Climatological Characterisation of Ocean Sites for Ocean Colour System Vicarious Calibration: El Hierro (Canary Islands, Spain)

Task 1 Report: Climatological and observational data sets

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Table of Contents

List of Acronyms

AEMET	Agencia Estatal de Meteorología
AENA	Aeropuertos Españoles y Navegación Aérea
AERONET	AErosol RObotic NETwork
AOT	Aerosol Optical Thickness
AVHRR	Advanced Very High Resolution Radiometer
BNDC	Banco Nacional de Datos Climatológicos
CDOM	Coloured Dissolved Organic Matter
CMEMS	Copernicus Marine Environment Monitoring Service
ECMWF	European Centre for Medium-Range Weather Forecasts
EEZ	Exclusive Economic Zone
EMIS	Environmental Marine Information System
EMODnet	European Marine Observation and Data Network
ESA	European Space Agency
EUBREWNET	European Brewer Network
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
FTIR	Fourier Transform Infrared Spectroscopy
GAW	Global Atmosphere Watch
GLONASS	Global Navigation Satellite System
GNSS	Global Navigation Satellite System
GOME	Global Ozone Monitoring Experiment
GPS	Global Positioning System
IARC	Izaña Atmospheric Research Center
IASI	Infrared Atmospheric Sounding Interferometer
IBI	Iberian Biscay Irish
ICAO	International Civil Aviation Organization
ICOADS	International Ocean-Atmosphere Data Set
IEO	Instituto Español de Oceanografía
IEOOS	Spanish Institute of Oceanography Integrated Ocean Observing System
IGN	Instituto Geográfico Nacional
IHM	Instituto Hidrográfico de la Marina
IMK-ASF	Institute of Meteorology and Climate Research - Atmospheric Trace Gases and Remote Sensing
IOC	Intergovernmental Oceanographic Commission
IZO	Izaña Observatory
JRC	Joint Research Centre
KIT	Karlsruhe Institute of Technology
MAPA	Ministerio de Agricultura, Pesca y Alimentación del Gobierno de España
MARS	Meteorological Archival and Retrieval System
MERIS	Medium Resolution Imaging Spectrometer
MINECO	Ministerio de Economía y Competitividad del Gobierno de España
MODIS	Moderate Resolution Imaging Spectroradiometer

MSR	ozone Multi-Sensor Reanalysis
MY	Multi-Year
NCEI	National Centers for Environmental Information
NDACC	Network for the Detection of Atmospheric Composition Change
NOAA	National Oceanic and Atmospheric Administration
NRT	Near-Real-Time
OC-SVC	Ocean Colour-System Vicarious Calibration
OLCI	Ocean and Land Colour Instrument
OMI	Ozone Monitoring Instrument
PWV	precipitable water vapour
RBCC-E	Regional Brewer Calibration Centre for Europe
SCIAMACHY	Scanning Imaging Absorption Spectrometer for Atmospheric Chartography
SCO	Santa Cruz Observatory
SeaWiFS	Sea-viewing Wide Field-of-view Sensor
TEMIS	Tropospheric Emission Monitoring Internet Service
TROPOMI	TROPOspheric Monitoring Instrument
VIIRS	Visible Infrared Imaging Radiometer Suite
WMO	World Meteorological Organization
WOA	World Ocean Atlas
WOD	World Ocean Database
WORCC	World Optical Depth Research and Calibration Center

1 Introduction

1.1 IEO

The Spanish Institute of Oceanography (IEO – Instituto Español de Oceanografía), established in 1914, dedicates its activities to the scientific research of the oceans, from oceanographical features to the sustainability of the fisheries resources. IEO's main headquarters are located in Madrid, however, the institute presents nine oceanographical centers, along the Spanish coast and Islands, having an important contribution to the advisory of the Spanish government, in terms of fisheries and environmental policies.

The Canary Islands Oceanographical Center, actually located in the island of Tenerife, was created 94 years ago, and plays a key role in the scientific knowledge of the region. The Center performs important research on biodiversity, on hydrological and ocean circulation characteristics and on local and international fisheries. Its studies in the Canary Archipelago, as well as participation in transatlantic and international programs, represent the institute's local and world-class excellence.

The IEO currently has a fleet of five oceanographic vessels (in addition to other smaller vessels) of between 14 and 65 meters in length: Ramón Margalef, Francisco de P. Navarro, J.Mª. Navaz, Lura, and Ángeles Alvariño. All of them are equipped with the most modern electronic navigation and location systems, as well as the necessary tools to collect samples, both water and sediment, determination of physical and chemical variables of seawater, as well as for the studies of flora and marine fauna. To complete the fleet, actually the IEO is building a 90 meter world-wide coverage research vessel. Moreover, the IEO has a ROV Liropus 2000 and several AUVs for the remote observation of the ocean.

1.2 AEMET-IARC

The State Meteorological Agency of Spain (AEMET) is responsible for the development, implementation and delivery of the state's weather services and for supporting the performance of other public policies and private activities, contributing to the safety of persons and property, and to the welfare and sustainable development of Spanish society. The Agency has the status of meteorological authority of the state, as well as aeronautical meteorological authority.

The Izaña Atmospheric Research Center (IARC), which is part of AEMET, represents a centre of excellence in atmospheric science. It manages four observatories in Tenerife, including the high altitude Izaña Observatory, which was inaugurated in 1916 and has since carried out uninterrupted meteorological and climatological observations and is now a World Meteorological Organization (WMO) Centennial Station.

The Izaña Observatory has contributed to the WMO Global Atmosphere Watch (GAW) Programme since its establishment in 1989 and is one of 31 GAW Global stations. It performs high-quality, long-term (multi-decadal) measurements and research of atmospheric greenhouse gases, surface and column ozone, ultraviolet and solar radiation, in situ and column aerosols and selected reactive gases. It contributes to tropospheric and stratospheric atmospheric composition monitoring and international research programmes. The environmental conditions at Izaña are optimal for calibration and validation activities of both ground based and space borne sensors. The Fourier transform infrared spectroscopy (FTIR) programme at the IARC is actively involved in the validation of different satellite instrument measurements (e.g. the EUMETSAT Infrared Atmospheric Sounding Interferometer (IASI) and the TROPOspheric Monitoring Instrument (TROPOMI) trace gas products).

