AGI SDI SERVER
Release 2011-04 RC1

CONTENTS

1. TECHNICAL DESCRIPTION

1.1. General concept

AGI SDI Server 2011 is a custom remastering of Debian Squeeze (version 6.0.1a), bundled with the best system management tools, spatial (geo-) data processing libraries, deployment containers, on-line data distribution services and web mapping interfaces. It is a complete Open Source Spatial Data Infrastructure (SDI) server solution, developed by a team of experts working at the Applied Research Center of the Institute of Aerial Geodesy in Kaunas (Lithuania) under the EC FP7-SPACE-2007-1 project *"Geoland2 - Towards an Operational GMES Land Monitoring Core Service"* (Grant Agreement No.218795). The abbreviation "AGI" stands for the Lithuanian name of the company UAB "Aerogeodezijos institutas" (Institute of Aerial Geodesy, also known as AGI - see Section 6 for details).

A distinctive feature of AGI SDI Server is that it is a highly customized system with a completely pre-installed setup of software and configuration of all elements, including even database containers, which makes it a fully functional ready-to-go out-of-the-box solution for powering large-scale Spatial Data Infrastructure (SDI), implemented on the basis of Open Source operating system and software technology. AGI SDI Server also includes customised scripts designed to automate the process of configuration and activation of SDI services with minimum input required from the Administrator.

The first version of the AGI SDI Server was released for operational testing by FP7 "Geoland 2" project team in late August 2009. It appeared in 4 variants (editions) - "LITE", "PRO", "COMBO" and "CAT" activating different applications for SDI services. The same concept of different servers with different level of complexity and functionality, dedicated for either small or large spatial data deployments will be maintained in future as well.

The second (updated) version of AGI SDI Server was released on April, 2011. It appears in 2 editions - "G2" and "FULL" (see section 1.3 of the current manual). Difference between editions is what services are running:

- "G2" edition by default has only WMS and CSW services enabled (other services are installed, but disabled);
- "FULL" edition has all services installed (disabled by default) - they can be enabled as needed.

1.2. Specifications

1.2.1. Linux Operating System

The first preview version of AGI SDI Server (2009) was released on June 27, 2009 and is based on Debian GNU/Linux 5.0.2. Testing of the system and updating the SDI applications with their new versions lasted for about 6 months, and the stable version was ready during the first week of 2010. Therefore we may consider the first (2009) release of AGI SDI Server as

an SDI platform providing the latest stable open source software released before the end of 2009.

Second preview version of AGI SDI Server (2011) was released on April 2011. All components were updated to current versions - operating system is Debian GNU/Linux 6.0.1a.

The current release of the Server is built on Linux kernel version 2.6. To avoid any possible hardware conflicts, we reduced the system down to the absolute minimum of interface requirements. There is no GUI interface in the current release of the AGI SDI Server 2011, instead of that we deployed the best available open source web applications dedicated for management of Linux operating systems and services (see Section 5 of the current manual). The AGI SDI Server 2011 uses all the latest versions of applications and libraries available from Debian 6.0.x repositories, and there are no system components and applications, which would be "locked" to a certain version with pending restrictions on upgrades.

1.2.2. SDI services

In Deegree 2.4, there are OGC WebServices for Web Map Service (WMS) 1.1.1, Web Feature Service (WFS) 1.1, Web Coverage Service (WCS) 1.0 and Catalogue Service Web-Profile (CSW) 2.0.2 available. WMS and WCS are the official reference implementations of the Open Geospatial Consortium; WFS and CSW are fully transactional. CSW supports ISO19115/ISO19119 Application Profile and DE-Profile 1.0.1. More details are available on Deegree 2.4 features web page.

GeoServer 2.0.3 is fully compliant to WMS 1.1.1, WFS (1.0 and 1.1, transactions and locking) and WCS (1.0 and 1.1) specifications, as tested by the CITE conformance tests. GeoServer additionally serves as Reference Implementation for WCS 1.1 and WFS 1.0 and 1.1. A detailed description of capabilities is presented in GeoServer features web page.

1.3. Pre-installed applications

AGI SDI Server has a complete set of tools and applications for effective and user-friendly management of the Linux system, it's users and databases, as well as support of the core Internet services, including file transfer protocols, web interfaces for building SDI, web mapping projects and publishing of the on-line content.

There are two AGI SDI Server 2011 activation options:

1. G2 (former COMBO) version (GeoServer WMS, Deegree CSW)
2. FULL version (services are enabled as needed)

The following table summarizes the most essential software applications and services pre-installed and configured on AGI SDI Server 2011 and activated with the above-mentioned 2 options:

APPLICATIONS	G2	FULL
System/database management tools:		
- SSH 5.5	+	+
- Midnight Commander 4.7.0	+	+
- Webmin 1.540	+	+
Relational databases:		
- PostgreSQL 8.4.7	+	+
- PostGIS 1.5.1	+	+
Internet servers:		
- *Apache2 2.2.9*	+	+
- *PHP5 5.2.6*	+	+
- Tomcat 6.0.28 (with Sun-Java6-JDK 6.24)	+	+
- ProFTPd 1.3.3	+	+
SDI applications:		
- GeoServer 2.0.3	+	*
- Deegree 2.4	+	*
- G2 soap2http-proxy (required for Deegree CSW)	+	*
SDI services:		
- WMS (Web Map Service)	+	*
- WFS (Web Feature Service)	-	*
- WCS (Web Coverage Service)	-	*
- CSW (Catalogue Service) with soap2http-proxy	+	*
- WPS (Web Processig Service)	-	*

Links to on-line documentation of the main web applications installed on the AGI SDI Server 2011 are available in Section 5 of the current manual.

1.4. Pre-configured databases

All the PostgreSQL/PostGIS databases loaded on the AGI SDI Server (except the GEODATA) are dedicated and connected to SDI web applications and interfaces. All the tables, functions and content of those databases are automatically generated by SQL scrips following the installation instructions of the corresponding applications. Those databases also contain some examples of data records used for testing of web applications, but deployment of new data records is perfectly possible as soon as the servers would become operational. The following table summarizes relational GIS-enabled databases pre-installed and configured on AGI SDI Server 2011:

DATABASES	**Description**
POSTGRES	PostgreSQL/PostGIS default system database.
POSTGIS	PostGIS database template with UTF-8 encoding - to be used for creation of new GIS-enabled (PostGIS) databases.
GEODATA	A general purpose spatial database for storing and processing attribute tables and vector data layers imported from external sources. Contains the following DB schemas : - public (default schema for the public access) ; - import (for importing shapes, temp. storage) ; - work (for processing of tables and features) ; - data (for storing of processed geo-data outside the public access area).
CSW	A special database pre-configured and connected to the Deegree Web Catalogue CSW application (see Section 5.4).

GEODATA is the only general-purpose AGI SDI Server database with pre-installed GIS functionality, which is intended to be used for deployment of the operational vector GIS datasets for further publishing through the available SDI services. Due to technological limitations of PostGIS, it is currently possible to load only attribute tables and vector data. PostGIS raster data functionality is under development.

Additional databases can be created by the user if needed.

1.5. Downloads

AGI SDI Server is distributed as ISO disk image files, which must be downloaded and either burned to CD or DVD disks using standard applications, or used as ISO installation media for virtual machines. The current repository of those ISO files is on a web server at the Institute of Aerial Geodesy in Kaunas (Lithuania) :

http://www.agi.lt/sdi-iso

ISO files of AGI SDI Server are named according to the year of release, also indicating if the system has support for 32 or 64-bit processors. Checksums (md5) of the ISO files (named accordingly) are provided for the download as well. The current Manual is available as a separate PDF file at the same FTP folder as the ISO images.

AGI SDI Server ISO files :

- **agi-sdi-server-2009-i386.iso** 32-bit (x86)
- **agi-sdi-server-2009-amd64.iso** 64-bit (x86_64)
- **agi-sdi-server-2011-G2_RC1-amd64.iso** 64-bit (x86_64)

For the operational "production" servers you should consider using modern hardware with sufficient storage capacity, processing power and memory. Please note that both modern Intel and AMD processors are designed to support 64-bit and 32-bit operating system architecture.
We recommend to use 64-bit version of AGI SDI Server.
For legacy systems, that do not support 64-bit instructions, 32-bit AGI SDI Server is available.

2. INSTALLATION OF THE SERVER

2.1. Preparation to install

Network connectivity

- DNS registration of your server hostname
- Firewall/router protected network with DMZ access to some ports
- Minimum: Tomcat (8080), FTP (21), SSH (22)
- Optional: HTTP (80)
- TCP/IP cable connection
    - Internet UPLOAD speed MUST be at least 2 Mbps, if you expect to use SDI Server in production environment.

Computer hardware

- Minimum: a modern PC with at least
- Intel Dual Core processor (64 bits)
- Minimum: 2 Gb of RAM (4 Gb recommended)
- At least 20 Gb HDD space + disk space for the datasets
- DVD-ROM reading device
- No special requirements for multimedia components
    - Video card, sound – not essential

Other requirements

- For servers, that MUST be operational on 24/7 basis:
- High-quality hardware components;
- UPS device is mandatory;
- Air-conditioning of the room may be also required (depending on the conditions)

Download an appropriate ISO image file from http://www.agi.lt/sdi-iso and "burn" the DVD disk by using any commercial or open source software on any operating system (e.g. Brasero on Ubuntu Linux). You can also use downloaded ISO image as is for virtual machine boot media. If you have "modern" processor, we strongly recommend using 64-bit distributions (Intel Dual-core processors support both 32-bit and 64-bit instructions) - this will allow you to install with more than 4GB RAM and provide significant improvement in performance, especially with large databases.

Before you start installation process, please read the current Manual - at least Sections 2 and 3 ("Installation" and "Configuration"). This will give you an insight on what software components are included into the operating system, and what are the obligatory post-install/ configuration steps to be performed before your server can be opened for public access.

2.2. Installation of the system

Insert the Live CD and start the PC. SDI Server operating system will start and load (as Live-CD) automatically. The system loads with pre-defined user "custom".

However, in order to start the installation process, you first have to switch from an ordinary user ("custom") to the system to administrator ("root"). Type command `sudo su` ("super-user") at the console . To switch back to the ordinary user account, type `exit` at the command prompt.

```
sudo su
...
exit
```

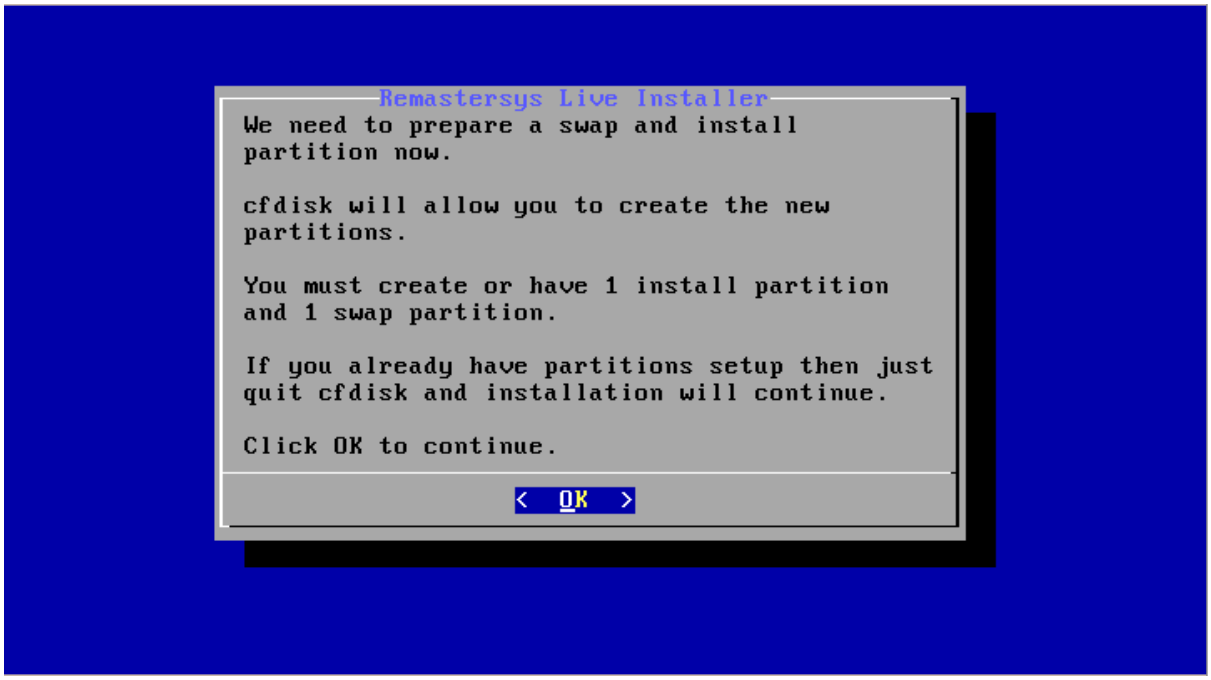
Installation of AGI SDI Server is guided by a special application called `rematersys-installer` which has a minimalistic, yet very straight-forward text interface with minimum questions to be answered. The most complicated part is disk partitioning with cfdisk program. It is a pretty simple and usual step for those with previous experience in Unix systems. However, if you are a new Linux user, we strongly advice you to read cfdisk pages in google and consult someone with experience in Unix/Linux filesystems.

To start the installation process, switch to the root user (by entering "`sudo su`" at the command prompt) and start installer :

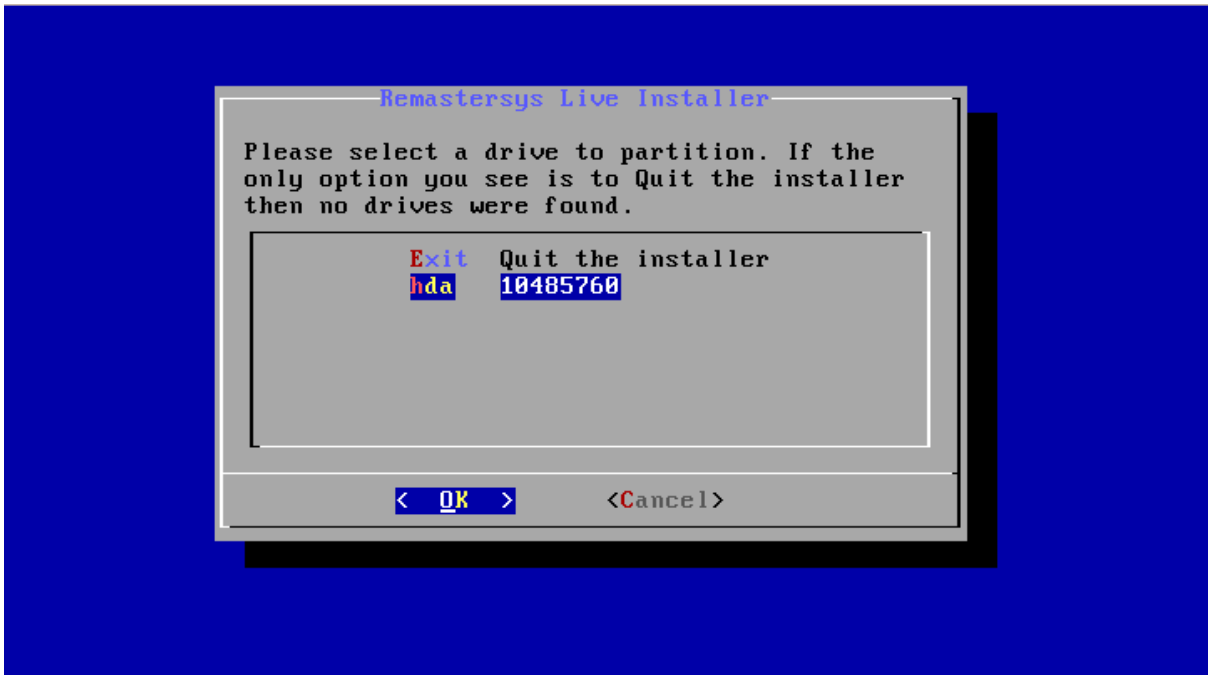
```
sudo su
remastersys-installer
```

SDI Server installation process will start with the following warning:

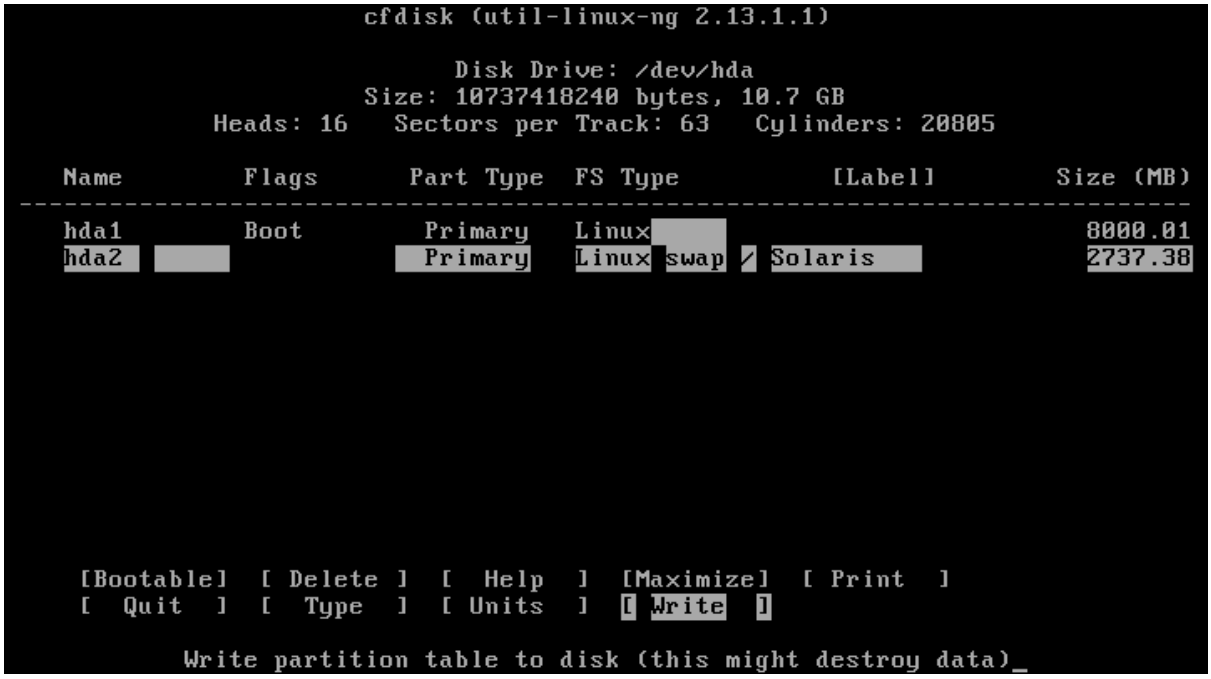
The first (and most complicated/important) stage of the server installation configures disk space for deployment of the operating system and your data. This is where the setup of the system will actually start. You'll be instructed how to proceed with disk partitioning:



Then, you will have to select a physical disk (hardware) for further partitioning:



After you choose the hardware, a special disk partitioning program, called `cfdisk`, will start:



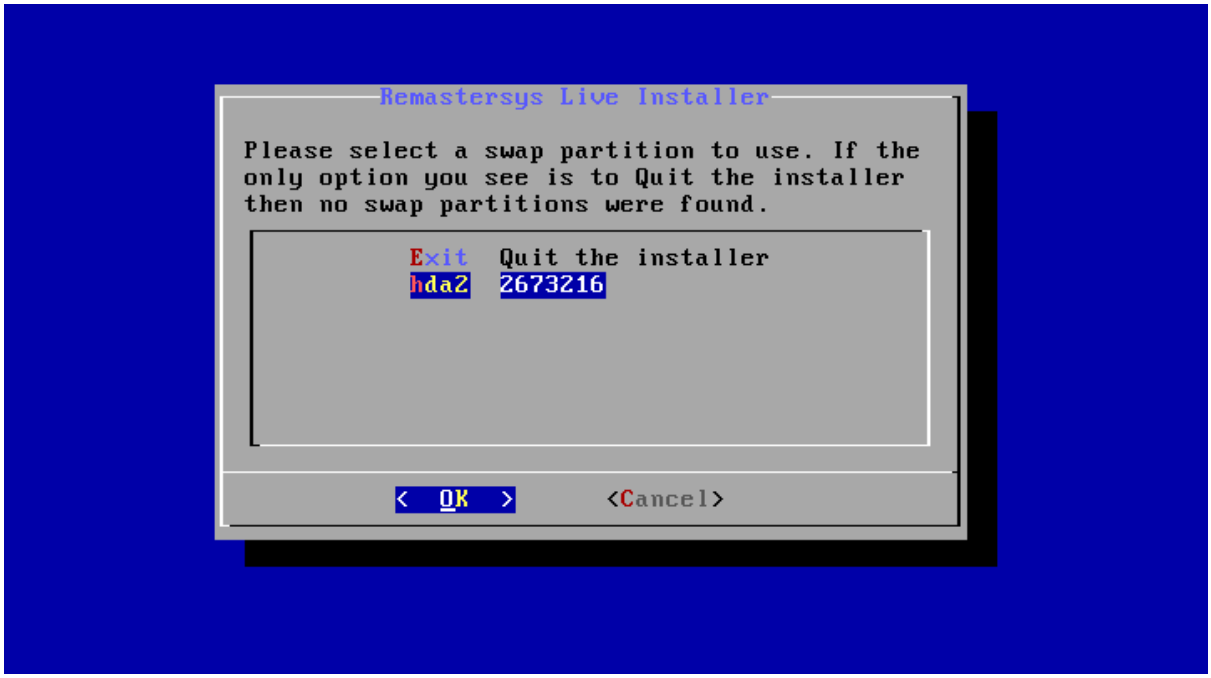
While using `cfdisk` utility, you must BE VERY CAREFUL - ALL DATA ON THAT DISK WILL BE LOST. A generic disk partitioning schema could look like this: first primary partition (e.g. sda1) of ext3 type (83) with boot flag can take the whole disk, while the second primary partition (e.g. ext2) of swap type (82) and the size of double your RAM can be created in the end of the disk.

The installer allows you to put /home folder to a separate partition, so you can optionally create a primary bootable (type 83) `sda1` partition for the system (/), primary (type 83) partition for user data (`/home`) and swap (type 82) partition for the swap space.

