INSPIRE services.
A gentle introduction.

The objective of Météo-France web service is to facilitate the access and the consultation of public data in order to make them interoperable with georeferenced data from other Administrations or other sources.

The Météo-France data this document is about are operable and interoperable in compliance with INSPIRE standards.

What is INSPIRE?

The European Directive INSPIRE[1] aims at establishing a spatial data infrastructure to ensure interoperability between databases and facilitate the dissemination, availability, use and reuse of geographical information in Europe.

It was transposed by the insertion of articles in the French code of the environment[2] (Art. L127-1 to L127-10 and R127-8 to R127-10). According to this code Météo-France must, as a public authority, provide certain data according to the INSPIRE requirements.

These requirements mainly focus on:
- documentation of data and services (metadata);
- services on data, in particular for consulting and downloading;
- data exchange formats to ensure interoperability.

For more information on the legislation relating to the INSPIRE Directive and all information on its implementation in France, we recommend to have a look at the website CNIG (National Council for Geographic Information).

The directive classifies data in different topics with specific requirements. The weather service is one of the topics of Annex III of the Directive. It is the subject of a specification document at the European level named "Data Specification on Atmospheric Conditions - Meteorological Geographical Features - Technical Guidelines" which can be downloaded on the INSPIRE portal of the European Commission.

These guidelines take into account INSPIRE's implementing rules with regards to weather forecast data, which have specific characteristics compared to other geographical data, in particular regarding time issue, vertical extent, coordinate systems, refresh rate and data volumes that can often be very high.

What is a web service?

A network service or a web service is a software system to support communication and data exchange

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[1] Directive 2007/2 / EC of the European Parliament and of the Council of March, 14th 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri = OJ: L: 2007: 108: 0001: 0014: en: PDF)

[2] The French Environmental Code is available online at http://www.legifrance.gouv.fr/affichCode.do?cidTexte=LEGITEXT000006074220.

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between heterogeneous systems and applications in distributed environments. So this is a set of interfaces reachable from Internet or an Intranet, for machine to machine interaction in real time.

In geomatics, a web service offers a service that will enable remote management of data. Several types of services covering different functional areas can be identified:

- discovery services (CSW[3] protocol);
- view services, i.e. the simple display of maps (WMS[4] protocols and/ or WMTS [5]);
- download services of data (WCS[6], WFS[7] and SOS[8] protocols).

Météo-France has set up an infrastructure of spatial data web services which allow to view and download spatial data through appropriate queries. The consultation services are based on the WMS standard protocol and the downloading services are based on the WCS standard protocol.

The standards describe the parameters to be set to properly access the desired result: identification of layers or objects, spatio-temporal extent, used projection, etc.

Available data sets through INSPIRE services

The scope of concerned data is a part of public data, including data that Météo-France provides for free, in accordance with international commitments of France within the framework of WMO[9]. Following data are concerned:

- Results from the French global atmospheric forecast model (called ARPEGE) on a global grid with a resolution of 0°5. Data is updated four times a day and available up to 4 days, with a temporal resolution of 3 hours.

- Results from the French global atmospheric forecast model (called ARPEGE) on a grid with a resolution of 0°1 for Europe. Data is updated four times a day and available up to 4 days, with a temporal resolution of 3 hours.

- Results from the French high resolution atmospheric forecast model (called AROME) on a grid with a resolution of 0°025 for France. Data is updated every 3 hours and available up to 42 hours, with a temporal resolution of 1 hour.

- Results from the French high resolution atmospheric forecast model (called AROME) on a grid with a resolution of 0°01 for France. Data is updated every 3 hours and available up to 42 hours, with a temporal resolution of 1 hour.

- Fields from the limited area French numerical weather prediction model. Resolution 0.025 degree over French West Indies (22,45N 10,4N 67,8W 52,2W)

- Fields from the limited area French numerical weather prediction model. Resolution 0.025 degree over French Guiana (8,95N 1,05N 56,75W 46,30W). Main parameters. Step 1h.

- Fields from the limited area French numerical weather prediction model. Resolution 0.025 degree over Reunion and Mayotte islands (7,25S 25,9S 32,75E 67,6E). Main parameters. Step 1h.

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[3]   CSW: OGC® standard Catalog Service for the Web
[4]   WMS: OGC® standard Web Map Service
[5]   WMTS: OGC® standard Web Map Tile Service
[6]   WCS: OGC® standard Web Coverage Service
[7]   WFS: ® OGC standard Web Feature Service
[8]   SOS: OGC standard ® Sensor Observation Service
[9]   WMO: World Meteorological Organization

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- Fields from the limited area French numerical weather prediction model. Resolution 0.025 degree over New Caledonia (13,75S 26S 158,5E 171,5E). Main parameters. Step 1 h.

1. Fields from the limited area French numerical weather prediction model. Resolution 0.025 degree over New Polynesia (12,6S 25,25S 157,5W 144,5W). Main parameters. Step 1 h.

- Storm surge modelized by Hycom2D on the Mediterranean Sea, forced by the Arome 10 meters winds and atmospheric pressure on the sea. The model grid is curvilinear with an horizontal resolution of around 1 km on the french coasts. 3 parameters are provided : the instantaneous storm surge (delivered every hour), the maximal storm surge during the 3 previous hours (delivered every 3 h) and the maximal storm surge during the 24 previous hours (delivered every 24 h). For the 0h and 12h productions, the forecasts are provided until 42h ; for the 6h and 18h productions, the forecasts are provided until 36h.

- Storm surge modelized by Hycom2D on the NE Atlantic Ocean and the North Sea, forced by the Arome 10 meters winds and atmospheric pressure on the sea. The model grid is curvilinear with an horizontal resolution of around 1 km on the french coasts. 3 parameters are provided : the instantaneous storm surge (delivered every hour), the maximal storm surge during the 3 previous hours (delivered every 3 h) and the maximal storm surge during the 24 previous hours (delivered every 24 h). For the 0h and 12h productions, the forecasts are provided until 42h ; for the 6h and 18h productions, the forecasts are provided until 36h.

- Storm surge modelized by Hycom2D on the NE Atlantic Ocean and the North Sea, forced by the Arpege 10 meters winds and atmospheric pressure on the sea. The model grid is curvilinear with an horizontal resolution of around 1 km on the french coasts. 3 parameters are provided : the instantaneous storm surge (delivered every hour), the maximal storm surge during the 3 previous hours (delivered every 3 h) and the maximal storm surge during the 24 previous hours (delivered every 24 h). For the 0h production, the forecasts are provided until 102h ; for the 6h production, the forecasts are provided until 72h ; for the 12h production, the forecasts are provided until 84h ; for the 18h production, the forecasts are provided until 60h.