IARC also plays an important role in quality assurance activities by operating the Regional Brewer Calibration Centre for Europe (RBCC-E), which maintains the Brewer ozone reference and hosts the European Brewer

Network (EUBREWNET). In addition, IARC operates a WMO Commission for Instruments and Methods of Observations Testbed for Aerosols and Water Vapour Remote Sensing Instruments. It also maintains one of the World Optical Depth Research and Calibration Center (WORCC) Precision Filter Radiometer reference instruments and is one of three AERONET-EUROPE calibration facilities. More details of the IARC research activities, its measurement programmes and facilities can be found in Cuevas et al. (2019).

2 Identification of climatological and observational data sets

The objective of Task 1 is to identify the climatological and observational data sets to be used as the basis for the study. The following sections identify the sources of the climatological and observational data sets relevant for each parameter as listed in Section 3.5 of EUMETSAT (2020).

Each identified data set has been verified as readily accessible and useable for this study.

3 Geography

3.1 Site location

Nautical charts of the site location will be obtained from GRAFCAN, showing neighbouring land within 120 nautical miles together with the bathymetry extracted from (IEO-IHM).

GRAFCAN carries out production, maintenance and management activities of the geographic and territorial information of the Canary Islands Autonomous Region, and is the functional manager of the Territorial Information System of the Autonomous Region. The company is responsible for the technical direction of the activities carried out, guiding the development criteria, procedures and technological implementation. Likewise, it is responsible for harmonizing and coordinating the possible external execution of all or some of the actions to be carried out.

GRAFCAN, since 2010, has a quality management system in accordance with UNE-EN ISO 9001:2015 and an environmental management system in accordance with UNE-EN ISO 14001: 2015 for design and production activities, maintenance, supply and dissemination of geographic and territorial information. In January 2015, GRAFCAN published the declaration of conformity of its information systems with the Spanish National Security Scheme, and in October 2018 the accreditation certificate was obtained.

3.2 Sea bottom depth and slope at site

Canary Island bathymetry data will be obtained from the Instituto Hidrográfico de la Marina (IHM) which produces bathymetry data for the Spanish Exclusive Economic Zone (EEZ) with a spatial resolution of 150 m. In addition, high-resolution multi-beam bathymetry dataset will be obtained from IHM (2010) from data on board their hydrographic vessel “Malaspina” with a spatial resolution of 30 m. The data set will be available from the IEO repository with a special approval authorization from IHM for the EUMETSAT contract; this approval has now been received.

3.3 Sun zenith angle

The Sun zenith angle at 10AM Local Solar Time (LST) per day of year for the El Hierro proposed site will be calculated following equations in Iqbal (1983), Chapter 1, Eq. 1.4.1 for equation of time and Eq. 1.5.1 for the sun zenith angle.

4 Atmosphere characterisation

4.1 Fractional cloud cover

4.1.1 In situ data: AEMET National Climatological Data Base (BNDC)

Fractional cloud cover data will be obtained from in situ data at the AEMET meteorological station at El Hierro airport.

Dataset summary:

The AEMET National Climatological Data Base (BNDC-Banco Nacional de Datos Climatológicos) contains observations from AEMET principal and secondary climatological measurement stations in Spain.

Geographic location:	El Hierro airport 27° 49' 8‘’N, 17° 53' 20‘’W, 32 m a.s.l.
Temporal extent to be used in study:	2000-2020
Temporal resolution:	Okta observations: 0700, 1300 and 1800h UTC
Spatial resolution:	in situ
Responsible organisation:	AEMET
Data access:	AEMET National Climatological Data Base (BNDC)
References:	http://www.aemet.es/en/lineas_de_interes/datos_y_estadistica

4.1.2 Reanalyses: European Centre for Medium-Range Weather Forecasts ERA5

Fractional cloud cover data will also be obtained from the European Centre for Medium-Range Weather Forecasts (ECMWF) ERA5 reanalysis dataset.

Dataset summary:

ERA5 provides hourly estimates of a large number of atmospheric, land and oceanic climate variables. The data cover the Earth on a 30km grid and resolve the atmosphere using 137 levels from the surface up to a height of 80km. ERA5 includes information about uncertainties for all variables at reduced spatial and temporal resolutions. (www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5)

Geographic location:	18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N
Temporal extent to be used in study:	2001-2020
Temporal resolution:	Hourly
Spatial resolution:	30 km x 30 km
Responsible organisation:	ECMWF
Data access:	IARC-AEMET has access to ERA5 data through the ECMWF Meteorological Archival and Retrieval System (MARS)
References:	Hersbach et al. (2020)

4.2 Wind velocity and direction

4.2.1 **In situ data:** AEMET National Climatological Data Base (BNDC)

Wind velocity and direction data will be obtained from in situ data at the AEMET meteorological station at Tacorón.

Dataset summary:

The AEMET National Climatological Data Base contains observations from AEMET principal and secondary climatological measurement stations in Spain.

Geographic location:	Tacorón measurement station
	27° 39' 55"N, 18° 1' 7"W, 98 m a.s.l.
Temporal extent to be used in study:	2010-2020
Temporal resolution:	Hourly
Spatial resolution:	in situ
Responsible organisation:	AEMET
Data access:	AEMET National Climatological Data Base (BNDC)

4.2.2 **Reanalyses:** European Centre for Medium-Range Weather Forecasts ERA5

Wind velocity and direction data will also be obtained from the ERA-5 reanalysis.

Dataset summary:

ERA5 provides hourly estimates of a large number of atmospheric, land and oceanic climate variables. The data cover the Earth on a 30km grid and resolve the atmosphere using 137 levels from the surface up to a height of 80km. ERA5 includes information about uncertainties for all variables at reduced spatial and temporal resolutions.

Geographic location:	18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N
Temporal extent to be used in study:	2001-2020
Temporal resolution:	Hourly
Spatial resolution:	30 km x 30 km
Responsible organisation:	ECMWF
Data access:	IARC-AEMET has access to ERA5 data through MARS

4.3 Aerosol type and optical thickness

4.3.1 In Situ data

Dataset summary:

In situ Aerosol Optical Thickness (AOT) at 550 nm and Angström exponent (α) data will be obtained from the Santa Cruz de Tenerife Observatory (SCO) AErosol RObotic NETwork (AERONET) station located in Tenerife, managed by IARC (see Section 1.2). Both parameters are obtained from CIMEL CE318 sun photometer measurements.

