

# D6.6 Database web portal final version

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Database web portal final version D6.6

Issue 1.0

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**SEN3APP**

**Processing Lines And Operational Services Combining Sentinel And In-Situ Data For Terrestrial Cryosphere And Boreal Forest Zone**

**FP7 Grant agreement No 607052**



# Document History

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<b>Date</b>	<b>Update</b>	<b>Contributor</b>	<b>Organization</b>
04/10/2016	Initial draft	Mwaba Hiltunen	FMI
11/10/2016	Section 1, 2 and 3	Mwaba Hiltunen	FMI
11/10/2016	Input to Section 3.4	Cemal Melih Tanis	FMI
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25/10/2016	Final document	Mwaba Hiltunen	FMI

# Document Release Sheet

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<b>Book captain:</b>	Mwaba Hiltunen (FMI)	Sign	Date
<b>Approval (lead contractor for WPX)</b>	Name (ORG)	Sign	Date
<b>Endorsement:</b>	Ali Nadir Arslan, Project Manager, (FMI)	Sign	Date

<b>Dissemination level</b>	
Public	<b>X</b>
Restricted to a group (including the Commission Services) specified by the consortium	
Confidential, only for members of the consortium and for the Commission Services	

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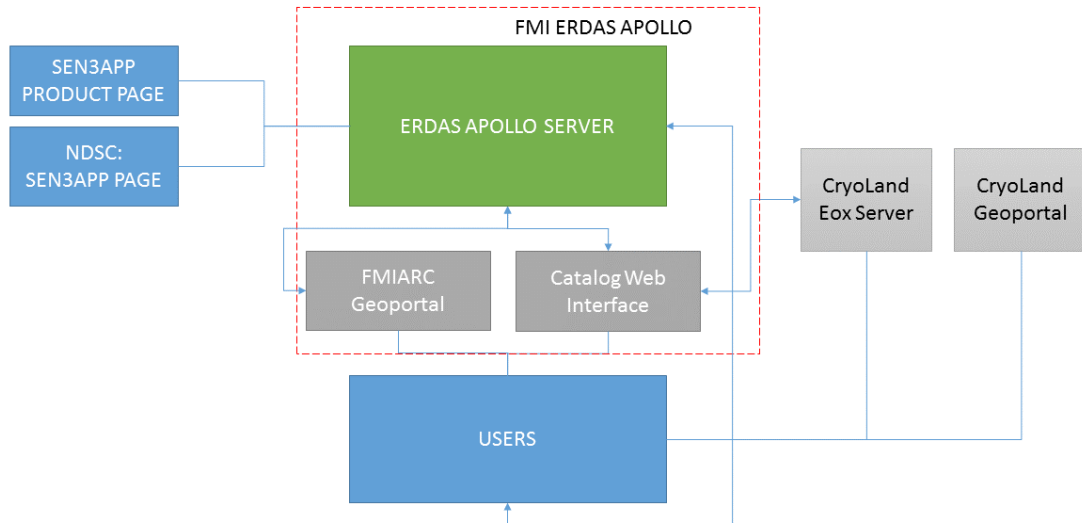
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**Acronym:**

CGS	Collaborative Ground Station
CSW	Catalogue Service for the Web
DHuS	Data Hub Service
ebRIM	ebXML Registry Information Model
ENVEO	Environmental Earth Observation IT GmbH
EO-WCS	Earth Observation - Web Coverage Service
EO-WMS	Earth Observation - Web Map Service
EO-WPS	Earth Observation - Web Processing Service
EOX	EOX IT Services GmbH
ESA	European Space Agency
FMI	Finnish Meteorological Institute
FTP	File Transfer Protocol
HTTP	HyperText Transfer Protocol
ICT	Information and Communication Technology
NSDC	National Satellite Data Centre
OGC	Open Geospatial Consortium
SOS	Sensor Observation Service
WCS	Web Coverage Service
WMS	Web Map Service

# 1 Introduction

This document describes the final version of the database web portal for the SEN3APP products and Sentinel data. Based on the deliverable D6.5, FMI's existing infrastructure and the CryoLand system have been utilized. Figure 1.1 gives an overview of the overall database web portal system in SEN3APP.