- Storm surge modelized by Hycom2D on the Mediterranean Sea, forced by the Arpege 10 meters winds and atmospheric pressure on the sea. The model grid is curvilinear with an horizontal resolution of around 1 km on the french coasts. 3 parameters are provided : the instantaneous storm surge (delivered every hour), the maximal storm surge during the 3 previous hours (delivered every 3 h) and the maximal storm surge during the 24 previous hours (delivered every 24 h). For the 0h production, the forecasts are provided until 102h ; for the 6h production, the forecasts are provided until 72h ; for the 12h production, the forecasts are provided until 84h ; for the 18h production, the forecasts are provided until 60h.

- Waves modelized by WW3 on a unstructured grid (french mediterranean coasts), nested in the MFWAM grid, forced by the Arpege 10 meters winds. 13 parameters are provided every 3 h : the significant height, the mean direction and the peak period for the 4 kinds of waves : total sea, wind waves, primary swell and secondary swell ; moreover, the mean period of the total sea is available. For the 0h production, the forecasts are provided until 102h ; for the 6h production, the forecasts are provided until 72h ; for the 12h production, the forecasts are provided until 84h ; for the 18h production, the forecasts are provided until 60h. For all these 4 productions, a period of 6h analysis is also provided (WW3 forced by the Arpege analysis of the 10 m wind).

- Waves modelized by WW3 on a unstructured grid (french Atlantic coasts), nested in the MFWAM grid, forced by the Arpege 10 meters winds. 13 parameters are provided every 3 h : the significant height, the mean direction and the peak period for the 4 kinds of waves : total sea, wind waves, primary swell and secondary swell ; moreover, the mean period of the total sea is available. For the 0h production, the forecasts are provided until 102h ; for the 6h production, the forecasts are provided until 72h ; for the 12h production, the forecasts are provided until 84h ; for the 18h production, the forecasts are provided until 60h. For all these 4 productions, a period of 6h analysis

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is also provided (WW3 forced by the Arpege analysis of the 10 m wind).

- Waves modelized by MFWAM on the global domain, forced by the Arpege 10 meters winds. 18 parameters are provided every 3 h : the significant height, the mean direction and the mean period for the 5 kinds of waves : total sea, wind waves, total swell, primary swell and secondary swell ; moreover, the peak period of the total sea, the 10 m wind direction and speed are available. For the 0h production, the forecasts are provided until 102h ; for the 6h production, the forecasts are provided until 72h ; for the 12h production, the forecasts are provided until 84h ; for the 18h production, the forecasts are provided until 60h.

- Waves modelized by MFWAM on a NorthEast Atlantic Ocean and Europe domain, forced by the Arpege 10 meters winds. 18 parameters are provided every 3 h : the significant height, the mean direction and the mean period for the 5 kinds of waves : total sea, wind waves, total swell, primary swell and secondary swell ; moreover, the peak period of the total sea, the 10 m wind direction and speed are available. For the 0h production, the forecasts are provided until 102h ; for the 6h production, the forecasts are provided until 72h ; for the 12h production, the forecasts are provided until 84h ; for the 18h production, the forecasts are provided until 60h.

- Waves modelized by MFWAM on a France domain, forced by the Arome 10 meters winds. 18 parameters are provided every hour : the significant height, the mean direction and the mean period for the 5 kinds of waves : total sea, wind waves, total swell, primary swell and secondary swell ; moreover, the peak period of the total sea, the 10 m wind direction and speed are available. For the 0h and 12h productions, the forecasts are provided until 42h ; for the 6h and 18h productions, the forecasts are provided until 36h.

- Surface observation data from international surface observation synoptic code messages (SYNOP) circulating on the Global Telecommunication System (GTS) of the World Meteorological Organization (WMO). It includes measured or observed atmospheric parameters from Earth surface such as temperature, humidity, wind direction, wind speed, air pressure, precipitation height for measurements and present weather, description of clouds, visibility for observations. According to instrumentation and local characteristics, other parameters may be available (snow depth, soil conditions, etc.). The data are available for mainland France and overseas departments, with a temporal resolution of 3 hours.

- Upper-air observation data obtained from weather balloons measurements between the ground and the ball burst altitude (between 20 and 30 km). This data comes from observation reports in altitude (TEMP) circulating on the Global Telecommunication System (GTS) of the World Meteorological Organization (WMO). It includes measured atmospheric parameters such as temperature, humidity, wind direction and wind speed, atmospheric and geopotential pressure. Measurements are performed by around ten specialized stations in mainland France and overseas departments and are available once or twice a day, at 0 and 12 h UTC.

- Monthly climate data from the regional climate network database of the World Meteorological Organization (WMO) in mainland France and overseas departments. It includes parameters such as temperature, humidity, wind speed and precipitation accumulation, gusts, pressure, pressure reduced to mean sea level, horizontal visibility, total snow depth, exposure, number of days with occurrence of a phenomenon (snow, hail, thunderstorms, lower or higher setting from a threshold, ...), monthly statistics (minimum, maximum and average values, and duration, ...).

- Monthly average conditions of the regional base of the World Meteorological Organization (WMO) in mainland France and overseas departments. These normal temperatures are calculated for the 1981-2010 period. It includes parameters such as temperature, humidity, pressure reduced to sea level, accumulated rainfall, sunshine duration.

Other types of data will be added gradually over time.

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How to access Météo-France INSPIRE services?

The concept

It is compulsory to register to be able to access the services even when these services provide data without any limitation of access nor use. Data access policy implementation is based on a key mechanism (API keys) for now.

This chapter describes how to obtain and use keys for these services. It is especially aimed at helping developers who want to directly query the services from a third client application not provided by Météo-France, typically a GIS (Geographic Information System).

How to get an account?

To get an account, a request must be sent to support.inspire@meteo.fr. A reply will be sent with an account identifier (UID) and the associated password (pwd).

How to get a key?

The user gets a key by making a request to an authentication web service, accessible via HTTPS, by giving his account ID (UID) and the associated password (pwd):

```
https://geoservices.meteofrance.fr/services/GetAPIKey?
username=YOUR_UID&password=YOUR_PASSWORD
```

The user then receives a reply with an XML document containing the key:

```
<Token>__Tiyodhhsd4G4q8856sqY884g59W6T54gSg__</Token>
```

NB: Please note that the GetAPIKey web service does not verify the validity of the UID and associated password.

