



Space Weather Pilot Project Coordination and Software Infrastructure Development

SWENET Web Service Developer Guide

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Document Information

I. Release Note

| | Name | Function | Date | Signature |
|------------------------|-------------|---------------------------|------------|-----------|
| Established by: | K. Ruhl | Technical Project Manager | 2007-10-19 | |
| Released by: | P. Beltrami | Project Manager | | |

II. Revision History

| Version | Date | Initials | Changed | Reason for Revision |
|---------|------------|----------|---------|--------------------------------|
| 1.0 | 2007-03-13 | KR | Created | First release based on Axis2. |
| 1.1 | 2007-10-19 | KR | XFire | Second release based on XFire. |
| | | | | |


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III. List of References

- /1/ The Java Programming Language, <http://java.sun.com/>
- /2/ PHP Programming Language, <http://www.php.net/>
- /3/ Ruby Programming Language, <http://www.ruby-lang.org/>
- /4/ XFire Webservices, <http://xfire.codehaus.org/>
- /5/ Apache Axis2 Webservices, <http://ws.apache.org/axis2/>
- /6/ W3 Schools, <http://www.w3schools.com/>

IV. List of Abbreviations

| Abbreviation | Description |
|--------------|----------------------------------|
| ESA | European Space Agency |
| SWENET | Space Weather European Network |
| WS | Web Service |
| WSDL | Web Service Description Language |
| XML | Extensible Markup Language |
| XSD | XML Schema Definition |

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1 Introduction

The SWENET portal is a globally accessible web interface for various international space weather products, data and services, with a focus on European sources. This document is concerned with the “data” part of the portal.

In the SWENET database, numerous space weather data are provided, some on a semi-realtime basis (< 1 min), others on a irregular basis (e.g. yearly sunspot numbers, diverse reports). These data sets are accessible via the web interface.


Since Q4/2006, the SWENET portal provides an additional option to retrieve this data: Access via web service. This allows applications to automatically access the database in a simplified way.

Web services are, in essence, XML messages sent to a server (here: the SWENET portal) as a request, and a corresponding XML message response containing the requested data (after the requested operation has been performed).

In SWENET, the webservices allow you the following actions:

- Ask which tables are available.
- For a given table, ask which columns are available, and what the latest date is.
- For a given table and column(s), and given a timespan, ask for data.

The following sections describe how to perform these 3 steps.

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2 Web Service Developer Guide

The SWENET webservice resources, including this guide and a variety of demo clients in various programming languages are available under:

<https://www.esa-spaceweather.net/docs/swenet/webservice> .

2.1 Operations in WDSL

Each web service programming starts with the WSDL file, which describes the available operations that can be called on the server:

<https://www.esa-spaceweather.net/swenet/xfire-webservice/ISwenetDataProvider?wsdl>

The following operations can be performed to request data from the SWENET database:

1. Login (`login` using username/ password from the SWENET portal)
2. Getting the names of available tables (`getTableNames`)
3. Getting the columns of a table (`getColumnNames`)
4. Getting the latest UTC date of a given table (`getLatestDate`)
5. Getting data for a given timespan (`getData`)
6. Logout (`logout`)

All of these operations have an appropriate request (e.g. `loginRequest`) and response (e.g. `loginResponse`). If an error occurs, an exception is returned.


2.2 How to use the Webservice

First, you need to know in general how a web service is used. A good starting point might be the W3 Schools online tutorials (<http://www.w3schools.com/webservices/>). Then, you need to study the WSDL file.

Depending on the platform and programming language that you want to use, the process differs from this point. Each platform usually has a software tool which takes the WSDL file as input and produces an API in the desired programming language.

For example, if you use Java /1/, the Codehaus XFire /4/ or the Apache Axis2 framework /5/ might be suitable solutions. Other programming languages, such as PHP /2/ or Ruby /3/, have built-in web service support.

The following subsections informally describe how to create the request and response. Full details are ultimately only given by the WSDL file, or by the demo applications.