Geographic location:	Santa Cruz de Tenerife Observatory (SCO) 28.473°N, 16.247°W, 52 m a.s.l.
Temporal extent to be used in study:	2005-2020
Temporal resolution:	Daily
Spatial resolution:	in situ
Responsible organisation:	IARC-AEMET
Data access:	IARC-AEMET and AERONET

https://aeronet.gsfc.nasa.gov/new_web/photo_db_v3/Santa_Cruz_Tenerife.html

References:	Holben et al. (1998), Giles et al. (2019) Barreto et al. (2016)

4.3.2 Satellite data

Dataset summary:

Aerosol Optical Thickness at 550 nm and Angström exponent data will be obtained from the Moderate Resolution Imaging Spectroradiometer (MODIS) data aboard the Aqua satellite.

Geographic location:	18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N
Temporal extent to be used in study:	2003-2020
Temporal resolution:	Daily
Spatial resolution:	1° x 1°
Responsible organisation:	NASA
Data access:	https://giovanni.gsfc.nasa.gov/giovanni
References:	Zhang and Reid, 2006

4.4 Absorbing gases

4.4.1 Atmosphere pressure

4.4.1.1 In situ data: AEMET National Climatological Data Base (BNDC)

Atmosphere pressure data will be obtained from in situ data at the AEMET meteorological station at El Hierro airport. Data will be extracted from the AEMET BNDC.

Dataset summary:

The AEMET National Climatological Data Base contains observations from AEMET principal and secondary climatological measurement stations in Spain.

Geographic location:	El Hierro airport 27° 49' 8‘’N, 17° 53' 20‘’W, 32 m a.s.l.
Temporal extent to be used in study:	2000-2020
Temporal resolution:	Daily
Spatial resolution:	in situ

Responsible organisation:	AEMET
Data access:	AEMET National Climatological Data Base (BNDC)

4.4.1.2 Reanalyses: European Centre for Medium-Range Weather Forecasts ERA5

Atmosphere pressure data will also be obtained from the ERA-5 reanalysis.

Dataset summary:

ERA5 provides hourly estimates of a large number of atmospheric, land and oceanic climate variables. The data cover the Earth on a 30km grid and resolve the atmosphere using 137 levels from the surface up to a height of 80km. ERA5 includes information about uncertainties for all variables at reduced spatial and temporal resolutions.

Geographic location:	18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N
Temporal extent to be used in study:	2001-2020
Temporal resolution:	Hourly
Spatial resolution:	30 km x 30 km
Responsible organisation:	ECMWF
Data access:	IARC-AEMET has access to ERA5 data through MARS

4.4.2 Total column ozone

4.4.2.1 In situ data: Izaña and Santa Cruz de Tenerife Observatory

Total column ozone data will be obtained from in situ Brewer spectrometer data at the Izaña Observatory (IARC-AEMET). Measurements are available from 1991 until present. Brewer spectrometer data are also available at the Santa Cruz de Tenerife Observatory (IARC-AEMET), both stations are part of EUBREWNET. Izaña Observatory is also a Network for the Detection of Atmospheric Composition Change (NDACC) station.

Dataset summary:

EUBREWNET (European Brewer Network) is a federated network of Brewer spectrophotometers for ozone measurement, which was created in 2014 within the framework of the COST-ES1207 action (http://www.eubrewnet.org/cost1207/) as a European project. It is now a global network with more than 100 instruments around the world coordinated by AEMET through the Izaña Atmospheric Research Centre.

Geographic location:	Izaña Observatory (IZO) 28.309°N, 16.499°W, 2373 m a.s.l. Santa Cruz de Tenerife Observatory (SCO) 28.473°N, 16.247°W, 52 m a.s.l.
Temporal extent to be used in study:	1991-2020
Temporal resolution:	Daily
Spatial resolution:	in situ

Responsible organisation:	IARC-AEMET
Data access:	http://www.eubrewnet.org/eubrewnet
References:	Rimmer et al. (2018)

4.4.2.2 Reanalyses: ozone multi-sensor reanalysis (MSR) V2

Total column ozone data will also be obtained from the ozone multi-sensor reanalysis (MSR) V2 updated to 2020.

Dataset summary:

The ozone multi-sensor reanalysis (MSR) is a multi-decadal ozone column data record constructed using all available ozone column satellite data sets, surface Brewer and Dobson observations and a data assimilation technique with detailed error modelling. The result is a high-resolution time series of 6-hourly global ozone column fields and forecast error fields that may be used for ozone trend analyses as well as detailed case studies.

Tropospheric Emission Monitoring Internet Service (TEMIS) is a web-based service to browse and download atmospheric satellite data products. The satellite data products consist mainly of tropospheric trace gases and aerosol concentrations, but also UV products, cloud information and surface albedo climatologies are provided. The satellite instruments used for these data sets are mainly GOME, GOME-2, SCIAMACHY and OMI. The data products are ordered around the themes air quality, ozone depletion, UV radiation, climate change, volcanic activity and surface reflectivity. TEMIS used to be part of the Data User Programme of the European Space Agency (ESA).

Geographic location:	18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N
Temporal extent to be used in study:	1970-2020
Temporal resolution:	Daily
Spatial resolution:	0.5° x 0.5°
Responsible organisation:	ESA: Tropospheric Emission Monitoring Internet Service
Data access:	https://www.temis.nl/protocols/o3field/o3mean_msr2.php
References:	van der A et al. (2015)

4.4.3 Total precipitable water

4.4.3.1 In situ data

Total precipitable water in situ data will be obtained from the Global Navigation Satellite System (GNSS) receiver at Faro de Orchilla (El Hierro).

Dataset summary:

The Global Navigation Satellite System technique consists in determination of precipitable water vapour (PWV) in the atmospheric column from the observed delay in radio signals at two different frequencies emitted by a network of Global Positioning System (GPS) and Global Navigation Satellite System (GLONASS) satellites received in the GNSS receiver. The GNSS network and data acquisition are managed by the Spanish National Geographic Institute (IGN).

Geographic location:	Faro de Orchilla, El Hierro 27.712699°N, 118.147063°W, 118 m a.s.l.
Temporal extent to be used in study:	2017-2020
Temporal resolution:	Daily
Spatial resolution:	in situ
Responsible organisation:	IGN and IARC-AEMET
Data access:	IARC-AEMET
References:	Schneider et al. (2010)

4.4.3.2 Reanalyses: European Centre for Medium-Range Weather Forecasts ERA5

Total precipitable water data will also be obtained from the ERA-5 reanalysis.

