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Seismology and Earthquake Engineering
Research Infrastructure Alliance for Europe

DELIVERABLE

D4.4 EIDA Metadata model standards

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Summary

SERA deliverable 4.4 is a report on metadata model standards and new federated service solutions that were implemented by the EIDA community during the SERA project to achieve richer and better archives across Europe. Deliverable D4.4 is directly related to Task 4.3, and partly related to Task 4.2. It complements deliverable D4.3 (Best practices guidelines, M36). In addition to being a standalone report for SERA and a document that builds towards the wider SERA WP4 deliverables, we hope this deliverable will be used as an independent community reference document describing solutions implemented at European data centers. We hope the implemented model standards will also become community standards. Community acceptance of the proposed solutions should go hand-in-hand with further SERA technical work (technical work cannot wait for full community acceptance) and be compliant with EPOS TCS-ICS services. At the same time we recognise the importance of global coordination of work and discussions towards international standardization of future formats in seismology and beyond.

1. Introduction

ORFEUS is one of the largest infrastructures in the world providing seismological data and closely derived products to the Earth-science research and engineering communities, in strong collaboration with European seismological observatories. The infrastructure is organized as an interconnected system of seismological observatories, seismic monitoring networks, research communities, waveform data archives and data services. A key component of ORPHEUS is the federated, distributed European Integrated waveform Data Archive (EIDA) that transparently connects a number of large data centers in Europe, including the ORFEUS Data Center. This unique, federated data archive system serves seismological waveform (meta)data from permanent and temporary networks of broadband and strong-motion sensors deployed in Pan-Europe and beyond through dedicated, standardized web services and GUIs. Currently, EIDA holds around 450 TB of data of about 100 permanent networks and 190 temporary networks, with a total of more than 11500 seismic stations (http://www.orfeus-eu.org/data/eida/).

Within EPOS, in which ORFEUS is the research infrastructure for seismic waveform data and metadata, EIDA is technically prepared to serve data from other European seismological networks as well as other data types (e.g., from OBS and NFO specific instrumentation) to a broader user community including earthquake and geotechnical engineers). This, however, requires Networking Activities like in SERA WP4-NA2 to engage and involve network operators to join the existing infrastructure of EIDA. These activities include presentations, information provision and meetings to demonstrate the benefits from joining the federated structure in which technical expertise and data management are shared in an efficient manner. Deliverable D4.1 “Outcome of regional technical EIDA meetings” by SERA WP4-NA2 reports on several of these activities. At the same time the support of different types of data through EIDA requires standardization of metadata extensions and the implementation of standardized services. An extensive overview on metadata needs, and suggestions for solutions, was made by SERA WP4-NA2 and documented in deliverable D4.2: “Report on metadata challenges and proposed solutions”.

On a global scale, the ORFEUS EIDA infrastructure builds upon international standards for web services and metadata that are discussed, defined and adopted by the global organization FDSN (International Federation of Digital Seismograph Networks; www.fdsn.org). This organization has defined the SEED format for seismic waveform data and metadata which have successfully been used for about 3 decades, and more recently its successor for metadata: StationXML. The ongoing adoption of a homogeneous version of the metadata format StationXML-across EIDA has been an important step forward to the goal to efficienlty federate the EIDA infrastructure.

Defining, extending or redefining standards in such a complex, interconnected, distributed and international structure, with dependencies beyond and across different solid Earth science domains, is a challenging process with different strategies and speeds in implementation. We address here the three levels of implementation at EIDA that needs to be coped with - EIDA level, EPOS level, FDSN level - and describe the current status and implementation carried out within SERA.

On the EIDA level the implementation of the Routing Service metadata was an important step forward to: a) transparently provide information on where and how to access data and metadata across EIDA; b) enable sustainable interaction with EPOS on both metadata levels to provide services across the solid Earth science domains; and c) provide the fundament for routing discussions within the FDSN towards the implementation of global routing.

To accommodate the need by other solid Earth domains within EPOS to incorporate domain specific metadata within seismological metadata an extension of the current seismological metadata is required, for example to support site characterization, large-N experiments and OBS data. The current status and need for metadata extension was evaluated and documented by SERA WP4-NA2 in deliverable D4.2: "Report on metadata challenges and proposed solutions" which lays the fundament for future implementation. The recommended metadata for site characterization, based on the outcome of SERA deliverable D7.2 on "Best practice and quality assessment guidelines for site characterization" provides the fundament for site characteristics to be built into the EIDA StationBook (http://orfeus-eu.org/stationbook/). Both reports anticipate future FDSN accepted standards for extensions of the StationXML metadata format and to include information on site characteristics.

In the global context of FDSN an important step forward has been made in the adoption and implementation of StationXML1.1 and the addition of Persistent Identifiers (PID) to properly acknowledge network data, for example through a Digital Object Identifiers (DOI). The use of these PIDs allows the referring to a wealth of metadata that is currently not yet captured in international standards, like specific detailed information on the operating networks, station characteristics or site characteristics. As mentioned, current discussions within the FDSN also concern the implementation of the routing system on a global scale to enable smart clients to acquire data from the global federated infrastructure that meets the requirements by the user.

