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# Observation JSON Format

Présentation

Environmental Sensing



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## 1 INTRODUCTION

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ObsJSON is a text format for the ES-Observation data.

This format is an application of the JSON format (RFC 8259), GeoJSON format (RFC 7946), Date and Time format (RFC 3339).

### 1.1 CONVENTIONS USED

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

The grammatical rules in this document are to be interpreted as described in [RFC5234].

### 1.2 TERMINOLOGY

The terms Json-Text, Json-Value (Value), Object, Member, Array, Number, String, False, Null, True are define in the JSON grammar.

The terms Geometry-type, Point, MultiPoint, LineString, MultiLineString, Polygon, MultiPolygon, GeometryCollection, GeoJSON-Types are defined in GeoJSON grammar.

Timestamp is defined in Date and Time format.

### 1.3 RULES

A Value in an ESValue SHOULD be unambiguous (i.e., parsers CAN deduce the Value type).

The Array SHOULD NOT include user's values.

The Objects MAY include users' elements.

An ObsJSON-Text CAN contains all the ESObservation information (i.e., the ESObservation build from the ObsJSON-Text is identical to the initial ESObservation).

Values in Array are ordered and independent from the other Values.

## 2 OBSJSON OBJECTS

An ObsJSON -Text is a JSON-text and consists of a single object ObsJSON

ObsJSON objects define in this document are:

- ESObservation
- ESObjs (ESDatation, ESLocation, ESProperty)
- ESIObs (ESResult)
- ESValue (DatationValue, LocationValue, PropertyValue, ResultValue)
- ESData (ESInformation, ESParameter, ESUserData)
- ESAtt (key /value Member)

### 2.1 ES OBSERVATION

#### Description

ESObservation is an Object. The Members included SHALL be:

- ESAtt,
- ESObjs,
- ESIObs
- ESData

The Members are:

Class	Member	Key	Value
ESAtt	Type	« type »	« observation »
ESAtt	Id	« id »	String
ESAtt	Idxref	« idxref »	Array
ESAtt	Order	« order »	Array
ESObjs	ESDatation	« datation »	Array or DatationValue
ESObjs	ESLocation	« location »	Array or LocationValue
ESObjs	ESProperty	« property »	Array or PropertyValue
ESIObs	ESResult	« result »	Array or ResultValue
ESData	ESInformation	« information »	Object
ESData	ESParameter	« parameter »	Object
ESData	ESUserData	String	Object

#### Validity

An ESObservation is valid if:

- it contains at least the Type Member,
- each Member is valid.

**Example**

```
{“type”:“observation”, “datation”:“morning”, “location”:“paris”, “property”:“air
quality”, “result”:“good” }
```

```
{“type”:“observation”, “datation”:“2021-01-05T22:18:26”, “location”:[2.4, 48.9],
“property” : {“typep”:“PM10”, “unit”:“µg/m3” } }
```

## 2.2 ESAtt

Two kind of ESAtt are defined:

- Defined ESAtt where the Key and the format of the Value are specified,
- User ESAtt where both Key and Value are unconstrained.

User ESAtt MAY be included in ESParameter Object or in ESUserData.

## 2.3 ESOBs

**Description**

ESObs is an ESValue Array. ESValue is specific for each ESOBs:

Member	Key	Value
ESDatation	« datation »	Array of DatationValue
ESLocation	« location »	Array of LocationValue
ESProperty	« property »	Array of PropertyValue

Note:

*If the Array contains only one ESValue, the square brackets MAY be omitted in the JSON String.*

**Validity**

An ESOBs Member is valid if:

- it contains at least one ESValue
- each ESValue is valid

**Example**

```
“location”:“paris”
```

```
“location”:[2.4, 48.9], [4.8, 45.8], [5.4, 43.3]]
```

```
“location”:[“paris”, “lyon”, “marseille”]
```

## 2.4 ESIObs

### Description

ESIObs is an “indexed” ESValue Array.

Member	Key	Value
ESResult	« result »	Array of “indexed” ResultValue

The “indexed” ESValue contains two information: An ESValue, an Index

- The ESValue SHALL be valid
- The Index is an Array value composed with one, two or three integer numbers.

