# Valentia Observatory

World Meteorological Organization Centennial Observing Station

Long-term meteorological observations are part of the irreplaceable cultural and scientific heritage of mankind that serve the needs of current and future generations for long-term high quality climate records. They are unique sources of past information about atmospheric parameters, thus are references for climate variability and change assessments. To highlight this importance, WMO has a mechanism to recognise centennial observing stations. In May 2017 Met Éireann's Valentia Observatory was awarded this status.



### The Start of a Legacy



Following the loss of 459 lives in 1854 when a violent storm sunk the Royal Charter passenger vessel, Vice-Admiral Robert Fitzroy (who captained the HMS Beagle expedition of Charles Darwin) was tasked with establishing a Meteorological Office to serve mariners. Fitzroy established 15 coastal observation stations; one of these became 'Valentia Observatory' on the southwest coast of Ireland.

Robert Fitzroy (1805-1865). Source: Wellcome Library

Instruments were installed at the former Revenue

Officer's House which was leased from the Knight of Kerry on Valentia Island. From here weather observations could be rapidly transmitted via telegraph. The first official weather observation transmitted from Valentia Observatory was at 8 a.m. on October 8th 1860.



Revenue House, Valentia Observatory, Valentia Island, Co. Kerry. Source: Met Éireann Library

During 1890 the Meteorological Council

considered expanding its activities at Valentia Observatory and decided to relocate to more suitable accommodation on the outskirts of Cahirciveen, overlooking Valentia Island. Westwood House was purchased from Trinity College and has provided continuous meteorological measurements from March 1892 to the present day.



#### Weather Observers



Staff at the Observatory, circa 1920. From left: L.H.G. Dines (Superintendent), Michael and John Morley (Boy Clerks), P.I Mulholland (Professional Assistant) and M. Sugrue (Supernumerary Clerk) (photo: F.E. Dixon). *Source: Met Éireann Library* 

**F**rom that first transmitted observation in 1860, Valentia Observatory has been recording and sharing its observations ever since. Long term records are essential for weather and climate science. These record sets are only made possible by the consistency and dedication of weather observers. Many observers have given their entire careers to maintaining accurate and timely measurements.

Routine weather observations even continued throughout the War of Independence and the Civil War. It was sometimes quite challenging to maintain a steady network of weather observations. Official reports from C.D. Stewart, Super-intendent at Valentia Observatory, described the events of August 1922 when Civil War gripped the town of Cahirciveen, Co. Kerry.

He reported 'On 23rd the Irish Free State forces took the town of Cahirciveen after some fighting, most of the actual shooting taking place in the vicinity of the Observatory. The whole operation was easily visible from the Observatory windows. The 18h and 21h observations were incidentally rendered extremely unpleasant by the constant crossfire of the two sides.' Stewart later remarked satisfactorily that 'no observation was missed and no record was lost' during this time.

General. All land communication with this place broke down from the 5th of August, the Republicas forces wrecking the railway and the telegraph wires. On the 25rd the Irish Free State forces took the town of Cahircireen after some fighting, most of the actual shooting taking place in the vicinity of the Observatory. The whole operation was easily visible from the Observatory windows. The 18h. and 21h. observations were incidentally rendered extremely unpleasant by the constant cross fire of the two sides. At 11.30 p.m. the occupants of the observatory winder. The left about 2 a.m. for the town which has since been in their hands. This has not, however, led to any resumption of communications up to the present, although we are now hoping to get the usual telegraph

Valentia Observatory Report of Works, 1922. Source: Met Éireann Library

#### The Growth of Valentia Observatory

Today Valentia Observatory is a centre of excellence for a wide range of earth observation programmes which have evolved over many decades. Here we take a brief look at the evolution of the Observatory.

## 1888

Taking magnetic measurements at Valentia Observatory's specialised magnetic monitoring hut. Source: Met Éireann Library



1888 Geomagnetism Valentia Observatory is one of the oldest geomagnetic observatories in the world with a continuous record. The Observatory measures the movement of the magnetic North Pole (vital for compass navigation) and also monitors the constant fluctuations in the magnetic field due to solar winds. Absolute magnetic observations have been made since 1888 and the variations in the Earth's magnetic field have been continuously recorded since 1953.

**1907 Meteorological Office** Until 1907 the station was under the control of the Royal Society, but in that year control was transferred to the British Met Office. The Irish Meteorological Service was established on the 8th December 1936, and shortly after this the British Met Office organisational infrastructure was transferred to the new organisation. While some staff transferred from Valentia Observatory following the changeover, those who remained were joined by new recruits to form a professional workforce who worked to maintain an institution known and respected by many members of the worldwide scientific community.