Dataset summary:

ERA5 provides hourly estimates of a large number of atmospheric, land and oceanic climate variables. The data cover the Earth on a 30km grid and resolve the atmosphere using 137 levels from the surface up to a height of 80km. ERA5 includes information about uncertainties for all variables at reduced spatial and temporal resolutions.

Geographic location:	18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N
Temporal extent to be used in study:	2001-2020
Temporal resolution:	Hourly
Spatial resolution:	30 km x 30 km
Responsible organisation:	ECMWF
Data access:	IARC-AEMET has access to ERA5 data through MARS

4.4.4 NO_2 surface concentrations, tropospheric and stratospheric columns

4.4.4.1 In situ data: NO_2 surface concentrations

NO_2 surface concentration in situ data will be obtained from two sites: 1) Izaña Observatory (remote background site) and 2) El Rio (European Monitoring and Evaluation Programme (EMEP)-regional background site). The El Rio measurement station forms part of the Canary Islands Air-Quality Monitoring Network.

Geographic location:	Izaña Observatory (IZO) 28.309°N, 16.499°W, 2373 m a.s.l. El Rio measurement station 28.145°N, 16.524°W, 500 m a.s.l.
Temporal extent to be used in study:	2010-2019
Temporal resolution:	Daily
Spatial resolution:	in situ

Responsible organisation:	Izaña Observatory: IARC-AEMET El Rio measurement station: Canary Islands Air-Quality Monitoring Network
Data access:	Izaña Observatory: IARC-AEMET El Rio measurement station: Canary Islands Air-Quality Monitoring Network (https://www3.gobiernodecanarias.org/medioambiente/calidaddelaire/inicio.do)

4.4.4.2 In situ data: NO_2 tropospheric and stratospheric columns

NO_2 tropospheric and stratospheric column in situ data will be obtained from Fourier transform infrared spectroscopy (FTIR) data at the Izaña Observatory (IARC-AEMET) to complement the satellite data series (see Section 4.4.4.3). FTIR records also form part of NDACC.

Dataset summary:

The FTIR programme at IARC is the result of the close collaboration of more than two decades between IARC-AEMET and IMK-ASF-KIT (Institute of Meteorology and Climate Research-Atmospheric Trace Gases and Remote Sensing, Karlsruhe Institute of Technlogy, Germany). The IMK-ASF has operated high-resolution ground-based FTS systems for over two decades and they are leading contributors in developing FTIR inversion algorithms and quality control of FTIR solar measurements.

Geographic location:	Izaña Observatory (IZO) 28.309°N, 16.499°W, 2373 m a.s.l.
Temporal extent to be used in study:	1999-2020
Temporal resolution:	Daily
Spatial resolution:	in situ
Responsible organisation:	IARC-AEMET and IMK-ASF-KIT
Data access:	IARC-AEMET and NDACC (https://www.ndaccdemo.org/)
References:	Robles-Gonzalez et al. (2016)

4.4.4.3 Satellite data

NO_2 tropospheric and stratospheric column data will be obtained from the Aura Ozone Monitoring Instrument (OMI) Nitrogen Dioxide Cloud-Screened Total and Tropospheric Column Product (OMNO2d).

Dataset summary:

The Level-3 daily global gridded Nitrogen Dioxide Product (OMNO2d) is a Level-3 Gridded Product where pixel level data of good quality are binned and "averaged" into 0.25x0.25 degree global grids. This product contains Total column NO_2 and Total Tropospheric Column NO_2, for all atmospheric conditions, and for sky conditions where cloud fraction is less than 30 percent.

(https://disc.gsfc.nasa.gov/datasets/OMNO2d_003/summary)

Geographic location:	18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N
Temporal extent to be used in study:	2004-2020
Temporal resolution:	Daily
Spatial resolution:	0.25° x 0.25°
Responsible organisation:	NASA
Data access:	https://giovanni.gsfc.nasa.gov/giovanni
References:	Krotkov et al. (2019)

5 Ocean characterisation

5.1 Chlorophyll concentration

5.1.1 **In situ data:** IEO Oceanographic cruises in the Canary Islands

Chlorophyll-*a* data will be obtained from depth profiles (0-200 m, 1 m vertical resolution) obtained by fluorescence analysis of in situ measurements calibrated with acetonic extracts of discrete water samples analysed by fluorometry. Samples taken during oceanographic cruises in 2018, 2019 and 2020 at different locations around the Canary Islands (RAPROCAN) and in the vicinity of the study area (VULCANA).

Geographic location:	19.00°W – 18.00°W, 26.00°N – 27.00°N
Temporal extent to be used in study:	2011-2020 Vulcana ; 2006-2020 Raprocan
Temporal resolution:	twice a year
Spatial resolution:	in situ
Responsible organisation:	Spanish Institute of Oceanography
Data access:	Spanish Institute of Oceanography Integrated Ocean Observing System (IEOOS, http://www.ieo.es)
References:	Yentsch and Menzel (1963), IOC (1994)

5.1.2 **Climatological data:** Environmental Marine Information System

Dataset summary:

The Joint Research Centre (JRC) Environmental Marine Information System (EMIS) is a geo-portal application that provides access to spatial, temporal, physical and biological marine variables, and related environmental information, derived from satellite remote sensing and/or numerical modelling. (for more details see: mcc.jrc.ec.europa.eu).
Standard monthly climatology sea surface chlorophyll-a concentrations of three different L3 products (MERIS, MODIS AQUA and SEAWIFS) at 2km resolution will be obtained.

Geographic location:	18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N
Temporal extent to be used in study:	MERIS: 2002-05-01 – 2020-12-31 MODIS AQUA: 2002-07-01 – 2015-12-31 SEAWIFS: 1997-09-01 - 2004-12-31
Temporal resolution:	Monthly
Spatial resolution:	2 km x 2 km
Responsible organisation:	Joint Research Centre Environmental Marine Information System
Data access:	https://data.jrc.ec.europa.eu/collection/emis
References:	Melin, (2013a; 2013b; 2013c)

5.1.3 **Reanalyses data:** Atlantic -Iberian Biscay Irish- Ocean Biogeochemistry Reanalysis Product (IBI_MULTIYEAR_BGC_005_003)

Dataset summary:

The Iberian Biscay Irish (IBI) Ocean Reanalysis system provides a 3D high-resolution biogeochemical multi-year product starting on 01/01/1993. To this aim, an application of the biogeochemical model PISCES is run simultaneously with the ocean physical IBI reanalysis, generating both products at the same 1/12° horizontal resolution. The PISCES model is able to simulate the first levels of the marine food web, from nutrients up to mesozooplankton and it has 24 state variables. The main biogeochemical variables, such as chlorophyll, oxygen, iron, nitrate, ammonium, phosphate, silicate, net primary production, the euphotic zone depth, surface partial pressure of carbon dioxide, dissolved inorganic carbon and pH are distributed as part of this IBI biogeochemical multi-year product.