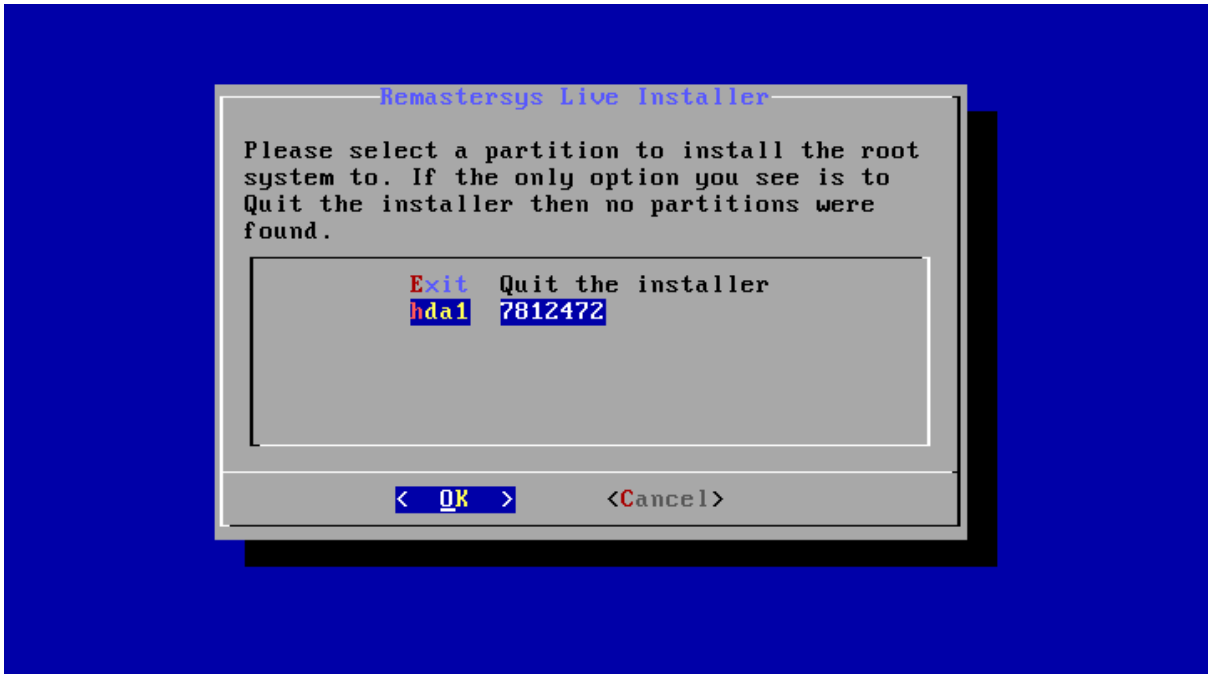
What partition layout to choose is up to you, but for testing purposes (or is you are unfamiliar with Linux operating system), 2 partitions (/ and swap) are enough.

After completing the disk setup, choose `[Write]` and `[Quit]`.

After you are done with disk partitioning, the installer will first ask you to identify swap space - you should select `sda5` the swap partition:

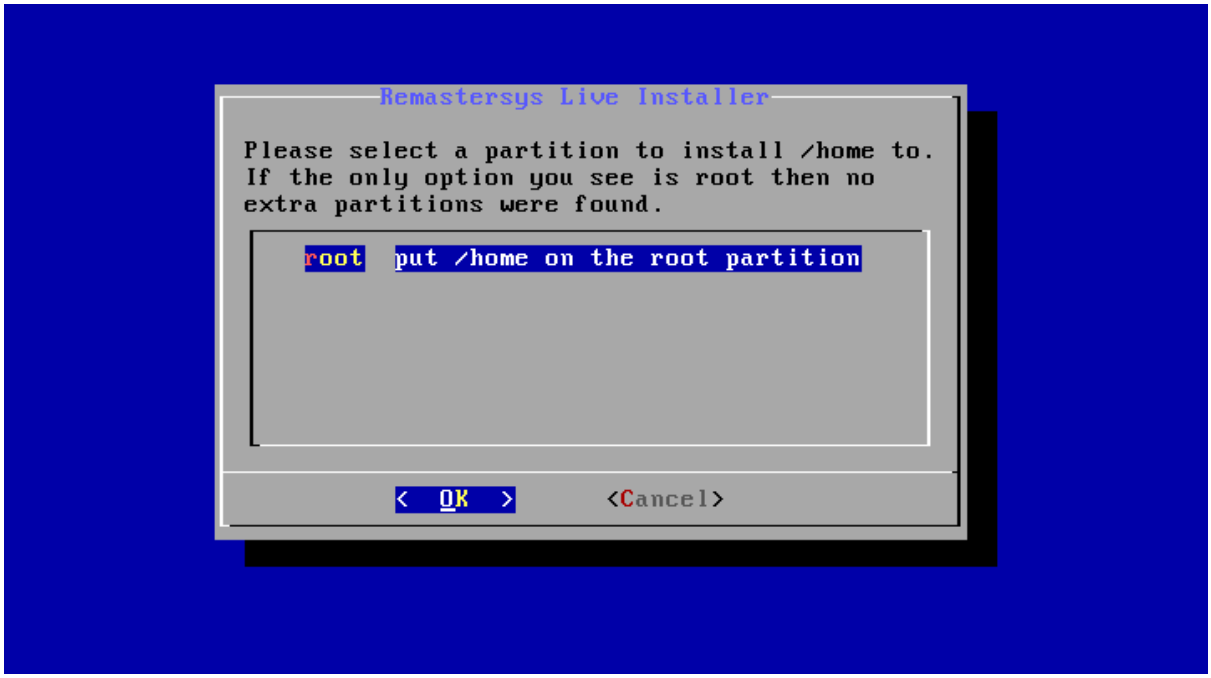


The next question is about root partition - you should select `sda1` as root partition of your system:

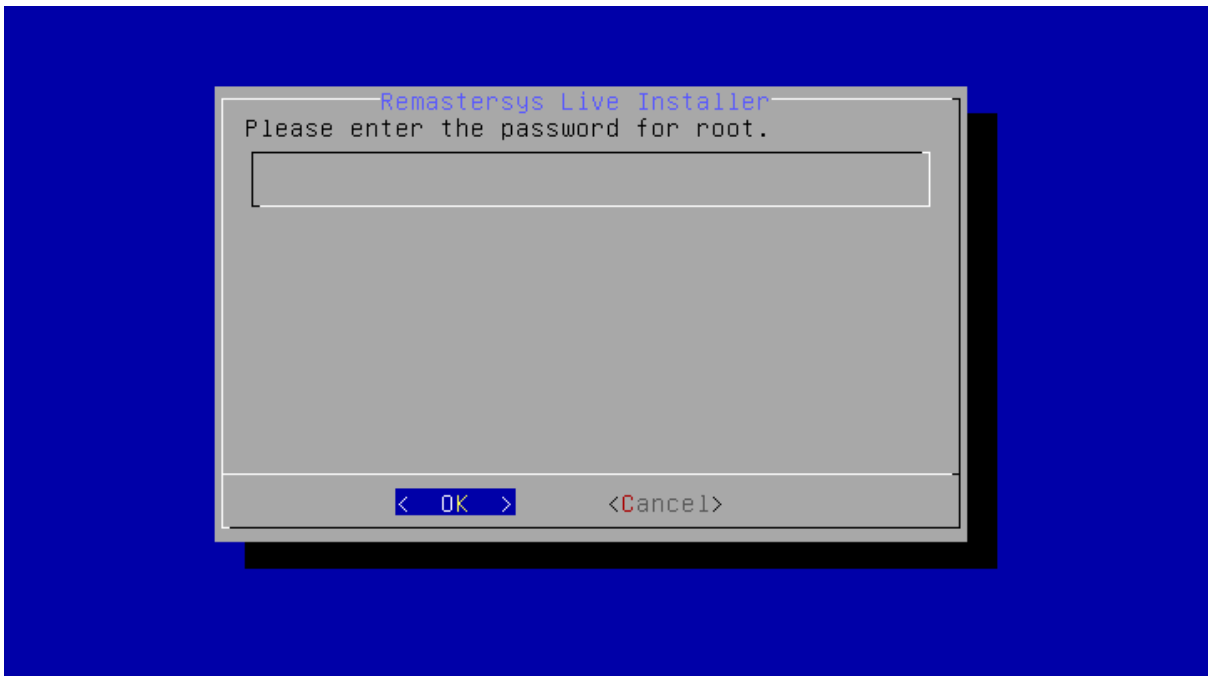


In next screen you will be asked to choose file system type for root partition - leave ext3 (default).

Then you will be warned that your /home folder will be placed at the same partition as /root (the system) - which is OK for the default configuration, as most of your data is likely to be located in the PostgreSQL/PostGIS database OR in `/sdi` folder:

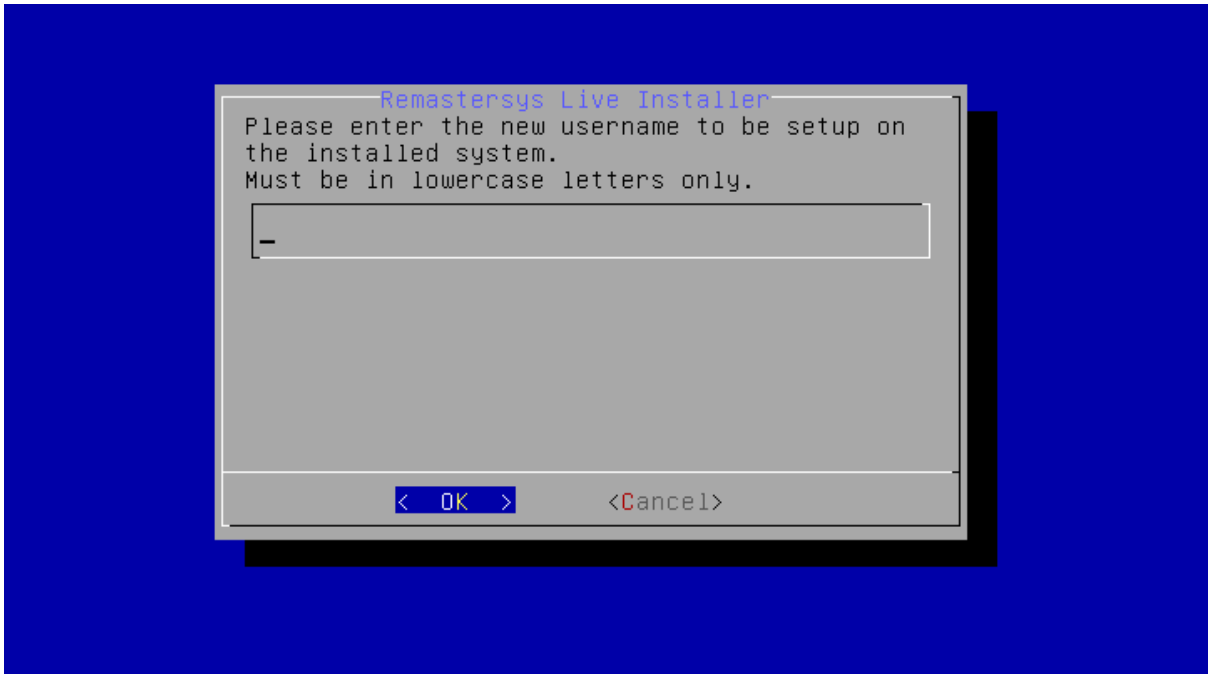


However, there is a possibility to create one separate partition for /home with remastersys-installer if you wish to do so. All partitions should be created in earlier stage with `cfdisk` utility.



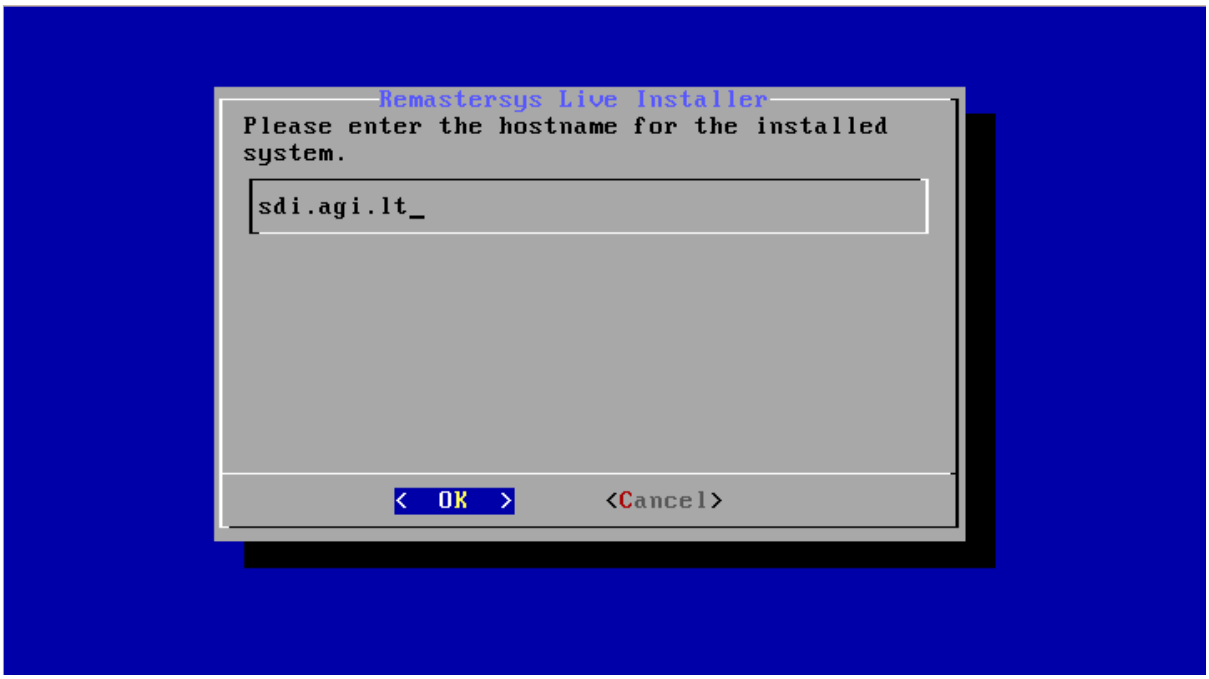
When asked, create (new) root password. Strong passwords should have at least 8 symbols (upper and lower case letters, numbers), or you can use pass-phrase (for example: password - fJk8ER2, passphrase - configuring5_this).

Then enter server user's real name (or just press ENTER), and username (you will use it to login):

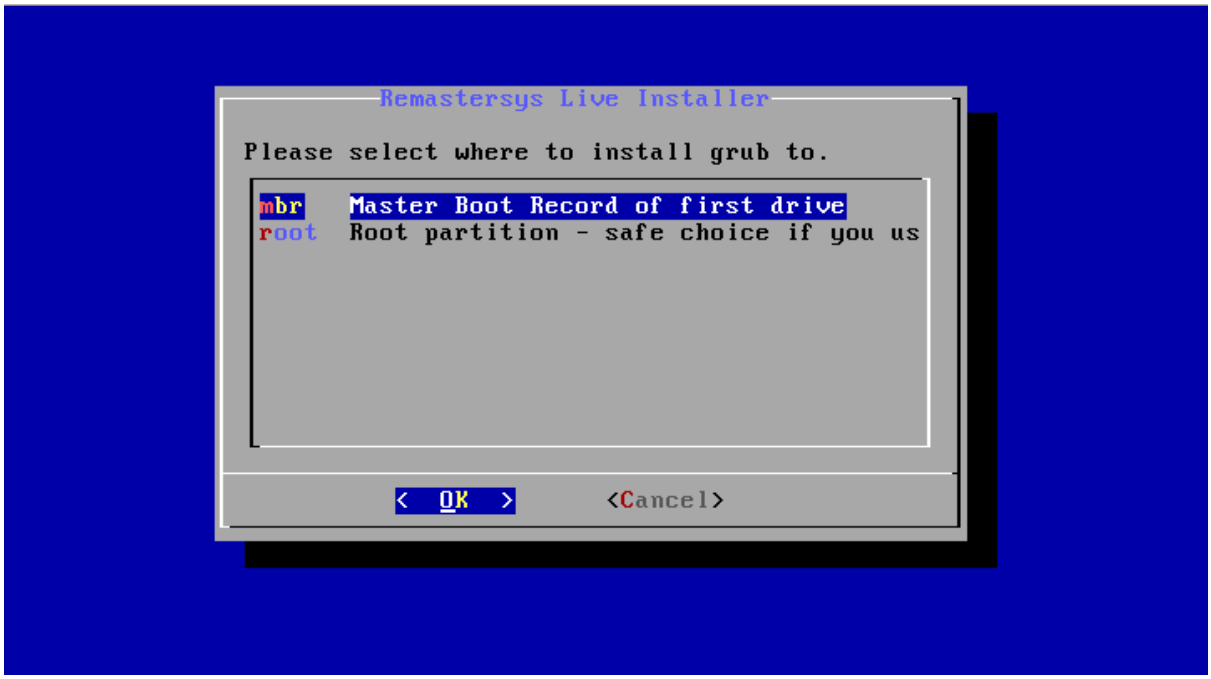


In next screen enter password for just created user. The same rules as for root password apply.
Note. Due to an error in current version of remastersys-installer, only `root` user is actually created.

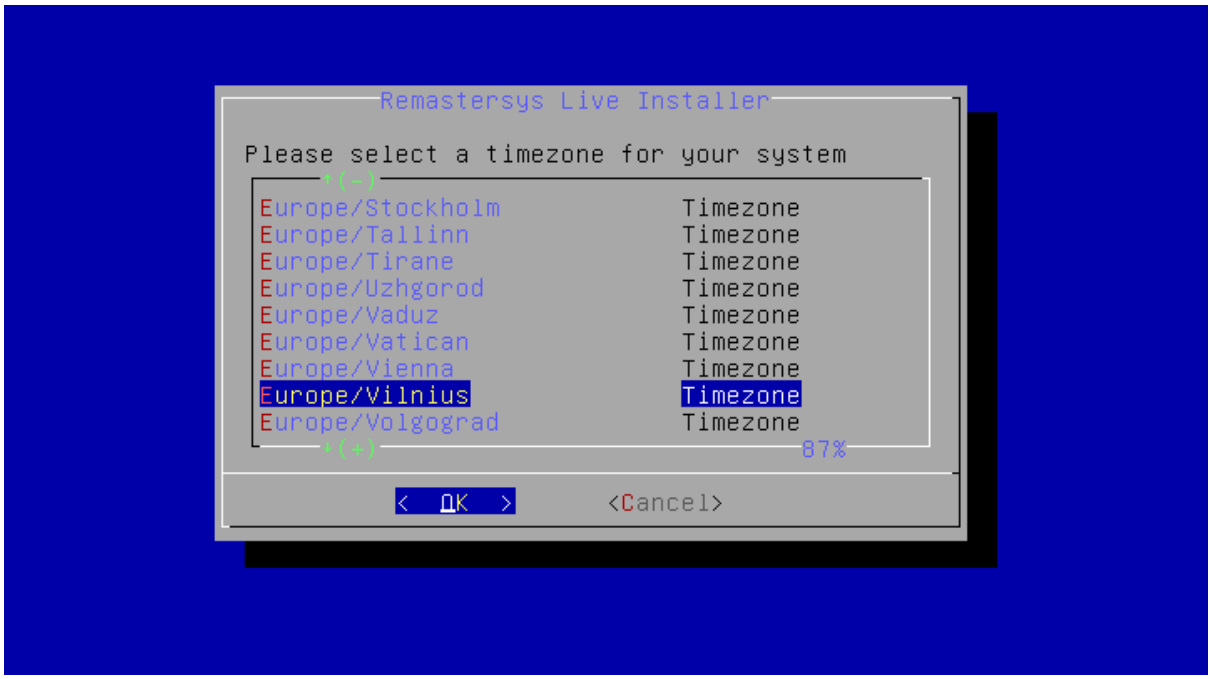
The installer then will also ask you for your server host name (consult your network administrator):



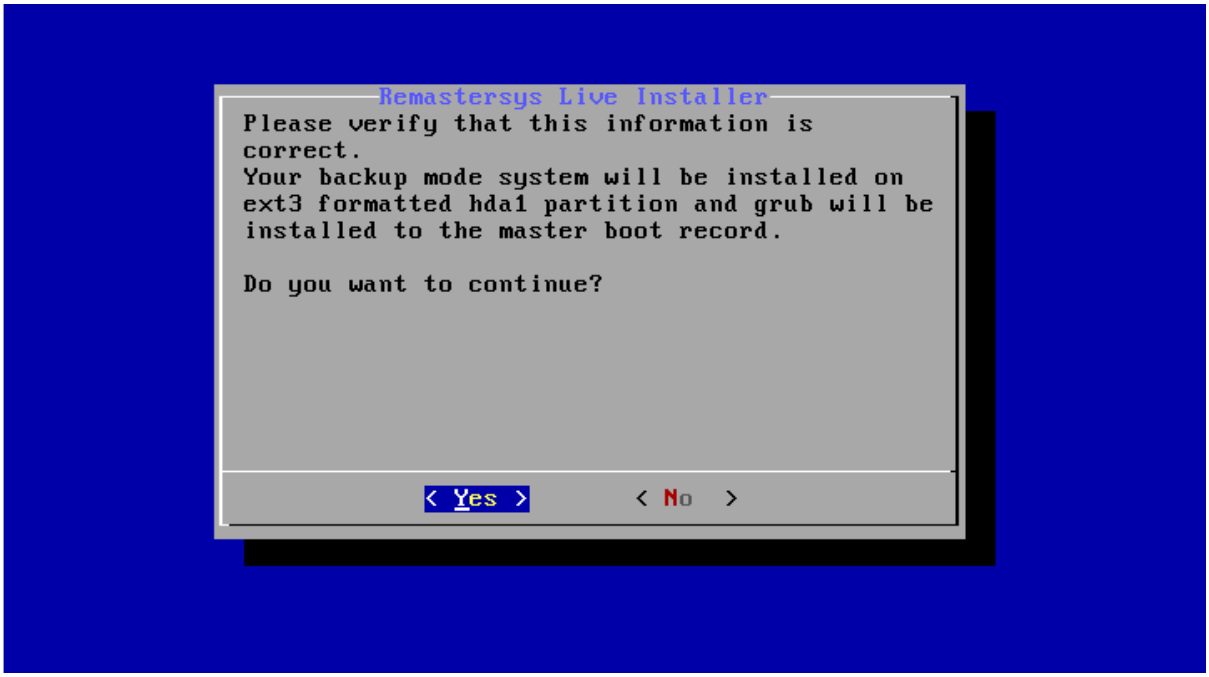
... and location to install system loader `grub` (the Master Boot Record - MBR - is a good choice for a server):