Working towards EIDA metadata model standards is a careful process that requires community engagement, technical support and international collaboration. Dissemination of information and promoting best practices are crucial for acceptance and proper use of metadata. These important aspects are carried out within a) Task 4.3 by SERA WP4-NA2 to provide guidelines on best practices (D4.3 "Best practices Guidelines") and b) Task 4.5 "EIDA Documentation System" through which up-to-date information on EIDA is extended and maintained.

Finally, on-going training and outreach material will be further developed within the existing EIDA Technical Commission (ETC) in order to fully support new data integration. Moreover EIDA experts provide on-site capacity building modules for newly integrated nodes. In a synergy with Task 4.1 the technical experts participate also in outreach events on best practice for data management, including adoption of metadata standards.

The following chapters describe important developments and implementations in EIDA metadata concerning DOIs, routing and site characteristics.

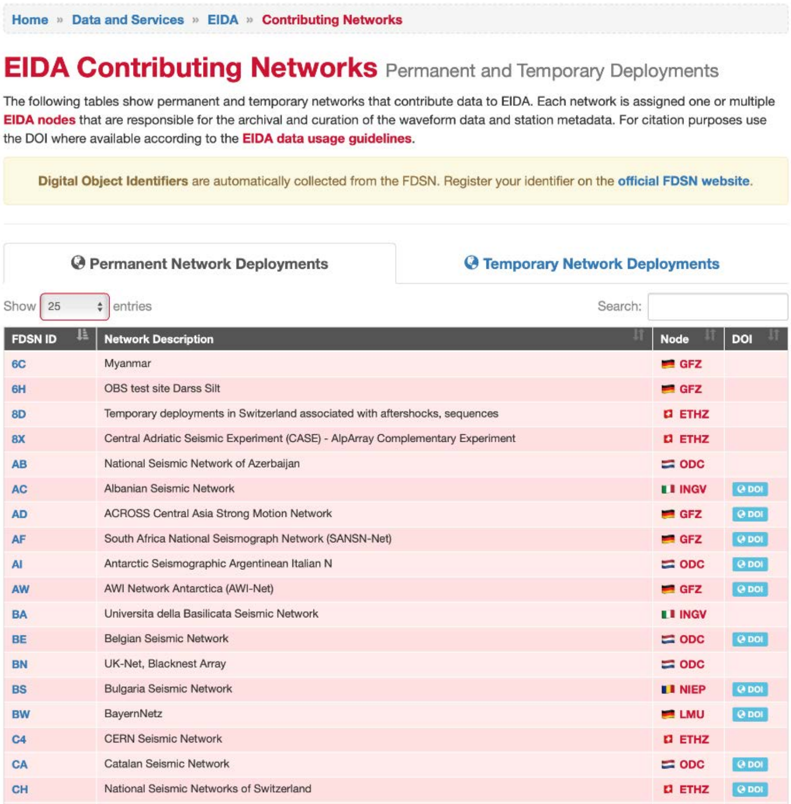
2. Digital Object Identifiers in EIDA metadata

DOI in StationXML

Digital Object Identifiers (DOIs) are unique and persistent character strings used to identify an object such as an electronic document. Historically they have been associated with publications, journal articles and books. Today they are also being used for other published works, including research datasets and seismic networks in seismology. The FDSN, including ORFEUS EIDA datacentres, supports the use of DOIs for seismological datasets and seismic networks. This is to ensure that seismic network operators under the FDSN umbrella receive full credit and citation(s) when scientists use their seismic network data in research and published articles. The use of persistent identifiers, like DOIs, are also supported by the European Research Infrastructure for Solid Earth, EPOS (European Plate Observing System), to: a) facilitate long-term preservation of seismological datasets; b) foster worldwide discoverability and interoperability of data in Earth Sciences; and c) ensure optimum standardization across the participating sub-communities within the solid Earth Sciences.

In order to better promote the use of DOIs and to integrate DOIs into seismological metadata, EIDA proposed the addition of a DOI to the StationXML schema (http://www.fdsn.org/xml/). StationXML is a schema definition for representing the Standard for the Exchange of Earthquake (SEED) metadata in XML. For this reason support has been added for persistent identifiers, like DOIs, in the StationXML schema (http://www.fdsn.org/xml/station/fdsn-station-1.1.xsd). To stress the support within the FDSN for StationXML, including the DOI, both ORFEUS and IRIS actively and financially support ISTI (www.isti.com) to prepare futureproof documentation of StationXML. A kick-off meeting with the goal to design the structure of this documentation as well as to define the process was held on 13-14 Feb 2020 in Saratoga Springs. This documentation will further help and promote the use and exploitation of the DOIs in seismology.

ORFEUS EIDA also promotes the use of DOIs through the website on the networks in EIDA: https://www.orfeus-eu.org/data/eida/networks/. The DOIs landing pages typically contain information on the licence attached to the data (e.g. http://www.fdsn.org/networks/detail/HL/). Also the ORFEUS EIDA data policy informs the research community on usage, acknowledgements and citation (https://www.orfeus-eu.org/data/eida/acknowledgements/).


Home » Data and Services » EIDA » Contributing Networks

EIDA Contributing Networks Permanent and Temporary Deployments

The following tables show permanent and temporary networks that contribute data to EIDA. Each network is assigned one or multiple EIDA nodes that are responsible for the archival and curation of the waveform data and station metadata. For citation purposes use the DOI where available according to the EIDA data usage guidelines.