Geographic location:	18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N
Temporal extent to be used in study:	1993-2019
Temporal resolution:	Monthly
Spatial resolution:	0.083° x 0.083°
Vertical coverage:	from -200 to 0.0 m
Responsible organisation:	European Commission (Copernicus programme)
Data access:	CMEMS: http://marine.copernicus.eu

https://resources.marine.copernicus.eu/?option=com_csw&view=details&product_id=IBI_MULTIYEAR_BGC_005_003

5.1.4 **Satellite data:** GLOBAL OCEAN CHLOROPHYLL (COPERNICUS-GLOBCOLOUR)

Dataset summary:

The Copernicus Marine Environment Monitoring Service (CMEMS) provides Global Ocean Satellite Observations, Chlorophyll-a products based on the Copernicus-GlobColour processor. Products are based on a multi sensors/algorithms approach to provide to end-users the best estimate. For Chlorophyll, a 1 km resolution over the Atlantic (46°W-13°E, 20°N-66°N) is also available for the Cloud Free product. Products are based on the merging of the sensors SeaWiFS, MODIS, MERIS, VIIRS-SNPP&JPSS1, OLCI-S3A&S3B. For OLCI-S3A, products are also delivered as a single sensor.

Geographic location:	18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N
Temporal extent to be used in study:	1997-09-04 - 2020-06-30
Temporal resolution:	Daily
Spatial resolution:	1 km x 1 km
Vertical coverage:	Surface
Responsible organisation:	European Commission (Copernicus programme)
Data access:	CMEMS: http://marine.copernicus.eu

https://resources.marine.copernicus.eu/?option=com_csw&view=details&product_id=OCEANCOLOUR_GLO_CHL_L4_REP_OBSERVATIONS_009_082

5.2 Apparent Optical Properties

Remote sensing reflectance (R_{rs}) data at 412, 442, 490, 510 and 560nm will be obtained from the following dataset.

5.2.1 **Satellite data:** COPERNICUS-GLOBCOLOUR: NORTH ATLANTIC OCEAN, OCEAN OPTICS PRODUCTS

Dataset summary:

The Copernicus Marine Environment Monitoring Service provides the NORTH ATLANTIC OCEAN, OCEAN OPTICS PRODUCTS (DAILY AVERAGE) REPROCESSED L3 (ESA-CCI). These are derived from level 2 data produced by SeaDAS l2gen (MODIS, VIIRS and SeaWiFS) and Polymer (MERIS and OLCI-3A), and the resulting R_{rs} bias corrected.

This RRS product is defined as the ratio of upwelling radiance and downwelling irradiance at 412, 443, 490, 510, 555 and 670 nm wavebands (corresponding to MERIS).

Geographic location:	18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N
Temporal extent to be used in study:	1997-09-04 - 2020-06-30
Temporal resolution:	Daily
Spatial resolution:	1 km x 1 km
Vertical coverage:	Surface
Responsible organisation:	European Commission (Copernicus programme)
Data access:	CMEMS: http://marine.copernicus.eu

https://resources.marine.copernicus.eu/?option=com_csw&view=details&product_id=OCEANCOLOUR_ATL_OPTICS_L3_REP_OBSERVATIONS_009_066

References:	McClain et al. (1995), Sathyendranath et al. (2012)

5.3 Inherent Optical Properties: Coloured Dissolved Organic Matter absorption

5.3.1 **Climatological data:** Environmental Marine Information System

Dataset summary:

The Joint Research Centre Environmental Marine Information System is a geo-portal application that provides access to spatial, temporal, physical and biological marine variables, and related environmental information, derived from satellite remote sensing and/or numerical modelling.

Standard monthly climatology for the sea surface Absorption Coefficient of coloured detrital matter at 443nm (adg in m^{-1}) will be obtained from three different products (MERIS, MODIS AQUA and SEAWIFS). The absorption coefficient adg represents the fraction of incident light absorbed by both detrital particles and Coloured Dissolved Organic Matter (CDOM).

Geographic location:	18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N
Temporal extent to be used in study:	MERIS: 2002-05-01 – 2020-12-31 MODIS AQUA: 2002-07-01 – 2015-12-31 SEAWIFS: 1997-09-01 - 2004-12-31

Temporal resolution: Monthly

Spatial resolution: MERIS: 2 km x 2 km
MODIS AQUA: 4 km x 4 km
SEAWIFS: 4 km x 4 km

Responsible organisation: Joint Research Centre Environmental Marine Information System

Data access: https://data.jrc.ec.europa.eu/collection/emis

https://data.jrc.ec.europa.eu/dataset/a856a778-b55b-469d-abc3-b43624b5bf63

References: Melin, (2013d; 2013e; 2013f)

5.3.2 Satellite data: COPERNICUS-GLOBCOLOUR: NORTH ATLANTIC OCEAN, OCEAN OPTICS PRODUCTS

Dataset summary:

The Copernicus Marine Environment Monitoring Service provides the NORTH ATLANTIC OCEAN, OCEAN OPTICS PRODUCTS (DAILY AVERAGE) REPROCESSED L3 (ESA-CCI).
These are derived from level 2 data produced by SeaDAS l2gen (MODIS, VIIRS and SeaWiFS) and Polymer (MERIS and OLCI-3A).

Geographic location: 18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N
Temporal extent to be used in study: 1997-09-04 - 2020-06-30
Temporal resolution: Daily

Spatial resolution: 1 km x 1 km

Vertical coverage: Surface

Responsible organisation: European Commission (Copernicus programme)

Data access: CMEMS: http://marine.copernicus.eu

https://resources.marine.copernicus.eu/?option=com_csw&view=details&product_id=OCEANCOLOUR_ATL_OPTICS_L3_REP_OBSERVATIONS_009_066

References: McClain et al. (1995), Sathyendranath et al. (2012)

5.4 Currents

5.4.1 In situ data: Spanish Deep Water Buoy Network in the Canary Islands

Dataset summary:

Spanish Deep Water Buoy Network, a multipurpose network for the marine environment monitoring. Puertos del Estado's deep water buoy network is a Spanish national buoy network with 15 measuring stations (2 in the Canary Islands) moored at deep water (between 400 m and 2000 m). These stations provide met-ocean parameters transmitted in real time by satellite and are available through Puertos del Estado and through the Copernicus Marine Environment Monitoring Service (CMEMS).