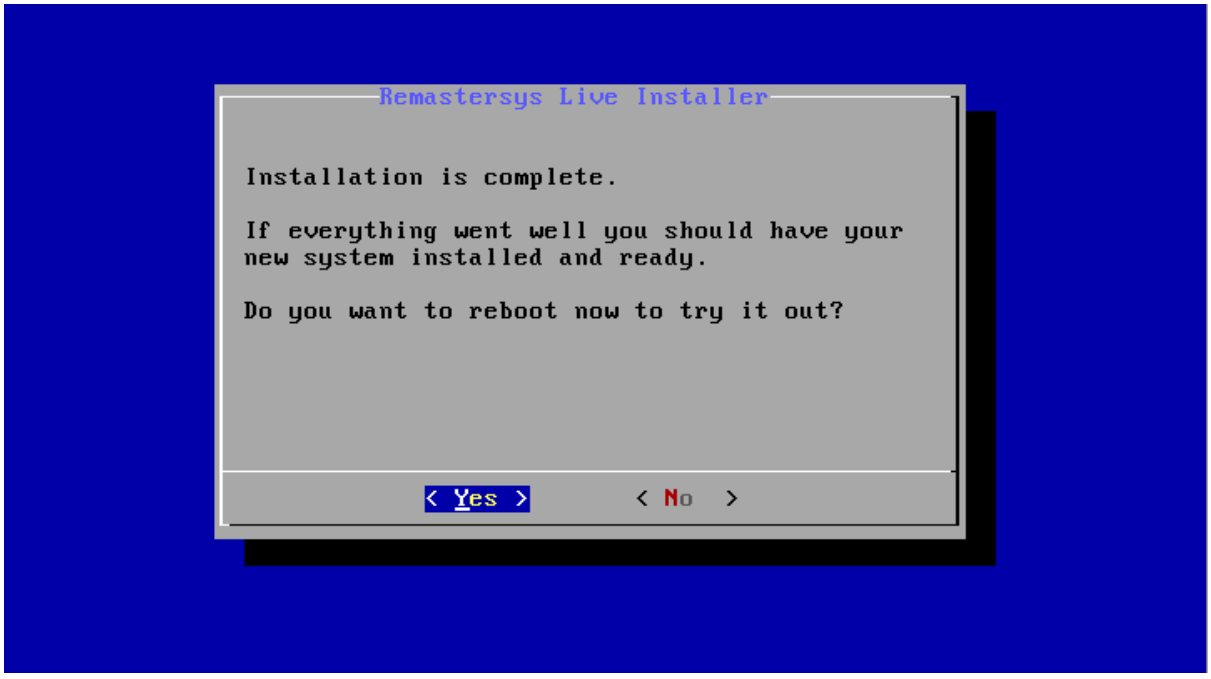
Finally, you will be asked to set clock (answer YES) and choose your time zone - geographical region:



After final confirmation of your system settings, the disk partitions will be created and formatted, and SDI Server system will be installed:



After the installation is complete, you should restart the system and remove the Live CD:



3. POST-INSTALL CONFIGURATION

AGI SDI Server comes as completely functional system with pre-configured network connection and logins/passwords all over the system, databases and applications, therefore you MUST change all the passwords before "going public" with your SDI Server. If you fail to comply to this essential security requirement, all your data and services will be completely unprotected, and sooner or later will be violated or even destroyed.

In just installed system there is only one user - root - configured. It is recommended to create additional user for every-day tasks.

3.1 Create new user

New users are created with `adduser` command. At command prompt enter:

```
adduser <new_user_name>
```

You will probably want to do sytem configuration tasks with the same user (using `sudo` command), so after creating new user, add it to sudo group:

```
usermod -a -G sudo <new_user_name>
```

3.2. Changing the network connection settings

Debian installer used in AGI SDI Server will try to establish a network connection via DHCP, and (if successful) doesn't offer any other options for network configuration. Therefore AGI SDI Server has a default pre-configured DHCP network connection, which worked well on our testing setups.

However, for the production servers, it is often necessary to define stationary connections with fixed host/IP/netmask/gateway/DNS parameters. Most likely you will go for this option as well, so it will be necessary to setup network parameters for your server. To find out what is your dynamic IP address during the current session, type the following command (as root) :

```
sudo ifconfig -a
```

Find the `inet_addr:` parameter in `eth0` section - this is your current IP address.

While testing the server, try using a pre-installed Midnight Commander (mc) to navigate around the system, or try connecting to the server from external computer via ssh (for the first connection accept the ssh public key with "yes", then enter "sdi" password) :

```
ssh -l sdi your_server_IP_address
```

You can also test some internet services and applications from external computer connected to the same sub-net. See Section 5 for detailed description of the bundled applications.

Before proceeding any further, please study the Debian networking guide at the following URL :

http://www.debianhelp.co.uk/network.htm

Setting up network connection in Debian systems is pretty simple and well documented. You have to :

3.2.1. Set up the host name

Modify the configuration file :

```
sudo nano  /etc/hostname
```

Exit the editor by pressing Ctrl+X and answer Yes to save the changes (nano editor commands and options are shown in the bottom of editor screen). OR enter the commands as shown in Debian networking guide

3.2.2. Set up the DNS parameters

Modify the configuration file :

```
sudo nano /etc/resolv.conf
```

Exit the editor by pressing Ctrl+X and answer Yes to save the changes (nano editor commands and options are shown in the bottom of editor screen).

3.2.3. Set up the static IP address

Modify the configuration file :

```
sudo nano /etc/network/interfaces
```

```
iface eth0 inet dhcp
#iface eth0 inet static
#address 192.168.1.1
#netmask 255.255.255.0
#gateway 192.168.1.254
```

The config which already has a pre-defined template for you to uncomment and fill in. Exit the editor by pressing Ctrl+X and answer Yes to save the changes (nano editor commands and options are shown in the bottom of editor screen).

3.2.4. Restart the network

```
sudo /etc/init.d/networking restart
```

3.3 Restarting the system

After completing all the above-mentioned post-installation steps you should restart your system :

```
sudo reboot
```

When the system is re-loaded, log in as sdi user and test the network connection by running a couple of simple ping tests :

```
ping <your_server_IP>
ping <your_server_host_name_and_domain>
ping 193.219.50.12
```

If ping works properly (bytes are returned back from your server and an external host `193.219.50.12`), your network is configured and works well.

It is also very useful to run system upgrade immediately after it's deployment and regularly during the whole period of it's operation. Programs `aptitude` or `apt-get` can be used for this task:

```
sudo apt-get update
sudo apt-get upgrade
sudo apt-get purge
```

4. SYSTEM SECURITY

Debian Squeeze 6.0.1a operating system provides a solid foundation for a secure internet server. However, AGI SDI Server has a broad variety of sophisticated web applications and databases with pre-configured and documented default logins and passwords, which makes the default system completely open and unprotected. Therefore the most important step of the Server post-install configuration is OBLIGATORY modification of all passwords and fixing the database connections. The following instructions will lead you all the way towards a complete replacement of the default passwords, thus creating a secure SDI server.

4.1. CHANGE THE DEFAULT PASSWORDS

4.1.1. Default system user and root

```
sudo passwd sdi       (enter the new sdi user password)
sudo passwd root      (enter the new root user password)
```

4.1.2. Database administrator and user

Passwords of PostgreSQL/PostGIS database administrator and user can be changed by using web administration applications (PhpPGAdmin or Webmin), but the "traditional" way is logging into the PostgreSQL database and changing the passwords directly there. Enter the following commands to become PostgreSQL database administrator and change the passwords :

```
sudo su postgres
psql -U postgres -d template1 -c "ALTER USER postgres WITH
PASSWORD '<new_password>';"
psql -U postgres -d template1 -c "ALTER ROLE u_geodata WITH
PASSWORD '<new_password>';"
psql -U postgres -d template1 -c "ALTER ROLE u_csw WITH
PASSWORD '<new_password>';"
exit
```

4.1.3. Tomcat manager

In many production environments, it is very useful to have the capability to deploy a new web application, or undeploy an existing one, without having to shut down and restart the entire container. In addition, you can request an existing application to reload itself, even if you have not declared it to be reloadable in the Tomcat 6 server configuration file.

To support these capabilities, Tomcat 6 includes a web application (installed by default on context path `http://your.server.name:8080/manager/html`) that supports the following functions:

- Deploy a new web application from the uploaded contents of a WAR file.
- Deploy a new web application, on a specified context path, from the server file system.
- List the currently deployed web applications, as well as the sessions that are currently active for those web apps.
- Reload an existing web application, to reflect changes in the contents of `/WEB-INF/classes` or `/WEB-INF/lib`.
- List the OS and JVM property values.
- List the available global JNDI resources, for use in deployment tools that are preparing `<ResourceLink>` elements nested in a `<Context>` deployment description.
- List the available security roles defined in the user database.
- Start a stopped application (thus making it available again).
- Stop an existing application (so that it becomes unavailable), but do not undeploy it.
- Undeploy a deployed web application and delete its document base directory (unless it was deployed from file system).

It would be quite unsafe to ship Tomcat with default settings that allowed anyone on the Internet to execute the Manager application on your server. Therefore, the Manager application is shipped with the requirement that anyone who attempts to use it must authenticate themselves, using a username and password that have the appropriate role associated with them. Further, there is no username in the default users file (`/etc/tomcat6/tomcat-users.xml`) that is assigned an appropriate role. Therefore, access to the Manager application is completely disabled by default.

Stop the Tomcat 6 service :

```
sudo /etc/init.d/tomcat stop
```

Edit the Tomcat 6 users configuration file :

```
sudo nano /etc/tomcat6/tomcat-users.xml
```

Find the following line and replace sdi and geoland to some new login/password combination.

```
<user username="sdi" password="geoland" roles="manager"/>
```

Note that those are not related to she system user sdi and its password, so you can use any combination here. Exit the editor by pressing Ctrl+X and answer Yes to save the changes (nano editor commands and options are shown in the bottom of editor screen).

Start the Tomcat 6 service :

```
sudo /etc/init.d/tomcat start
```

4.1.4. Deegree database connection

Deegree Catalog Server (CSW) needs to be connected to PostGIS database. To fix the pre-configured deegree-csw database connection, you have to change only one line in csw database connection config file :

```
sudo nano /var/lib/tomcat6/webapps/deegree-csw/WEB-INF/conf/
csw/featuretypes/csw_postgres.xsd
```

Replace geoland with the new postgres user password (see Section 4.1.2.) in the following line :

```
<Password>geoland</Password>
```

Exit the editor by pressing Ctrl+X and answer Yes to save the changes.

4.1.5. GeoServer administrator

GeoServer has a default login "admin" with password "geoserver". To change those to your own combination, you have to edit the GeoServer users properties file :

```
sudo nano /sdi/geoserver/data/security/users.properties
```

Replace "geoserver" with any other password. You can also change the login "admin", and even add new lines like the uncommented one to define additional users with administrator role. Exit the editor by pressing Ctrl+X and answer Yes to save the changes.

4.2. Management of the user accounts

Creating new users (besides root and your primary login) on your system is OPTIONAL, but could be very useful if you need to temporary open some FTP or SSH connections to the outside world for the purpose of data upload/download, diagnostics, training, etc. To create a new user, enter the following command and provide password, full name, etc. when asked :

```
sudo adduser <new_user_name>
```

It is NOT RECOMMENDED to keep the additional user accounts as soon as they become unnecessary, as this may increase vulnerability of your server. To completely delete any of the users on your system (except the root and some system-managed accounts), including their personal folders, passwords and config files, you should type the following command :

```
sudo userdel -r <user_name>
```

For instructions on modifying the existing user accounts, see Section 4.1.1.
For mode information about adduser and userdel commands type in command prompt:

```
man adduser
man userdel
```

If you want to add only FTP user without login rights, use `/usr/bin/passwd` as shell when creating user.

5. ACCESS TO WEB APPLICATIONS AND FTP

As it was mentioned in Section 1.3, the AGI SDI Server includes the latest versions of essential system and database management tools, as well as SDI and CMS applications. Those on-line tools are intended to provide the system with a sufficient remote administration platform and replace the missing GUI component, but first of all the pre-installed web applications provide the user interface to SDI components of the system.

5.1. Webmin

AGI SDI Server system administration can be made in a very user-friendly way by using the Webmin application. Go to the following URL (make sure you connect to https, not http port) and login as root with your new root password. In the original server setup the password is "geoland", but you must change the root password as instructed in Section 4.1.1.

```
https://your.server.name:10000
```

Navigation in Webmin interface is very simple, but you have to be experienced in administration of Linux systems in order not to avoid destructive actions. Webmin detects all the services and servers available on your system and provides interfaces for their administration. Tou can even run management tasks such as backups of the whole system and databases in Webmin environment. There is a comprehensive Webmin Wiki and module documentation pages available on Webmin documentation web page.

5.2. Apache Tomcat

Apache Tomcat Java Servlet platform has useful administration and management tools for, where you can check the system status and available resources, as well as control the status of Java applications deployed on the system. The Tomcat front-page is accessible on port 8080 of your server :

```
http://your.server.name:8080
```

It is important to note that all the SDI applications deployed on the AGI SDI Server run on Tomcat 5.5 platform, and the most efficient way to control them is by usin the Tomcat Manager. Click on `[Tomcat Manager]` in `[Administration]` section on top of the left-side menu and enter login/password as specified in `/etc/tomcat5.5/tomcat-users.xml` file (see Section 4.1.3). In the default configuration we used "sdi" login with "geoland" password. There is a comprehensive collection of Tomcat 5.5 on-line documents on the Apache Tomcat web site.

5.3. Deegree

AGI SDI Server is powered by Deegree 2.4 suite of applications (see Section 1.3), which can be accessed directly on port 8080 of your server :

`http://your.server.name:8080/deegree-wms` (WMS - web map server)
`http://your.server.name:8080/deegree-wfs` (WFS - web feature server)
`http://your.server.name:8080/deegree-wcs` (WCS - web coverage server)
`http://your.server.name:8080/deegree-csw` (CSW - web catalogue server)
`http://your.server.name:8080/deegree-wps` (WPS - web processing server)
`http://your.server.name:8080/deegree-wpvs` (WPVS - web perspective view)
`http://your.server.name:8080/geoportal` (iGeoPortal application)

If you have already completed the post-install configuration (editing and running `2_xml.sh` script), there is no other post-install configuration needed for Deegree 2.2 applications, except CSW (catalogue) connection to the PostGIS database (csw). There is no need to enter any passwords directly while working with Deegree applications, but after changing the postgres password, you must also change the CSW config file (see Section 4.1.5). You should study PDF manuals of the above-mentioned applications available on the Deegree 2.4 download page.

5.4. GeoServer

AGI SDI Server is powered by GeoServer 2.0 which provides WMS, WFS and WCS services (see Section 1.3). GeoServer application can be accessed at port 8080 of your server :

`http://your.server.name:8080/geoserver`

All the geoserver and data management tasks are done in `[Config]` section, where the default login is "admin" and password "geoserver". You should immediately change the admin user password as described in Section 4.1.6. No database connection needs to be configured for GeoServer 2.0 at the setup phase. There is a comprehensive on-line GeoServer 2.0 Users Manual available on GeoServer web site.

5.5. proftpd

A powerful and highly customizable FTP server (proftpd) has been included into AGI SDI Server in order to enable file exchange using the FTP protocol. The default setup of proftpd server is restricted only to password protected user access (i.e. there is no public FTP service

available). In order to maintain system security, we strongly recommend using temporary user accounts for FTP access (see Section 4.2). You can read more about proftpd server configuration and management at http://www.proftpd.org .

If you want to add FTP-only user (without login rights), use `/usr/bin/passwd` as shell when creating user. By default, users are restricted to their home directory.

6. HOW TO USE - DEEGREE CSW

Metadata records are stored and served by CSW (Catalogue Service - Web). AGI SDI server provides Deegree CSW server for such task.

Instructions below were written for SATChMo dataset providers - you may need to adjust them to meet your needs.

Before going into details of metadata creation, we need to define the “minimum” set of G2 requirements related with publishing the projects data and metadata. Due to the formal requirement to deliver the datasets as downloadable files (archives) to the G2 clients, also for the purpose of data exchange between partners, it was decided that archived dataset files will be published on “download” services (FTP/HTTP) by the data providers. To make those datasets “discoverable”, a central catalogue is established on G2 portal, where metadata records on all downloadable datasets are searched and download links, as well as dataset quicklooks, are provided to the clients through those dataset metadata records. This part of SDI implementation is completely under the responsibility of the data providers.

In order to structure the massive amount of G2 metadata, it was decided to create thematic G2 metadata search services on the G2 portal. Those services are defined by service metadata records, created by project partners maintaining metadata CSW catalogues where all dataset metadata records from data providers are published. Those partners hosting G2 “component catalogs” also maintain their metadata search services on the G2 portal. For instance, AGI has established a metadata service catalog called “SATChMo VHR Land Cover Dataset Catalogue” on G2 portal and connected it to a CSW metadata dataset catalogue hosted on AGI CSW server. AGI will also maintain the G2 configures the G2 “SATChMo VHR Land Cover Dataset Catalogue” setup while dataset metadata XML records and URLs of newly established WMS services will be sent to AGI by the SATChMo data providers.

After a considerable effort within G2 SDI team and data providers to find a reasonable solution for creation/editing of metadata, it was decided that the best option would be to create a new on-line application for metadata creation and editing, that would be compliant with the INSPIRE specifications and fully satisfy the needs of the project. Therefore it is HIGHLY RECOMMENDED to use GMES metadata editor for creating metadata records for the datasets containing SATChMo VHR Land Cover Data classification results. The following chapters will describe and illustrate the whole procedure of metadata creation based on a real example of one of AGI SATChMo VHR datasets. You can follow this example closely with only minor simple changes to be included while creating your own metadata records.

Note - if you plan to connect your Deegree CSW server to Geoland 2 portal, you must have enabled and properly configured soap2http-proxy. Edit `server-config.wsdd`, located at `/var/lib/tomcat6/webapps/soap2http-proxy/WEB-INF`:

```
<service name="deegreeSOAPInterface" style="message">
  <parameter name="httpLocation"
value="http://your.server.address:8080/deegree-csw/services"/>
```

6.1 Create metadata records

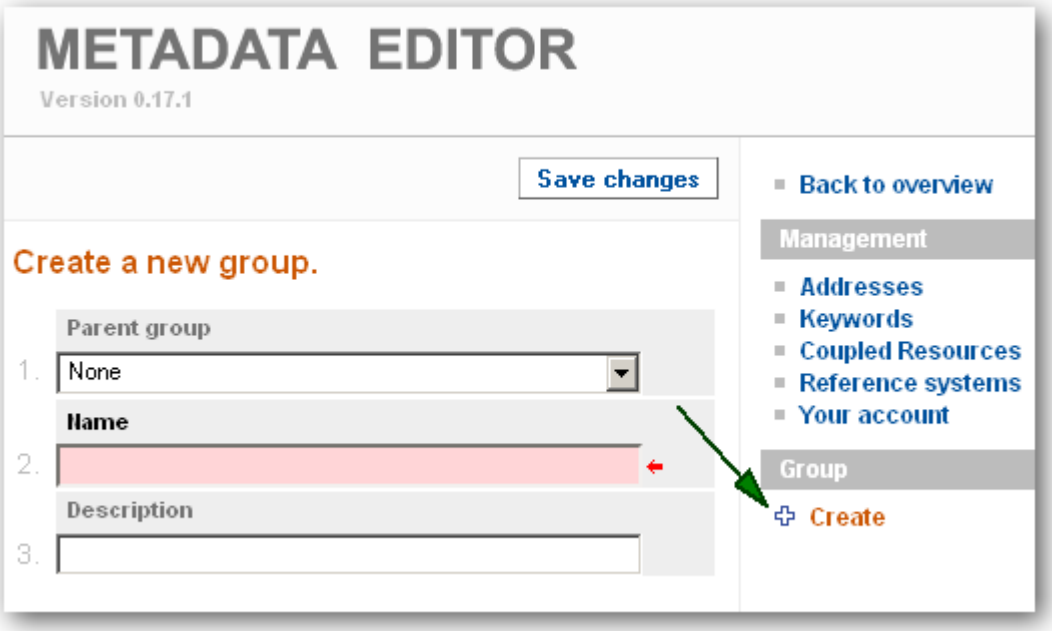
Although Deegree CSW 2.4 has it's own catalogueManager metadata editor, DO NOT use it for creating or editing G2 metadata records - it does not support all required fields. catalogueManager editor can be used to delete unnecessary metadata records from CSW, and Deegree catalogueManager search - to display what records are served by CSW.

6.1.1 Logging in, creating new group

If you are a new metadata provider, you will first of all need to register on the Geoland2 Expert Portal at http://www.geoland2.eu before starting to create your own metadata records. Registration is free and rather simple, so we will not focus on that in detail.

After completing your registration, open the G2 GMES metadata editor page on http://land.eu/gmes-metadata-editor/login/auth and log in. Metadata records are organized by assigning them to appropriate group, so first thing you will have to do is create new group for metadata records on your SATChMo VHR Land Cover datasets.

To create a metadata group, select Goup/Create from the right side menu, add the name, description and save changes. Note that you will need to select a parent group if your dataset groups are arranged into some complicated hierarchy. In our generic case this option may be ignored.
Wherever you see fields marked with red arrows and colour, please be careful to provide the requested information there – those metadata fields are obligatory!



Fill in required information, then press „Save changes“. Press „Back to overview“ - you can see new just created group.