Digital Object Identifiers are automatically collected from the FDSN. Register your identifier on the official FDSN website.

Permanent Network Deployments | Temporary Network Deployments

Show 25 entries Search:

FDSN ID	Network Description	Node	DOI
6C	Myanmar	GFZ	
6H	OBS test site Darss Silt	GFZ	
8D	Temporary deployments in Switzerland associated with aftershocks, sequences	ETHZ	
8X	Central Adriatic Seismic Experiment (CASE) - AlpArray Complementary Experiment	ETHZ	
AB	National Seismic Network of Azerbaijan	ODC	
AC	Albanian Seismic Network	INGV	DOI
AD	ACROSS Central Asia Strong Motion Network	GFZ	DOI
AF	South Africa National Seismograph Network (SANSN-Net)	GFZ	DOI
AI	Antarctic Seismographic Argentinean Italian N	ODC	DOI
AW	AWI Network Antarctica (AWI-Net)	GFZ	DOI
BA	Universita della Basilicata Seismic Network	INGV	
BE	Belgian Seismic Network	ODC	DOI
BN	UK-Net, Blacknest Array	ODC	
BS	Bulgaria Seismic Network	NIEP	DOI
BW	BayernNetz	LMU	DOI
C4	CERN Seismic Network	ETHZ	
CA	Catalan Seismic Network	ODC	DOI
CH	National Seismic Networks of Switzerland	ETHZ	DOI

The ORFEUS website displays the actual status of DOIs available for seismic networks within EIDA.

EIDA Data Policy Usage, Acknowledgements, and Citation

Acknowledgement

The user is kindly requested to provide proper reference to the data suppliers. This can be done by citing the individual data suppliers (network name and/or network code, see ORFEUS EIDA network list). Acknowledgement to ORFEUS and EIDA is also greatly appreciated.

Data Citation

Some of the data sets distributed by EIDA have DOI's (Digital Object Identifier) associated with their **seismic networks** according to a standard procedure recently approved by the FDSN. Where this is the case, this will be shown on the ORFEUS EIDA network list page for that network. Please use the DOI indicated in your acknowledgments or citations as appropriate, if one is available. Citation is of the following form:

```
Creator (Year): Title. Publisher. ResourceType. doi:DOI.

GEOFON Data Center (1993): GEOFON Seismic Network. Deutsches GeoForschungsZentrum GFZ. Other/Seismic Network.
doi:10.14470/TR560404.
```

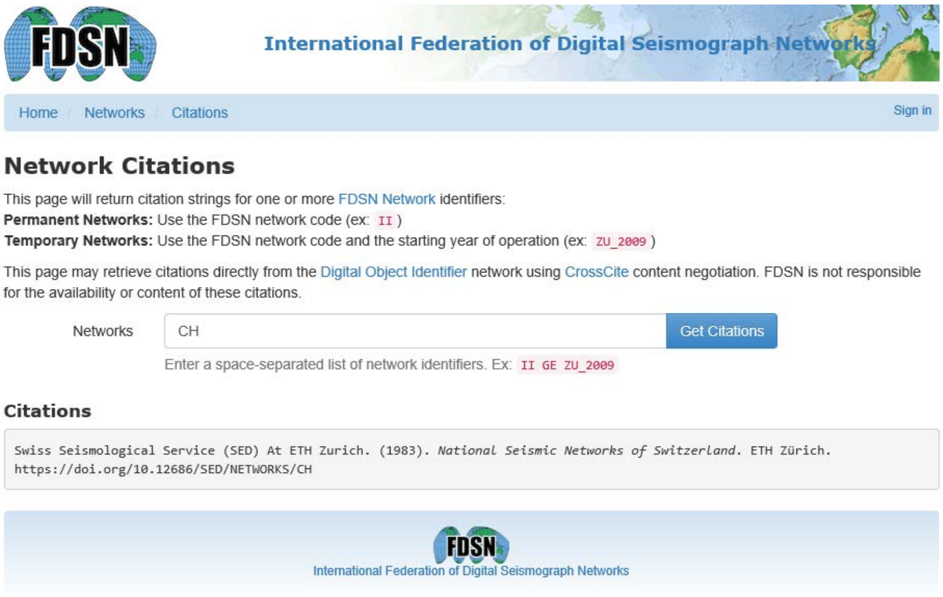
ORFEUS and EIDA actively encourages citation and acknowledgement through the use of DOIs.

A persistent <Identifier> element has been added to all base nodes in the StationXML1.1 schema, like on the levels of Network, Station and Channel to add information on each level (https://www.fdsn.org/xml/station/fdsn-station-changes-1.0-to-1.1.txt). The schema also supports multiple identifiers of different types (e.g. Archival Resource Key identifier).

For example:

```
<Network code="CO">
    <Identifier type="DOI">10.1341/abcde</Identifier>
    <Identifier type="ARK">12341515</Identifier>
</Network>
```

National libraries, data centres and other organisations usually are able to provide, or mint, a DOI. ORFEUS and EIDA recommend to closely follow the recommendations on the contents as set by the FDSN for network DOIs as described in the next section. The FDSÑ also can mint the DOI for a network and provide existing DOIs for a major number of permanent and temporary networks through a mapping service: http://www.fdsn.org/networks/citation/. This page may retrieve citations directly from the Digital Object Identifier network using CrossCite content negotiation.