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2.2.1 Method: Login

Expects: `String user, String password`
Returns: `String sessionId`

The `login` method expects a username and password from the SWENET web portal and returns a session ID. This session ID (or authentication token) is used for subsequent operations.

2.2.2 Method: Table Names

Expects: `String sessionId`
Returns: `String[] tables`

The `getTableNames` method expects the session ID and returns an array of strings containing the table names.

2.2.3 Method: Column Names

Expects: `String sessionId, String table`
Returns: `String[] columnNames`

The `getColumnNames` method expects the session ID and a table name, and returns an array of strings containing the table names.

2.2.4 Method: Latest Date

Expects: `String sessionId, String table`
Returns: `Date latestDate`

The `getLatestDate` method expects the session ID and a table name, and returns a date, the latest (maximum UTC) in the table.

2.2.5 Method: Get Data


Expects: `String sessionId, String table, String[] columns, Date startDate, Date endDate`
Returns: `Object[][] data`

The `getData` method takes a session Id, table and column names, and a start and end date (the timespan). It returns a two-dimensional object array with the values; this array can be addressed with `data[row][column]`.

2.2.6 Method: Logout

Expects: `String sessionId`
Returns: `void`


Giving the session ID, the logout method performs a logout and returns nothing. While this is not strictly necessary for your application to work, it is nicer to the SWENET server because it frees up system resources for the next caller.

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3 Conclusion

We hope that this developer guide could help you in setting up your webservice application. A good way to get started is to have a look at the short demo applications. We really tried to make the source code readable and concise, so please do not hesitate to have a quick look at it.

For any suggestions and/or updates to this document, please mail to swenet@etamax.de . Thank you for reading and happy coding!


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Annex A SWENET webservice description files

A.1 SWENET WSDL file

```
<?xml version="1.0" encoding="UTF-8"?>
<wsdl:definitions targetNamespace="http://esa-spaceweather.net/swenet/xfire-webservice"
xmlns:tns="http://esa-spaceweather.net/swenet/xfire-webservice"
xmlns:wsdlssoap="http://schemas.xmlsoap.org/wsdl/soap/" xmlns:soap12="http://www.w3.org/2003/05/soap-
envelope" xmlns:ns1="http://webservice.swenet.estec.esa.eu" xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soapenc11="http://schemas.xmlsoap.org/soap/encoding/"
xmlns:soapenc12="http://www.w3.org/2003/05/soap-encoding"
xmlns:soap11="http://schemas.xmlsoap.org/soap/envelope/" xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/">
  <wsdl:types>
    <xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema" attributeFormDefault="qualified" elementFormDe-
fault="qualified" targetNamespace="http://esa-spaceweather.net/swenet/xfire-webservice">
      <xsd:element name="login">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element maxOccurs="1" minOccurs="1" name="in0" nillable="true" type="xsd:string"/>
            <xsd:element maxOccurs="1" minOccurs="1" name="in1" nillable="true" type="xsd:string"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="loginResponse">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element maxOccurs="1" minOccurs="1" name="out" nillable="true" type="xsd:string"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="getColumnTypes">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element maxOccurs="1" minOccurs="1" name="in0" nillable="true" type="xsd:string"/>
            <xsd:element maxOccurs="1" minOccurs="1" name="in1" nillable="true" type="xsd:string"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:complexType name="ArrayOfString">
        <xsd:sequence>
          <xsd:element maxOccurs="unbounded" minOccurs="0" name="string" nillable="true" type="xsd:string"/>
        </xsd:sequence>
      </xsd:complexType>
      <xsd:element name="getColumnTypesResponse">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element maxOccurs="1" minOccurs="1" name="out" nillable="true" type="tns:ArrayOfString"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="getColumnNames">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element maxOccurs="1" minOccurs="1" name="in0" nillable="true" type="xsd:string"/>
            <xsd:element maxOccurs="1" minOccurs="1" name="in1" nillable="true" type="xsd:string"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="getColumnNamesResponse">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element maxOccurs="1" minOccurs="1" name="out" nillable="true" type="tns:ArrayOfString"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="logout">
        <xsd:complexType>
          <xsd:sequence>
            <xsd:element maxOccurs="1" minOccurs="1" name="in0" nillable="true" type="xsd:string"/>
          </xsd:sequence>
        </xsd:complexType>
      </xsd:element>
      <xsd:element name="logoutResponse">
        <xsd:complexType/>
      </xsd:element>
      <xsd:element name="getData">
```