Geographic location: Gran Canaria buoy (WMO: 13130). 15.80°W, 28.20°N

	Mooring Depth: 780 m Temporal extent: (1997-present) Tenerife buoy (WMO: 13131). 16.58°W, 27.99°N Mooring Depth: 710 Temporal extent: (1998-present)
Temporal extent to be used in study:	1997-2019
Temporal resolution:	Hourly data
Spatial resolution:	in situ
Responsible organisation:	Puertos del Estado, Madrid, Spain
Data access:	http://www.puertos.es CMEMS: http://marine.copernicus.eu

5.4.2 **Climatological data:** Drifter-Derived Climatology of Global Near-Surface Current

Dataset summary:

The Drifter-Derived Climatology provides a monthly climatology for the world of near-surface currents and temperature at a one-quarter degree resolution. Three versions are available: the first one contains annual mean values of near-surface currents and Sea Surface Temperature, the second one contains monthly mean values of surface currents and Sea Surface Temperature, and the third one contains information about current variance (eddy kinetic energy) derived from residuals with respect to the time-mean, seasonal, spatial gradient, and Southern Oscillation Index-related currents.

Geographic location:	20.00°W – 10.00°W, 26.00°N – 30.50°N
Temporal extent to be used in study:	1979-2020
Temporal resolution:	Monthly climatology / mean (annual) climatology
Spatial resolution:	0.25° x 0.25°
Responsible organisation:	National Oceanic and Atmospheric Administration (NOAA)
Data access:	https://www.aoml.noaa.gov/phod/gdp/mean_velocity.php
References:	Laurindo et al. (2017)

5.4.3 **Reanalyses data:** Atlantic -Iberian Biscay Irish- Ocean Physics Reanalysis Product (IBI_MULTIYEAR_PHY_005_002)

Dataset summary:

The Iberian Biscay Irish Ocean Reanalysis system provides 3D monthly and daily ocean fields, as well as hourly mean values for some surface variables, since 01/01/1993. Monthly and daily averages of 3D Temperature, Salinity, Mix Layer Depth, Sea Bottom Temperature, Zonal and Meridional Velocity components and Sea Surface Height are provided. Hourly means of surface fields for variables such as Sea Surface Height, Mix Layer Depth, Surface Temperature and Currents, together with Barotropic Velocities are also provided. The IBI model numerical core is based on the NEMO v3.6 ocean general circulation model run at 1/12° horizontal resolution. Altimeter data, in situ temperature and salinity vertical profiles and satellite sea surface temperature are assimilated.

Geographic location: 18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N

Temporal extent to be used in study: 1993-2019

Temporal resolution: Hourly data

Spatial resolution: 0.083° x 0.083°

Responsible organisation: European Commission (Copernicus programme)

Data access: CMEMS: http://marine.copernicus.eu

https://resources.marine.copernicus.eu/?option=com_csw&view=details&product_id=IBI_MULTIYEAR_PHY_005_002)

References: Maraldi et al. (2013)

5.5 Waves

5.5.1 In situ data: Spanish Deep Water Buoy Network in the Canary Islands

Dataset summary:

Spanish Deep Water Buoy Network, a multipurpose network for the marine environment monitoring.

Geographic location: Gran Canaria buoy (WMO: 13130) 15.80°W, 28.20°N
Mooring Depth: 780 m
Temporal extent: (1997-present)

Tenerife buoy (WMO: 13131) 16.58°W, 27.99°N
Mooring Depth: 710 m
Temporal extent: (1998-present)

Temporal extent to be used in study: 1997-2019

Temporal resolution: Hourly data

Spatial resolution: in situ

Responsible organisation: Puertos del Estado, Madrid, Spain

Data access: http://www.puertos.es

CMEMS: http://marine.copernicus.eu

5.5.2 Reanalyses data: ATLANTIC -IBERIAN BISCAY IRISH- OCEAN WAVE REANALYSIS (IBI_MULTIYEAR_WAV_005_006)

Dataset summary:

The IBI-MFC provides a Multi-Year (MY) high-resolution wave reanalysis product for the IBI area starting in 01/01/1993. The model system was run by AEMET in the AEMET supercomputer. The

MY model set-up is as much analogous as possible to the model set-up used in the IBI-MFC Near-Real-Time (NRT) forecast system. The model application is based on the MFWAM model developed by Meteo-France, with the same grid of 5 km of horizontal resolution. Both, the MY and the NRT products, are fed by the ERA 5 reanalysis wind data from ECMWF. As boundary conditions, the NRT system uses the 2D wave spectra from the CMEMS GLOBAL forecast system, whereas the MY system is nested to the CMEMS GLOBAL reanalysis.

Geographic location:	18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N
Temporal extent to be used in study:	1993-2019
Temporal resolution:	Hourly data
Spatial resolution:	0.05° x 0.05°
Responsible organisation:	European Commission (Copernicus programme)
Data access:	CMEMS: http://marine.copernicus.eu

(https://resources.marine.copernicus.eu/?option=com_csw&view=details&product_id=IBI_MULTIYEAR_WAV_005_006)

5.6 Sea Surface Temperature

5.6.1 In situ data

In situ data for Sea Surface Temperature (SST) will be obtained from the following datasets.

5.6.1.1 Temperature data from IEO Oceanographic cruises at El Hierro Island

This data will be obtained from the VULCANO-I (CTM2012-36317) and VULCANO-II (CTM2014-51837-R) projects funded by Ministerio de Economía y Competitividad del Gobierno de España (MINECO) and FEDER and also through the projects VULCANA-I (IEO-2015-2017), VULCANA-II (IEO-2018-2020) and RAPROCAN (IEO-2006-2020) funded by the Spanish Institute of Oceanography (IEO).