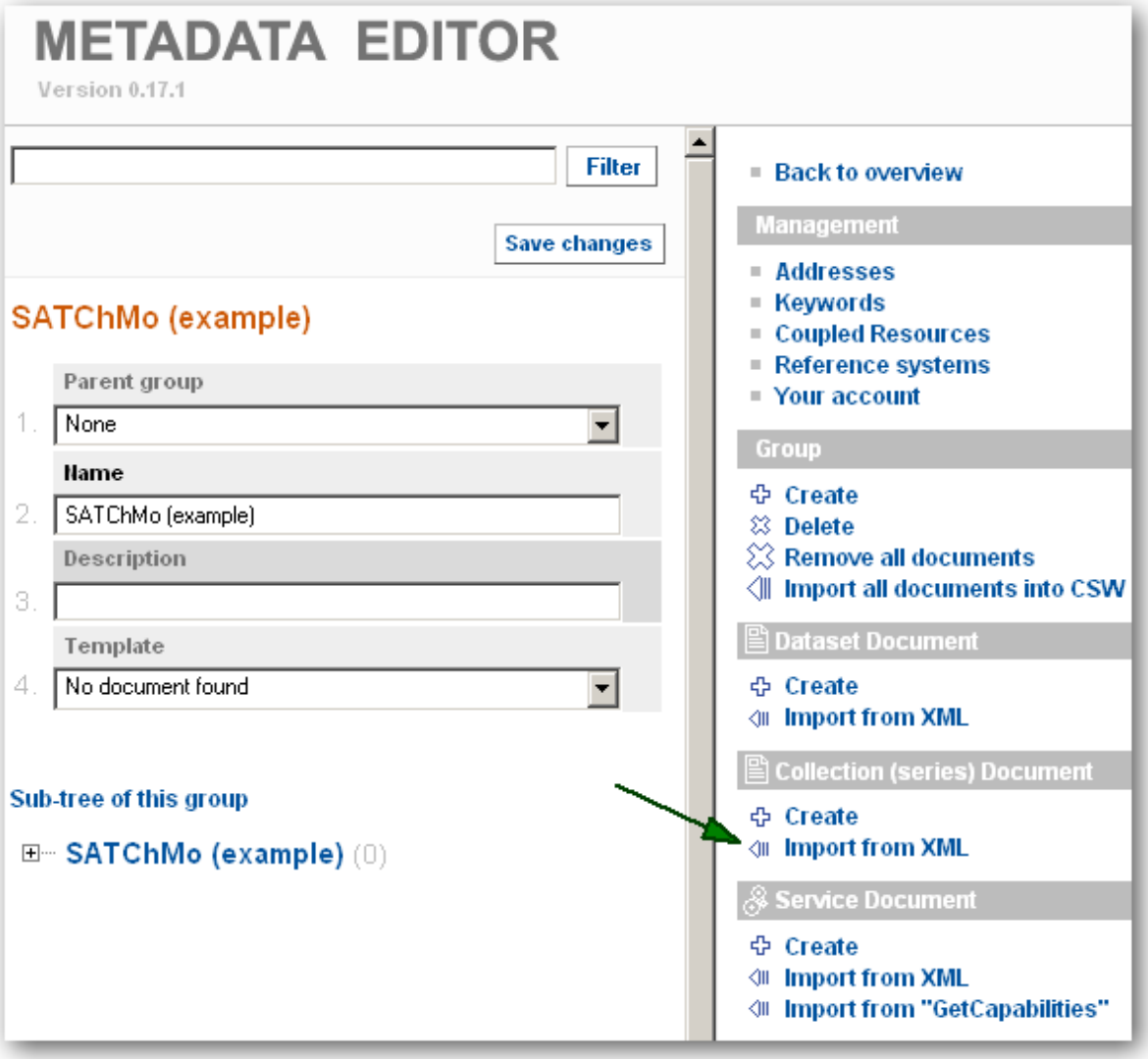
6.1.2 Uploading dataser series XML file

To create a searcheable thematic metadata catalog (e.g. for SATChMo datasets) on the G2 Portal, it is necessary to create a so-called dataset series metadata XML file. This initial operation is done by the partner hosting the corresponding datasets metadata catalog (in case of SATChMo VHR that would be AGI). But it is also essential that all the data providers load this metadata series XML document into their GMES metadata editor workspaces before starting to create their own dataset metadata XML documents, which will need a „Parent ID“ field to be filled in by simply pointing to that previously imported dataset series metadata record.

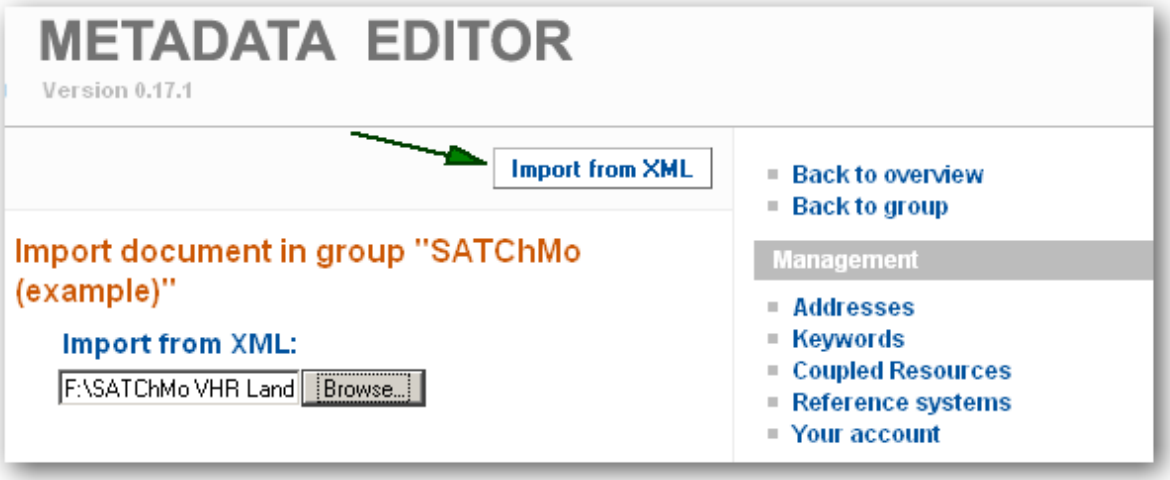
The dataset series metadata XML record is like a „summary“ of all datasets which will be present in that series. Structurally this XML file is identical to the datasets metadata XML files. However, there is one essential difference. Dataset series defines a so-called „Parent ID“ code, which must be further replicated in all the dataset metadata XML files as their „parent“ identificator. This code is the only XML element binding all metadata records into a certain searcheable „series“ on the G2 Portal, although all those datasets and corresponding metadata documents are produced independently by different data providers.

GMES metadata editor does not allow to edit metadata file identifiers – they are generated automatically. To ensure, that correct metadata parent identifier is assigned to all dataset metadata records belonging to the same dataset series, the original dataset series metadata XML document with a unique file identifier („parent ID“) must be uploaded to the group by each data provider in their GMES metadata editor environments.

In the overview window (if you are not there – press „Back to overview“ link), select your group, then in the right side menu select „Collection (series) Document – Import from XML“.



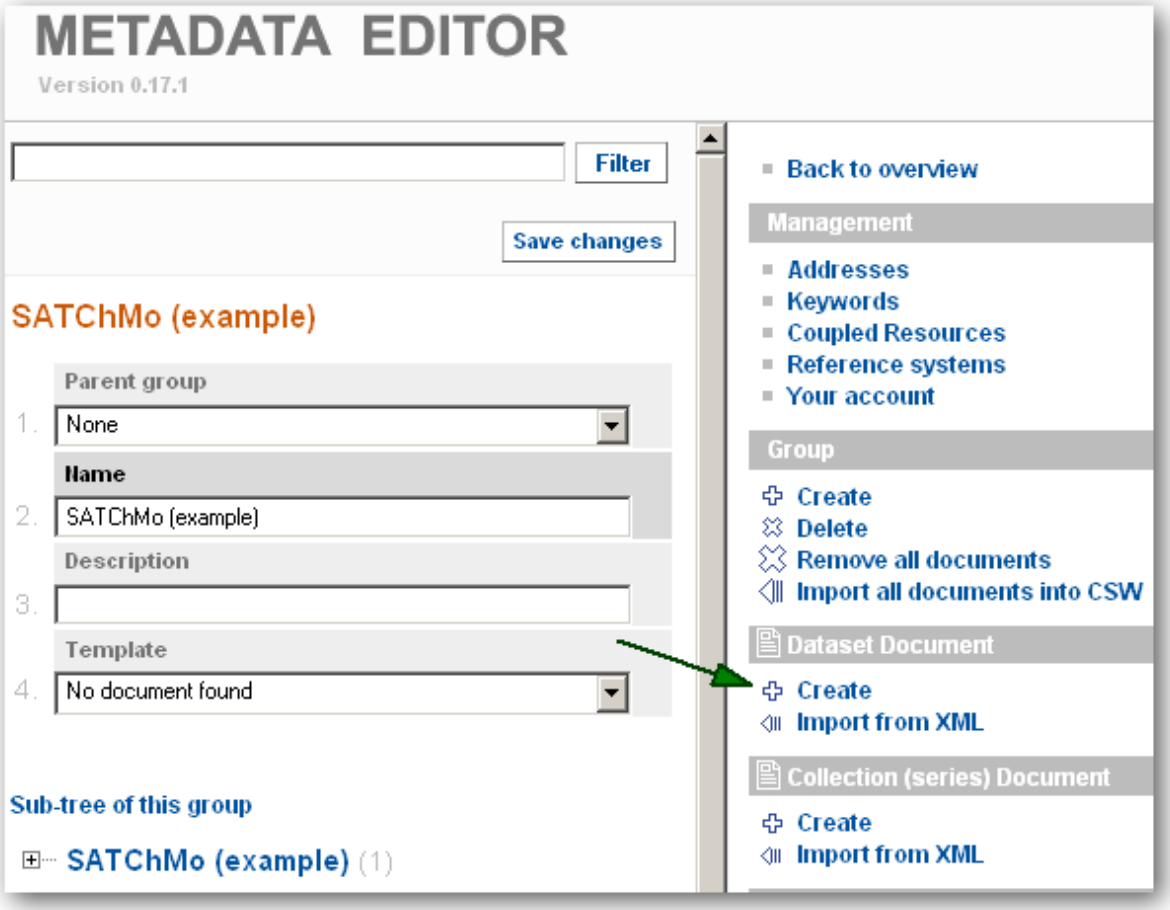
In next page, click „Browse“, select your XML with parent identifier file. Then press „Import from XML“ button above.



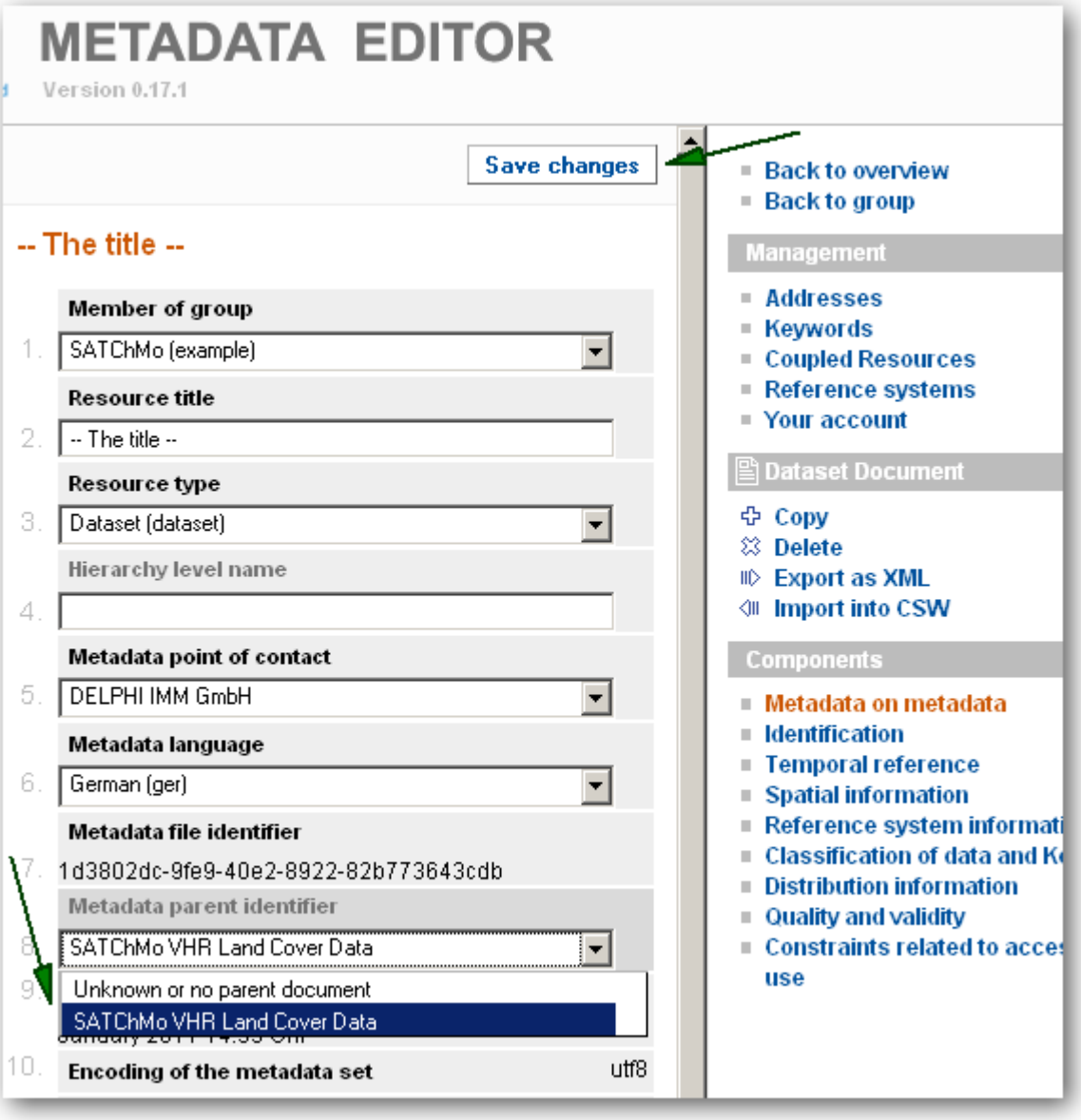
Parent document is uploaded, now you will be able to refer to it in your datasets metadata.

6.1.3 Creating dataset metadata document

Now you are ready to start creating metadata records for your own SATChMo VHR datasets. The whole process is really simple and straightforward, it is also quite nicely documented (see the left column on the metadata editor allpication window – it will be interactively changing with short descriptions as you navigate over the certain fields). The oblidatory fields are marked with red color and arrows, but we strongly recommend to fill in as much information as possible. If you do so for the first metadata record, you will be able to save it as XML document, load again and use as a template for the following records, with only minor changes to be made (as the datasets will be thematically identical). This is a really good practice which would save you a lot of time and improve the overall quality of your metadata.
To start creating a new dataset metadata record, return to overview, then select group where you want to create metadata for dataset. In the right side menu select „Dataset document – Create“.

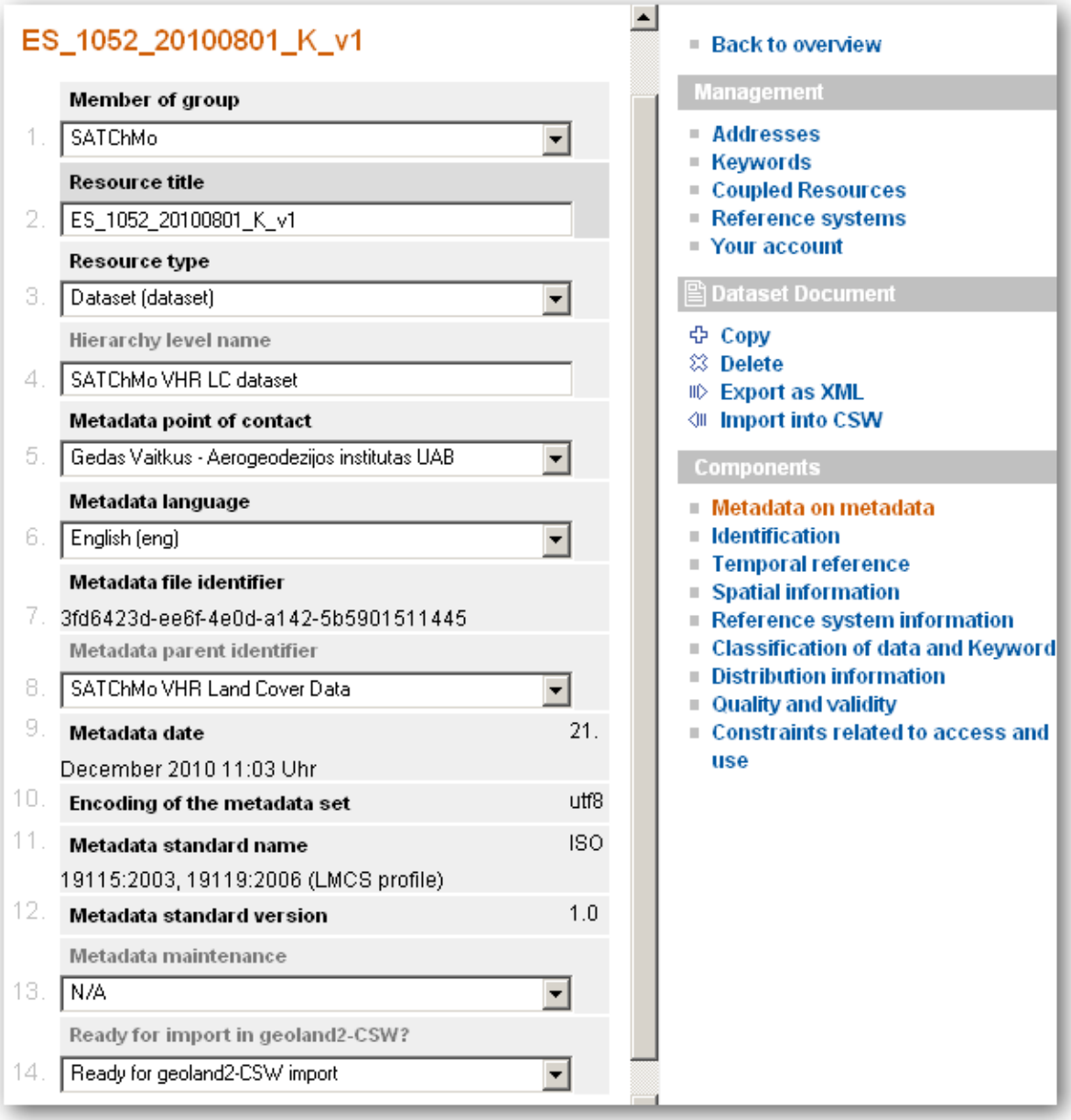


In the next page, do not forget to select correct „Metadata parent identifier“! Also, because metadata editor is web based, press „Save changes“ every few minutes – when there are no activity for a certain period of inactivity, the editing session will expire and you will have to log in again (unsaved data, of course, will be lost in this case).

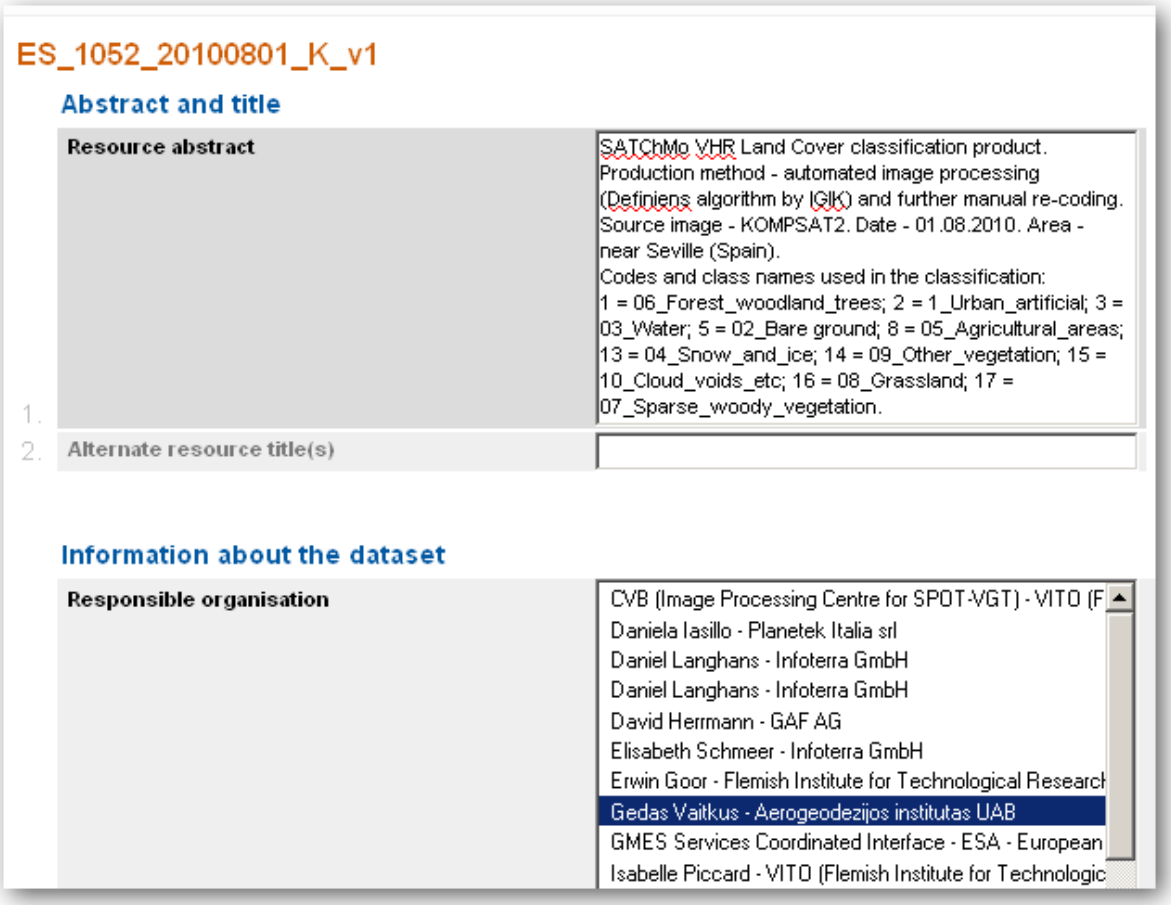


Below we present an example of how a dataset document is created, based on a real ES_1052_20100801_K_v1 dataset produced by AGI. Please fill in the fields of your metadata records accordingly.