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```

<xsd:complexType>
<xsd:sequence>
<xsd:element maxOccurs="1" minOccurs="1" name="in0" nillable="true" type="xsd:string"/>
<xsd:element maxOccurs="1" minOccurs="1" name="in1" nillable="true" type="xsd:string"/>
<xsd:element maxOccurs="1" minOccurs="1" name="in2" nillable="true" type="tns:ArrayOfString"/>
<xsd:element maxOccurs="1" minOccurs="1" name="in3" type="xsd:dateTime"/>
<xsd:element maxOccurs="1" minOccurs="1" name="in4" type="xsd:dateTime"/>
</xsd:sequence>
</xsd:complexType>
</xsd:element>
<xsd:element name="getDataResponse">
<xsd:complexType>
<xsd:sequence>
<xsd:element maxOccurs="1" minOccurs="1" name="out" nillable="true" type="ns1:ISwenetDataSet"/>
</xsd:sequence>
</xsd:complexType>
</xsd:element>
<xsd:element name="getTableNames">
<xsd:complexType>
<xsd:sequence>
<xsd:element maxOccurs="1" minOccurs="1" name="in0" nillable="true" type="xsd:string"/>
</xsd:sequence>
</xsd:complexType>
</xsd:element>
<xsd:element name="getTableNamesResponse">
<xsd:complexType>
<xsd:sequence>
<xsd:element maxOccurs="1" minOccurs="1" name="out" nillable="true" type="tns:ArrayOfString"/>
</xsd:sequence>
</xsd:complexType>
</xsd:element>
<xsd:element name="getLatestDate">
<xsd:complexType>
<xsd:sequence>
<xsd:element maxOccurs="1" minOccurs="1" name="in0" nillable="true" type="xsd:string"/>
<xsd:element maxOccurs="1" minOccurs="1" name="in1" nillable="true" type="xsd:string"/>
</xsd:sequence>
</xsd:complexType>
</xsd:element>
<xsd:element name="getLatestDateResponse">
<xsd:complexType>
<xsd:sequence>
<xsd:element maxOccurs="1" minOccurs="1" name="out" type="xsd:dateTime"/>
</xsd:sequence>
</xsd:complexType>
</xsd:element>
</xsd:schema>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema" attributeFormDefault="qualified" elementFormDefault="qualified" targetNamespace="http://webservice.swenet.estec.esa.eu">
<xsd:complexType name="ISwenetDataSet">
<xsd:sequence>
<xsd:element minOccurs="0" name="columnCount" type="xsd:int"/>
<xsd:element minOccurs="0" name="columnNames" nillable="true" type="tns:ArrayOfString"/>
<xsd:element minOccurs="0" name="columnTypes" nillable="true" type="tns:ArrayOfString"/>
<xsd:element minOccurs="0" name="data" nillable="true" type="xsd:ArrayOfArrayOfAnyType"/>
<xsd:element minOccurs="0" name="endDate" type="xsd:dateTime"/>
<xsd:element minOccurs="0" name="rowCount" type="xsd:int"/>
<xsd:element minOccurs="0" name="startDate" type="xsd:dateTime"/>
<xsd:element minOccurs="0" name="tableName" nillable="true" type="xsd:string"/>
</xsd:sequence>
</xsd:complexType>
</xsd:schema>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema" attributeFormDefault="qualified" elementFormDefault="qualified" targetNamespace="http://www.w3.org/2001/XMLSchema">
<xsd:complexType name="ArrayOfArrayOfAnyType">
<xsd:sequence>
<xsd:element maxOccurs="unbounded" minOccurs="0" name="ArrayOfAnyType" nillable="true" type="xsd:ArrayOfAnyType"/>
</xsd:sequence>
</xsd:complexType>
<xsd:complexType name="ArrayOfAnyType">
<xsd:sequence>
<xsd:element maxOccurs="unbounded" minOccurs="0" name="anyType" nillable="true" type="xsd:anyType"/>
</xsd:sequence>
</xsd:complexType>
</xsd:schema>
</wsdl:types>
<wsdl:message name="loginResponse">
<wsdl:part name="parameters" element="tns:loginResponse"/>
