



Making Ireland Weather
and Climate Prepared



GCOS-IRELAND NATIONAL COMMITTEE

GCOS/WCRP Atmospheric Observation Panel for Climate
(AOPC-27)

Update in activities, 27 June 2022



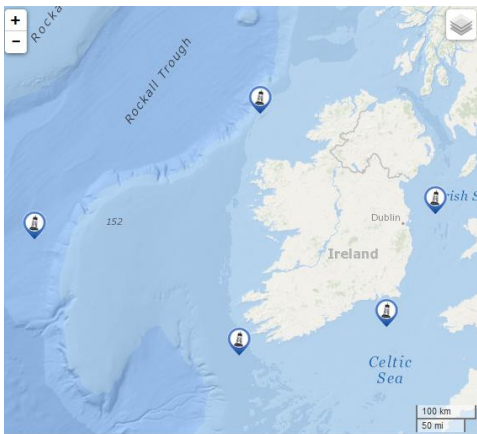
NATIONAL GCOS IRELAND (GCOS-IRELAND)

- Established early in 2018
- joint initiative by the Director of Met Éireann (MÉ), the Director General of the Environmental Protection Agency (EPA), and the Chief Executive of the Marine Institute (MI)
- committee consists of nominees from MÉ, EPA and MI and complimented by Teagasc as well as remote sensing expertise



GCOS-IRELAND AIMS

- works to ensure the sustained provision of reliable physical, chemical and biological observations and data records for the total climate system – across the atmospheric, oceanic and terrestrial domains, including hydrological and carbon cycles, for Ireland.
- The role of GCOS-Ireland is to coordinate and promote the GCOS observing principles relating to Essential Climate Variables (ECVs) of relevance to Ireland.



RECENT ACTIVITIES

- This most recent 'Status of Ireland's Climate' report was commissioned by GCOS-Ireland and co-funded by the EPA, MÉ and MI
- The research contact was awarded to the MaREI Centre at University College Cork who are the authors of the report.
- Coordination of Sea Level Measurement Advisory Group
- Support for ICOS initiative
- National Soil Moisture Network development



Rialtas na hÉireann
Government of Ireland

Climate Status Report for Ireland 2020



An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreacht
Department of Housing,
Local Government and Heritage

Observed National Climate Indicators Show the Status of Ireland's Climate

- Over the last decade Ireland's climate was warmer and wetter than ever previously observed.
- Records from Ireland show that the levels of the main drivers of climate: change carbon dioxide, methane and nitrous oxide, have increased steadily since 2012, a trend that is reflected globally.
- Sea-levels have increased in the oceans around Ireland but gaps remain in the national sea-level observational network.
- Steps are required to provide a comprehensive sea level observation programme and to ensure institutional supports are provided for key climate observation systems in Ireland.



GREENHOUSE GASES

EMISSIONS CONTINUE TO RISE

Atmospheric concentrations of carbon dioxide, methane and nitrous oxide are the highest observed since measurements began.



↑ + 50%
CO₂

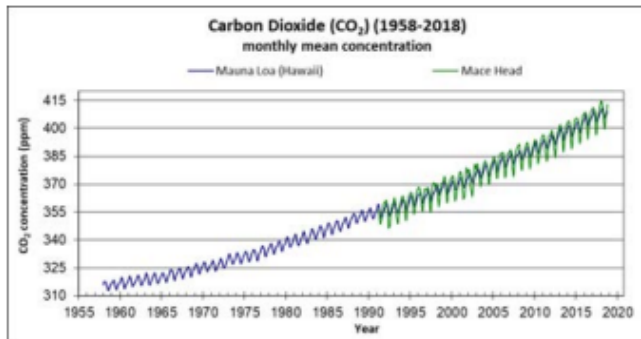
↑ + 170%
CH₄

↑ + 20%
N₂O

Background **carbon dioxide (CO₂)** concentrations reached 414 ppm in 2020 which is approximately a **50% increase** compared to pre-industrial levels.

Methane (CH₄) concentrations are at 1940 ppb - which is approximately a **170% increase** compared to pre-industrial levels.

Nitrous oxide (N₂O) concentrations are now above 330 ppb - which is approximately a **20% increase** compared to pre-industrial levels.



Monthly mean concentration of carbon dioxide at Mauna Loa, Hawaii (1958-2018) and Mace Head Research Station, Ireland (1992-2018)

RAINFALL



ANNUAL AVERAGE AMOUNTS OF PRECIPITATION ARE INCREASING

↑ + 6%

Annual precipitation was **6% higher** in the period 1989 to 2018, compared to the 30-year period 1961 to 1990. The decade 2006 to 2015 was the **wettest on record**.

AEROSOLS



AEROSOLS AFFECT CLIMATE DYNAMICS IN SEVERAL WAYS AND REPRESENT AN AREA OF GREAT UNCERTAINTY IN THE UNDERSTANDING OF THE EARTH'S CLIMATE SYSTEM

Atmospheric levels of sulfur over the 35-year period 1980 - 2015, as measured at Valentia Observatory, Co. Kerry show an approximately **80% reduction**, highlighting the success of regulation and technological advances.

AIR TEMPERATURE



ANNUAL AVERAGE AIR TEMPERATURE IS RISING

↑ + 0.9°C

The annual average surface air temperature in Ireland has increased by approximately **0.9°C over the last 120 years**, with a rise in temperatures being observed in all seasons.

Fifteen of the top 20 warmest years on record have occurred since 1990.

THE LENGTH OF WARM SPELLS HAS INCREASED SLIGHTLY OVER THE LAST 60 YEARS



SEA LEVEL CONTINUES TO RISE

↑ + 2-3 mm/year

Ireland

↑ + 1.7 mm/year

Dublin

Satellite observations indicate that the **sea level around Ireland has risen** by approximately **2-3mm/year** since the early 1990s. Analysis of sea level data from Dublin Bay suggests a rise of approximately 1.7mm/year since 1938 which is consistent with global average rates.