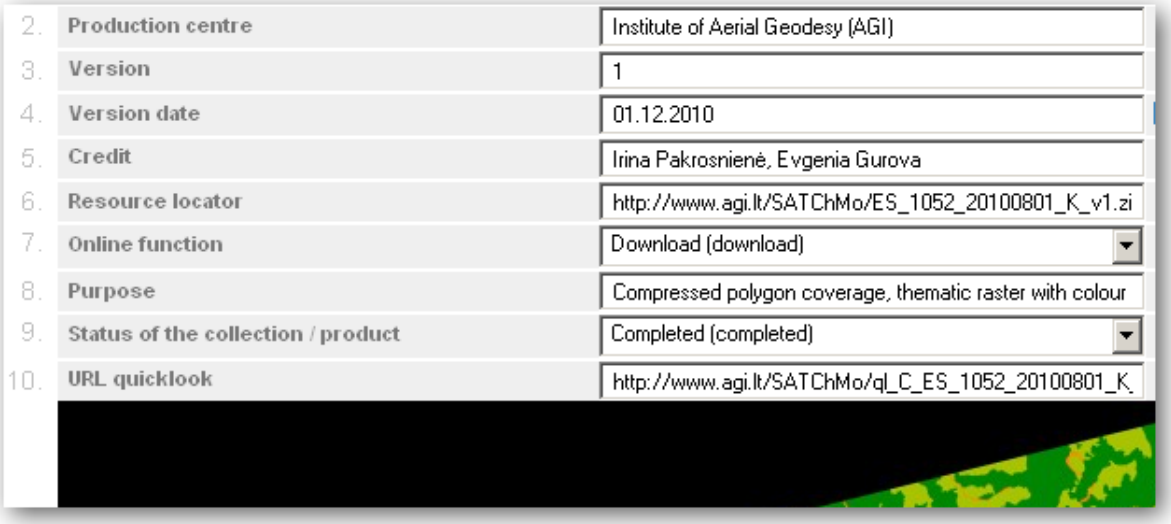
6.1.3.1 Metadata on metadata

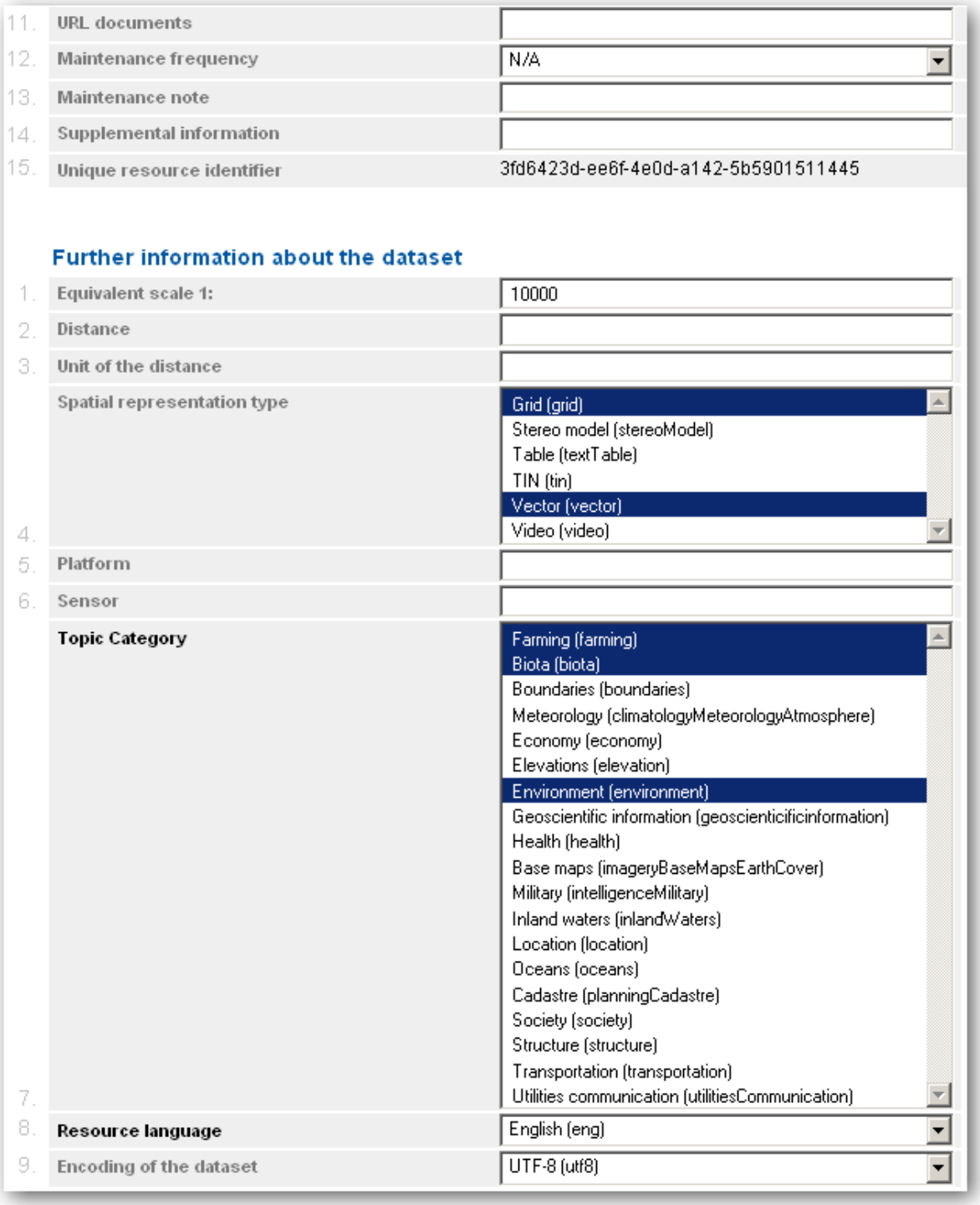


6.1.3.2 Identification

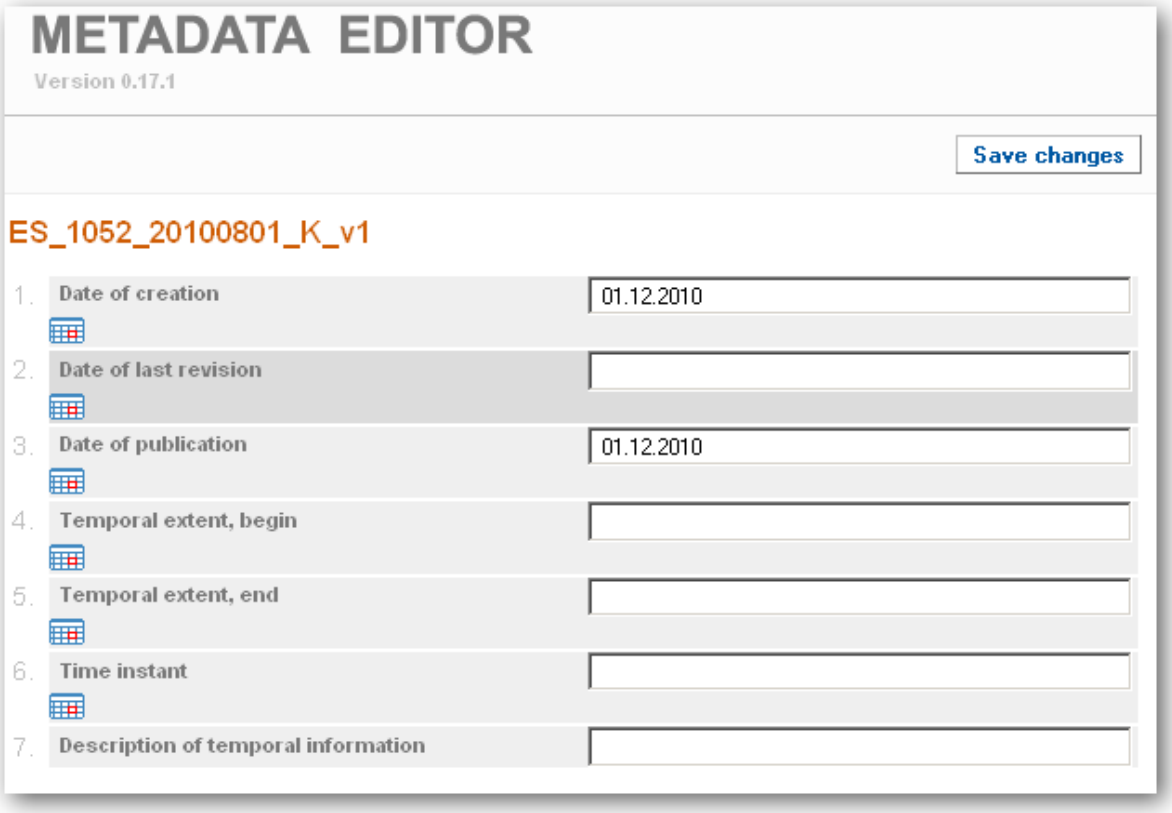


Resource abstract is a critically important field in the metadata record. It will show up in all metadata search engines presented along with your dataset title. Please be careful to briefly, but clearly define your datasets here. Please note that the classification schema (class names and codes) will only be listed within this field – there is no other place in the metadata document to do that. The same is for reference data (source imagery), classification methodology, post-processing, etc.

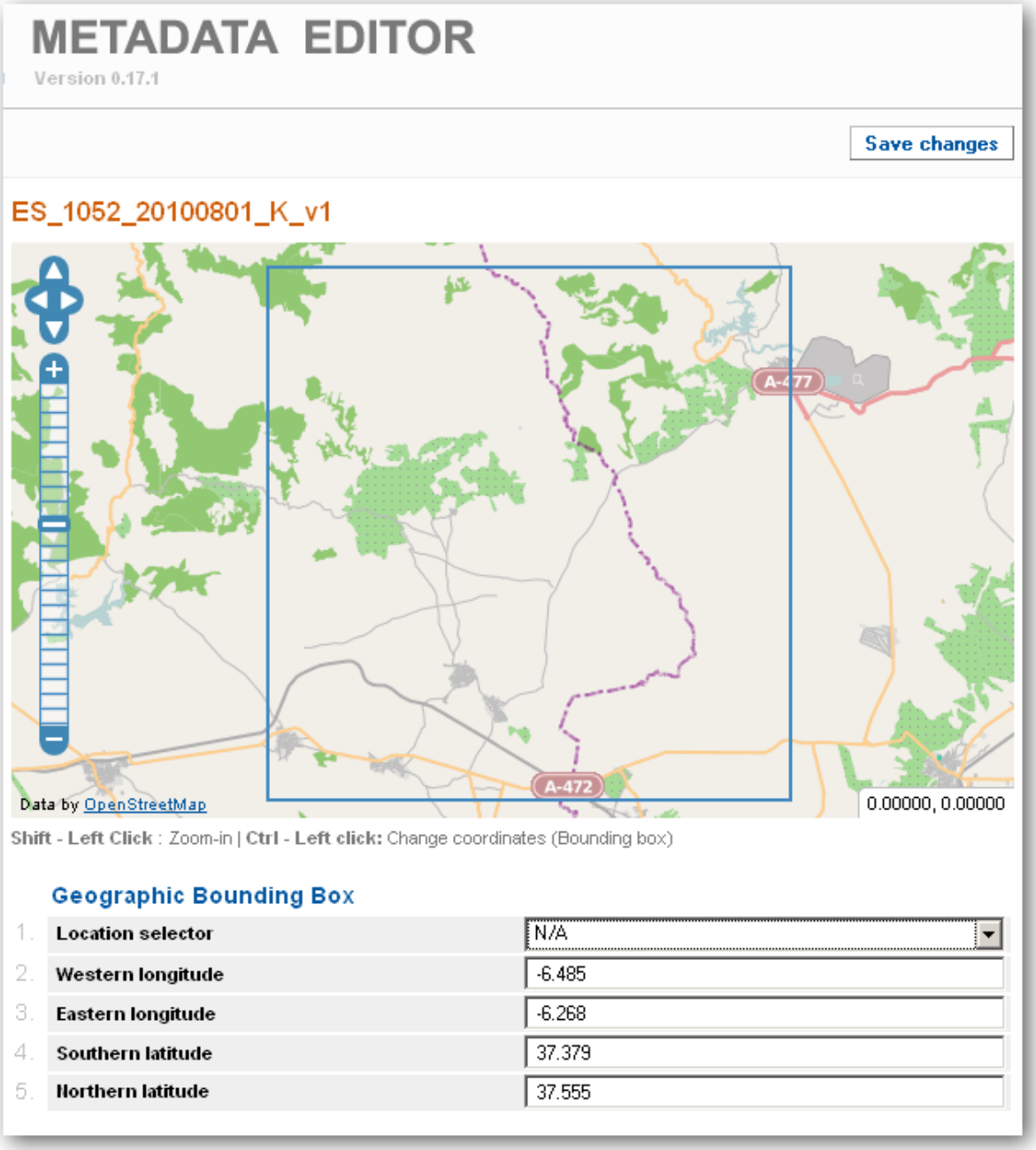




6.1.3.3 Temporal reference

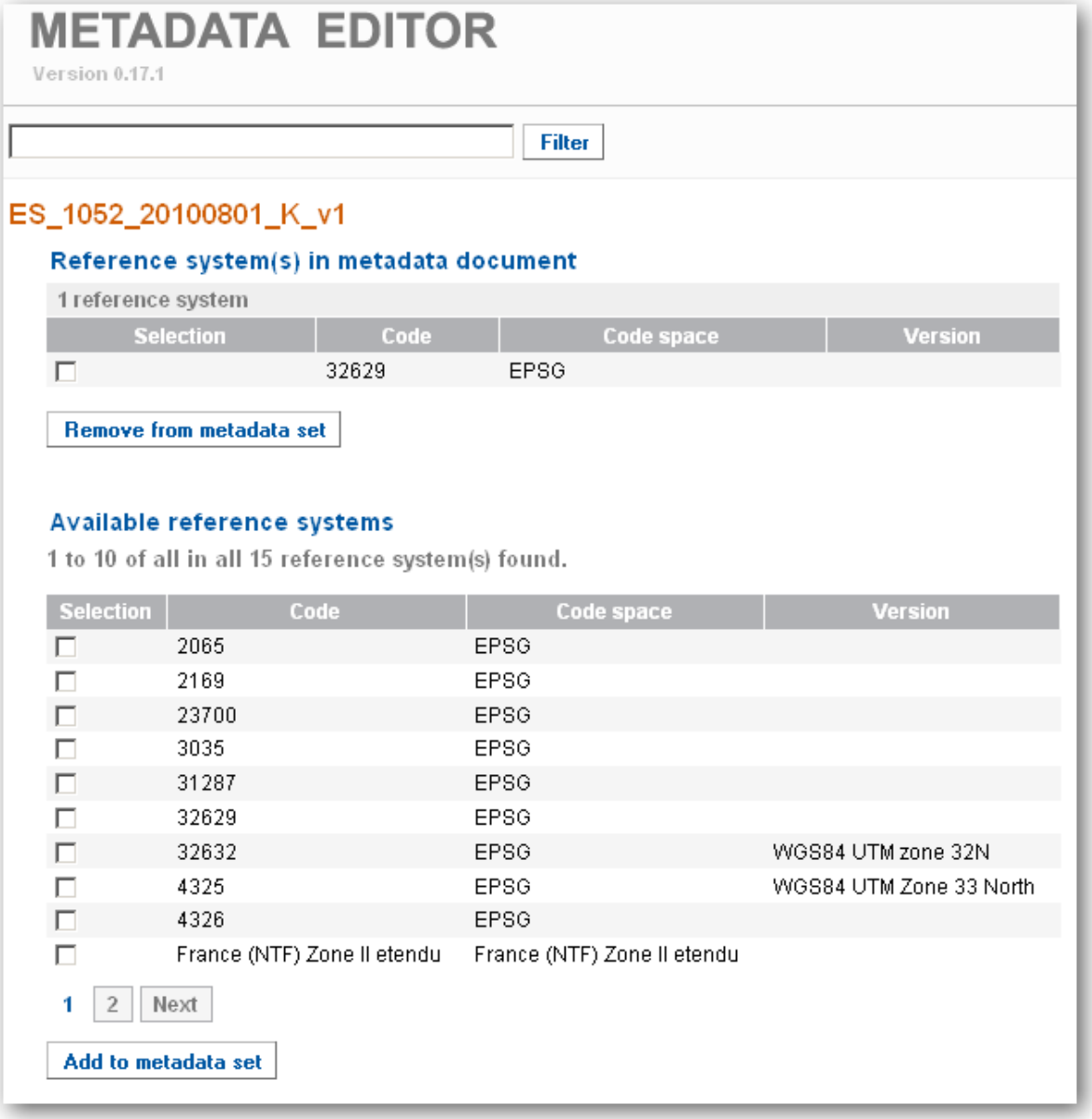


6.1.3.4 Spatial information



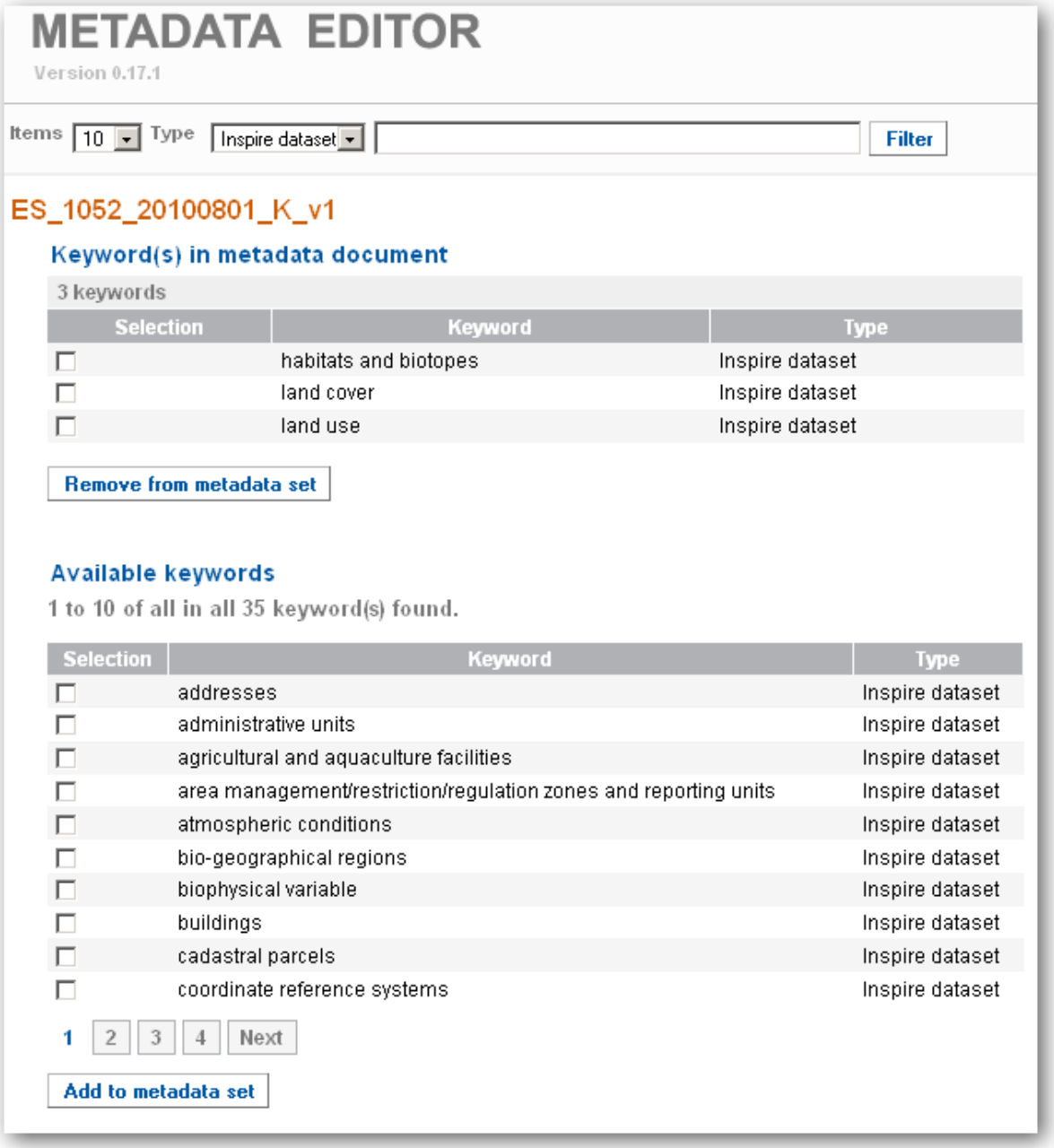
The bounding box can be calculated automatically.

6.1.3.5 Reference system information



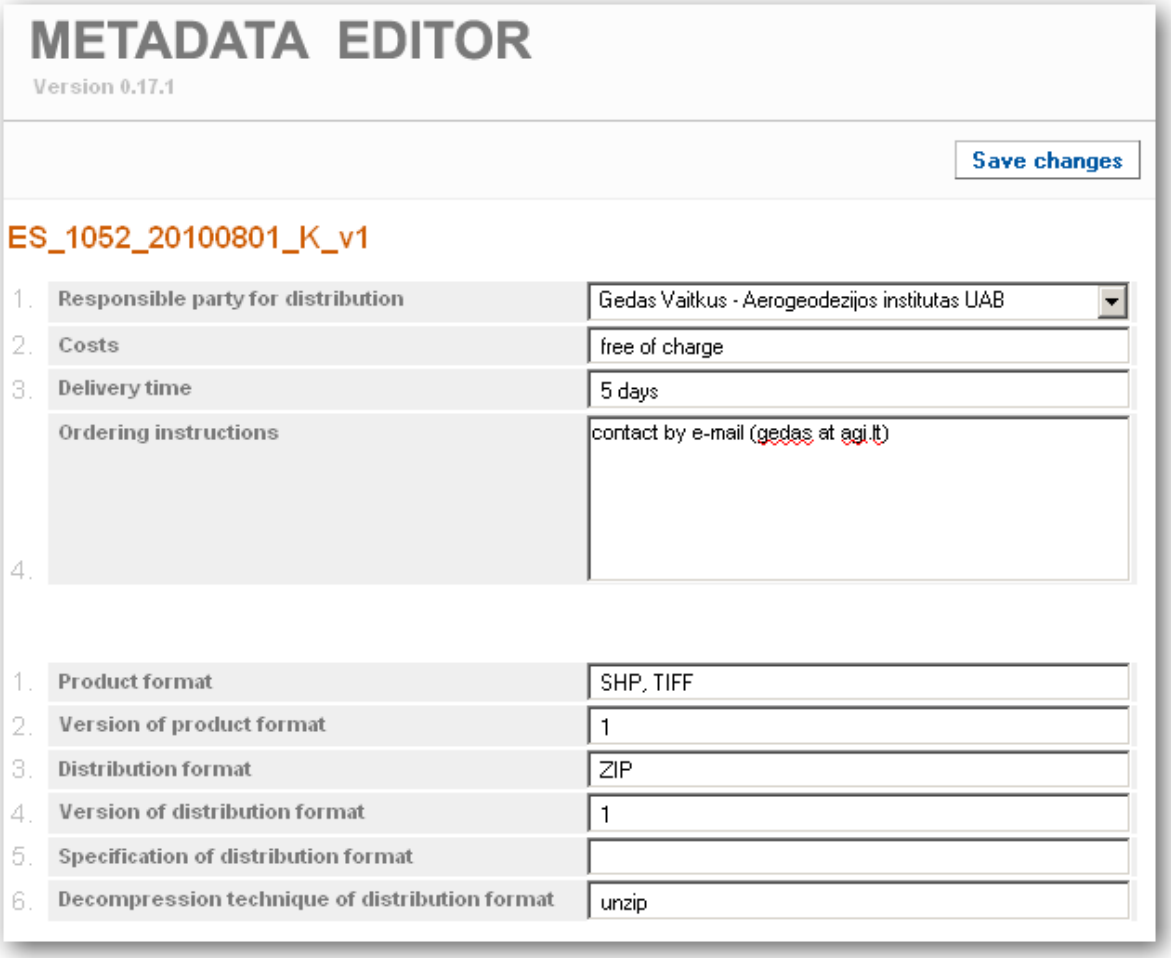
Note, that different datasets may be in different reference systems! If there is no CRS of your particular dataset in this list, you can easily define one. The only thing to know is the EPSG code of the CRS used in your dataset.