</wsdl:part>
</wsdl:message>
<wsdl:message name="logoutRequest">
<wsdl:part name="parameters" element="tns:logout"/>

```

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```

</wsdl:part>
</wsdl:message>
<wsdl:message name="getTableNamesResponse">
  <wsdl:part name="parameters" element="tns:getTableNamesResponse">
    </wsdl:part>
  </wsdl:message>
<wsdl:message name="getDataResponse">
  <wsdl:part name="parameters" element="tns:getDataResponse">
    </wsdl:part>
  </wsdl:message>
<wsdl:message name="logoutResponse">
  <wsdl:part name="parameters" element="tns:logoutResponse">
    </wsdl:part>
  </wsdl:message>
<wsdl:message name="getColumnNamesRequest">
  <wsdl:part name="parameters" element="tns:getColumnNames">
    </wsdl:part>
  </wsdl:message>
<wsdl:message name="getDataRequest">
  <wsdl:part name="parameters" element="tns:getData">
    </wsdl:part>
  </wsdl:message>
<wsdl:message name="getColumnNamesResponse">
  <wsdl:part name="parameters" element="tns:getColumnNamesResponse">
    </wsdl:part>
  </wsdl:message>
<wsdl:message name="getLatestDateRequest">
  <wsdl:part name="parameters" element="tns:getLatestDate">
    </wsdl:part>
  </wsdl:message>
<wsdl:message name="getTableNamesRequest">
  <wsdl:part name="parameters" element="tns:getTableNames">
    </wsdl:part>
  </wsdl:message>
<wsdl:message name="getLatestDateResponse">
  <wsdl:part name="parameters" element="tns:getLatestDateResponse">
    </wsdl:part>
  </wsdl:message>
<wsdl:message name="loginRequest">
  <wsdl:part name="parameters" element="tns:login">
    </wsdl:part>
  </wsdl:message>
<wsdl:message name="getColumnTypesRequest">
  <wsdl:part name="parameters" element="tns:getColumnTypes">
    </wsdl:part>
  </wsdl:message>
<wsdl:message name="getColumnTypesResponse">
  <wsdl:part name="parameters" element="tns:getColumnTypesResponse">
    </wsdl:part>
  </wsdl:message>
<wsdl:portType name="ISwenetDataProviderPortType">
  <wsdl:operation name="login">
    <wsdl:input name="loginRequest" message="tns:loginRequest">
      </wsdl:input>
    <wsdl:output name="loginResponse" message="tns:loginResponse">
      </wsdl:output>
    </wsdl:operation>
  <wsdl:operation name="getColumnTypes">
    <wsdl:input name="getColumnTypesRequest" message="tns:getColumnTypesRequest">
      </wsdl:input>
    <wsdl:output name="getColumnTypesResponse" message="tns:getColumnTypesResponse">
      </wsdl:output>
    </wsdl:operation>
  <wsdl:operation name="getColumnNames">
    <wsdl:input name="getColumnNamesRequest" message="tns:getColumnNamesRequest">
      </wsdl:input>
    <wsdl:output name="getColumnNamesResponse" message="tns:getColumnNamesResponse">
      </wsdl:output>
    </wsdl:operation>
  <wsdl:operation name="logout">
    <wsdl:input name="logoutRequest" message="tns:logoutRequest">
      </wsdl:input>
    <wsdl:output name="logoutResponse" message="tns:logoutResponse">
      </wsdl:output>
    </wsdl:operation>
  <wsdl:operation name="getData">
    <wsdl:input name="getDataRequest" message="tns:getDataRequest">
      </wsdl:input>
    <wsdl:output name="getDataResponse" message="tns:getDataResponse">
      </wsdl:output>
    </wsdl:operation>
  <wsdl:operation name="getTableNames">
    <wsdl:input name="getTableNamesRequest" message="tns:getTableNamesRequest">