Example of a network citation provided by the FDSN mapping service using the DOI.

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DOI Recommendations

The FDSN provides recommendations on the use of DOI information as documented by Clark et. al, 2014 (FDSN recommendations for seismic network DOIs and related FDSN services; http://www.fdsn.org/pdf/V1.0-21Jul2014-DOIFDSN.pdf) on which EIDA suggested many recommendations.

In general, it was suggested to increase the number of optional fields and add licencing information. More specifically:

* **Include a licencing field to the DOI information**

<u>For Example</u>

<rightsList>

<rights rightsURI="info:eu-repo/semantics/openAccess">Open Access</rights>

<rights rightsURI="https://creativecommons.org/licenses/by/4.0">Creative Commons By 4.0 Universal</rights>

</rightsList>

* **Add Related identifiers**

Limit the existing user-facing language of "Published Description" only to DOI identifiers of type *IsDocumentedBy*.

<u>For example</u>:

<relatedIdentifiers>

<relatedIdentifier relatedIdentifierType="DOI" relationType="IsDocumentedBy">

10.5072/example-full

</relatedIdentifier>

<relatedIdentifier relatedIdentifierType="DOI" relationType="IsDocumentedBy">

10.4401/ag-4196

</relatedIdentifier>

</relatedIdentifiers>

* **Modify the Contributor field**

Add support to various types (e.g. Contact Person, Data Collector, Data Manager, Distributor, Hosting Institution, Data Curator, Sponsor).

<u>For example</u>:

<contributors>

<contributor contributorType="ProjectLeader">

<contributorName>Starr, Joan</contributorName>

<givenName>Joan</givenName>

<familyName>Starr</familyName>

<nameIdentifierschemeURI="http://orcid.org/"</nameIdentifierScheme>

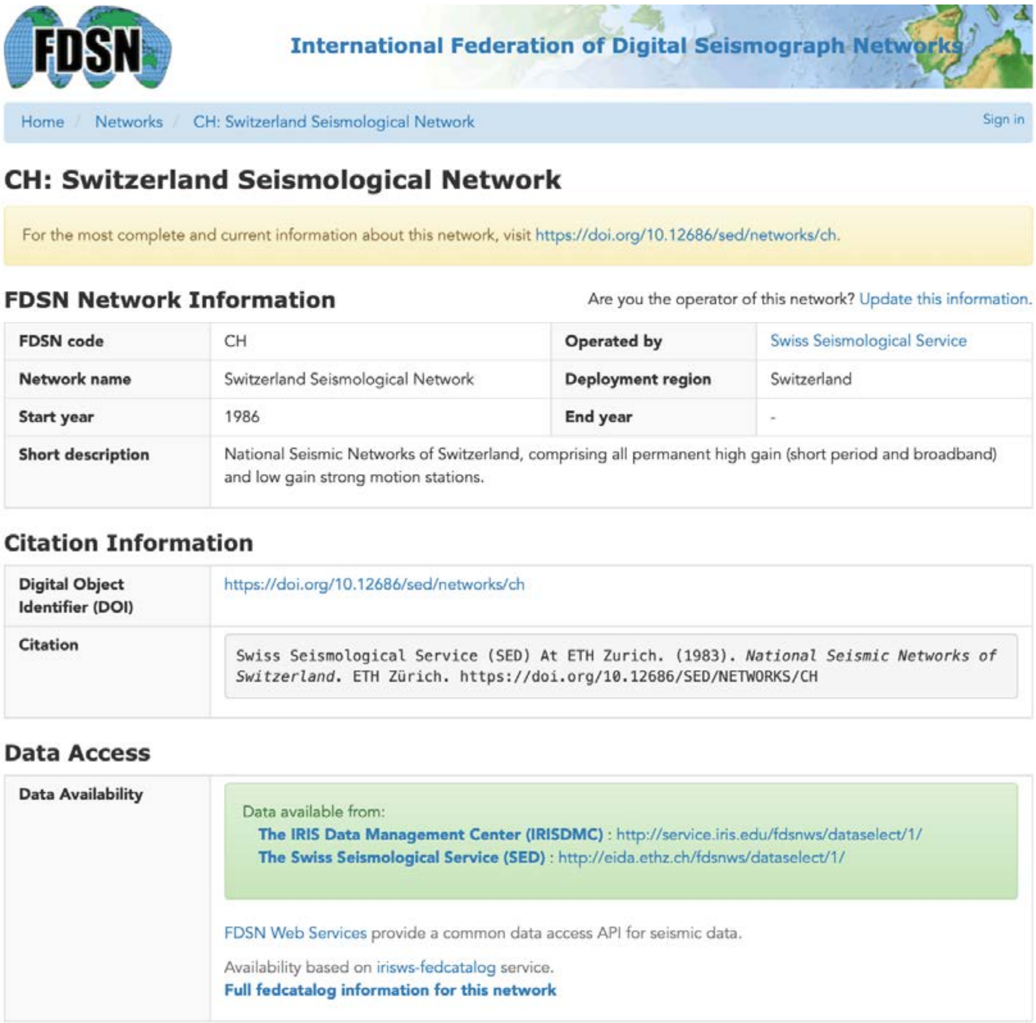
<nameidentifier>"ORCID">0000-0002-7285-027X</nameidentifier>

<affiliation>California Digital Library</affiliation>

</contributor>

</contributors>

The FDSN web pages and its editing tool reflect these new standards. The main difficulty across FDSN DOI minting services is that a large amount of existing data, much of which consists of temporary networks which are no longer actively managed, cannot realistically be corrected/refined by operators. Thus, IRIS/FDSN maintained minimal DOI records in order to minimize the chances of distributing false or misrepresentative data. The new FDSN DOI minting web form now includes these additional metadata in the DOI records.