6.1.3.6 Classification of data and keywords

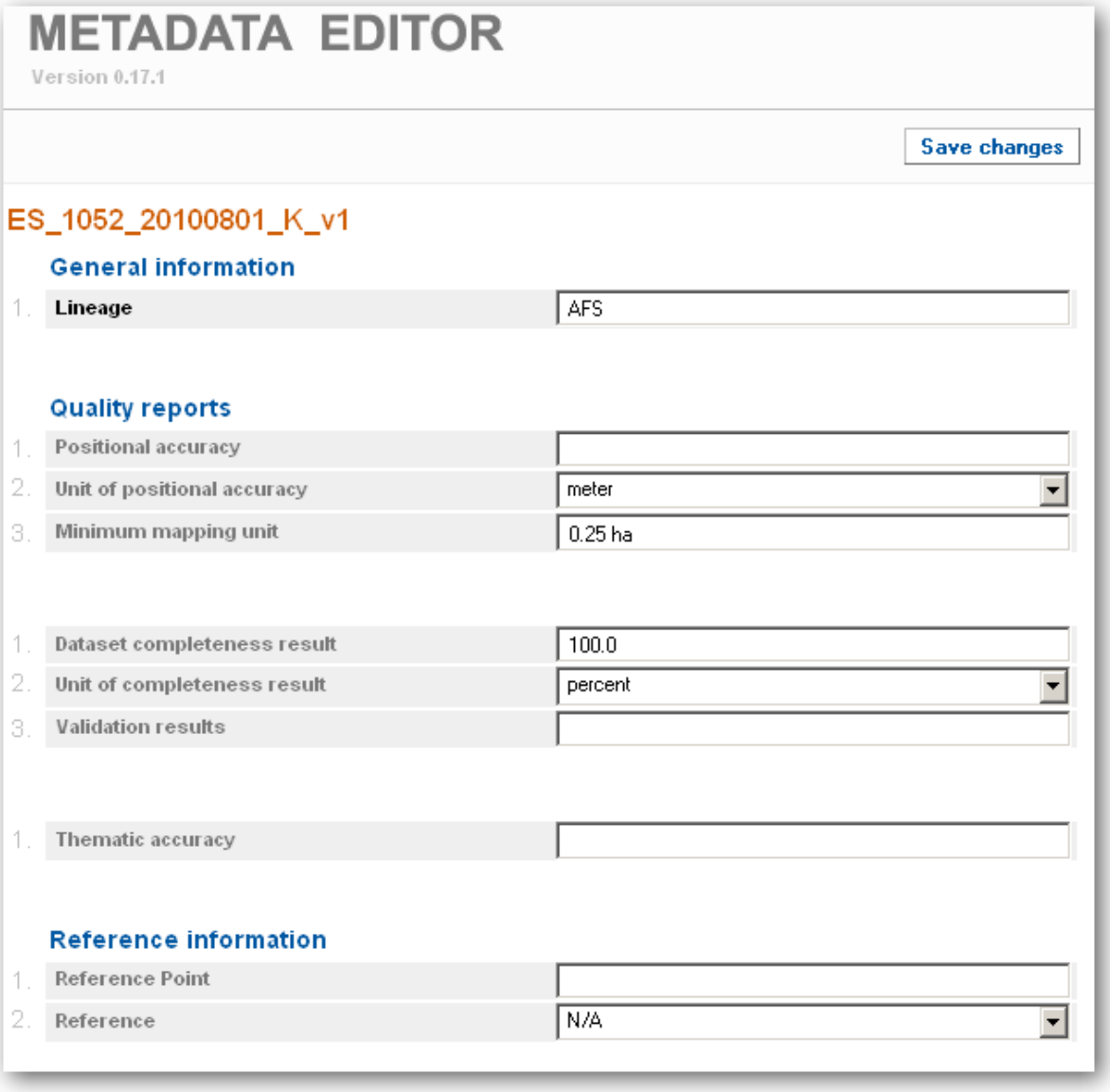


Kewords used in all the dataset metadata records within a certain dataset series should be the same, so this issue should be discussed by the production tem and a clear recommendation made on how this part of metadata should be filled in.

6.1.3.7 Distribution information



6.1.3.8 Quality and validity

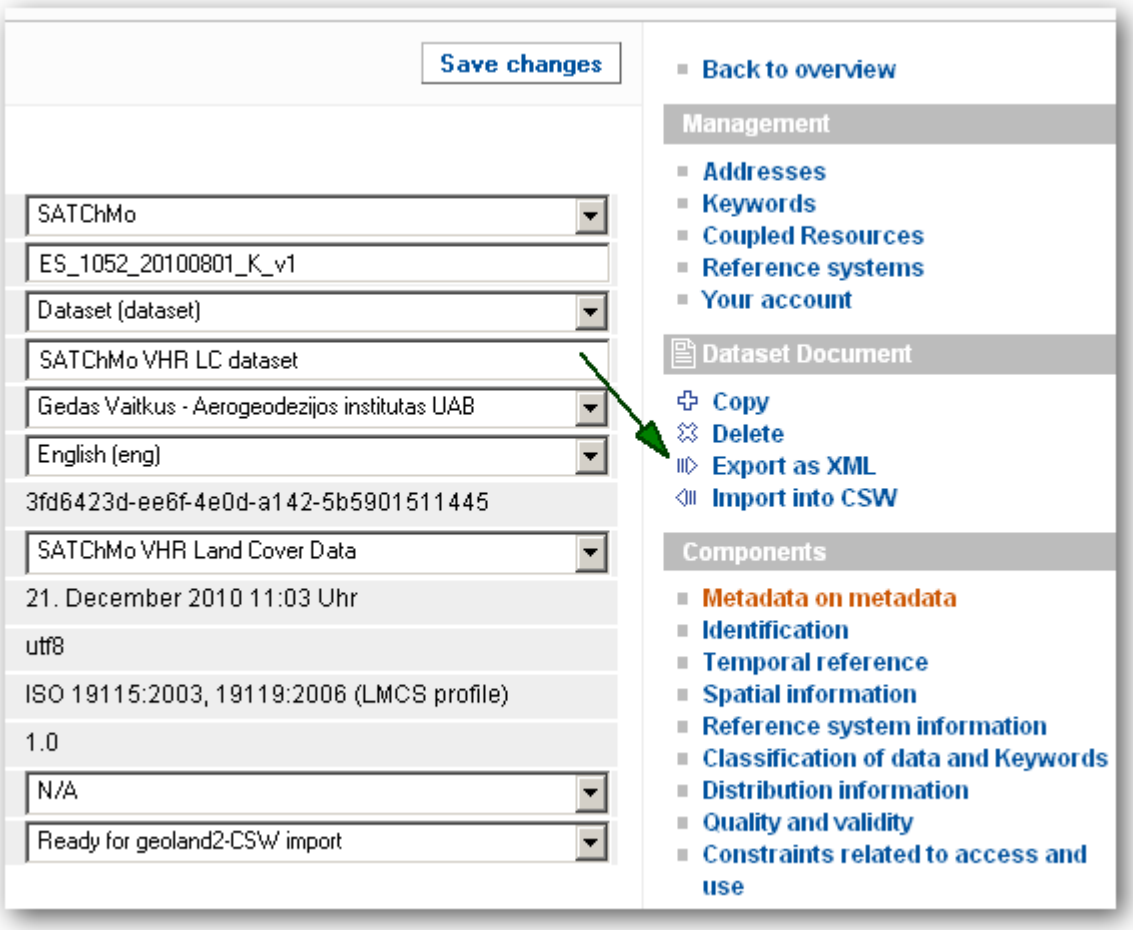


6.1.3.9 Constraints related to access and use

6.1.4 Exporting to XML dataset metadata document

After filling in the required fields, dataset document is ready to be saved in XML format. To do that, return to overview, go to group and select the document you want to save as XML file.

Then select „Dataset document – Export as XML“ in the right-side menu bar. After that, save that page, selecting „File – Save Page As“/“File – Save As“ in the web browser menu.



The resulting XML file can be uploaded to CSW server.

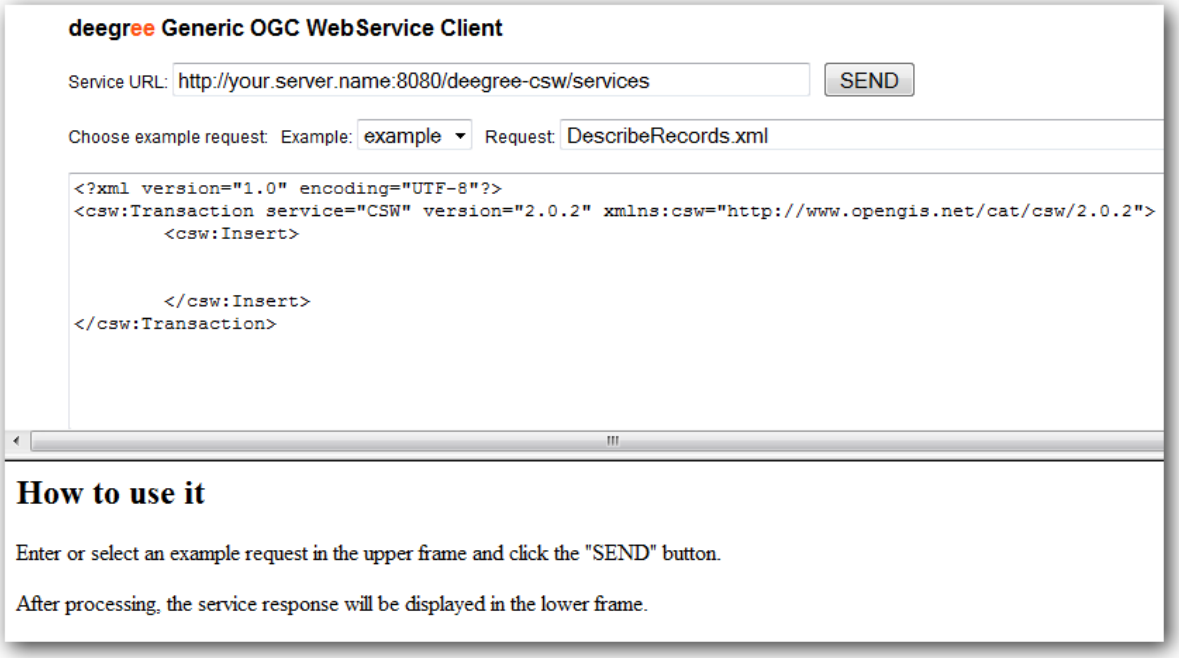
6.2 Upload metadata XML files to CSW

Metadata XML file to Deegree CSW server can be uploaded using it's Generic OGC WebService Client. Navigate to `http://your.server.name:8080/deegree-csw/client/client.html`

Then prepare request field to insert data - replace it with these lines:

```
<?xml version="1.0" encoding="UTF-8"?>
<csw:Transaction service="CSW" version="2.0.2"
xmlns:csw="http://www.opengis.net/cat/csw/2.0.2">
    <csw:Insert>

    </csw:Insert>
</csw:Transaction>
```



Then copy/paste your XML file contents (except first line - "`<?xml version="1.0" encoding="UTF-8"?>`") between `<csw:Insert>` and `<csw:Insert>` tags.

Press SEND button. If record was inserted successfully, there should be `<csw:totalInserted>1</csw:totalInserted>` line in transaction response.

6.3 List metadata records, uploaded to CSW

There are two ways to view, what metadata records are uploaded to Deegree CSW:

1. In Generic OGC WebService Client execute "GetRecords_title.xml" request.
2. Use Deegree catalogueManager search.

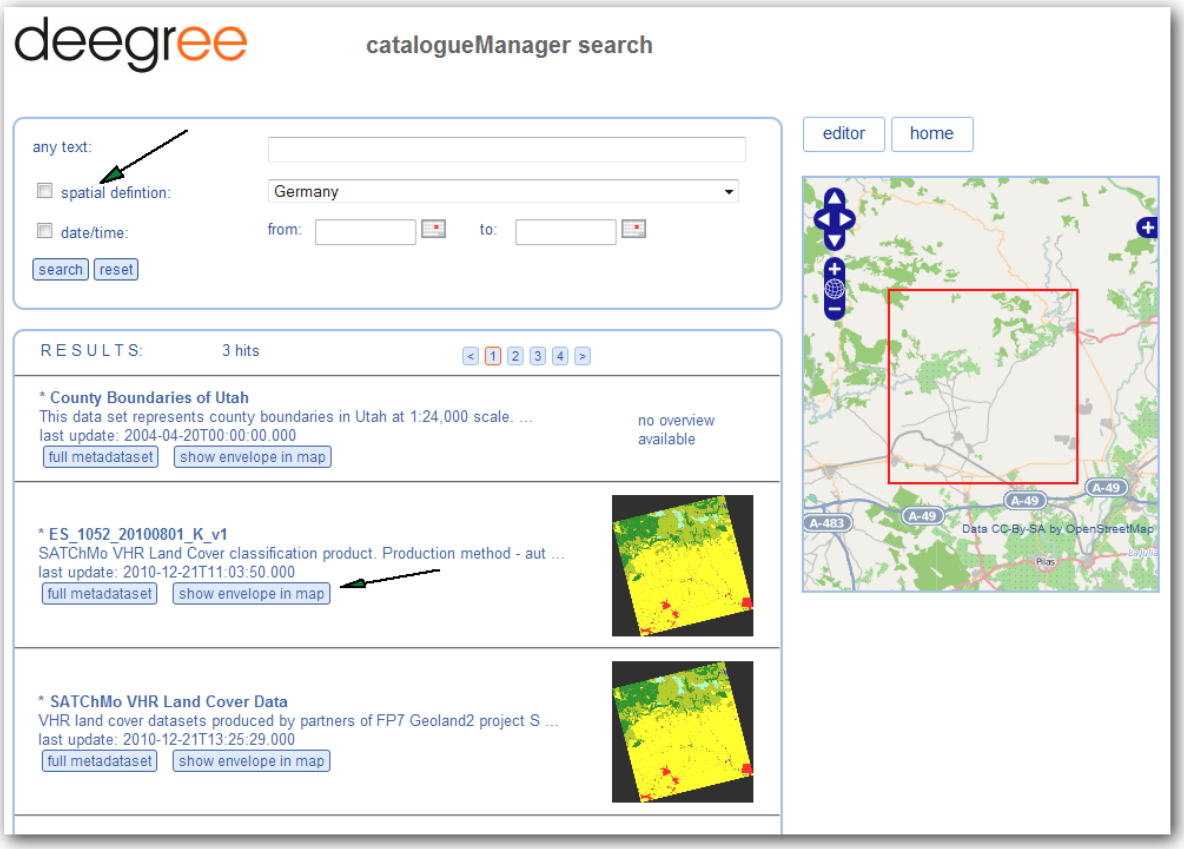
6.3.1 Generic client

Navigate to `http://your.server.name:8080/deegree-csw/client/client.html`, then select and execute "`GetRecords_title.xml`" request. <gmd:MD_Metadata> fields can be expanded to view more detailed information.

6.3.2 catalogueManager search

Starting with Deegree CSW 2.4, there is new tool available - catalogueManager. It is a collection of client and server applications for managing ISO and INSPIRE compliant metadata. It provides HTTP/SOAP interfaces for searching, accessing, harvesting and manipulating metadata for geographic data and services. Metadata can be searched by their title, topic, date etc. and the spatial extent of the described data/service. deegree supports Dublin Core and INSPIRE compliant ISO 19115/19119/19139 metadata encoding. If the ISO metadata format is used, data metadata and service metadata can be coupled. This enables a user to first search for data metadata matching, for example, a specific topic and area and then finding a WMS, WFS etc. serving the data described by the data metadata sets matching the initial search.

Search client can be accessed at `http://your.server.name:8080/deegree-csw/md_search.jsp`



Since catalogueManager is very recent addition to Deegree CSW, it's functionality is quite limited. It can search by text and date (search by spatial definition is restricted to Germany, Utah and Hessen).

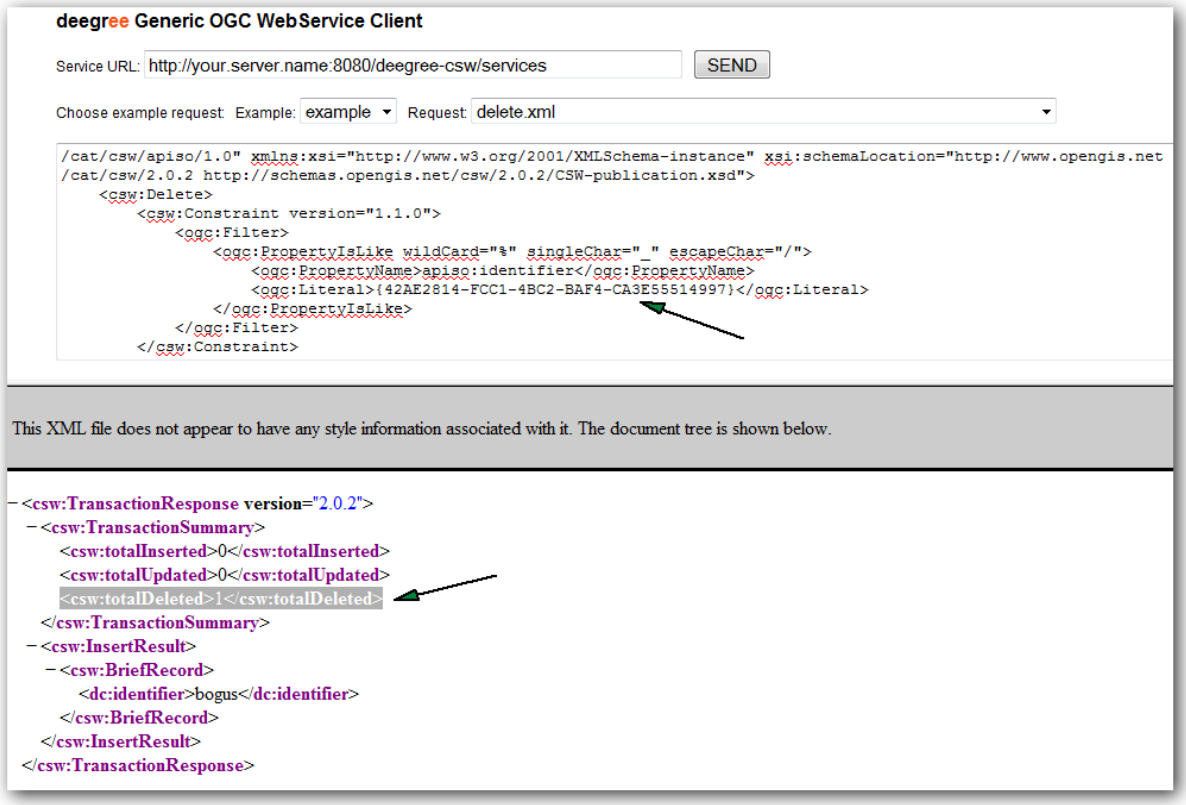
"show envelope in map" button displays data, described by metadata, location in the map on the right side.

6.4 Delete metadata records from CSW

Metadata records from Deegree CSW can be deleted using generic client or catalogueManager editor.