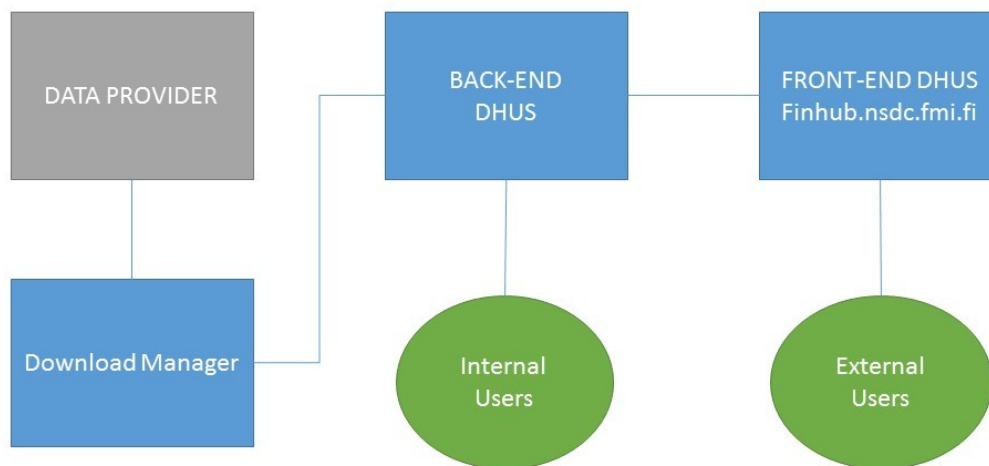


**Figure 1.1 Overview of the database system**

As can be seen from Figure 1.1, SEN3APP products are disseminated from two interfaces, FMI Erdas Apollo system and CryoLand system. The FMI Erdas Apollo system is a data dissemination instance of the Finnish National Satellite Data Centre located in Sodankylä. The CryoLand system is powered by the EOxServer software which was developed within the EU FP7 project CryoLand (2011-2015). The CryoLand system is hosted by ENVEO. The following chapters will summarize the features of the final implementation of the SEN3APP database web portal system.

## 2 Sentinel Data

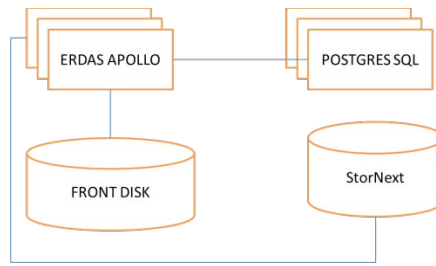
Sodankylä site now hosts the Finnish Collaborative Ground Segment which is providing ESA Sentinel data. Sodankylä National Satellite Data Centre focuses on fast delivery remote sensing product generation for scientific and commercial uses. The data centre's high performance computer arrays are capable of processing vast amounts of satellite data to value adding products to various users. The products can be delivered directly to customer or to large data archives for bulk use. Satellite data and products can be transferred to users with no delays using high speed optical fibre. Figure 2.1 shows the Sodankylä NSDC DHUS system for delivering ESA Sentinel data.



**Figure 2.2 Sodankylä NSDC FINHUB DHUS system**

## 3 FMI Erdas Apollo System

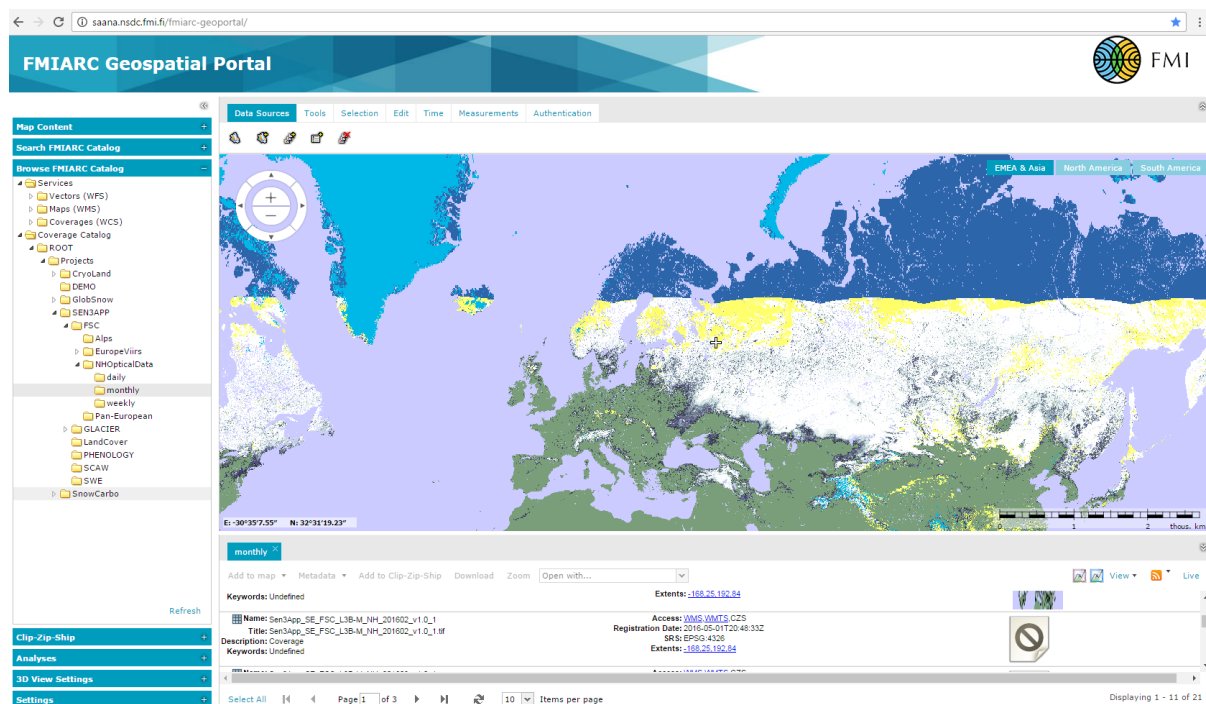
The FMI Erdas Apollo System is powered by Erdas Apollo. Erdas Apollo is an interoperable OGC/ISO-based commercial application that implements an out-of-the-box service-oriented architecture (SOA). It is implemented on a geospatial platform that enables high performance OGC web services from the FMIARC catalog. Users can interact with the FMIARC catalog directly using a Web Coverage Service (WCS) interface, a Web Map Service (WMS) interface, the Web Feature Service (WFS) interface, and the Web Registry Service (WRS) interface. All of these interfaces are compliant with the standards established by the Open Geospatial Consortium (OGC).