Dataset summary:

VULCANO/A and RAPROCAN projects are two main monitoring programmes led by IEO which focus respectively on two main objectives: (i) the study of the physical-chemical, biological and geological processes of the El Hierro island marine ecosystem after the submarine eruption of Tagoro submarine volcano in 2011 and (ii) the study of physical-chemical and biological processes in order to understand the changes happening in the Coastal Transition Zone between the upwelling of northeast Africa and the oriental limit of the Subtropical Gyre.

Geographic location:	19.00°W – 18.00°W, 26.00°N – 27.00°N
Temporal extent to be used in study:	2011-2020 Vulcano/a ; 2006-2020 Raprocan
Temporal resolution:	twice a year
Spatial resolution:	in situ
Responsible organisation:	Spanish Institute of Oceanography
Data access:	Spanish Institute of Oceanography Integrated Ocean Observing System (IEOOS, http://www.ieo.es)

References:	Vulcana/o (Fraile-Nuez et al., 2012;2018) Raprocan (Tel et al., 2016) https://os.copernicus.org/articles/12/345/2016/

5.6.1.2 Spanish Deep Water Buoy Network in the Canary Islands

Dataset summary:

Spanish Deep Water Buoy Network, a multipurpose network for the marine environment monitoring. Puertos del Estado's deep water buoy network is a Spanish national buoy network with 15 measuring stations (2 in the Canary Islands) moored at deep water (between 400 m and 2000 m).

Geographic location:	Gran Canaria buoy (WMO: 13130) 15.80°W, 28.20°N Mooring Depth: 780 m Temporal extent: (1997-present) Tenerife buoy (WMO: 13131) 16.58°W, 27.99°N Mooring Depth: 710 m Temporal extent: (1998-present)
Temporal extent to be used in study:	1997-2019
Temporal resolution:	Hourly data
Spatial resolution:	in situ
Responsible organisation:	Puertos del Estado, Madrid, Spain
Data access:	http://www.puertos.es CMEMS: http://marine.copernicus.eu

5.6.2 **Climatological data:** NOAA National Centers for Environmental Information (NCEI) World Ocean Atlas 2018

Dataset summary:

The World Ocean Atlas (WOA) is a collection of objectively analysed, quality controlled temperature, salinity, oxygen, phosphate, silicate, and nitrate means based on profile data from the World Ocean Database (WOD). It can be used to create boundary and/or initial conditions for a variety of ocean models, verify numerical simulations of the ocean, and corroborate satellite data.

Geographic location:	18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N
Temporal extent to be used in study:	1955-2010
Temporal resolution:	Monthly / Seasonal / Yearly
Spatial resolution:	0.25° x 0.25°
Responsible organisation:	NOAA

Data access:

https://www.ncei.noaa.gov/access/world-ocean-atlas-2018/bin/woa18.pl

References: Boyer et al. (2018), Garcia et al. (2019)

5.6.3 **Reanalyses data:** Iberian Biscay Irish Ocean Reanalysis system

Dataset summary:

The Iberian Biscay Irish Ocean Reanalysis system provides 3D monthly and daily ocean fields, as well as hourly mean values for some surface variables, since 01/01/1993. Monthly and daily averages of 3D Temperature, Salinity, Mix Layer Depth, Sea Bottom Temperature, Zonal and Meridional Velocity components and Sea Surface Height are provided. Hourly means of surface fields for variables such as Sea Surface Height, Mix Layer Depth, Surface Temperature and Currents, together with Barotropic Velocities are also provided. The IBI model numerical core is based on the NEMO v3.6 ocean general circulation model run at 1/12° horizontal resolution. Altimeter data, in situ temperature and salinity vertical profiles and satellite sea surface temperature are assimilated.

Geographic location: 18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N

Temporal extent to be used in study: 1993-2019

Temporal resolution: Hourly data

Spatial resolution: 0.083° x 0.083°

Responsible organisation: European Commission (Copernicus programme)

Data access: CMEMS: http://marine.copernicus.eu

(https://resources.marine.copernicus.eu/?option=com_csw&view=details&product_id=IBI_MULTIYEAR_PHY_005_002)

References: Maraldi et al. (2013)

5.6.4 Satellite data

SST will also be obtained from the Advanced Very High Resolution Radiometer (AVHRR) data.

Dataset summary:

The SST data provided by NOAA and produced with their optimum interpolation method applied on remotely sensed satellite data and in situ data from buoys (moored and drifting) and ships. The satellite instrument used for the SST measurements is the Advanced Very High Resolution Radiometer. The SST in situ data used for the interpolation were obtained from the International Ocean-Atmosphere Data Set (ICOADS).

The spatial grid resolution of the analyses is 0.25° and the temporal resolution is daily. The original SST time series covers a length of 39 years, from 1981 to 2019. Since the year 1981 is incomplete, the final time series were adjusted to start January 1st 1982 and end December 31st 2019 (38 years).

Geographic location: 18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N

Temporal extent to be used in study: 1982-2019

Temporal resolution: Daily

Spatial resolution: 0.25° x 0.25°

Responsible organisation: NOAA

Data access:

https://www.ncei.noaa.gov/data/sea-surface-temperature-optimum-interpolation/v2/access/avhrr-only/

References: Li et al. (2001)

5.7 Salinity

5.7.1 In situ data

In situ data for salinity will be obtained from the same datasets as for the SST.

5.7.1.1 IEO Oceanographic cruises at El Hierro Island

This data will be obtained from the VULCANO-I (CTM2012-36317) and VULCANO-II (CTM2014-51837-R) projects funded by MINECO and FEDER and also through the projects VULCANA-I (IEO-2015-2017), VULCANA-II (IEO-2018-2020) and RAPROCAN (IEO-2006-2020) funded by IEO.

Dataset summary:

VULCANO/A and RAPROCAN projects are two main monitoring programmes led by IEO which focus respectively on two main objectives: (i) the study of the physical-chemical, biological and geological processes of the El Hierro island marine ecosystem after the submarine eruption of Tagoro submarine volcano in 2011 and (ii) the study of physical-chemical and biological processes in order to understand the changes happening in the Coastal Transition Zone between the upwelling of northeast Africa and the oriental limit of the Subtropical Gyre.