In practice, the service provides a key (without sending an error message) even if the user has provided a wrong information, but in this case, the key will be invalid. The real access control is performed during the service invocation.

Use of a key to invoke a web service

A key provides access to services accessible via URLs such as (REST for example):

```
https://geoservices.meteofrance.fr/services/service_name/?
param1=value1&param2=value2& ... &paramN=valueN
```

A key is associated with an identified user and gives access to all datasets he has the right to access, either for consultation or downloading.

This key must be added either to the list of key-value pairs in the service invocation URL, or in the base

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access URL to the service. Please note that the "*token"* setting m*ay* be positioned anywhere in the list of settings and in particular at the beginning or the end.

```
https://geoservices.meteofrance.fr/services/service_name/?
param1=value1&param2=value2&...&paramN=valueN&token=YOUR_KEY
```

```
https://geoservices.meteofrance.fr/api/YOUR_KEY/service_name/?
param1=value1&param2=value2&...&paramN=valueN
```

Key validity duration

A key has an unlimited validity duration, until the revocation of access rights to the resource.

General information on Météo-France INSPIRE services

INSPIRE identifies different types of services including:

- discovery services;
- view services;
- download services.

This documentation only deals with view and download services.

Discovery services are also provided by the "Géocatalogue" (the French geographical information portal) and the OpenWIS WMO Global Information System for Western Europe portall implemented by both Météo-France and the UK Meteorological Office.

In addition, the INSPIRE directive mentions other types of services (processing services and dial-in services) that are not yet available.

Services operate on "data sets series" which are data sets grouped into time series. These series of data sets are homogeneous in terms of access rights policies, spatial-temporal area and development process. It is at the data sets series level that data can be discovered on the "Géocatalogue" or on the OpenWIS website because metadata are associated with that level of granularity. It is possible to group data sets series into a set of series if necessary.

Typically, results of ARPEGE model provided on an overall 0°5 grid are seen as a data set series. A data set represents for example the results of a particular run of this model.

For design and practical reasons, services are associated with one and only one "data sets series". Each data set series will be made available at least through a consultation service (WMS) and a download service (WCS or SOS).

NB : Request examples given in this document are in plain text for readability reasons. It can be necessary to encode the URL to prevent a misleading interpretation of some character such as "(", ")"; "&" or "/"...

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View (or images) services

NB : a view service is available on each offered data set.

View services are based on the WMS 1.3.0 standard (OGC® 06-042) and compliant with "basic WMS" conformance class and with INSPIRE implementation rules on services. "Basic WMS" conformance class corresponds to a WMS where only GetCapabilities and GetMap operations are implemented.

WMS services allow remote users to get access to raster georeferenced images from a raster or a vector data source, via a simple HTTP request. Data are available in different image formats (JPG, PNG, GIF ...).

For more details on the WMS standard, you can consult the online documentation on the French geomatics portal: http://georezo.net/wiki/main/standards/wms#web_map_service_wms.

The service is self-documented through the GetCapabilities operation that provides a list of supported operations and available layers. These layers are generally associated with a physical parameter (temperature, wind, relative humidity ...).

For each layer the description of covered space domain, supported coordinate systems, dimensions and attributes - especially default values and the graphic styles available – can be found in the GetCapabilities response.

Main characteristics of Météo-France implementation are:

Version

WMS 1.3.0 only and INSPIRE extensions.

Operations

GetCapabilities, GetMap

Dimensions

The management of dimensions is compliant with the Best Practice guide on the implementation of the WMS standard in meteorology, written by an OGC® thematic working group and called "OGC Best Practice for using Web Map Services (WMS) with Time-Dependent or Elevation-dependent Data" (OGC ® 12-111r1).

The Service supports 3 dimensions:

- TIME: validity date of data (for digital weather prediction, baseline plus forecast step) ;
- REFERENCE_TIME: baseline date time of the forecast, called model "run" date ;
- ELEVATION: vertical level, expressed in the pressure coordinate system.

Default value management policy:

– If TIME and REFERENCE_TIME are not specified in the request or are specified as a value with the keyword "current", the service returns the latest forecast (issued from the last model run) valid for the closest time to current date (the in-service date). These dates are indicated as the "default" attribute value in the GetCapabilities response;
– If ELEVATION is not specified in the request and the layer is available at several vertical levels, the service provides the first level of the available levels list in the GetCapabilities response. Beware the default vertical level may not be the closest to the ground level of the list.

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Examples of queries

GetCapabilities

```
https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-NWP-GLOBAL-ARPEGE-05-
GLOBE-WMS?request=GetCapabilities&
service=WMS&version=1.3.0&language=fr
```

GetMap

```
https://geoservices.meteofrance.fr/inspire/api/YOUR_KEY/MF-NWP-GLOBAL-
ARPEGE-05-GLOBE-WMS?
request=GetMap&service=WMS&version=1.3.0&LAYERS=TEMPERATURE__ISOBARIC_SURFA
CE&CRS=EPSG:4326&styles=T__ISOBARIC__SHADING&format=image/png&width=550&hei
ght=400&BBOX=10,-50,80,50&ELEVATION=850&dim_reference_time=2016-05-
31T00:00:00Z&time=2016-05-31T12:00:00Z
```

- Layer: TEMPERATURE__ISOBARIC
- Coordinate system: EPSG: 4326 (a.k.a. Geographic, Equidistant Cylindrical, Plate Carre or Equirectangular)
- Layer style: contours with coloured areas according to the temperature
- Raster format: png
- Image Size: 550 points (on longitude axis) * 400 points (on latitude axis)
- Geographic area: 10N 50W (SW corner); 80N, 50E (NE corner)
- Level: 850hpa (about 1500m)
- Model run date: 2016-05-31T00:00:00Z (May 31, 2016 at 0h GMT)
- Validity date of forecast: 2016-05-31T12:00:00Z (May 31, 2016 at 12h GMT)

Be careful with the order of geographic coordinates as BBOX is defined in the requested coordinate system. In EPSG:4326 the order is minimum latitude, minimum longitude, maximum latitude, maximum longitude.

WCS Download service

NB: For now, download services are only available for the French atmospheric forecasting models called ARPEGE and AROME. There are no download services related to surface observations, upper-air observations, monthly climatology nor seasonal norms available yet.

The WCS norm relates to the downloading of geographical coverages (or "fields") in compliance with the ISO 19123 standard. A geographical coverage is mathematically a function from a spatial or space-time domain (called "Domain Set") to a values domain (called "Range Set").