**Figure 3.3 FMI Erdas Apollo system**

### 3.1 FMIARC-GeoPortal

The FMI ERDAS APOLLO system provides a friendly graphical user interface, the FMIARC- GeoPortal. The FMIARC-GeoPortal enables to users to search, view, and download the data in the catalog that has been made accessible to them. The FMIARC-GeoPortal is a web client that enables the distribution of SEN3APP imagery and data available to all of the different users who need the products. The portal enables users to interact with the FMIARC Erdas Apollo server. Figure 3.2 shows a screenshot of the FMIARC- GeoPortal. The key features of the GeoPortal were highlighted in the deliverable 6.9 technical material and handouts for user training.

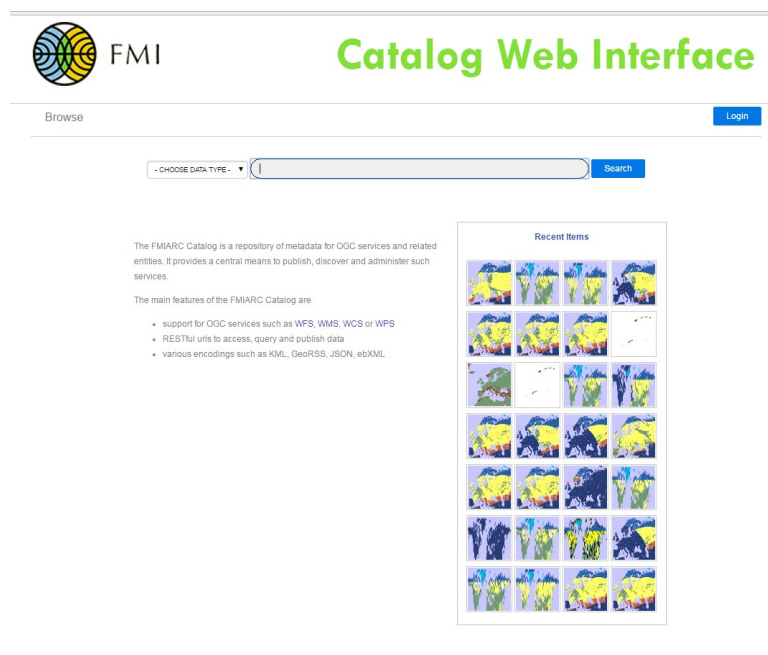


**Figure 3.2 <http://saana.nsdcm.fmi.fi/fmiarc-geoportal/>**



## 3.2 FMIARC Catalog Web Interface

Another user interface provided by the FMI Erdas Apollo System is the FMIARC Catalog web Interface. The interface offers a means for users to browse through the FMIARC Catalog. The FMIARC Catalog is a repository of metadata for OGC services and related entities. It provides a central means to publish, discover and administer such services. The main features of the FMIARC Catalog are support for OGC services such as WFS, WMS, WCS or WPS RESTful urls to access, query and publish data various encodings such as KML, GeoRSS, JSON, ebXML.



**Figure 3.3 FMIARC Catalog Web Interface**  
<http://saana.nsdci.fmi.fi/erdas-apollo/catalog/>

## 3.3 Data management and Data ingestion

Data from databases, geospatial imagery, vector, terrain, LAS, any OGC-compliant third-party web service, and business data (documents, movies, pictures, URLs, any electronic content) can easily be catalogued into the FMI Erdas Apollo system. Data can be located remotely or locally. For SEN3APP products the StorNext system is used for data storage.