International Federation of Digital Seismograph Networks

Home / Networks / CH: Switzerland Seismological Network   Sign in

CH: Switzerland Seismological Network

For the most complete and current information about this network, visit https://doi.org/10.12686/sed/networks/ch.

FDSN Network Information

Are you the operator of this network? Update this information.

FDSN code	CH	**Operated by**	Swiss Seismological Service
Network name	Switzerland Seismological Network	**Deployment region**	Switzerland
Start year	1986	**End year**	-
Short description	National Seismic Networks of Switzerland, comprising all permanent high gain (short period and broadband) and low gain strong motion stations.		

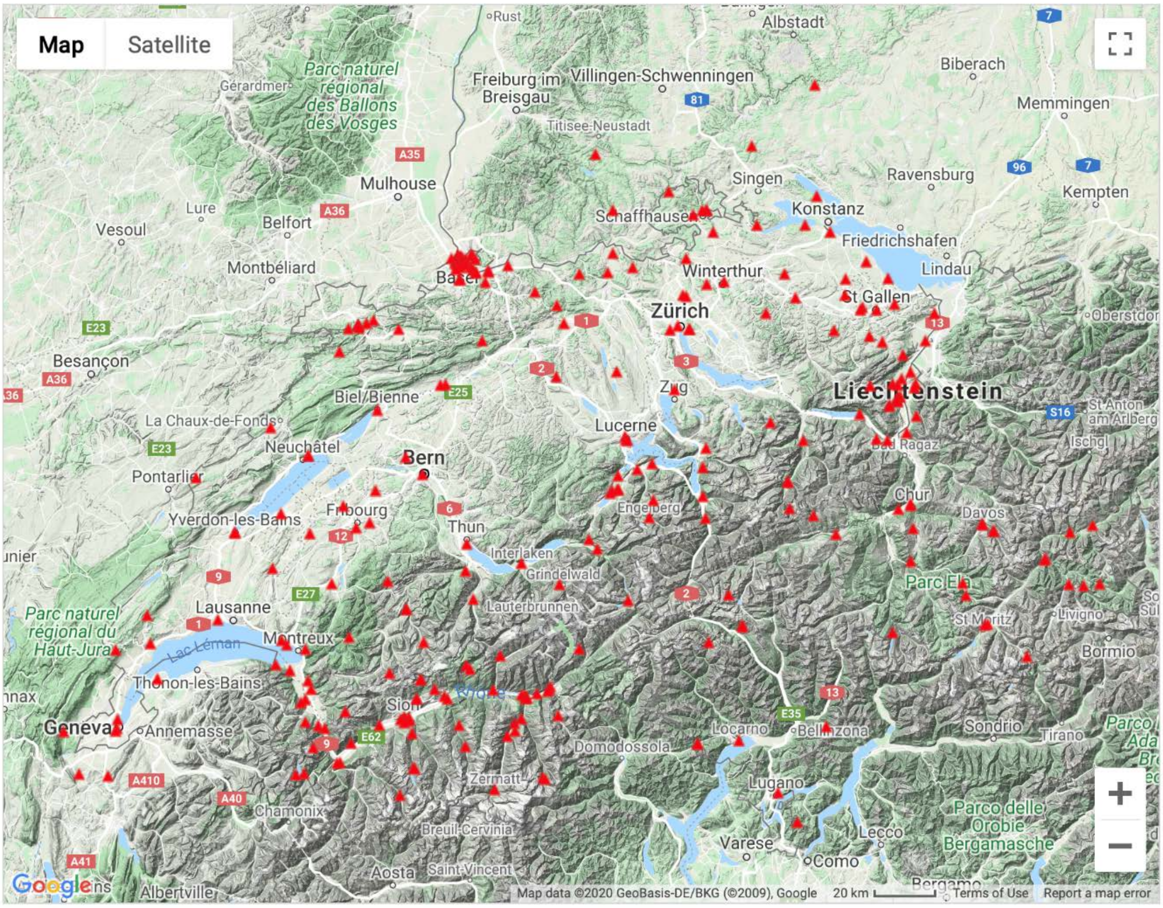
Citation Information

Digital Object Identifier (DOI)	https://doi.org/10.12686/sed/networks/ch
Citation	Swiss Seismological Service (SED) At ETH Zurich. (1983). *National Seismic Networks of Switzerland*. ETH Zürich. https://doi.org/10.12686/SED/NETWORKS/CH

Data Access

Data Availability	Data available from: **The IRIS Data Management Center (IRISDMC)** : http://service.iris.edu/fdsnws/dataselect/1/ **The Swiss Seismological Service (SED)** : http://eida.ethz.ch/fdsnws/dataselect/1/ FDSN Web Services provide a common data access API for seismic data. Availability based on irisws-fedcatalog service. **Full fedcatalog information for this network**

Stations in this Network



Station Code	Station Name	Latitude	Longitude	Data Center(s)
ACB	Klingnau, Acheberg, AG	47.58772	8.25474	SED
AIGLE	Bunker A365, Aigle, VD	46.34176	6.95295	SED
BALST	Balsthal, SO	47.33578	7.69498	SED
BERGE	Lenzkirch, Germany	47.87161	8.17798	SED
BERNI	Berninapass, GR	46.413636	10.023095	SED

Example webpage dynamically created by FDSN based on information available via the corresponding DOI.