6.4.1 Generic client

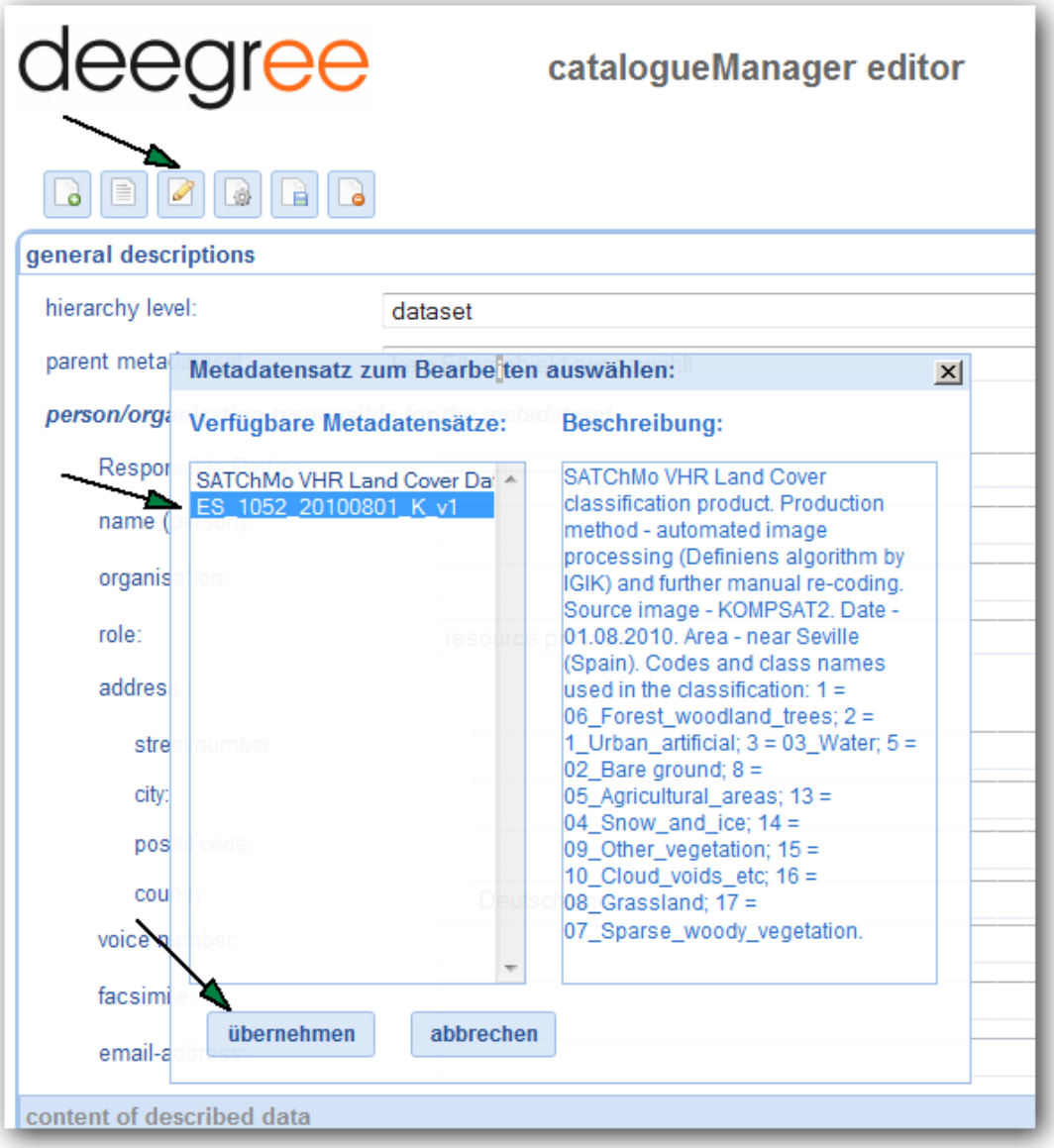
Navigate to `http://your.server.name:8080/deegree-csw/client/client.html`, then select "`delete.xml`" request. Replace "%" in `<ogc:Literal>%</ogc:Literal>` with file identifier of record you want to delete. Press SEND button.



6.4.2 catalogueManager editor

Deegree 2.4 catalogueManager editor is NOT suitable for metadata editing. Howevet, it can be used to delete existing records in CSW:

1. Press "Edit existing metadata set" button.
2. New window with metadata records list will open. Select desired record.
3. Press "ubernehmen" button.



4. Then, press "delete metadataset" button. Confirm your choice by pressing "OK" button.


deegree
catalogueManager editor
general descriptions
hierarchy level:
dataset
parent metad
person/orga
Respon
name (
organis
role:
addres
stre
city:
pos
cou
voice n
facsimi
email-a
content of described data
Löschen bestätigen
Bitte bestätigen!
Möchten Sie den Datensatz mit dem Titel ES_1052_20100801_K_v1 wirklich löschen?
OK
abbrechen

7. HOW TO USE - GEOSERVER

GeoServer is an open source software server written in Java that allows users to share and edit geospatial data. Designed for interoperability, it publishes data from any major spatial data source using open standards.

GeoServer is the reference implementation of the Open Geospatial Consortium (OGC) Web Feature Service (WFS) and Web Coverage Service (WCS) standards, as well as a high performance certified compliant Web Map Service (WMS). In AGI SDI Server "G2" version, only GeoServer WMS component will be used.

7.1 Understanding GeoServer data directory structure

Note: do not to the confuse the “GeoServer data directory” itself and the (user) data directory in it.

- "GeoServer data directory” is set at $GEOSERVER_DATA_DIR variable (or default value is used, which is root of GeoServer web application);
- $GEOSERVER_DATA_DIR/data is a location where actual data can be stored. This directory is commonly used to store shapefiles and raster files but can be used for any data that is file based.

In our case it is:

- `/var/lib/tomcat6/webapps/geoserver/data` - default value of `$GEOSERVER_DATA_DIR`
- `/var/lib/tomcat6/webapps/geoserver/data/data` - user files location

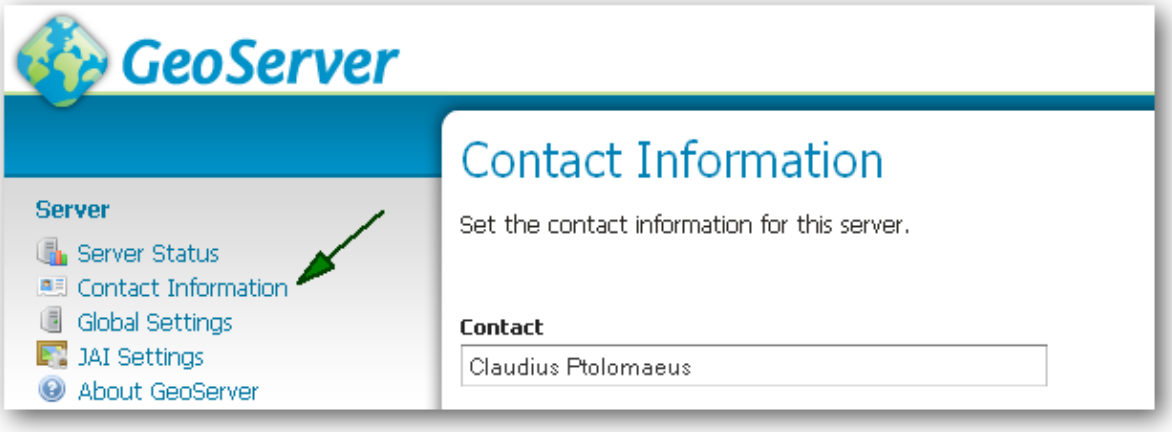
Variable `$GEOSERVER_DATA_DIR` can be set in `WEB-INF/web.xml` file for the GeoServer application. In our case, it is located at `/var/lib/tomcat6/webapps/geoserver/WEB-INF/web.xml`

In AGI SDI server default `$GEOSERVER_DATA_DIR` is set to `/sdi/geoserver/data`.

7.2 Personalising GeoServer

7.2.1 Contact information

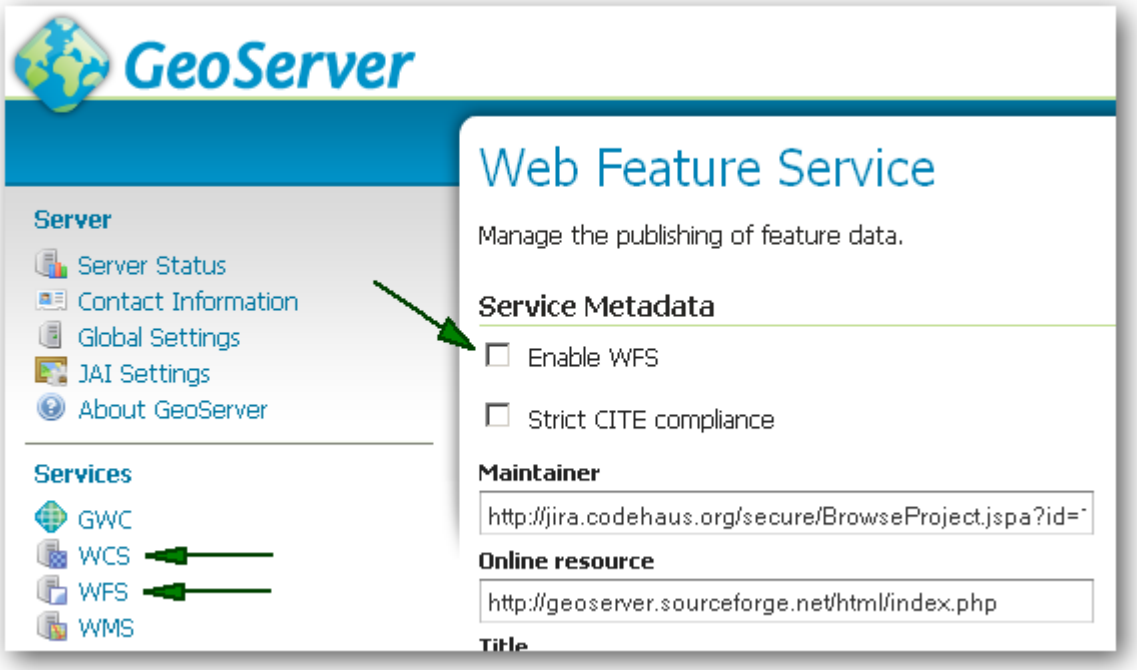
You can change contact information at Server -> Contact information. See GeoServer user manual for details.



7.2.2 Turn features on and off

If you use GeoServer only to publish SATChMo data, you can turn off WCS and WFS services. To save your system resources and simplify configuration, leaving only WMS service active is highly recommended.

In Services menu, select WCS, WFS and deselect “Enable WCS”, “Enable WFS” in Service Metadata properties, then click on “Submit”.



By default, AGI SDI server has WCS and WFS turned off.

7.3 Publishing data on GeoServer

Publishing data in GeoServer consists of two steps:

1. Files, containing vector (and raster) data has to be uploaded to the computer, where GeoServer is installed (for example, by using ftp servise remotely, or samba service locally).
2. After placing the datasets on the server running your WMS, the service is configured and datasets published by using GeoServer's web interface.

GeoServer data management menu has several main components to be configured:

Here is a quick explanation of GeoServer Data menu components and the required operations to publish your datasets:

Component	Description
Workspaces	Workspace is a container which is used to organize other items. In GeoServer, a workspace is (often) used to group similar layers together. For instance, typical workspace could be called SATChMo to contain G2 SATChMo dataset.
Stores	A store connects to a data source that contains raster or vector datasets. A data source can be a file or group of files such as a table in a database, a single file (such as a shapefile), or a directory. The store construct is used so, that connection parameters are defined once, rather than for each piece of data in a source. As such, it is necessary to register a store before loading any data.
Layers	In Geoserver, the term layer refers to raster or vector data that contains geographic features.
Layer groups	A layer group, is a group of layers that acts as a single layer. This is useful when creating a basemap, or other situations when more than one separate layer needs to be requested simultaneously or frequently. Since layers tend to contain only a single type of geometry, this allows to combine data types in one request. A layer group is relevant to WMS (map image) requests only. There is no equivalent to WFS requests.
Styles	Geospatial data has no inherent visualization. Therefore additional information, in the form of a style, needs to be applied to data in order to visualize it. GeoServer uses the Styled Layer Descriptor (SLD) markup language, a subset of XML, to describe geospatial data. See the *Styling* section in GeoServer user manual for more information on working with styles.

So, to publish your vector datasets on the WMS after you place them physically on the server running WMS service, it is necessary to complete at least those three steps:

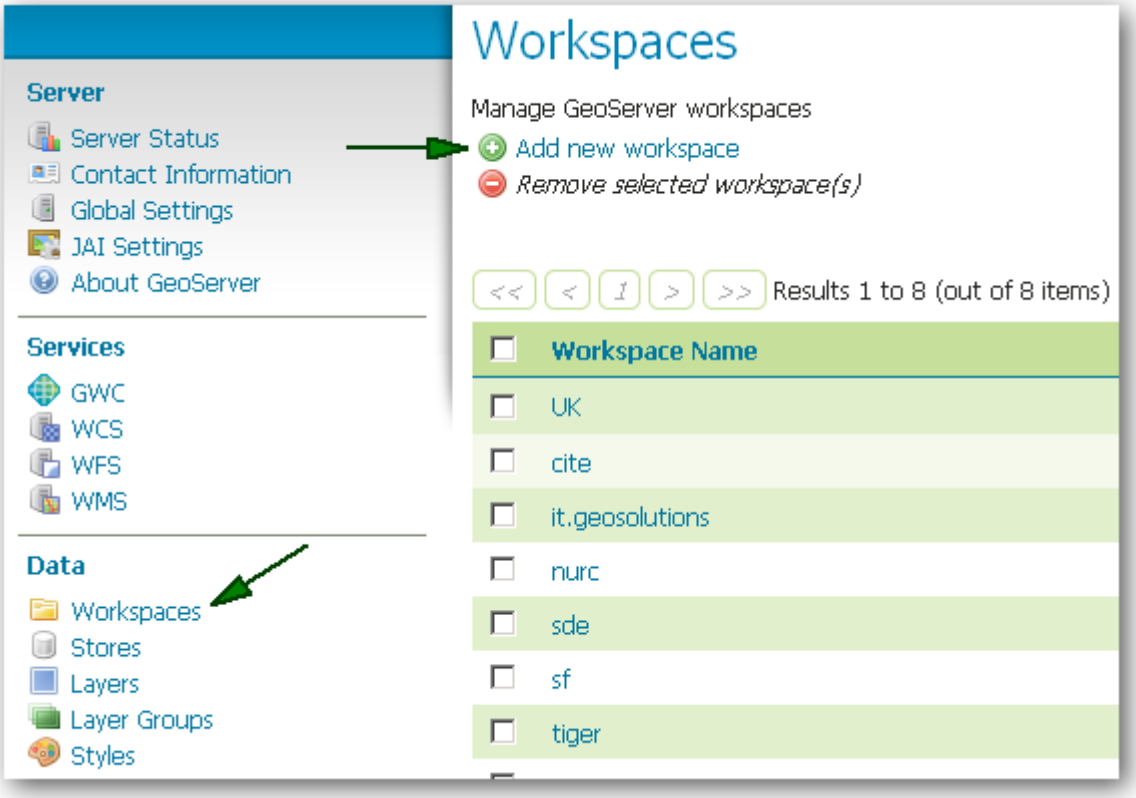
1. Create a workspace;
2. Register a data store for your uploaded dataset(-s);
3. Create a new WMS layer and point to a certain newly uploaded dataset (to be repeated for all new datasets);
4. Create (if not done already) a new style and assign it to your newly created layers.

The procedure will be described in detail. Data, used as example, is G2 SATChMo VHR dataset.

7.3.1 Create a workspace

The first step in data loading is creation of a workspace (unless you already have created one earlier). This creates a certain container for your datasets related methodologically or thematically under one project. Creating a workspace is also essential, because it will allow to distinguish between different groups of WMS layers published on the same WMS server.
As for G2, you will have to provide a link to a certain workspace on your WMS server which contains SATChMo VHR datasets in order to publish them on the G2 Portal.
To create a GeoServer workspace, you will need to follow these steps:

1. Navigate to the main GeoServer Web Administration page (`http://your.server.address:8080/geoserver`).
2. Click on the Workspaces link on the left column, under Data.
3. Click on the "Add new workspace" link at the top centre of the page.



In the next page, you will be prompted to enter the workspace name and URI.

Field	Value
Name	SATChMo
Namespace URI	http://www.geoland2.eu
Default workspace	Yes (select checkbox)

Note: you can add data to non-default workspace, too.

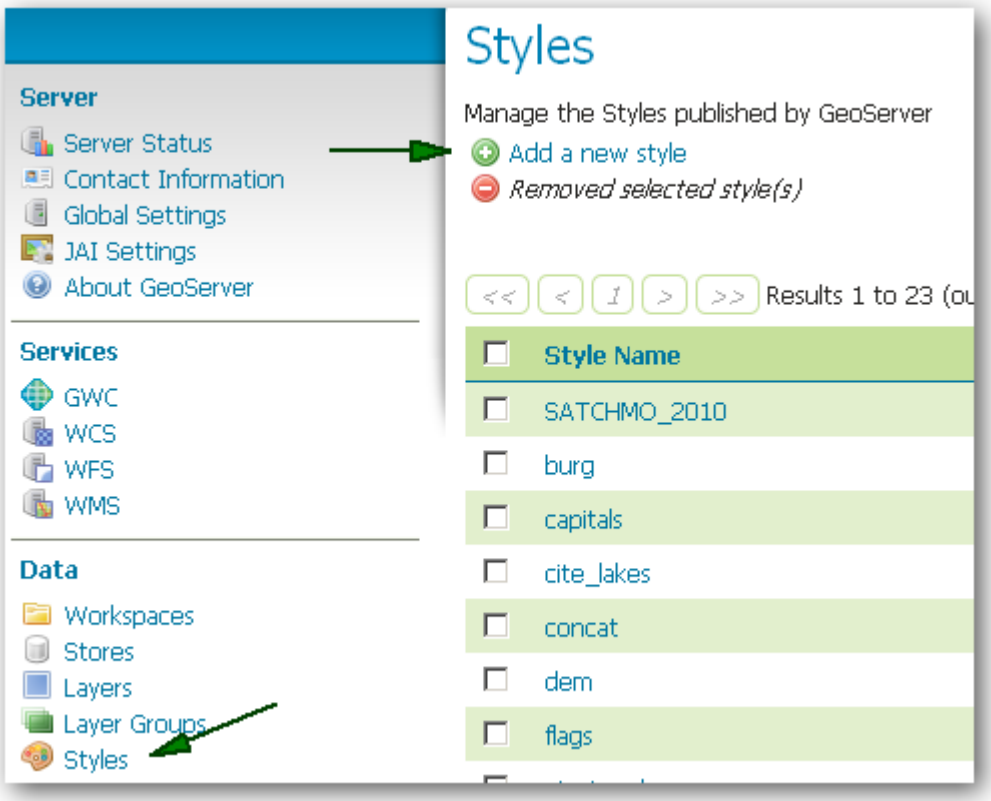
Click on “Submit” to add new workspace into your WMS server.

7.3.2 Add style for vector data

Before uploading vector data (shape files), their visualization style must be defined, because with WMS client it is not possible to change style of datasets in client application. In other words, if a certain style is not assigned to a vector dataset published by your WMS server, on all the “clients” (desktop GIS or on-line mapping applications) it will all appear single-coloured, and the clients will NOT be able to change the thematic colouring, making your WMS service practically useless for any thematic mapping purposes. Another important aspect of styling WMS datasets is that they must be defined the same way in all the WMS services hosted by separate data providers in order to maintain thematic integrity in large-scale (regional) thematic mapping applications.

In order to set up the style(-s) of your datasets published over WMS services, you need to complete the following steps:

1. Navigate to the main GeoServer Web Administration page.
2. Click on the Styles link on the left column, under Data.
3. Click on the “Add new style” link at the top centre of the page.
   In next page, you will be prompted to enter the style name. Style itself can be typed (or copy/pasted) in editor or uploaded as file.
4. Click on “Validate” to check new style, then, if no errors are found, on “Submit” to add new style.



See GeoServer documentation for detailed information about style creation:
http://docs.geoserver.org/stable/en/user/styling/index.html

7.3.3 Upload data to GeoServer data directory

Before publishing data in GeoServer, it should be uploaded into Data Directory first. Again, please make sure that file naming conventions are properly followed. The following example shows how a typical sequence of dataset deployment operations on Ubuntu Linux server may look like this:

1. Create folder `SATChMo` in `$GEOSERVER_DATA_DIR/data`, for example
   `sudo mkdir /sdi/geoserver/data/data/SATChMo`
2. In `SATChMo` folder, create a subfolder `shp` for vector data. For example:
   `cd /sdi/geoserver/data/data/SATChMo`
   `sudo mkdir shp`
3. Copy your vector data to `shp` folder. For example, for UK_20090912_3970_K_v1.zip (unpack archive before copying):
   `sudo cp V_UK_20090912_3970_K_v1.* /sdi/geoserver/data/data/SATChMo/shp`
4. Change SATChMo directory permissions:
   `sudo chown -R tomcat6:tomcat6 /sdi/geoserver/data/data/SATChMo/`

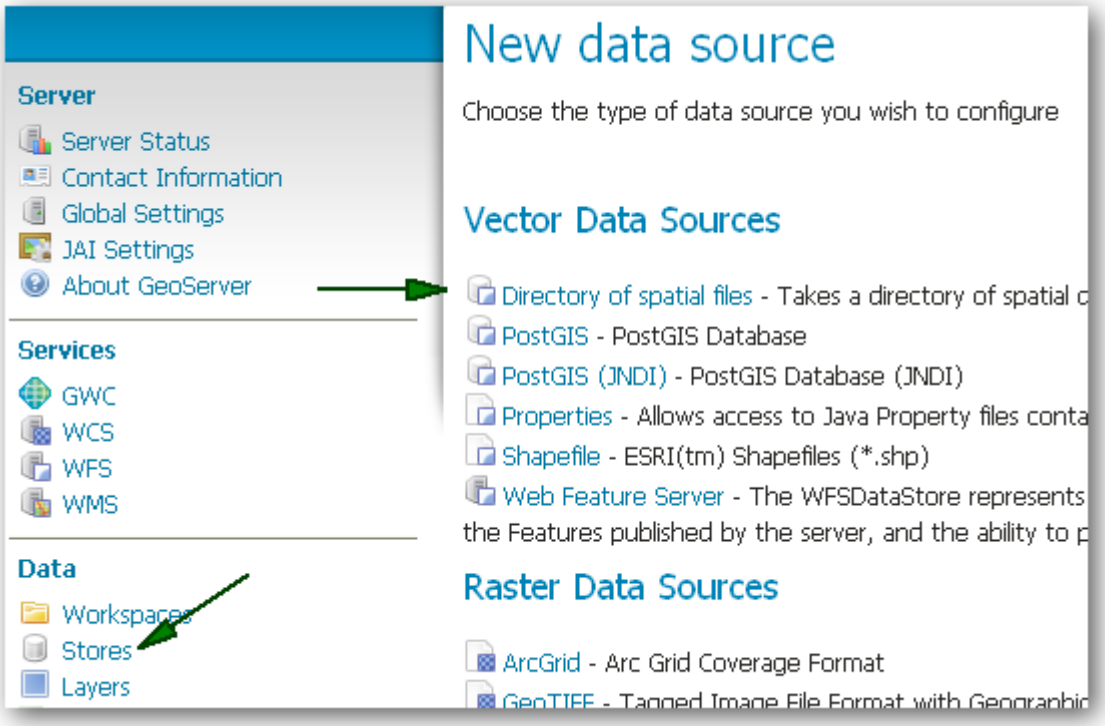
7.3.4 Publish vector datasets

The overall procedure of datasets publishing on GeoServer WMS is rather straightforward. At first, you need to create new store to define a connection to the directory (on your server) containing your vector datasets. When data store is defined, you can start publishing individual datasets. The following chapters will illustrate the whole process in detail.