The StorNext system is monitored and maintained by the FMI's ICT department. They take into account all the security and backup of the storage. When the product processing lines push the products to a SEN3APP directory on StorNext, the files are then catalogued to the Erdas Apollo system using crawlers. These geospatial information crawlers are scheduled server jobs which continuously monitor the SEN3APP storage directory in for incoming

products. The crawlers check the directory for new products every hour, for the products generated three times a day and monthly for the monthly aggregate products. One good feature with the crawlers is that one can set up listeners on directories to automatically crawl for many different data types and file formats for instance raster, vector and multimedia files. In SEN3APP some of the file formats ingested are CSV and GEOTIFF.

The CryoLand web services have been published to the FMIARC metadata catalogue which harvests the web services metadata, including spatial extent, keywords, title, and thumbnails. Web services metadata are automatically exposed through an OGC-compliant CSW ebRIM web interface, as well as through RESTful endpoints. Hence users can browse the FMIARC metadata catalogue from one point when searching for available SEN3APP products.

### 3.4 SEN3APP products page

The page provides detailed information about how to download and access all the products that are provided within the SEN3App project. SEN3App products page is created under the SEN3App webpage (<http://sen3app.fmi.fi/>) and available from <http://sen3app.fmi.fi?page=Products>. In the page, the products generated within the project, are described and information on how to access the products is provided. For each product, a specific page, where the detailed information and previews can be found, is created and available from the links in the product page. This are shown in Figure 3.5 and 3.6.

### 3.5 NSDC: SEN3APP Page

NSDC SEN3APP page provides information about data products generated within the project and also links to download products.

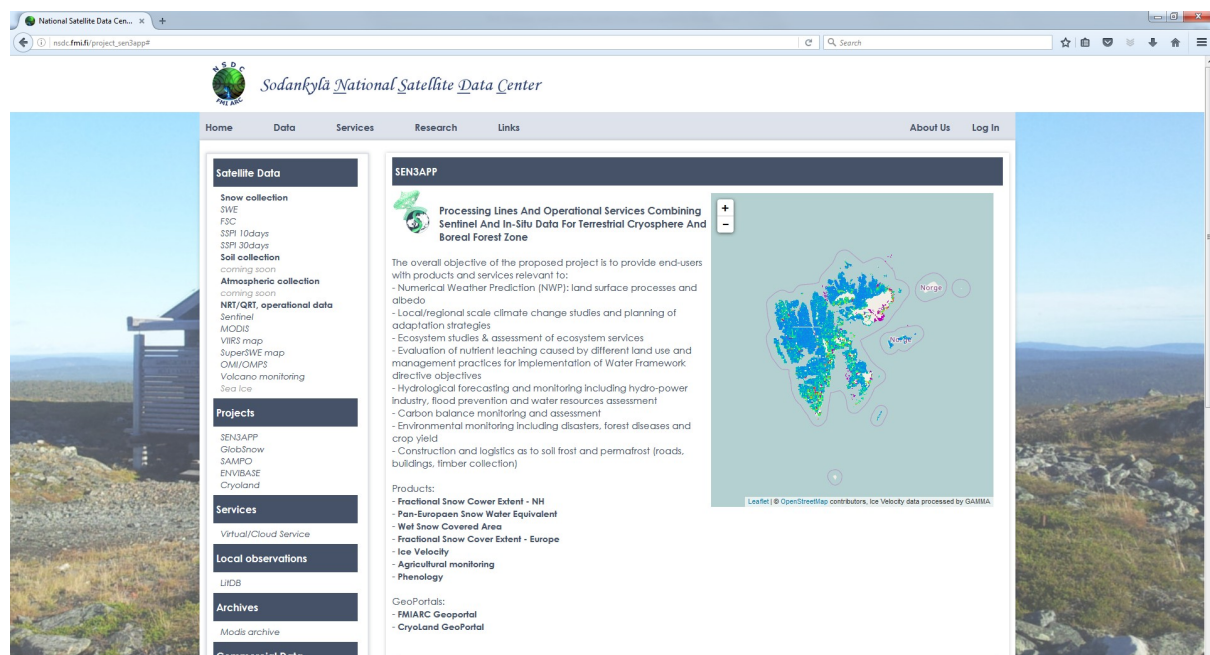


Figure 3.4 [http://nsdc.fmi.fi/project\\_sen3app](http://nsdc.fmi.fi/project_sen3app)



# SEN3APP

PROCESSING LINES AND OPERATIONAL SERVICES COMBINING SENTINEL AND  
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**Fractional Snow Cover Extent - NH**

**Pan-European Snow Water Equivalent**

**Wet Snow Covered Area**

**Fractional Snow Cover Extent - Europe**

**Ice Velocity**

**Agricultural monitoring**

**Phenology**

**FMIARC GeoPortal**

**CryoLand GeoPortal**

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**Notice board**

06-10-2016: [8th EARSeL Workshop on Land Ice and Snow will be held in Bern, 7 - 9 February 2017.](#)