3. EIDA Routing Service

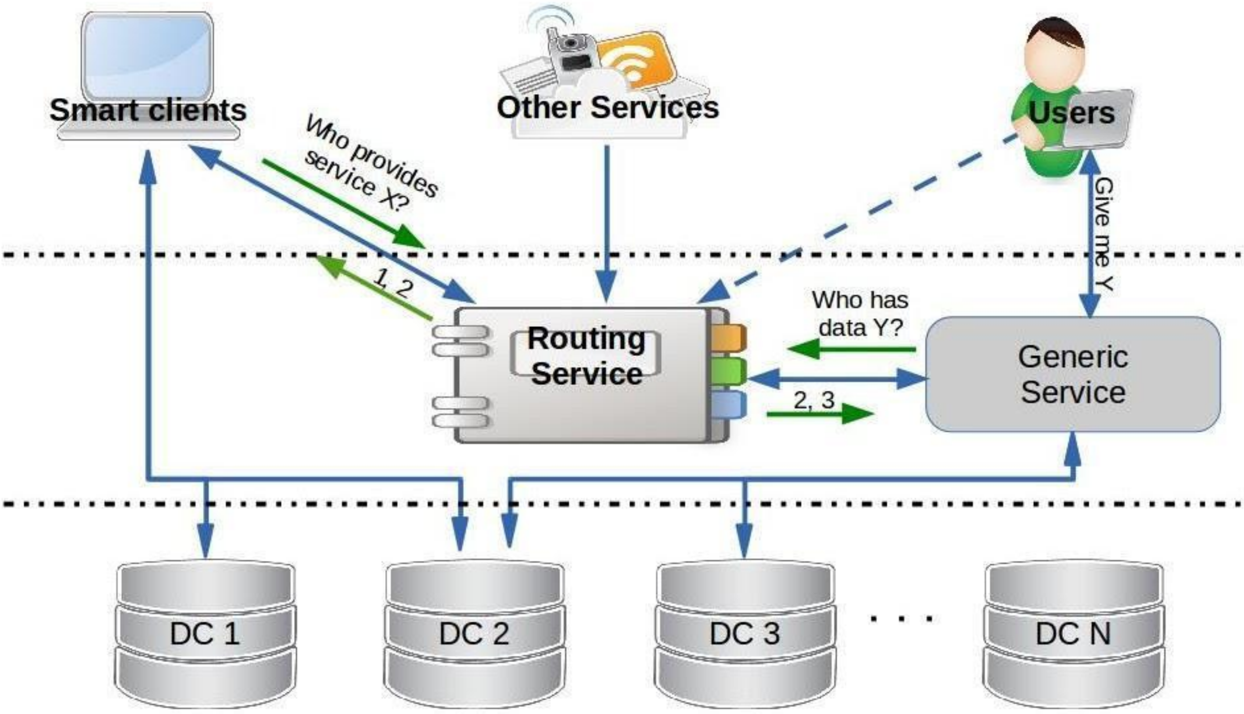
A data centre federation tool for the seismological community