Météo-France WCS services enable to download results of numerical weather predictions, as 2D sub-groups from 3D fields (longitude, latitude, validity time) or 4D fields (longitude, latitude, validity time and altitude).

Fields the services operates on are "Referenceable Grid Coverage". That means that coordinates of each point can be obtained in an external coordinate system. The external coordinate system of offered services has 4 dimensions: longitude, latitude, validity time and vertical level.

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Please remind that the service only enables to download sub-groups of maximum 2 dimensions, even if the coverage is defined in 3 or 4 dimensions.

The service is self-documented through the GetCapabilities operation which provides service metadata, in particular the list of supported operations and the list of available fields.

The service provides a DescribeCoverage operation which describes formally the fields structure in XML format.

The offered download service is based on the following standards:

- OGC® Web Coverage Service 2.0 Interface Standard – Core (OGC® 09-110r4)
- OGC® Web Coverage Service 2.0 Interface Standard – KVP Protocol Binding Extension (OGC® 09-147r3)

Main characteristics of Météo-France implementation are:

Version

WCS 2.0.1 and INSPIRE extensions.

Operations

GetCapabilities, DescribeCoverage, GetCoverage

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GetCapabilities

Settings:

- – Service: WCS (compulsory)
- – Version: 2.0.1 (compulsory, the only one supported)
- – Request: GetCapabilities (compulsory)
- – Language: language of the response (optional, INSPIRE extension); French and English are available.

Example of query:

```
https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-NWP-GLOBAL-ARPEGE-05-
GLOBE-WCS?SERVICE=WCS&REQUEST=GetCapabilities&version=2.0.1&Language=fre
```

Response:

GetCapabilities response gives a list of operations supported by the service and a list of available fields:

- • Title
- • ID
- • ISO type

```
...
<wcs:CoverageSummary>
...
</wcs:CoverageSummary>
<wcs:CoverageSummary>
      <ows:Title>
Air temperature on isobare surfaces.
      </ows:Title>
      <wcs:CoverageId>
TEMPERATURE__ISOBARIC_SURFACE___2016-05-30T12.00.00Z
      </wcs:CoverageId>
      <wcs:CoverageSubtype>
ReferenceableGridCoverage
      </wcs:CoverageSubtype>
</wcs:CoverageSummary>
...
<wcs:CoverageSummary>
...
</wcs:CoverageSummary>
...
```

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DescribeCoverage

Settings:

– Service: WCS (compulsory)
– Version: 2.0.1 (compulsory, the only one supported)
– Request: GetCoverage (compulsory)
– CoverageId: coverage identifier (as it appears in the GetCapabilities response)

Example of query:

```
https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-NWP-GLOBAL-ARPEGE-05-
GLOBE-WCS?
SERVICE=WCS&version=2.0.1&REQUEST=DescribeCoverage&CoverageId=TEMPERATURE__I
SOBARIC_SURFACE___2016-05-31T00.00.00Z
```

DescribeCoverage response describes the coverage structure:

- Spatial extent (latitude-longitude cover)
- Temporal extent (validity date of the forecast)
- Geometry of the grid (coverage "DomainSet")
    o Number of grid points on the different axes
    o Coordinates System used on the different axes
    o Point coordinates on the different axes:
        ▪ Coordinates on longitude and latitude axes define a regular grid which mesh depends on the data set resolution.
        ▪ On the time axis, these coordinates provide the available forecast steps in seconds from the reference date of the model ("run") and not the absolute validity dates in ISO 8601, because of the GML limit target. Conversely, dates in queries should be compliant with the ISO 8601 format – see example below.
        ▪ On the vertical axis, these coordinates provide the different levels available in pressure or height coordinates.
- Type of data and value unit on the grid (coverage "RangeSet").

GetCoverage

Settings:

– Service: WCS (compulsory)
– Version: 2.0.1 (compulsory, the only one supported)
– Request: GetCoverage (compulsory)
– CoverageId: coverage identifier (as it appears in the GetCapabilities response)
– Subset: subsetting parameters along the axes. Combination of subset settings in the query must define a subset of at most dimension 2.
– Format: (optional) image/tiff as default value. At the moment GeoTiff is the only downloading format available. If the format setting is not defined, the data will be provided in GeoTiff format. It is highly recommended to download a compressed GeoTiff file to reduce download times with **geotiff:compression** setting. Available compression types are: PACKBITS, LZW, JPEG, DEFLATE.

