia rate per year</td>
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<td>Caribbean rate per year</td>
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<tr>
<th>Ocean heat content</th>
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<tr>
<td>700 meters (10^{22} J wrt 1981-2010)</td>
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<td>2000 meters (10^{22} J wrt 1981-2010)</td>
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<th>Ocean acidification</th>
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<tr>
<td>pH from open ocean stations HOTS and BATS, annual decrease (data up to 2016)</td>
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</tbody>
</table>
Global Temperature – warmest 5 & 10 years

5 years: 2014-2018: \(1.04 \pm 0.09^\circ C\)
10 years: 2009-2018: \(0.93 \pm 0.07^\circ C\)
Global Temperature - 4\textsuperscript{th} warmest year

The 4 warmest years on record are the last 4 (2015-2018)

0.98 ± 0.12\degree C above 1850-1900 set to be 4\textsuperscript{th} warmest year on record
Warmest La Niña year

Global temperature difference from pre-industrial (°C) 1850 - 2018

2018

Oct 2018 0.98 °C
4th warmest

2011
2008
2000
1999
1989
1974
1955
1976
1950
1956

Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct  Nov  Dec
Surface air temperature anomaly
Jan-Oct 2018
<table>
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<tr>
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<th>CO₂</th>
<th>CH₄</th>
<th>N₂O</th>
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<tbody>
<tr>
<td>2017 global abundance</td>
<td>405.5 ± 0.1 ppm</td>
<td>1’859 ± 2 ppb</td>
<td>329.9 ± 0.1 ppb</td>
</tr>
<tr>
<td>2017 abundance relative to 1750</td>
<td>146 %</td>
<td>257 %</td>
<td>122 %</td>
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<tr>
<td>2016-2017 absolute increase</td>
<td>2.2 ppm</td>
<td>7 ppb</td>
<td>0.9 ppb</td>
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<tr>
<td>2016-2017 relative increase</td>
<td>0.55 %</td>
<td>0.38 %</td>
<td>0.27 %</td>
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<tr>
<td>Mean annual absolute increase of last 10 years</td>
<td>2.24 ppm yr⁻¹</td>
<td>6.9 ppb yr⁻¹</td>
<td>0.93 ppb yr⁻¹</td>
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Source: WMO Greenhouse Bulletin No. 14, November 2018
Greenhouse gas levels reach new record

Globally averaged mole fraction (a) and its growth rate from 1984 to 2017 (b). Increases in successive annual means are shown as the shaded columns in (b). The red line in (a) is the monthly mean with the seasonal variation removed. The blue dots in and line depict the monthly averages.
**Arctic March max**
14.48 million km²,
7% below average
(1981-2010),
record low first 2 month

**Arctic September min**
4.62 million km²,
28% below average
12 smallest in last 12 yrs
Sea Level rising

GMSL Jan - Jul 2018: 2-3 mm higher than the same period in 2017
Each 3-month period in 2018 (to September 2018) upper 700m (data from 1955) and 2000m (from 2005) were the hottest or 2nd hottest (2017 hottest).
Ocean Acidification increases

Open-ocean sources over the last 30 years have shown a clear trend of decreasing pH

Credit: Richard Feely (NOAA-PMEL) and Marine Lebrec (IAEA OA-ICC)
Extreme events worldwide growing

700 disasters/year (2017)

Accounted events have caused at least one fatality and/or produced normalized losses ≥ US$ 100k, 300k, 1m, or 3m (depending on the assigned World Bank income group of the affected country).

Source: NatCatService.munichre.com
Natural Disasters - last 20 years

90.6% weather related

Source: UN ISDR & CRED: October 2018
4.5 Billion people affected – last 20 years

96% weather related

Source: UN ISDR & CRED: October 2018
Climate risks and associated impacts
Every life matters

Extreme weather left a trail of devastation on all continents and led to many casualties

- Over at least **1 600 excess deaths** associated with heat waves, more than 100 with the wildfires
- A historically significant heatwave affected parts of East Asia in late July and early August. The worst-hit area was Japan. A national record of 41.1 °C was set at Kumagaya on 23 July. Over **150 deaths** in Japan were associated with the heat.
- A wildfire to the northeast of San Francisco, known as The Camp Fire, is the deadliest fire in over a century for the U.S. and, in terms of property loss, the most destructive on record for California. There have been at least **79 fatalities**.
- Large parts of western Japan experienced destructive flooding in late June and early July. At least **230 deaths** were reported and 6,695 houses were destroyed.
- In August, the southwest Indian state of Kerala suffered major flooding, reportedly the worst since 1924. **223 deaths** were reported and more than 5.4 million were affected.
Socio-economic impacts

Heavy humanitarian consequences:
In Madagascar, the number of people affected by food insecurity increased to 1.3 million in southern regions

• Over 2 million people were reported to be displaced in association with extreme weather and climate events
• Vulnerable Rohingya refugees severely affected: As of September 2018, up to 200,000 refugees were exposed heightened risk of landslides and flooding.

Large economic losses:
• Exceptional drought in Europe and southern America. 43% crop losses in Germany relative to the 2013-17 average, likely to be costed in the billions of euros
• Florence and Michael the most significant hurricane landfalls on the United States mainland in 2018 with heavy economic losses.
• Typhoon Manghkut/Ompong, which crossed the Philippines in mid-September was associated with agricultural losses that could reach at least US$ 265 million.
• Gita in the South Pacific in February 2018 was the most intense tropical cyclone ever to affect Tonga causing severe damage. Significant damage also occurred in Samoa, American Samoa and on outlying islands of Fiji
Every life matters!

Every bit of warming matters

Every year matters

Every choice matters

WMO OMM
World Meteorological Organization
Organisation météorologique mondiale