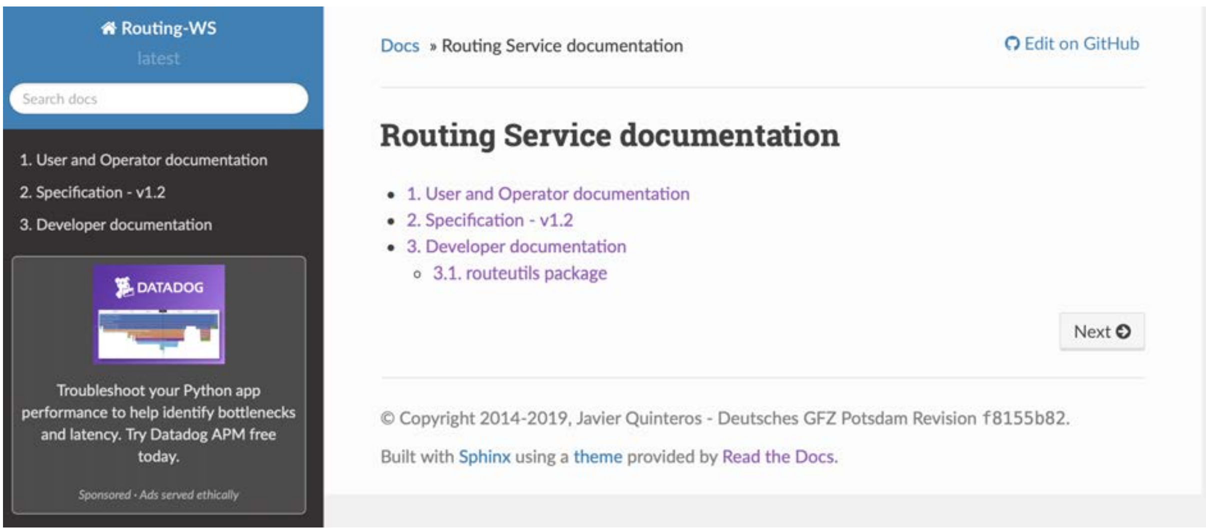
In the context of the design of the EIDA New Generation (EIDA-NG) software, the participating EIDA data centers offer data products using compatible types of services, but pertaining to different seismic objects, such as waveforms, inventory, or event data. EIDA has long offered the ArcLink service, that is now deprecated and fully replaced by the FDSN and EIDA web services for accessing its data holdings (http://www.orfeus-eu.org/data/eida/webservices/). In keeping with the distributed nature of it, the provided services could run at different nodes and produce information about a reduced subset of all the available data objects. To assist users, and software clients, to locate data and services, the EIDA community designed the Routing Service (http://www.orfeus-eu.org/data/eida/webservices/routing/), which could run at the EIDA nodes or elsewhere, including on a user's personal computer. This (meta)service can be queried by clients or other services in order to localize the address(es) where the desired information is provided. The Routing Service serves this information in order to help the development of smart clients and/or services of higher level, which can offer the user an integrated view of the whole EIDA, hiding the complexity of its internal structure. However, the Routing Service does not need to be aware of the extent of the content offered by each service, avoiding the necessity for a large synchronized database at any place. The service is open and enables it to be queried by users or clients without the requirement of credentials or authentication. An example of its usage is the implementation of the Federator web service (http://www.orfeus-eu.org/data/eida/nodes/FEDERATOR/), where a user can issue a request against a specific endpoint without having to know where the data or combination of data are hosted, implying the use of the Routing Service.

Additionally, since the concept of a collection of stations, different from the formal network, has existed since a long time, the Routing Service supports the creation of a virtual network code. This virtual network is defined by a subset of stations from one or more real networks. In the case that the synchronization is enabled, the virtual networks will also be synchronized and shared within EIDA, where queries always return real network and station codes.

The figure describes how the Routing Service runs. Each EIDA node/datacenter provides a number of entries in a specified format describing its networks and where a client can reach their seismic waveforms and their related metadata. The Routing Service then harvests this distributed information and a client or another service can then query it for this information. A complete service description is documented including an extensive explanation of the specifications that could be queried. For instance, the data may be filtered by network/station/channel/location codes (supporting wildcards), time window and service type. Moreover, the Routing Service supports a "priority" parameter that indicates which datacenter has the priority to distribute a duplicated entry/network. This capability could pave the way for a secondary (or more) EIDA server support for each data center, even on a global scale, providing in that way a traffic balance of the requests in case of a burst or it could be used as a failover mechanism.

The routing service and its specifications are described in detail on this document https://routing.readthedocs.io/en/latest/userdoc.html with examples and parameters provided at http://www.orfeus-eu.org/data/eida/webservices/routing/.





4. Site characterization metadata

Site characterization is critical input to seismic hazard and risk assessment (e.g. GMPE, microzonation studies, damage scenarios) and seismic design (building codes, critical facilities). Although the number of strong-motion stations vastly increased in Europe over the last decade, only a fraction includes refined site condition indicators like geology, EC8 soil classes, local Vs30 and Vs profiles and housing characteristics. There is a need to set up an

European framework for site condition parameters, following what has been accomplished in NERA and on-going EPOS EU-projects. Different stakeholders in the European discussion towards standardization and technical implementation of site characterization involved in the current discussions are: CNRS, AUTH, INGV, ETH. At the same time different initiatives are (being) implemented in which the use and storage of site characterization information are fundamental, e.g. the ESM (European Strong Motion database and the EGD (European Geotechnical Database). For harmonization purposes within the different solid Earth services and products (e.g. EPOS) site information has to be standardized in XML format (e.g. SiteXML). Currently a working version of SiteXML is in place as part of QuakeML2.0 (Appendix A). Ideally, coordination and homogenisation of best practice with global agencies like COSMOS should be sought.

Including site characterization in the current FDSN standardized metadata model for stations, StationXML, is a challenge. The current omission is partly due to lack of an internationally accepted standard for these parameters and the inherently time consuming process to discuss, accept and standardize such parameters on a global scale. SERA work package NA5 evaluated, through an international questionnaire (deliverable D7.2), the most relevant site characterization indicators as agreed upon today by the scientific community. This is the first attempt to move forward to reach high-level metadata standardization for site characterization.

The recommendations of this working group provided the following list of indicators whose percentage of “mandatory” answers exceeds 40% (percentage is related to the Questionnaire answers).