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Example of query:

```
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GLOBE-WCS?
service=WCS&version=2.0.1&REQUEST=GetCoverage&coverageid=TEMPERATURE__ISOBAR
IC_SURFACE___2016-05-31T00.00.00Z&subset=time(2016-05-
31T12:00:00Z)&subset=lat(40,55)&subset=long(-
5,10)&subset=pressure(850)&format=image/tiff
```
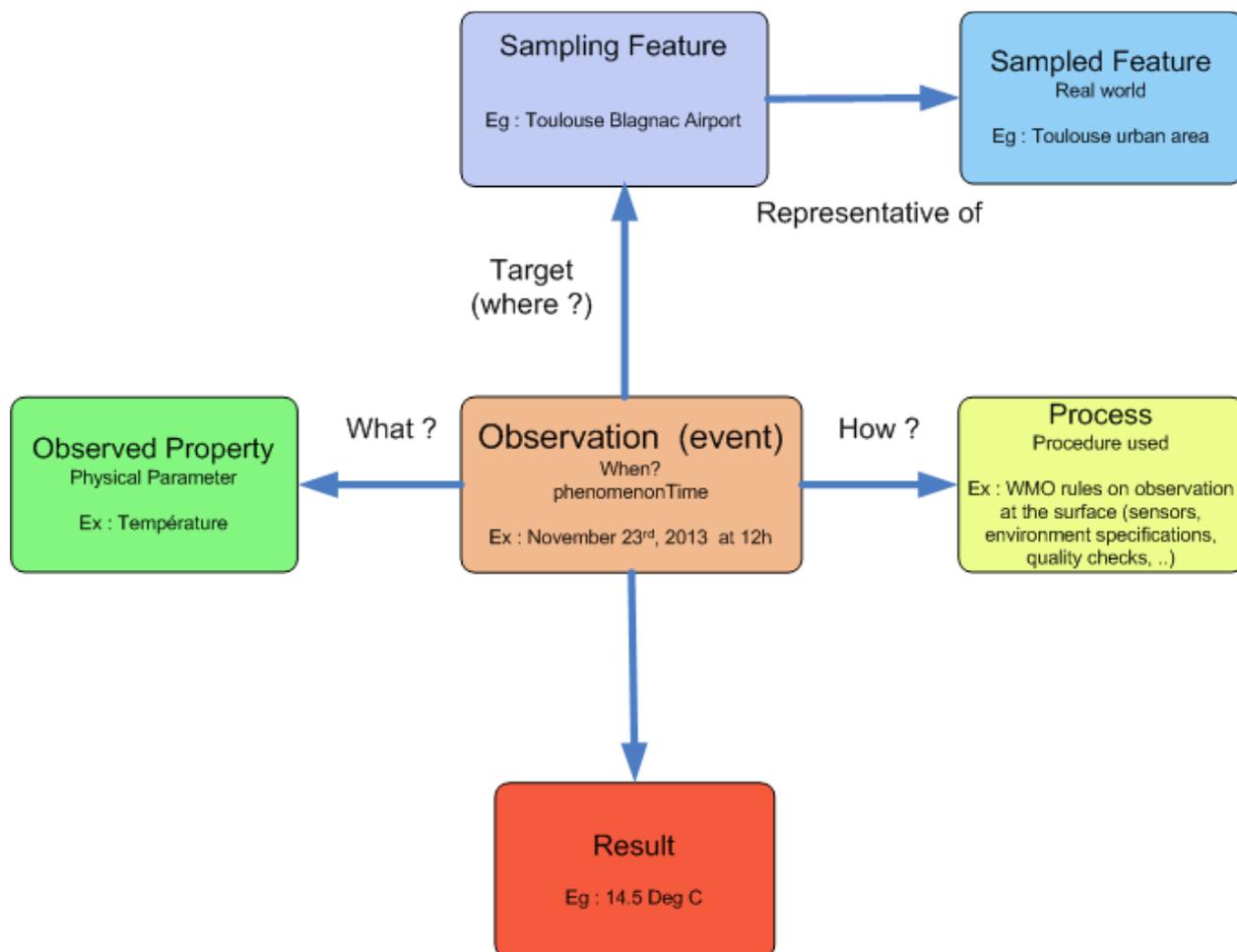
- Coverage: TEMPERATURE_ISOBARIC_SURFACE_2016-05-31T00.00.00Z (temperature field at isobar level provided by the run dated 2016-05-31T00.00.00Z)
- Latitude sub-set: from 40°N to 55°N
- Longitude sub-set: from 5°W to 10°E
- Step sub-set: 2016-05-31T12:00:00Z
- Vertical level subset: 850hpa
- Format: GeoTiff (image/tiff)

SOS Download service

The SOS standard is one of the SWE (Sensor Web Enablement) service which allows access to sensor data. The underlying data model used to encode data retrieved through SOS services is quite generic and based on the ISO standard "Observations and Measurements" (O&M, ISO 19156). At the moment, SOS services provided by Meteo-France give access to monthly statistics and normals for a set of meteorological stations and near real-time observations in the future.

This standard is also the basis for the INSPIRE specifications for meteorology and oceanography and also for the new WMO model, METCE (Exchange Model for Weather, Climate and Water).

The figure below illustrates the main concepts introduced by the O & M model:

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The key feature of the O & M model is the observation event. The concept of "observation" is related to a generic event that consists in estimating past, present or future values of a feature of interest's property. Therefore, it could be applied to climatology, real-time observation and forecasting as well. The model also distinguishes the observed property from the process by which its value is obtained (Procedure).

For example, an amount of precipitation can be assessed by different methods: in situ observation, remote sensing, numerical models or mixed methods.

The O & M model also introduces the sampling feature concept: it is impossible to estimate the temperature at any point of the atmosphere (Sampled Feature), because it's basically a continuous function of a multidimensional domain. In meteorology, the value of the parameters are generally estimated on representative points of the target domain: typically, meteorological stations or a network of stations are sampling features.

The observed properties generally stand for physical parameters or phenomena. Several parameter repositories coexist historically in the MetOcean community, mainly the WMO repository (tables associated with the GRIB and BUFR binary codes) and the "CF" conventions on global climate forecasting and climate (Climate-Forecast conventions). A major work is under way at WMO to setup a thesaurus on-line for parameters and related metadata and concepts, derived from historical parameter tables. This thesaurus could be referenced through URIs from new formats, especially XML formats. In addition, a data model has been developed to describe and construct complex parameters (composite parameters, statistics, etc.) upon base parameters (eg mean, minimum, maximum temperature over a

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period). SOS services provided use the OMM vocabulary for base parameters.

The INSPIRE guidelines introduce seven specialized observations depending on the topology of the sampling feature:

GridObservation: values on a regular grid at a given time instant (coverage);

GridSeriesObservation: values on a regular grid, over a time interval (coverage time series);

PointObservation: value on a point at a given time instant;

PointTimeSeriesObservation: time series of values for a given point;

ProfileObservation: vertical profile of values at a given time instant;

TrajectoryObservation: values on a trajectory (eg aircraft trajectory);

MultiPointObservation: values at points cloud (as opposed to a regular grid) at a given time.

The proposed SOS service only covers **MultiPointObservation** observations.

The SOS download service is based on the following standards :

- OGC® Sensor Observation Service 2.0 (OGC® 12-006)
- OGC® Observations and Measurements 2.0 (OGC® 10-004r3)
- OGC® Observations and Measurements - XML implementation 2.0 (OGC® 10-025r1)
- OGC® SensorML: Model and XML encoding Standard 2.0 (OGC® 12-000)

Main characteristics of Meteo-France SOS implementation :

- The server implements GetCapabilities, DescribeSensor, GetObservation operations (related to the SOS 2.0 "Core" compliance class) and the GetFeatureOfInterest operation (Requirements for SOS 2.0 Enhanced Operations Extension).

- The web service style is REST / KVP. (The query is contained in a URL, the parameters being specified by key / value pairs, as opposed to HTTP POST XML, XML encoded query).

Version

SOS 2.0.0 and INSPIRE extensions

Operations

GetCapabilities, DescribeSensor, DescribeFeatureOfInterest, GetObservation

The following sections describe in detail operation's parameters and whether they are mandatory (M) or optional (O).

Note that some parameters are not supported by the server.

GetCapabilities

The GetCapabilities operation provides the metadata for using the service, in particular:

- compliance classes and supported operations,
- filtering capacities,
- geographical area covered,
- conditions of access and use,
- available parameters.