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**Internal Login:**

Username

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Login

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**Questions & Comments Form**

## Fractional Snow Cover Extent for Northern Hemisphere from Optical Data (FMI & SYKE)

**Product Code & Name**

Fractional Snow Cover Extent

**Contact**

Dr. Kari Luojus, Finnish Meteorological Institute  
Email: kari.luojus () fmi.fi

Dr. Sari Metsämäki, Finnish Environment Institute  
Email: sari.metsamaki () ymparisto.fi

**Overview**

The Daily Fractional Snow Cover (DFSC) product provides the fractional snow cover (FSC) in percentage (%) per grid cell for all satellite overpasses of a given day. The product represents the best estimate of today's snow cover. If there are multiple snow observations (only far north within a day), the satellite observations applied are those giving best solar illumination (highest solar elevation). The product is generated for each day based on a 24 hours' time window limited by sunlight. The product is produced and made available for each day in near real time.

**Data Portals**

- [FMIARC GeoPortal](#)
- [SEN3APP Snow Extent Data HTTP Access](#)

**Validation Status**

The VIIRS based product has not been validated, but the algorithm behind it (applied to nearly corresponding sensors) has undergone extensive validation. We refer here to the description of GlobSnow SE product (Metsämäki et al., 2015) where some validation is presented and to the actual the validation report from GlobSnow product (available on request from Kari Luojus, FMI).

Metsämäki, S., Pulliainen, J., Salminen, M., Luojus, K., Wiesmann, A., Solberg, R., Böttcher, K., Hiltunen, M. and Ripper, E., "Introduction to GlobSnow Snow Extent products with considerations for accuracy assessment", Remote Sensing of Environment, Vol. 156, January 2015, pp. 96-108, doi: 10.1016/j.rse.2014.09.018.

Bippusaari, G., Nagler, T., Ripper, E., Hüsler, F., Wunderle, S., Metsämäki, S., Böttcher, K., Foppa, N., Fontana, F., Schöner, W., Unger, R., Malnes, E., Hindberg, H., Solberg, R., Due Trier, O., Luojus, K., Hiltunen, M., Pulliainen, J. and Pinnock, S. (2014) Full Snow Extent Validation and Intercomparison Report. ESA DUE GlobSnow-2, Del. 21. Publication in preparation.

**User Guide**

The description of the NH FSC product is in preparation. The description to the legacy FSC product, which is applicable for most parts is available here:  
[http://www.globsnow.info/se/GlobSnow2\\_SE\\_SWE\\_Product\\_User\\_Guide\\_v1\\_r1.pdf](http://www.globsnow.info/se/GlobSnow2_SE_SWE_Product_User_Guide_v1_r1.pdf)

**Algorithm Theoretical Basis Document**

The algorithm is described in:  
Metsämäki, S., Pulliainen, J., Salminen, M., Luojus, K., Wiesmann, A., Solberg, R., Böttcher, K., Hiltunen, M. and Ripper, E., "Introduction to GlobSnow Snow Extent products with considerations for accuracy assessment", Remote Sensing of Environment, Vol. 156, January 2015, pp. 96-108, doi: 10.1016/j.rse.2014.09.018.

Additional information regarding the algorithm can also be found in the User Guide.

**Spatial Coverage & Resolution**

Northern Hemisphere Spatial resolution: 1000m, (in future 500m)

**Temporal Coverage & Resolution**

Daily product, Weekly and Monthly aggregate products

**Platform(s)**

Suomi NPP

**Sensor(s)**

VIIRS

**Data Format (s)**

NetCDF, GeoTIFF

**Version**

V1.0

**Producers**

FMI and SYKE

**Data Policy**

Data are provided free of charge during the project period for non-commercial usage

**Access**

Products will be provided through the [FMIARC GeoPortal](#).  
Available via [http](#), [wms](#) and [wcs](#).



Leaflet | © OpenStreetMap contributors, Daily Fractional Snow Cover data processed by FMI, Weekly Fractional Snow Cover data processed by FMI, Monthly Fractional Snow Cover data processed by FMI

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**Figure 3.5** [http://sen3app.fmi.fi/index.php?page=Fractional\\_Snow\\_Cover\\_Extent\\_-\\_NH&style=main](http://sen3app.fmi.fi/index.php?page=Fractional_Snow_Cover_Extent_-_NH&style=main)



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**Questions & Comments Form**

**Products**

In these pages, the products generated within the EU FP7 project SEN3APP are described and information on how to access the products is provided.