Indicator	Mandatory
f_0	>80%
$V_S(Z)$	>60%
V_{S30}	>60%
Surface geology	>60%
Depth seismic bedrock	>50%
Depth engineering bedrock	>50%
Soil class	>50%
Site transfer function	>40%
V_s seismic bedrock	>40%
HV curve	>40%

Without a current existing European database for site characteristics and access tools based on (standardized) webservices a pragmatic approach will be taken by the seismological waveform community to include site characterization metadata in addition to standardized station metadata. This is done by using the <ExternalReference> element available in the StationXML structure, containing the URL to a Site Characterization XML file that currently can be hosted by an authoritative data center or the network operator. Such a link allows the usage of SiteXML in, for example, the StationBook service to expose this information through EIDA. The SiteXML file can be maintained and updated by the station owner to ensure up-to-date and complete scientific contents according to the current status of detailed information and scientific knowledge. Although this is not the preferred sustainable solution it is currently the most pragmatic one until the site characterization community establishes a dynamic site characterization database together with access tools based on (standardized) web services.

The new version of the Station Book (https://orfeus-eu.org/stationbook/), developed within the SERA framework, has been designed with modularity and extensibility in mind. It allows fast and low-cost adjustments on all levels (data models, logic and behaviour, presentation) to satisfy the rapidly changing user requirements. Utilizing those possibilities, the newly proposed site characterization metadata model can be swiftly added to the application and presented to the user in a clean, readable manner while fully upholding to its federated data dissemination policy which gives all authorized data centers right and possibility to easily expose files containing site characterization information.

By using the standard FDSNWS-Station query output (StationXML) a) an URL (on the station level) to the site characterization metadata is provided (see example below), b) the system can retrieve the station characterization information from an authoritative data center in real time, and c) the information can be extracted and rendered to the page associated with the given station. This flexible mechanism allows easy updates of the site characterization data and even minor changes in the SiteXML format id required.

5. Conclusions

Implementing new standard metadata models, or extending existing ones, in the framework of EIDA and beyond is a complex and slow process. Different stakeholders need to be involved, and existing systems need to be aligned to meet current, common scientific acceptance. We have shown successful results on three different levels: EIDA, EPOS and FDSN: a) the standardization and implementation of a routing system in EIDA to provide metadata on existing services and where to find them; b) the implementation of DOIs in StationXML on a global level (FDSN) to improve visibility of networks and foster proper acknowledgement of data providers; and c) the flexibility of the current system to include additional metadata in StationXML (site characteristics).

6. Appendices

Appendix A: Implementation of external metadata in EIDA StationXML.

This appendix provides example information on referring to external metadata (like Site Characteristics) in StationXML. By parsing this external piece of information (e.g. SiteXML file) such information can be propagated to the research community through standardized services (e.f fdsnws_station, EIDA StationBook etc.).

```
<fsx:Station alternateCode="" code="" endDate="" historicalCode="" restrictedStatus="" startDate="" xmlns:fsx="http://www.fdsn.org/xml/station/1">
  <fsx:Description>{0,1}</fsx:Description>
  <fsx:Comment id="">{0,unbounded}</fsx:Comment>
  <fsx:Latitude datum="WGS84" minusError="" plusError="" unit="DEGREES">{1,1}</fsx:Latitude>
  <fsx:Longitude datum="WGS84" minusError="" plusError="" unit="DEGREES">{1,1}</fsx:Longitude>
  <fsx:Elevation minusError="" plusError="" unit="METERS">{1,1}</fsx:Elevation>
  <fsx:Site>{1,1}</fsx:Site>
  <fsx:Vault>{0,1}</fsx:Vault>
  <fsx:Geology>{0,1}</fsx:Geology>
  <fsx:Equipment resourceId="">{0,unbounded}</fsx:Equipment>
  <fsx:Operator>{0,unbounded}</fsx:Operator>
  <fsx:CreationDate>{1,1}</fsx:CreationDate>
  <fsx:TerminationDate>{0,1}</fsx:TerminationDate>
  <fsx:TotalNumberChannels>{0,1}</fsx:TotalNumberChannels>
  <fsx:SelectedNumberChannels>{0,1}</fsx:SelectedNumberChannels>
  <fsx:ExternalReference>{0,unbounded}</fsx:ExternalReference>
  <fsx:Channel alternateCode="" code="" endDate="" historicalCode="" locationCode="" restrictedStatus="" startDate="">{0,unbounded}</fsx:Channel>
</fsx:Station>
```

Appendix B: QuakeML2.0 Site Characterization

Site.XML has been created to exchange site characterization information for permanent seismic stations. The content is based on QuakeML (https://quake.ethz.ch/quakeml/QuakeML2.0) and the EGD level1 description. The content fulfills information required by the European Geotechnical Database (EGD) and by SERA.

A sample Site.XML file can be found here.

https://gitlab.com/resif/site-characterization/-/raw/master/XML/SiteOGPC_SERA.xml

with an example of how to include it as ExternalReference in StationXML:

```
<ExternalReference>
  <URI>https://gitlab.com/resif/site-characterization//raw/master/XML/SiteOGPC_SERA.xml
  </URI>
  <Description>Site characterization RA.OGPC. Updated 2020-04-17</Description>
</ExternalReference>
```

Full example of StationXML:

https://ws.resif.fr/fdsnws/station/1/query?network=RA&level=channel&format=xml&nodata=404&station=OGPC&refreshcache

Contact

Project lead	ETH Zürich
Project coordinator	Prof. Dr. Domenico Giardini
Project manager	Dr. Kauzar Saleh
Project office	ETH Department of Earth Sciences
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Project website	www.sera-eu.org