OCEAN ACIDITY



THE OCEAN IS BECOMING MORE ACIDIC

↓ -0.05 pH units
(change 1991 - 2013)

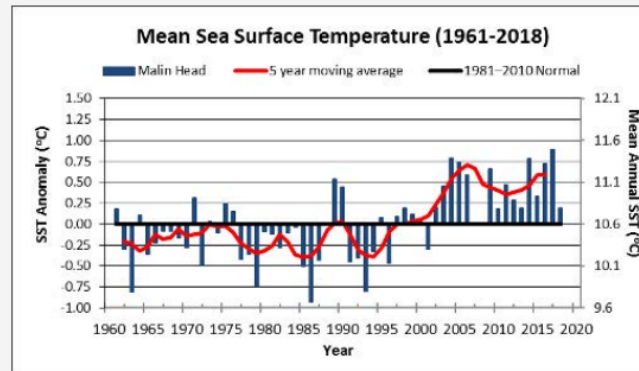
Measurements in the surface waters to the west of Ireland between 1991 and 2013 indicate an **increase in ocean acidity** which threatens calcifying species such as corals, shellfish and crustaceans.



SEA SURFACE TEMPERATURE THE OCEAN IS GETTING WARMER

↑ + 0.15°C /decade
(Global trend
1990 - 2020)

The average **sea surface temperature** at Malin Head over the 10 years between 2009 and 2018 was **0.47°C** above the 1981-2010 mean.



RIVER FLOWS



THERE IS AN INCREASE IN FLOWS ACROSS MOST OF THE COUNTRY

However, there is evidence in recent years of an increase in potential drought conditions especially in the east.

↑ trend 1972-2017

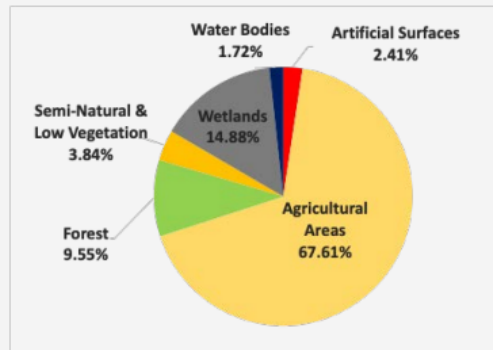
LAND COVER

THE AREA OF FORESTS AND ARTIFICIAL SURFACES HAS INCREASED



↑ + 30 % (forest extent 1990 to 2018)

Land cover observations since 1990 show **increases** in the area covered by both **artificial surfaces** and **forests** and a **decrease** in **wetland areas** which include peatlands.



Main land cover type distribution in Ireland in 2018 (CORINE)

VEGETATION FIRES



MOST FIRES OCCUR BETWEEN MARCH AND JUNE EACH YEAR

4,000 - 6,000 ha
(Average area burned annually)

Upland heaths and blanket bogs have the strongest association with fires.

WHAT NEEDS TO BE DONE TO IMPROVE THE NATIONAL CLIMATE OBSERVATION SYSTEM?

There are a number of issues that need to be addressed to make the national climate observation system more robust and capable of addressing the country's long-term needs with regard to climate monitoring and understanding.

The following recommendations are made:

- Ensure continued maintenance of existing **climate monitoring** programmes and infrastructure, the transition of climate observations that rely on one-off funding to **long-term sustainable programmes**, and investigate potential to monitor essential climate variables not currently observed in Ireland.

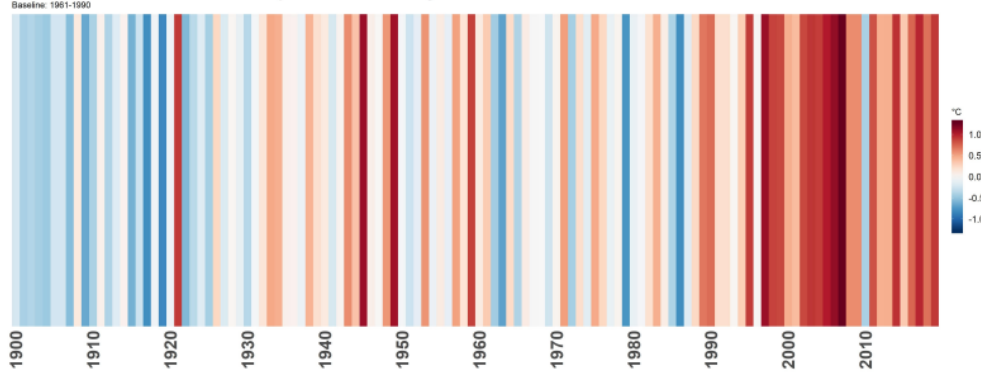
- Build on the **analysis of historic in situ and satellite data** records for those essential climate variables relevant to Ireland that have not yet been fully exploited.

- Establish climate-relevant observation networks**, for those variables currently not systematically monitored, that take advantage of existing national infrastructure and expertise.

- Improve **discovery of and access to information and data** on Ireland's essential climate variables and related observational infrastructure.

- GCOS Ireland should **co-ordinate development of a roadmap** for maintenance, consolidation and, where necessary, upgrade of Ireland's climate observation system.

Ireland Mean Surface Air Temperature Anomaly



ANNUAL AIR TEMPERATURE DIFFERENCE (1900 - 2019) COMPARED TO THE
MEAN VALUE CALCULATED OVER THE PERIOD 1961 TO 1990.

More information on climate stripes: <https://showyourstripes.info>

THANK YOU!!