Geographic location:	19.00°W – 18.00°W, 26.00°N – 27.00°N
Temporal extent to be used in study:	2011-2020 Vulcano/a; 2006-2020 Raprocan
Temporal resolution:	twice a year
Spatial resolution:	in situ
Responsible organisation:	Spanish Institute of Oceanography
Data access:	Spanish Institute of Oceanography Integrated Ocean Observing System (IEOOS, http://www.ieo.es)
References:	Vulcana/o (Fraile-Nuez et al., 2012;2018) Raprocan (Tel et al., 2016) https://os.copernicus.org/articles/12/345/2016/

5.7.1.2 Spanish Deep Water Buoy Network in the Canary Islands

Dataset summary:

Spanish Deep Water Buoy Network, a multipurpose network for the marine environment monitoring. Puertos del Estado's deep water buoy network is a Spanish national buoy network with 15 measuring stations (2 in the Canary Islands) moored at deep water (between 400 m and 2000 m).

Geographic location:	Gran Canaria buoy (WMO: 13130). 15.80°W, 28.20°N Mooring Depth: 780 m Temporal extent: (1997-present) Tenerife buoy (WMO: 13131). 16.58°W, 27.99°N Mooring Depth: 710 m Temporal extent: (1998-present)
Temporal extent to be used in study:	1997-2019
Temporal resolution:	Hourly data
Spatial resolution:	in situ
Responsible organisation:	Puertos del Estado, Madrid, Spain
Data access:	http://www.puertos.es CMEMS: http://marine.copernicus.eu

5.7.2 **Climatological data:** World Ocean Atlas

Dataset summary:

The World Ocean Atlas is a collection of objectively analysed, quality controlled temperature, salinity, oxygen, phosphate, silicate, and nitrate means based on profile data from the World Ocean Database. It can be used to create boundary and/or initial conditions for a variety of ocean models, verify numerical simulations of the ocean, and corroborate satellite data.

Geographic location:	18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N
Temporal extent to be used in study:	1955-2010
Temporal resolution:	Monthly / Seasonal / Yearly
Spatial resolution:	0.25° x 0.25°
Responsible organisation:	NOAA

Data access:

https://www.ncei.noaa.gov/access/world-ocean-atlas-2018/bin/woa18.pl

References: Boyer et al. (2018), Garcia et al. (2019)

5.7.3 **Reanalyses data:** Iberian Biscay Irish Ocean Reanalysis system

Dataset summary:

The Iberian Biscay Irish Ocean Reanalysis system provides 3D monthly and daily ocean fields, as well as hourly mean values for some surface variables, since 01/01/1993. Monthly and daily averages of 3D Temperature, Salinity, Mix Layer Depth, Sea Bottom Temperature, Zonal and Meridional Velocity components and Sea Surface Height are provided. Hourly means of surface fields for variables such as Sea Surface Height, Mix Layer Depth, Surface Temperature and Currents, together with Barotropic Velocities are also provided. The IBI model numerical core is based on the NEMO v3.6 ocean general circulation model run at 1/12° horizontal resolution. Altimeter data, in situ temperature and salinity vertical profiles and satellite sea surface temperature are assimilated.

Geographic location: 18.5074°W – 18.1250°W, 27.3200°N – 27.6600°N

Temporal extent to be used in study: 1993-2019

Temporal resolution: Hourly data

Spatial resolution: 0.083° x 0.083°

Responsible organisation: European Commission (Copernicus programme)

Data access: CMEMS: http://marine.copernicus.eu

(https://resources.marine.copernicus.eu/?option=com_csw&view=details&product_id=IBI_MULTIYEAR_PHY_005_002)

References: Maraldi et al. (2013)

6 Other

6.1 Shipping routes and traffic statistics

6.1.1 Shipping routes

Shipping routes data will be obtained from the European Marine Observation and Data Network.

Dataset summary:

The European Marine Observation and Data Network (EMODnet) is a network of organisations supported by the EU's integrated maritime policy. These organisations work together to observe the sea, process the data according to international standards and make that information freely available as interoperable data layers and data products. Shipping routes data will be obtained from the EMODnet Human Activities Data Portal.

The main objective of EMODnet Human Activities is to make available information on the geographical position, spatial extent and attributes of a wide array of marine and maritime human activities throughout Europe. Particular attention is given to providing, when possible, historical time series to indicate the temporal variation of activities such as fishing and port traffic. Time when data was provided together with attributes to indicate the intensity of each activity will also be included.

Geographic location:	Canary Islands & nearby
Temporal extent to be used in study:	2019
Temporal resolution:	Yearly
Responsible organisation:	EMODnet

Data access:

https://www.emodnet-humanactivities.eu/download-data.php

References:	Martín Míguez et al. (2019)

6.1.2 Shipping traffic statistics

Monthly shipping traffic statistics data will be obtained from the Tenerife Port Authority (Puertos de Tenerife).

Dataset summary:

Geographic location:	El Hierro port (La Estaca)
Temporal extent to be used in study:	2017-2019
Temporal resolution:	Monthly
Responsible organisation:	Tenerife Port Authority
Data access:	https://www.puertosdetenerife.org

6.2 Airline routes and traffic statistics

6.2.1 Airline routes

Airline routes data will be obtained from the International Civil Aviation Organization (ICAO).

Dataset summary:

Geographic location: Canary Islands & nearby

Temporal extent to be used in study: 2019

Temporal resolution: Yearly

Responsible organisation: ICAO

Data access: https://gis.icao.int/history/

6.2.2 Airline traffic statistics

Monthly airline traffic statistics data will be obtained from Aeropuertos Españoles y Navegación Aérea (AENA) information.

Dataset summary:

Geographic location: El Hierro Airport

Temporal extent to be used in study: 2017-2019

Temporal resolution: Monthly

Responsible organisation: AENA

Data access:

http://www.aena.es/csee/Satellite?pagename=Estadisticas/Home

6.3 Fire occurrences in the surrounding areas

Fire occurrences data in the surrounding areas (within 50 km) will be obtained from the Spanish Ministry of Agriculture, Fisheries and Food (MAPA) official statistics of fire occurrences throughout Spain.

Dataset summary:

MAPA produces official statistics of fire occurrences throughout Spain. Every five years an analytical document of the preceding decade is prepared, providing an overview of the evolution of forest fires and their associated factors. Fire occurrence statistics for the Canary Islands from the most recent decade available will be obtained (2006-2015).

Geographic location: Canary Islands

Temporal extent to be used in study: 2006-2015

Spatial resolution: Data is provided at the municipal district level.

Responsible organisation: Spanish Ministry of Agriculture, Fisheries and Food

Data access: https://www.mapa.gob.es/es/desarrollo-rural/estadisticas/Incendios_default.aspx

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