```

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</wsdl:input>
  <wsdl:output name="getTableNamesResponse" message="tns:getTableNamesResponse">
</wsdl:output>
</wsdl:operation>
<wsdl:operation name="getLatestDate">
  <wsdl:input name="getLatestDateRequest" message="tns:getLatestDateRequest">
</wsdl:input>
  <wsdl:output name="getLatestDateResponse" message="tns:getLatestDateResponse">
</wsdl:output>
</wsdl:operation>
</wsdl:portType>
<wsdl:binding name="ISwenetDataProviderHttpBinding" type="tns:ISwenetDataProviderPortType">
  <wsdlsoap:binding style="document" transport="http://schemas.xmlsoap.org/soap/http"/>
  <wsdl:operation name="login">
    <wsdlsoap:operation soapAction="" />
    <wsdl:input name="loginRequest">
      <wsdlsoap:body use="literal"/>
    </wsdl:input>
    <wsdl:output name="loginResponse">
      <wsdlsoap:body use="literal"/>
    </wsdl:output>
  </wsdl:operation>
  <wsdl:operation name="getColumnTypes">
    <wsdlsoap:operation soapAction="" />
    <wsdl:input name="getColumnTypesRequest">
      <wsdlsoap:body use="literal"/>
    </wsdl:input>
    <wsdl:output name="getColumnTypesResponse">
      <wsdlsoap:body use="literal"/>
    </wsdl:output>
  </wsdl:operation>
  <wsdl:operation name="getColumnNames">
    <wsdlsoap:operation soapAction="" />
    <wsdl:input name="getColumnNamesRequest">
      <wsdlsoap:body use="literal"/>
    </wsdl:input>
    <wsdl:output name="getColumnNamesResponse">
      <wsdlsoap:body use="literal"/>
    </wsdl:output>
  </wsdl:operation>
  <wsdl:operation name="logout">
    <wsdlsoap:operation soapAction="" />
    <wsdl:input name="logoutRequest">
      <wsdlsoap:body use="literal"/>
    </wsdl:input>
    <wsdl:output name="logoutResponse">
      <wsdlsoap:body use="literal"/>
    </wsdl:output>
  </wsdl:operation>
  <wsdl:operation name="getData">
    <wsdlsoap:operation soapAction="" />
    <wsdl:input name="getDataRequest">
      <wsdlsoap:body use="literal"/>
    </wsdl:input>
    <wsdl:output name="getDataResponse">
      <wsdlsoap:body use="literal"/>
    </wsdl:output>
  </wsdl:operation>
  <wsdl:operation name="getTableNames">
    <wsdlsoap:operation soapAction="" />
    <wsdl:input name="getTableNamesRequest">
      <wsdlsoap:body use="literal"/>
    </wsdl:input>
    <wsdl:output name="getTableNamesResponse">
      <wsdlsoap:body use="literal"/>
    </wsdl:output>
  </wsdl:operation>
  <wsdl:operation name="getLatestDate">
    <wsdlsoap:operation soapAction="" />
    <wsdl:input name="getLatestDateRequest">
      <wsdlsoap:body use="literal"/>
    </wsdl:input>
    <wsdl:output name="getLatestDateResponse">
      <wsdlsoap:body use="literal"/>
    </wsdl:output>
  </wsdl:operation>
</wsdl:binding>
<wsdl:service name="ISwenetDataProvider">
  <wsdl:port name="ISwenetDataProviderHttpPort" binding="tns:ISwenetDataProviderHttpBinding">
    <wsdlsoap:address location="https://www.esa-spaceweather.net/swenet/xfire-
webservice/ISwenetDataProvider"/>
  </wsdl:port>
</wsdl:service>

```

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</wsdl:definitions>

Table 1: SWENET webservice WSDL file