SEN3APP products can be downloaded via the FMIARC GeoPortal (<http://saana.nsdcm.fmi.fi/fmiarc-geoportal>) and the CryoLand GeoPortal (<http://meso1.cryoland.enveo.at/cryoclient/>). For more information about the FMIARC geoportal and the CryoLand GeoPortal contact Mwaba.Hiltunen () fmi.fi and gabriele.biopus () enveo.at, respectively.

Methods of downloading data:

- WebClient: FMIARC- GeoPortal and CryoLand GeoPortal
- FTP services
- Web Coverage Service (WCS)
- Web Map Service (WMS)
- Drop box
- Http

SEN3APP products are grouped into four categories; Land cover and phenology, Snow, Glacier and Lake ice products.

You may use the left side menu or the links below for details about the products and method to access each product. Pages for some products are not available yet.

[Product Description & Access document that includes all the products is available from here.](#)

**Snow Products**

- Fractional Snow Cover Extent for Northern Hemisphere from Optical Data (FMI & SYKE)
- High Resolution (5km) Pan-European SWE Product (Augmented Using Optical FSC Data) (FMI)
- Regional Wet Snow Cover from Sentinel-1 Data (ENVEO)
- Regional and Pan-European Fractional Snow Cover Product from Synergistic Sentinel-3 SLSTR/OLCI Data (ENVEO)
- Extended Baltic Sea Drainage Basin Direct Broadcast FSC Based on NPP VIIRS/Sentinel-3 SLSTR (SYKE & FMI)

**Lake Ice Product**

- Lake Ice Extent (SYKE)

**Glacier Products**

- Glacier Outlines (ENVEO)
- Ice Velocity (GAMMA)
- Ice Velocity (ENVEO)
- Snow / Ice Areas on Glaciers (ENVEO)

**Land Cover & Phenology Products**

- Crop / Vegetation Classification (SYKE)
- Phenology (SYKE)

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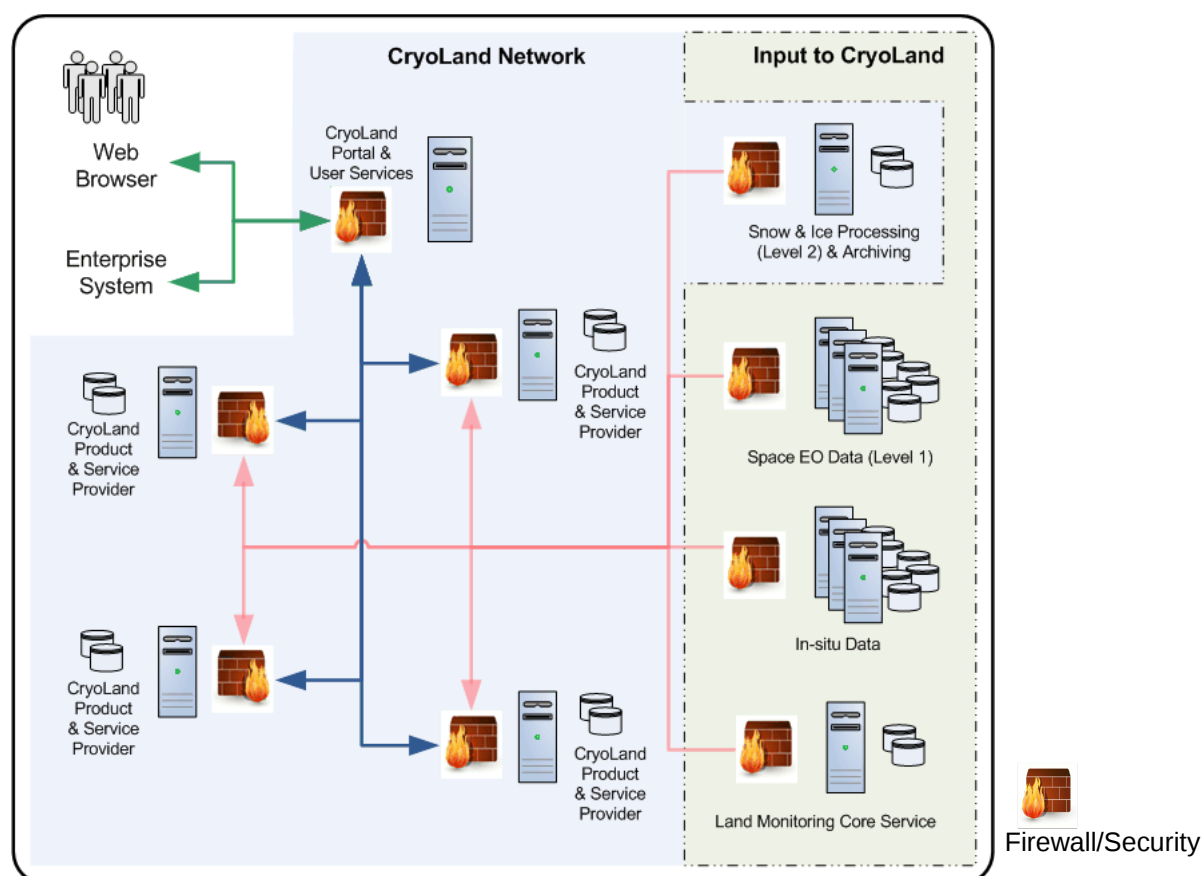