Two formats are defined for the “indexed” ESValue:

- ESValue format: only the ESValue value
- Index format: Array with first the ESValue and second the Index

*Note:*

*If the Array contains only one “indexed” ESValue, the square brackets MAY be omitted in the JSON String.*

*An ESIObs with ESValue format is equivalent to an ESObjs.*

### Validity

An ESIObs Member is valid if:

- it contains at least one ESValue
- each ESValue is valid
- each index is valid

An Index is valid if the integer numbers are positive.<sup>3--</sup>

### Example

21.8	<i>ESValue format (one ESValue)</i>
[“low temperature”, [0,2,1]]	<i>Index format (one ESValue)</i>
[[{“low temperature”, 2.1}, [0,2,1]], [21.8, [0,1,1]]]	<i>Index format</i>
[2.1, 21.8]	<i>Index format</i>

## 2.5 ESVALUE

### Description

An ESValue contains two information: A Name, a Value

One of the three formats SHALL be used for ESValue (where Name is a String):

- Object format: { Name : Value }
- Value format: Value
- Name format: Name

### **Validity**

An ESValue Member is valid if:

- One of the three formats is used,
- it contains at least a Value or a Name
- each Value is valid compared to ESObjs or ESIObs

*Note:*

*The Name string MAY be used to represent:*

- detailed information (e.g., “beginning of the observation”),
- link to external information (e.g., “<https://loco-philippe.github.io/ES.html>”),
- id to link internal information (e.g., “res003” where “res003” is a key in a ESData Object),

### **Example**

“morning”	Value format
{“morning”: “2021-01-05T10:00:00”}	Object format
[ [“2021-01-05T08:00:00”, “2021-01-05T12:00:00”] ]	Value format

## 2.5.1 LocationValue

### **Description**

The Value of a LocationValue is a representation of a Point or a Polygon. It is defined by a Coordinates Array (as specified in GeoJSON).

### **Validity**

A Value is valid if the Coordinates Array is valid and represents a Point or a Polygon.

### **Value example**

[2.4, 48.9]	Point
[ [2.4, 48.9], [4.8, 45.8], [5.4, 43.3], [2.4, 48.9] ]	Polygon
[ [ [0,0], [0,5], [5,5], [0,0] ], [ [1,1], [1,2], [2,2], [1,1] ] ]	Polygon with a hole

*Note:*

*The other Geometry-type are not allowed because the Coordinates Array is ambiguous:*

- *LineString, Multipoint and Array of Point have the same representation*
- *Polygon and Array of LineString have the same representation*
- *MultiPolygon and Array of Polygon have the same representation*

*The LineString in a Polygon MAY be open (without the last Point)*

## 2.5.2 DatationValue

### **Description**

A Date is defined by a Timestamp (as specified in RFC 3339).

The Value of a DatationValue is a representation of a single Date or a Slot (MultiInterval):

- Date: String
- Slot: Array of one or multiple Interval (an Interval is an Array of two Date)

### **Validity**

A Value is valid if the Date or Slot is valid.

### **Value example**

"2021-01-05T10:00:00"	Date
[["2021-01-05T08:00:00", "2021-01-05T12:00:00"]]	Interval
[["2021-01-05", "2021-01-10"], ["2021-01-20", "2021-01-25"]]	Slot

*Note:*

*Intervals MUST be represented by a Slot to avoid ambiguities with an array of Dates*

*If the DatationValue consists of a unique String, and if the String represents a Date, the parser SHALL assign the String to the Date, otherwise to the Name.*

## 2.5.3 PropertyValue

### **Description**

The Value of a PropertyValue is an Object made up of ESAtt. The Defined ESAtt are:

Member	Key	Value
PropertyType	« ptype »	String (mandatory)
Unit	« unit »	String (calculated)
SamplingFunction	« sampling »	String
Application	« application »	String
SensorType	« sensor »	String
UpperValue	« uppervalue »	Float
LowerValue	« lowervalue »	Float



Period	« period »	Float
UpdateInterval	« updateinterval »	Float
Uncertainty	« uncertainty »	Float

Note:

*If the PropertyValue consists of a single Member (the PropertyType), it's not allowed to replace the Object by a string (the PropertyType value).*

*If the ESAtt PropertyDict is not defined, the default PropertyDict is used*

### **Validity**

A Value is valid if it contains at least the PropertyType ESAtt.