Parameters	Values	M/O	Description
service	`"SOS"`	M	Service type, must be set to SOS
request	`"GetCapabilities"`	M	Operation, must be set to GetCapabilities
AcceptVersions		O	List of versions supported by the client delimited by ';'. - If the list contains "2.0.0", the server responds with capabilities "2.0.0" - If version "2.0.0" (the only version supported by the server) is not present in the list, the exception "VersionNegotiationFailed" is thrown by the server.
Sections		O	**Parameter not supported.** If this parameter is specified, the server throws the exception "OptionNotSupported" .
UpdateSequence		O	**Parameter not supported.** If this parameter is specified, the server throws the exception "OptionNotSupported".
AcceptFormat		O	If the requested format is other than "text/xml", the server throws the exception "OptionNotSupported".
			For any other parameter specified by the client, the server throws the exception "InvalidRequest".

Example of query:

```
https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-CLIM-MONTHLY-WMOESS-
METROPOLE-SOS?SERVICE=SOS&REQUEST=GetCapabilities
```

DescribeSensor

The DescribeSensor operation provides metadata on the procedure used to generate the data. For climatology, it provides a reference to WMO related requirements.

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Parameters	Values	M/O	Description
service	`"SOS"`	M	Service Type, must be set to SOS
version	`"2.0.0"`	M	Service Version, must be set to 2.0.0
request	`"DescribeSensor"`	M	Operation, must be set to DescribeSensor
procedure		M	URI of the procedure to be used among those advertised in the GetCapabilities response: Must be set to "http://geoservices.meteofrance.fr/inspire/climatology/MonthlyStatistics" for Monthly statistics. Must be set to "http://geoservices.meteofrance.fr/inspire/climatology/Normals" for Normals. If the request specifies a procedure not provided by the service, the server throws the exception: "InvalidParameterValue" .
procedureDescriptionFormat	`"http://www.opengis.net/sensorML/2.0.0"`	M	Must be set to `http://www.opengis.net/sensorML/2.0.0` If another format is requested by the client, the server throws an "OptionNotSupported" exception.
validTime		O	**Parameter not supported.** If this parameter is specified, the server throws the exception "OptionNotSupported".

Example of query:

```
https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-CLIM-MONTHLY-WMOESS-
GUADELOUPE-SOS?
SERVICE=SOS&REQUEST=DescribeSensor&procedure=http://geoservices.meteofrance.f
r/inspire/climatology/MonthlyStatistics&procedureDescriptionFormat=http://www
.opengis.net/sensorML/2.0.0&version=2.0.0
```

GetFeatureOfInterest

The GetFeatureOfInterest operation can be used to get metadata of the stations available in the dataset.

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Parameters	Values	M/O	Description
service	"SOS"	M	Service type, must be set to SOS
version	"2.0.0"	M	Service version, must be set to 2.0.0
request	"GetFeatureOfInterest"	M	Operation, must be set to GetFeatureOfInterest
featureOfInterest		O	List of stations, identified by URIs, delimited by ','. If this parameter is absent, the server returns the metadata for all stations available on the network. If there is at least one invalid station identifier in the list, the server returns an "InvalidParameterValue" exception.
observedProperty		O	**Parameter not supported.** If this parameter is specified, the server throws the exception "OptionNotSupported".
procedure		O	**Parameter not supported.** If this parameter is specified, the server throws the exception "OptionNotSupported" .
namespaces		C	Parameter to be used only in case of spatial filtering (presence of the spatial parameterFilter expressed by a BBOX). In this case, must be set to: `"xmlns(sams, http://www.opengis.net/samplingSpatial/2.0)"` If any other namespace is specified by the client, the server will throw the exception "OptionNotSupported".
spatialFilter		O	The only spatial filter supported by the operation is a filtering by geographic bounding box (BBOX). When this parameter is specified, only the stations located within this perimeter are processed. If another geometry is specified by the client, the server will raise the "OptionNotSupported" exception.
			For any other parameter specified by the client, the server throws the exception "InvalidRequest".

- Example of query:

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```
https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-CLIM-NORMALS-WMOESS-
GUADELOUPE-SOS?SERVICE=SOS&REQUEST=GetFeatureOfInterest&version=2.0.0
```

- Example of query with a BBOX spatial filter, defined by min latitude, min longitude, max latitude, max longitude:

```
https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-CLIM-NORMALS-WMOESS-
METROPOLE-SOS?
SERVICE=SOS&Version=2.0.0&REQUEST=GetFeatureOfInterest&namespaces=xmlns(sams,
http://www.opengis.net/samplingSpatial/2.0)&spatialFilter=om:featureOfInteres
t/*/sams:shape,42,5,47,10,urn:ogc:def:crs:EPSG::4326
```

- Example of query with featureOfInterest parameter:

```
https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-CLIM-NORMALS-WMOESS-
METROPOLE-SOS?
SERVICE=SOS&Version=2.0.0&REQUEST=GetFeatureOfInterest&FeatureOfInterest=http
://geoservices.meteofrance.fr/Station/IIiii/7630
```

GetObservation

The Get Observation operation is used to obtain data for one or more stations, structured in "Observation" according to the O & M standard described above.

Parameters	values	O/M	Description
service	"SOS"	M	Service type, must be set to SOS
version	"2.0.0"	M	Service version, must be set to 2.0.0
request	"GetObservation"	M	Operation, must be set to GetObservation
offering		O	Parameter not supported. If this parameter is specified by the client, the server will raise the "OptionNotSupported" exception.
observedProperty		O	Parameter, identified by its URI.

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			Please note that the server does not support a parameter list as input. If you want to download several parameters, you should not specify the observedProperty parameter, so the server will return all available parameters. If there is at least one invalid parameter in the list, the server returns an "InvalidParameterValue".
procedure		O	**Parameter not supported.** If this parameter is specified, the server throws the exception "OptionNotSupported".
featureOfInterest		O	List of stations, identified by URIs, delimited by ','. If this parameter is absent, the server returns the metadata for all stations available on the network. If there is at least one invalid station identifier in the list, the server returns an "InvalidParameterValue" exception.

namespaces		C	Parameter to be used in case of spatial filtering only (presence of the spatial parameterFilter defined by a BBOX) and/or temporalFilter parameter).
			
			In case of spatial filtering, must be set to:
			`"xmlns (sams, http://www.opengis.net/samplingSpatial/2.0)"`
			
			In case of temporal filtering, must be set to:
			`"xmlns(om, http://www.opengis.net/om/2.0)"`
			
			if any other namespace is declared, the server returns an "InvalidParameterValue" exception.

spatialFilter		O	The only spatial filter supported by the operation is a filtering by geographic bounding box (BBOX). When this parameter is specified, the stations processed are only those located within the BBOX. If another geometry is specified by the

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			client, the server will raise the "OptionNotSupported" exception.
temporalFilter		O	- The server does not support time filtering for normals. - The server supports filtering by year and month of validity (YYYY-MM) for monthly climatology. If another temporal filtering is specified by the client, the server will raise the "OptionNotSupported" exception. It is mandatory in practice to use a temporal filter, otherwise the data returned by the server is for a default year and a default month, and not for all available dates and times.
responseFormat	`"http://www.opengis.net/om/2.0"`	O	The only response format supported is the O & M 2.0 XML implementation. This is the default response format. Any other language explicitly requested by the client results in an "OptionNotSupported" exception.
			For any other parameter specified by the client, the server throws the exception "InvalidRequest".

- Example of query with temporalFilter and featureOfInterest parameters:

```
https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-CLIM-MONTHLY-WMOESS-
METROPOLE-SOS?
service=SOS&version=2.0.0&request=GetObservation&featureOfInterest=http://geo
services.meteofrance.fr/Station/IIiii/07630&namespaces=xmlns(om,http://www.op
engis.net/om/2.0)&temporalFilter=om:phenomenonTime,2015-01/2015-12
```

featureOfInterest: station 07630 (TOULOUSE)
temporalFilter: 2015-01/2015-12
namespaces: xmlns(om,http://www.opengis.net/om/2.0)

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- Example of query with spatial and temporal filters:

```
https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-CLIM-MONTHLY-WMOESS-
METROPOLE-SOS?
service=SOS&version=2.0.0&request=GetObservation&namespaces=xmlns(om,http://w
ww.opengis.net/om/2.0),xmlns(sams,http://www.opengis.net/samplingSpatial/2.0)
&temporalFilter=om:phenomenonTime,2015-01/2015-
07&spatialFilter=om:featureOfInterest/*/sams:shape,42,5,47,10,urn:ogc:def:crs
:EPSG::4326
```

temporalFilter: 2015-01/2015-12
spatialFilter: 42N,5E,47N,10E
namespaces:
      xmlns(om,http://www.opengis.net/om/2.0)
      xmlns(sams,http://www.opengis.net/samplingSpatial/2.0)

- Example of query with temporalFilter, FeatureOfInterest, and ObservedProperty parameters:

```
https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-CLIM-MONTHLY-WMOESS-
METROPOLE-SOS?
service=SOS&version=2.0.0&request=GetObservation&featureOfInterest=http://geo
services.meteofrance.fr/Station/IIiii/07630&namespaces=xmlns(om,http://www.op
engis.net/om/2.0)&temporalFilter=om:phenomenonTime,2015-01/2015-
12&observedProperty=http://geoservices.meteofrance.fr/Parameter/MONTHLY_MINIM
UM_TEMPERATURE
```

featureOfInterest: station 07630 (TOULOUSE)
observedProperty: MONTHLY_MINIMUM_TEMPERATURE
temporalFilter: 2015-01/2015-12
namespaces: xmlns(om,http://www.opengis.net/om/2.0)

- Example of query on normals dataset with spatial filter:

```
https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-CLIM-NORMALS-WMOESS-
METROPOLE-SOS?
service=SOS&version=2.0.0&request=GetObservation&namespaces=xmlns(sams,http:/
/www.opengis.net/samplingSpatial/2.0)&spatialFilter=om:featureOfInterest/*/sa
ms:shape,42,5,47,10,urn:ogc:def:crs:EPSG::4326
```

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Available data sets and services

Metadata of all available data sets and related services will be available on the [OpenWIS portal of the WMO Information System for Western Europe](#), or in the "[Géocatalogue](#)" (French website for geographic information).

However, for convenience, a summary of the datasets available as well as the related services and URLs are presented in the following table.

For example, to access the GetCapabilites view service for surface observations in Guadeloupe, simply concatenate the URL base with the section of the WMS settings and the access key as shown below:

```
https://geoservices.meteofrance.fr/api/YOUR_KEY/ObsSurfWMORes40EssGuadeloup
eWMS? request=GetCapabilities&version=1.3.0&service=WMS
```

Datasets	Geographic Area	Service Type	Base URL to be used
Numerical Forecast French Model ARPEGE Resolution 0°5	World	WMS	https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-NWP-GLOBAL-ARPEGE-05-GLOBE-WMS?
		WCS	https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-NWP-GLOBAL-ARPEGE-05-GLOBE-WCS?
Numerical Forecast French Model ARPEGE Resolution 0°1	Europe	WMS	https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-NWP-GLOBAL-ARPEGE-01-EUROPE-WMS?
		WCS	https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-NWP-GLOBAL-ARPEGE-01-EUROPE-WCS?
Numerical Forecast French Model AROME Resolution 0°025	France	WMS	https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-NWP-HIGHRES-AROME-0025-FRANCE-WMS?
		WCS	https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-NWP-HIGHRES-AROME-0025-FRANCE-WCS?
Numerical Forecast French Model AROME Resolution 0°01	France	WMS	https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-NWP-HIGHRES-AROME-001-FRANCE-WMS?
		WCS	https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-NWP-HIGHRES-AROME-001-FRANCE-WCS?
Numerical Forecast French Model AROME Resolution 0°01	West Indies	WMS	https://geoservices.meteofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-AROME-OM-0025-ANTIL-WMS?

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	West Indies	WCS	`https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-AROME-OM-0025-ANTIL-WCS?`
	French Guiana	WMS	`https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-AROME-OM-0025-GUYANE-WMS?`
	French Guiana	WCS	`https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-AROME-OM-0025-GUYANE-WCS?`
	Reunion and Mayotte Islands	WMS	`https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-AROME-OM-0025-INDIEN-WMS?`
	Reunion and Mayotte Islands	WCS	`https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-AROME-OM-0025-INDIEN-WCS?`
	New Caledonia	WMS	`https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-AROME-OM-0025-NCALED-WMS?`
	New Caledonia	WCS	`https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-AROME-OM-0025-NCALED-WCS?`
	New Polynesia	WMS	`https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-AROME-OM-0025-POLYN-WMS?`
	New Polynesia	WCS	`https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-AROME-OM-0025-POLYN-WCS?`
Numerical Forecast French Model HYCOM2D (storm surge) forced by AROME	Mediterranean Sea	WMS	`https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-HYCOM2DARO-0041-MED-WMS?`
	Mediterranean Sea	WCS	`https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-HYCOM2DARO-0041-MED-WCS?`
	NorthEast Atlantic Ocean and the North Sea	WMS	`https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-HYCOM2DARO-0041-ATL-WMS?`
	NorthEast Atlantic Ocean and the North Sea	WCS	`https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-HYCOM2DARO-0041-ATL-WCS?`
Numerical Forecast French Model HYCOM2D (storm surge) forced by ARPEGE	Mediterranean Sea	WMS	`https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-HYCOM2DARP-0041-MED-WMS?`
	Mediterranean Sea	WCS	`https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-`

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			HIGHRES-HYCOM2DARP-0041-MED-WCS?
	NorthEast Atlantic Ocean and the North Sea	WMS	https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-HYCOM2DARP-0041-ATL-WMS?
	NorthEast Atlantic Ocean and the North Sea	WCS	https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-HYCOM2DARP-0041-ATL-WCS?
Numerical Forecast French Model MFWAM Resolution 0.5°	World	WMS	https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-GLOBAL-MFWAM-05-GLOBE-WMS?
	World	WCS	https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-GLOBAL-MFWAM-05-GLOBE-WCS?
Numerical Forecast French Model MFWAM Resolution 0.1°	Europe	WMS	https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-GLOBAL-MFWAM-01-EUROPE-WMS?
	Europe	WCS	https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-GLOBAL-MFWAM-01-EUROPE-WCS?
Numerical Forecast French Model MFWAM Resolution 0.025°	France	WMS	https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-MFWAM-0025-FRANCE-WMS?
	France	WCS	https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-MFWAM-0025-FRANCE-WCS?
Numerical Forecast French Model WW3 Resolution 0.02°	NorthEast Atlantic Ocean and the North Sea	WMS	https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-WW3ARP-001-ATL-WMS?
	NorthEast Atlantic Ocean and the North Sea	WCS	https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-WW3ARP-001-ATL-WCS?
Numerical Forecast French Model WW3 Resolution 0.02°	Mediterranean Sea	WMS	https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-WW3ARP-0002-MED-WMS?
	Mediterranean Sea	WCS	https://geoservices.mete-ofrance.fr/api/VOTRE_CLE/MF-NWP-HIGHRES-WW3ARP-0002-MED-WCS?
Surface Observations (derived from SYNOP messages)	Mainland France	WMS	https://geoservices.meteofrance.fr/api/YOUR_KEY/ObsSurfWMORes40EssMetroWMS?
	Martinique	WMS	https://geoservices.meteofrance.fr/api/YOUR_KEY/ObsSurfWMORes40EssMa

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			rtiniqueWMS?
	Guadeloupe	WMS	https://geoservices.meteofrance.fr /api/YOUR_KEY/ObsSurfWMORes40EssGu adeloupeWMS?
	Guyana	WMS	https://geoservices.meteofrance.fr /api/YOUR_KEY/ObsSurfWMORes40EssGu yaneWMS?
	Reunion island	WMS	https://geoservices.meteofrance.fr /api/YOUR_KEY/ObsSurfWMORes40EssRe unionWMS?
Altitude Observations (issued from TEMP messages)	Mainland France	WMS	https://geoservices.meteofrance.fr /api/YOUR_KEY/ObsAltiWMORes40EssMe troWMS?
	Guadeloupe	WMS	https://geoservices.mete- ofrance.fr/api/YOUR_KEY/ObsAltiW- MORes40EssGuadeloupeWMS?
	Guyana	WMS	https://geoservices.mete- ofrance.fr/api/YOUR_KEY/ObsAltiW- MORes40EssGuyaneWMS?
	Reunion island	WMS	https://geoservices.meteofrance.fr /api/YOUR_KEY/ObsAltiWMORes40EssRe unionWMS?
Monthly climate data	Mainland France	WMS	https://geoservices.meteofrance.fr /api/YOUR_KEY/ClimMensWMORes40EssM etroWMS?
		SOS	https://geoservices.meteofrance.fr /api/YOUR_KEY/MF-CLIM-MONTHLY- WMOESS-METROPOLE-SOS?
	Martinique	WMS	https://geoservices.meteofrance.fr /api/YOUR_KEY/ClimMensWMORes40EssM artiniqueWMS?
		SOS	https://geoservices.meteofrance.fr /api/YOUR_KEY/MF-CLIM-MONTHLY- WMOESS-MARTINIQUE-SOS?
	Guadeloupe	WMS	https://geoservices.meteofrance.fr /api/YOUR_KEY/ClimMensWMORes40EssG uadeloupeWMS?
		SOS	https://geoservices.meteofrance.fr /api/YOUR_KEY/MF-CLIM-MONTHLY- WMOESS-GUADELOUPE-SOS?
	Guyana	WMS	https://geoservices.meteofrance.fr /api/YOUR_KEY/ClimMensWMORes40EssG

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			uyaneWMS?
		SOS	https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-CLIM-MONTHLY-WMOESS-GUYANE-SOS?
	Reunion island	WMS	https://geoservices.meteofrance.fr/api/YOUR_KEY/ClimMensWMORes40EssReunionWMS?
		SOS	https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-CLIM-MONTHLY-WMOESS-REUNION-SOS?
Monthly average conditions	Mainland France	WMS	https://geoservices.meteofrance.fr/api/YOUR_KEY/ClimNormalesWMORes40EssMetroWMS?
		SOS	https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-CLIM-NORMALS-WMOESS-METROPOLE-SOS?
	Martinique	WMS	https://geoservices.meteofrance.fr/api/YOUR_KEY/ClimNormalesWMORes40EssMartiniqueWMS?
		SOS	https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-CLIM-NORMALS-WMOESS-MARTINIQUE-SOS?
	Guadeloupe	WMS	https://geoservices.meteofrance.fr/api/YOUR_KEY/ClimNormalesWMORes40EssGuadeloupeWMS?
		SOS	https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-CLIM-NORMALS-WMOESS-GUADELOUPE-SOS?
	Guyana	WMS	https://geoservices.meteofrance.fr/api/YOUR_KEY/ClimNormalesWMORes40EssGuyaneWMS?
		SOS	https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-CLIM-NORMALS-WMOESS-GUYANE-SOS?
	Reunion island	WMS	https://geoservices.meteofrance.fr/api/YOUR_KEY/ClimNormalesWMORes40EssReunionWMS?
		SOS	https://geoservices.meteofrance.fr/api/YOUR_KEY/MF-CLIM-NORMALS-WMOESS-REUNION-SOS?

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