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**Figure 3.6** <http://sen3app.fmi.fi/index.php?style=main&page=Products>

## 4 CryoLand System

The CryoLand GeoPortal is the online data access point for snow and land ice services developed and established during the EU FP7 project CryoLand (No. 262925, 2011 - 2015). Products in the CryoLand system are generated and provided by different operators based on freely available satellite data, but for the end-user, all products are accessible via a centralized portal (Figure 4.4). The CryoLand system has a basic FTP Server hosted by ENVEO for storing most of the generated snow and land ice products. Some products are only made available via the FTP server of other product providers. These external FTP servers are also linked with the CryoLand system. The integration of the different products into the CryoLand system and the user interfaces are controlled via the Open Source EOxServer software (<http://eoxserver.org>) running on a virtual machine hosted by ENVEO. Services provided by the CryoLand GeoPortal are described in deliverable D5.5 – D5.8, the documentation of service demonstration and performance document.



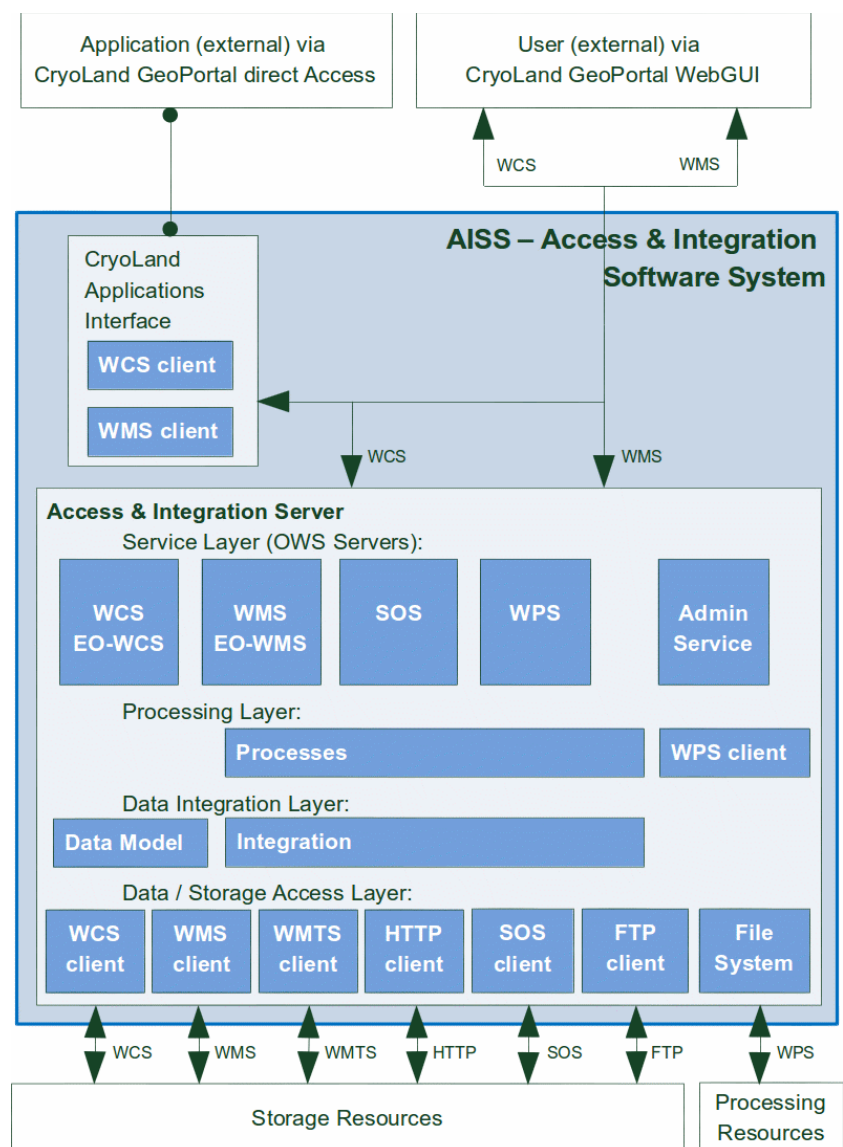
**Figure 4.4: Overview on the CryoLand system showing common resources and different service providers disseminated via a centralized interface to the end-users (figure by courtesy provided by EOx).**

### 4.1 Data management and Data ingestion

Snow and land ice products in the CryoLand system have been generated and provided by different partners of the CryoLand and SEN3APP consortium. All products include metadata meeting the INSPIRE standards, and are uploaded as compressed archive file (.tar.gz, .tgz) by different partners to the CryoLand

FTP server. The product generations, compilation of associated metadata files and data uploads are executed in most cases fully automated. Scripts of the Open Source EOxServer software system are checking regularly the availability of new products on the FTP server. Newly detected products are ingested into the CryoLand system and are then accessible through the CryoLand GeoPortal.