### 1907



Flying boat at Foynes. Source: Foynes Flying Boat & Maritime Museum

### 1939

**1939 Hourly Observations** The first transatlantic flights took place from Foynes in the summer of 1939. In response to the need for better forecasts, Valentia Observatory began recording weather observations every hour of the day and night throughout the whole year. Standard meteorological parameters such as pressure, temperature, wind speed and wind direction were recorded as well as parameters such as clouds and visibility.

# 1943



Launching a weather balloon from Valentia Observatory. Source: Met Éireann Library

# 1954

Removing daily seismic record from earthquake sensors at Valentia Observatory. Source: Met Éireann Library

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**1943 Weather Balloons** With the increasing emphasis on aviation, upper-air soundings (weather balloons) were introduced in September 1943 to measure pressure, temperature and humidity. Upper-air winds were calculated by tracking a specialised balloon. The weather balloons, which typically reach heights of between 30 and 35 km, provide valuable information on the current state of the atmosphere. Data from Valentia Observatory's balloons are distributed internationally and are incorporated in weather forecasting models throughout the world.

**1954 Solar Radiation** Valentia Observatory is Met Éireann's national solar and terrestrial radiation facility. The Observatory uses specialist equipment to continually monitor and record the intensity of solar radiation reaching the ground in Ireland. By measuring solar radiation at different wavelengths, information on the chemical and physical makeup of the atmosphere can be determined. Solar radiation monitoring equipment, Valentia Observatory. Source: Met Éireann Library



Source: Met Eireann

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**1962 Seismology** Seismology is the study of seismic waves (shock waves) produced by earthquakes or explosions. Seismic waves have been recorded at the Observatory since 1962 when a state-of-the-art building was constructed to house precise instruments. Valentia Observatory is the oldest seismic recording station in Ireland.

### 1962

# 1964



International Phenological Garden at Valentia Observatory. Source: Met Éireann Library

**1964 Phenology** Phenology is the study of biological phase changes in plants and animals. An International Phenological Garden was established at Valentia Observatory in 1964 and forms part of a network of such gardens throughout Europe. Phase changes (annual timing of leaf unfolding, flowering, ripe fruits, leaf fall) of a number of specially cloned trees have been recorded at the Observatory since 1964. These records, along with other records from similar cloned trees around Europe, provide a valuable climate change indicator.



**1980s Pollution Monitoring** Valentia Observatory began daily rain pollution sampling in 1980. Its geographical location exposes it to predominantly 'clean air' from the North Atlantic. This scientific programme helps quantify background pollution rates for both national and international pollution monitoring campaigns.

Air sampling intake heads for air pollution monitoring, Valentia Observatory. Source: Met Éireann Library

**1993 Ozone** To help characterise the extent of depletion of the ozone layer Valentia Observatory began an ozone monitoring programme. Through a combination of ground-based equipment and ozonesonde weather balloons, Valentia is now measuring the slowly recovering ozone layer above Ireland.



1993

Launching an ozone monitoring sensor attached to a weather balloon. Source: Met Éireann Library

### 2017

**2017 WMO Centennial Award** Valentia Observatory was awarded the status of 'Centennial Observing Station' by the World Meteorological Organization, for recognition of over 100 years of long-term, continuous and accurate weather observations.

### Looking to the Future

Today Valentia Observatory continues to modernise its long term monitoring programmes. Similar to the past 100 years, new scientific monitoring programmes are beginning. A state-of-theart atmospheric chemistry monitoring facility has been



Westwood House, Valentia Observatory, Cahirciveen, Co Kerry, c. 2015. Source: Met Éireann Library

built on Valentia Island to further our understanding of climate change and air quality. Modern remote sensing programmes, such as LIDAR, are being used to build a climatology of the atmospheric boundary layer. The Observatory has also expanded its geomagnetic programme to make more detailed measurements related to space weather.

Earth observations are increasingly important for decision-making regarding all interactions involving our planet, atmosphere and weather systems. For example, weather forecasting is not possible without accurate weather observations which are used to initialise the forecasting computer models, satellites are calibrated using ground-based observations and long-term records are essential to characterise changes in climate. This is why weather stations such as Valentia Observatory, which provide continuous accurate measurements, will continue to be vital in the future.

> 3elow: Westwood House, Valentia Observatory, Cahirciveer Co Kerry, c. 1915. Source: Met Éireann Library

"These long-term measurements... are the backbone of both weather forecasting and climate science. It is highly important that we ensure the long-term sustainability of these measurements."

> Prof. Petteri Taalas, Secretary-General, World Meteorological Organization