The PropertyType value MUST be present in a propertyDict how's define the Unit value

### **Example**

"Temp"	Minimal Value
{"ptype":"Temp", "unit":"°C"}	Defined Member
{"ptype":"Temp", "unit":"°C", "operation":"phase 1"}	User Member

Note:

*UserAtt MAY be used in the PropertyValue*

*For PropertyValue, the Name format is allowed (i.e., if the PropertyValue consists of a single string, this SHOULD be interpreted as the name).*

## 2.5.4 ResultValue

### **Description**

The Value of a ResultValue CAN be any JSON Object.

Note:

*For ResultValue, the Name format is not allowed (i.e., if the ResultValue consists of a single string, this SHOULD be interpreted as a Value).*

### **Validity**

A Value is valid if it contains at least one Result.

### **Example**

21.8

*Value format*`{"low temperature" : 2.4}`*Object format*`"https://loco-philippe.github.io/ES.html"`*Value format*`[21.8, {"test" : true}]`*Value format***Note:**

*If the ResultValue is composed by a unique String, the parser SHALL assign the String to the Result.*

## 2.6 ESDATA

ESData are elements where the Value MAY be an Object.

The Object is made up of Defined ESAtt and User ESAtt.

### 2.6.1 ESInformation

#### **Description**

The Defined ESAtt are:

Member	Key	Value
ObservationType	« typeobs »	String
LocationType	« typeloc »	String
DatationType	« typedat »	String
PropertyType	« typeprp »	String
ResultType	« typeres »	String
nValLocation	« nvalloc »	Integer
nValDatation	« nvaldat »	Integer
nValProperty	« nvalprp »	Integer
nValResult	« nvalres »	Integer
BoundingBox	« bbox »	Array (4 Float)
IntervalBox	« tbox »	Array (2 String)
Complet	« complet »	True / false
Score	« score »	Integer
MeasureRate	« measurerate »	Float
Dimension	« dimension »	Integer
Axes	« axes »	Array (1 to 3 integers)

#### **Validity**

An ESInformation is valid if the Value contains at least one ESAtt.

All the ESAtt are optional.

**Example**

```
{"typeobs": "areaObsrecord"}
```

*Minimal Value*

```
{"typeobs": "areaObsrecord", "complet": false, "score": 226}
```

*Defined Member*

*Note:*

*Those information come from the other ESObervation elements. A parser MAY ignore The ESInformation to build an ESObervation.*

## 2.6.2 ESParameter

**Description**

The Defined ESAtt are:

Member	Key	Value
Reference	« reference »	String
ResultTime	« resulttime »	Timestamp
Idxref	« idxref »	Array
Order	« order »	Array
PropertyDict	« pdict »	String
UniqueIndex	« unicindex »	True/false

**Validity**

An ESParameter is valid if the Value contains at least one ESAtt.

All the ESAtt are optional.

**Example**

```
{"order": [0, 2, 1], "unicindex": true, "approbation": true}
```

## 2.6.3 ESUserData

The structure of ESUserData is totally free.

It MUST not contain any Defined ESAtt.

The keys used in ESUserData MUST be different from those defined in the Reserved list name (see Appendix.)

### 3 APPENDIX : RESERVED VALUES

---

« type »  
« id »  
« datation »  
« location »  
« property »  
« result »  
« information »  
« parameter »  
« observation »  
« ptype »  
« unit »  
« sampling »  
« application »  
« sensor »  
« upppervalue »  
« lowervalue »  
« period »  
« updateinterval »  
« uncertainty »  
« typeobs »  
« typeloc »  
« typedat »  
« typeprp »  
« typeres »  
« nvalloc »  
« nvaldat »  
« nvalprp »  
« nvalres »  
« bbox »  
« tbox »  
« complet »  
« score »  
« measurerate »  
« dimension »  
« axes »  
« reference »  
« resulttime »  
« order »  
« propdict »  
« unicindex »