The general architecture of the CryoLand system is shown in Figure 4.5. The system includes various interfaces in the backend (FTP, HTTP, SOS, EO-WCS or WPS) for a maximum flexibility of the data transfer between the product providers and the centralized access and integration server. In the front end, standardized OGC web-service interfaces (EO-WMS and EO-WCS) are used to make the products easily accessible by end-users.

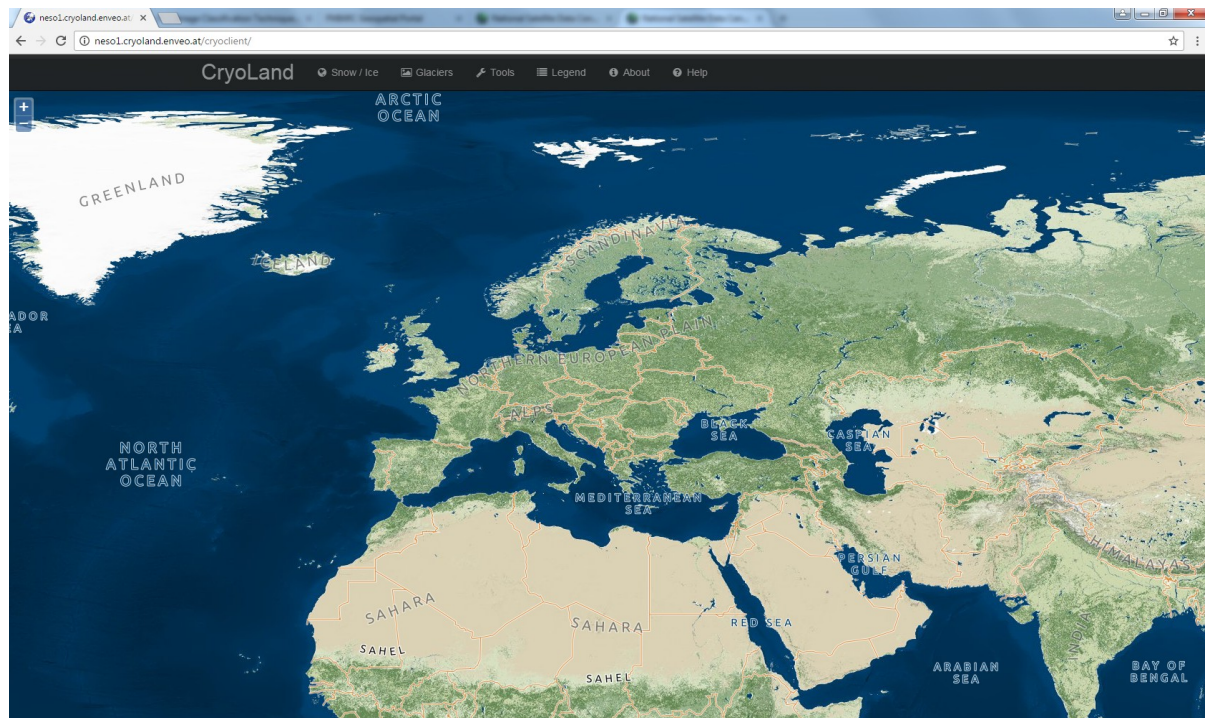


**Figure 4.5: Generalized architecture of the CryoLand system (by courtesy provided by EOx)**

## 4.2 CryoLand Geoportal

The CryoLand GeoPortal provides access to the products via an interactive graphical user interface (WebGUI, Figure 4.6), as well as through OGC

compliant web-service interfaces (EO-WMS, EO-WCS) for non-interactive access, e.g. for automated product downloads to a user's system.



**Figure 4.6: Starting website of the graphical user interface of the CryoLand GeoPortal to access the CryoLand and SEN3APP products (<http://neso1.cryoland.enveo.at/cryoclient/>).**

A detailed documentation on all features of the interactive graphical user interface (WebGUI) and an introduction how to access and download products archived in the CryoLand system either via the WebGUI or using OGC standards is available online from the Help menu of the WebGUI or from the CryoLand webpage (<http://cryoland.eu>).

Additionally, example scripts written in Python and IDL code are provided for download via the Help menu in the WebGUI or from the Download menu of the CryoLand webpage (<http://cryoland.eu/>) to support users with the automated download of products.