7.3.4.1 Create new vector data source

Defining the new data source on GeoServer is done by the following procedure:

1. Navigate to the main GeoServer Web Administration page.
2. Click on the Stores link on the left column, under Data.
3. Click on the "Add new store" link at the top centre of the page.
4. In "New data source" window, select "Directory of spatial files"
5. In next page, enter values from the table below (or substitute with your data);
6. Click „Save". If there is already files in data source folder, list of detected layers will be shown (you can ignore it now – layers will be published in next step)

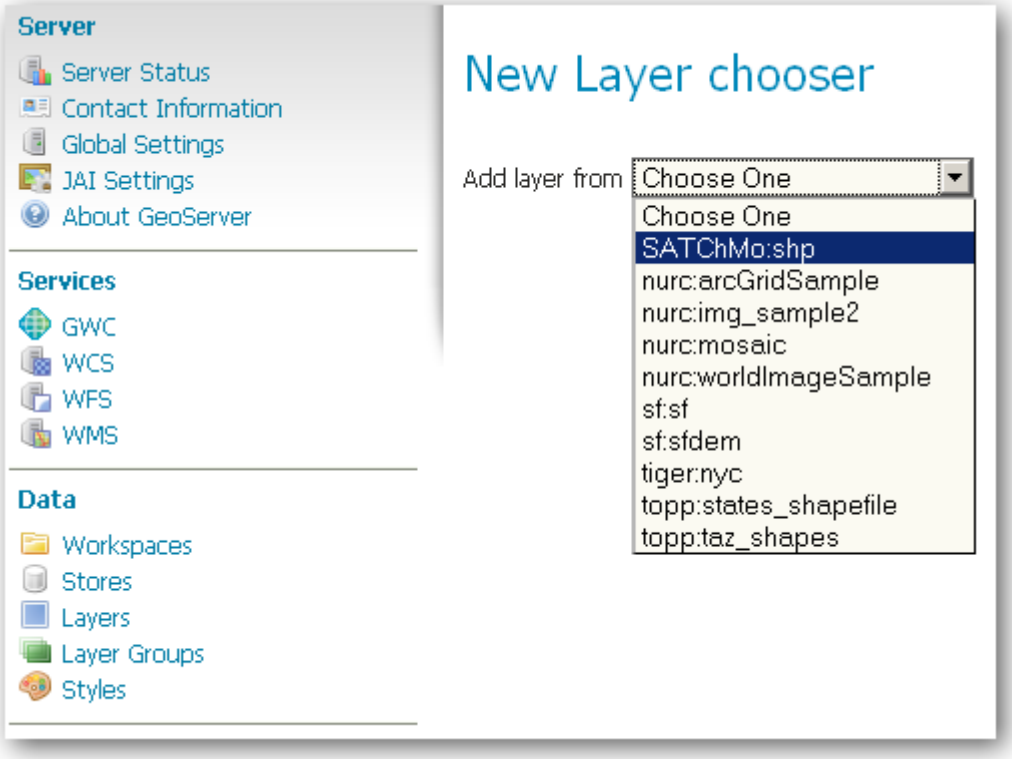


Field	Value
Workspace	SATChMo
Data source name	shp
Description	
Enabled	Yes (tick checkbox)
URL	file:data/SATChMo/shp

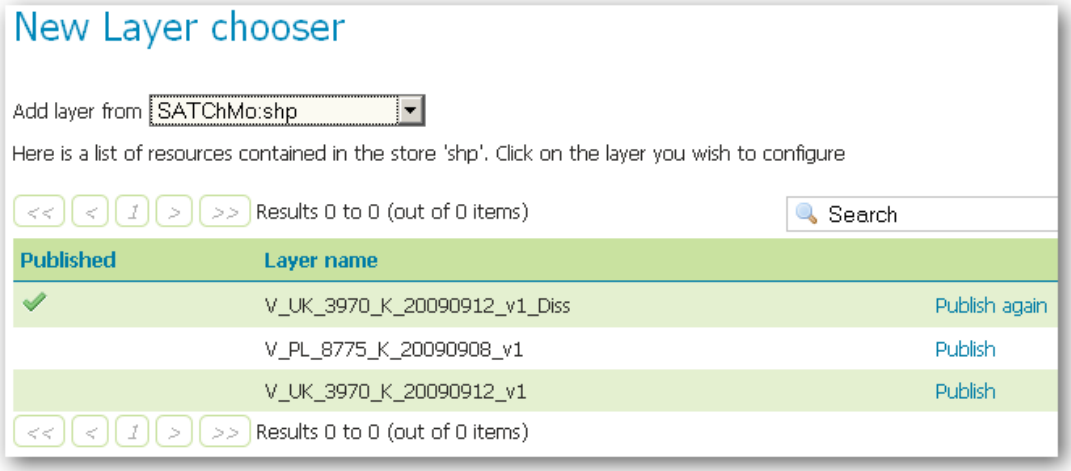
7.3.4.2 Publish vector layers

To publish vector datasets recently added to Vector Data Source, you need to complete the following steps:

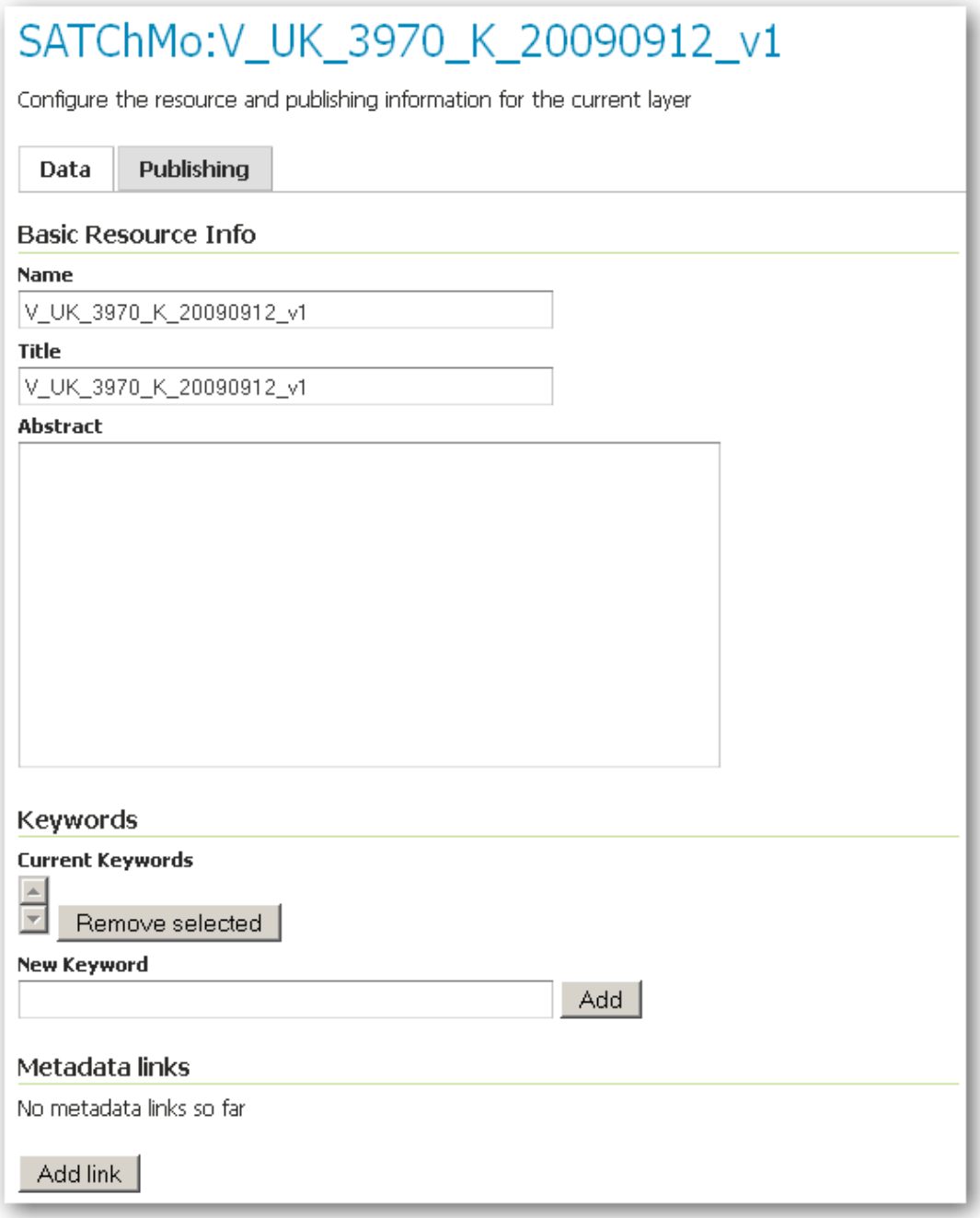
1. Navigate to the main GeoServer Web Administration page.
2. Click on the Layers link on the left column, under Data.
3. Click on the "Add a new resource" link at the top centre of the page.
4. In next page, from drop-down menu choose appropriate Workspace:Store (for example: SATChMo:shp)



5. Detected in chosen store layers will be shown – both published and unpublished.

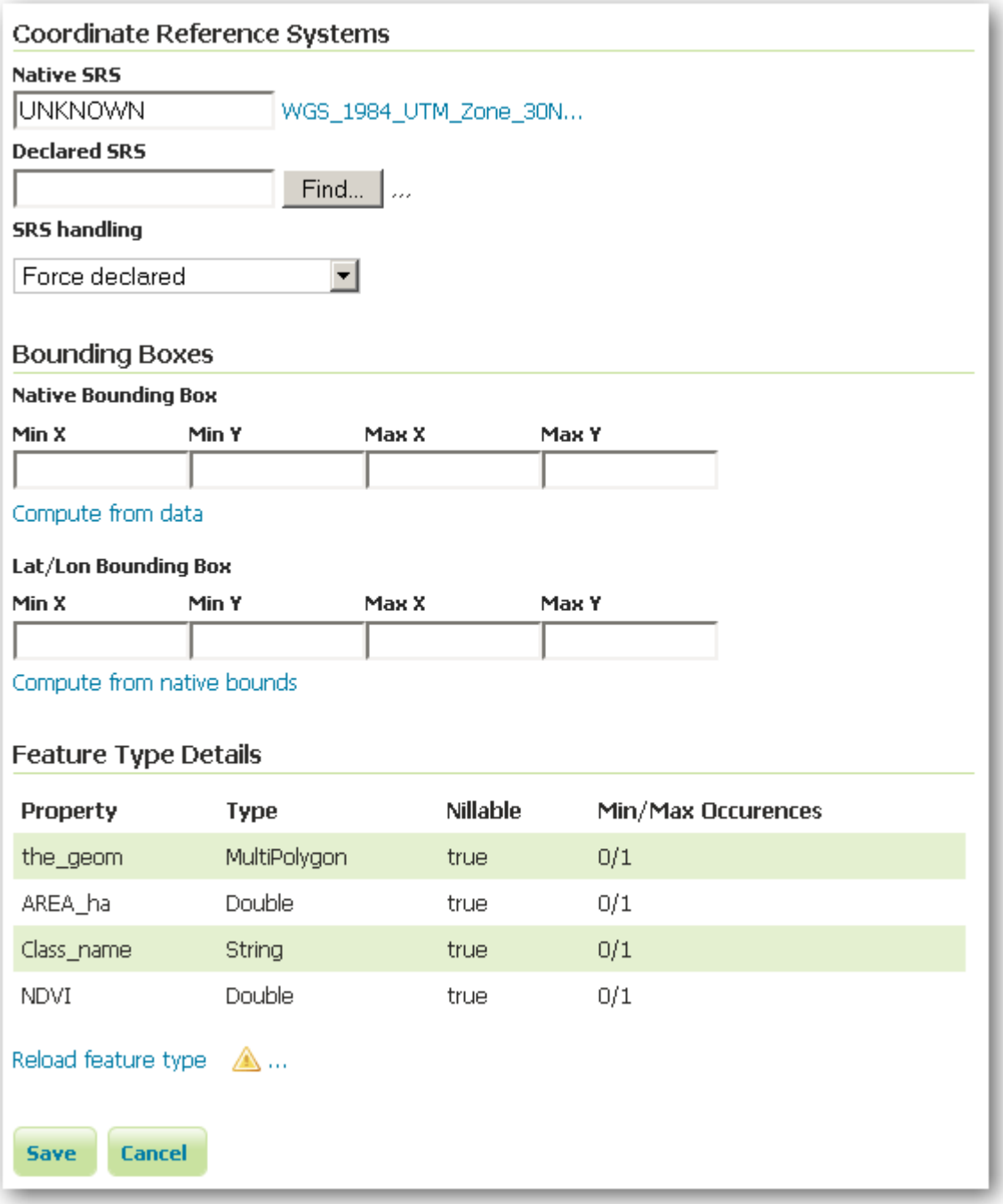


6. Select layer you want to publish, click on "Publish" next to that layer's name .
7. In next page, enter some metadata about layer (follow the screen-shots) :



It would be very useful if you could provide an abstract and at least some other information for each of your datasets published as WMS layers. In fact, this is the only way the clients will be able get any metadata information on your WMS broadcasts, as there will be NO DIRECT LINK between WMS layers published on your server and metadata records on the downloadable dataset files published on the G2 Portal Web Catalog Service.

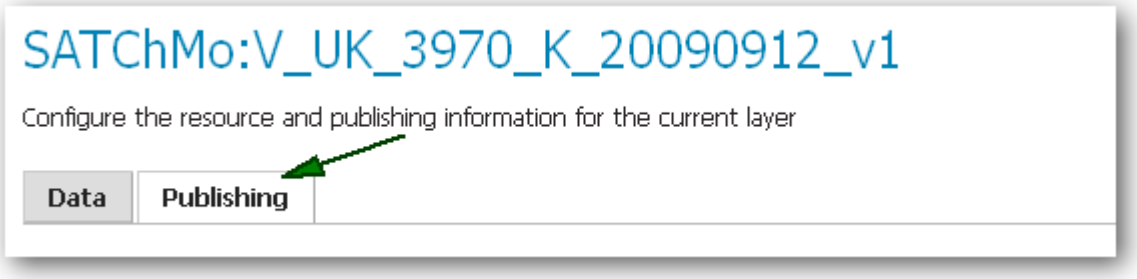
Continue on the same page (below metadata links). Next part is coordinate reference systems properties. If native SRS is not detected, enter it manually, then calculate bounding boxes (by clicking on link “Calculate ...”).



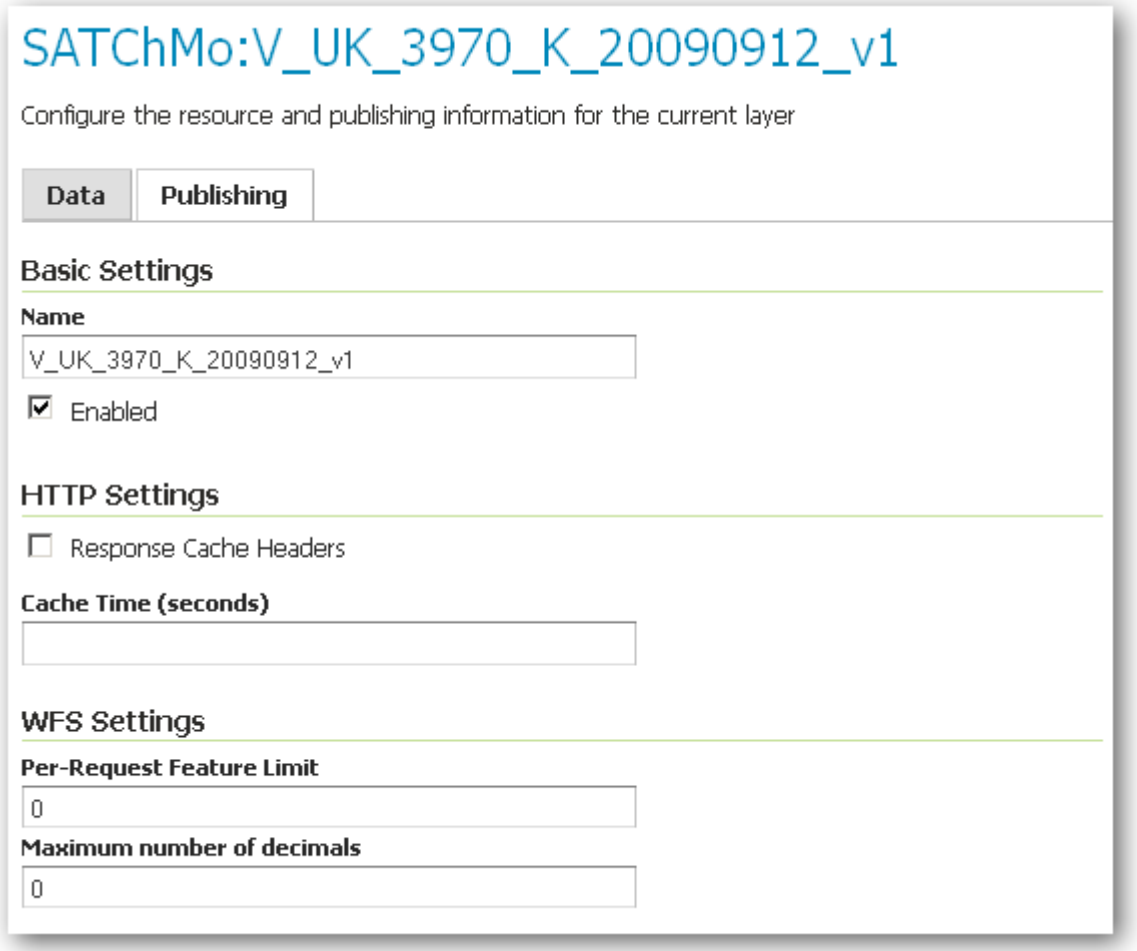
Field	Value
Native SRS	(if not detected – enter in “Declared SRS” field below)
Declared SRS	Enter corresponding coordinate system in EPSG format (for example: EPSG:32630)
SRS handling	Force declared (if native SRS is undetected, otherwise – leave default)
Native Bounding Box	If native SRS is undetected, enter it in “Declared SRS” field, then press “Compute from data” link. Otherwise it will be calculated automatically.

Lat/Lon Bounding Box	If native SRS is undetected, enter it in “Declared SRS” field, then press “Compute from native bounds” link. Otherwise it will be calculated automatically.

DO NOT press “Save” yet – you need to configure publishing information as well!

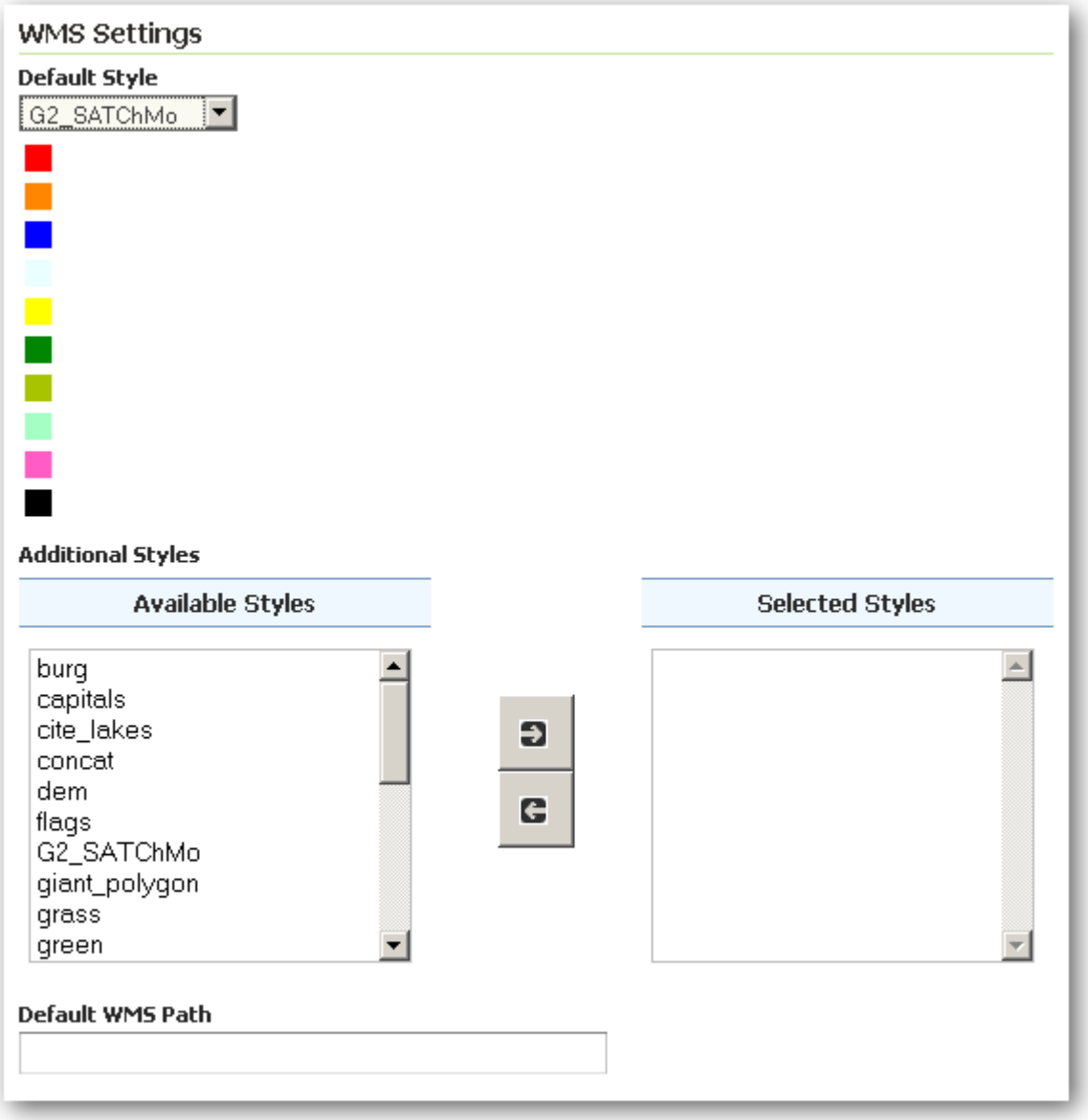


In the Publishing tab you will have to enter layer's publishing properties.



Field	Value
Name	(leave default)
Enabled	Yes (tick checkbox)
Response Cache Headers	(leave default)
Cache Time (seconds)	(leave default)
Per-Request Feature limit	(leave default)

Maximum number of decimals	(leave default)



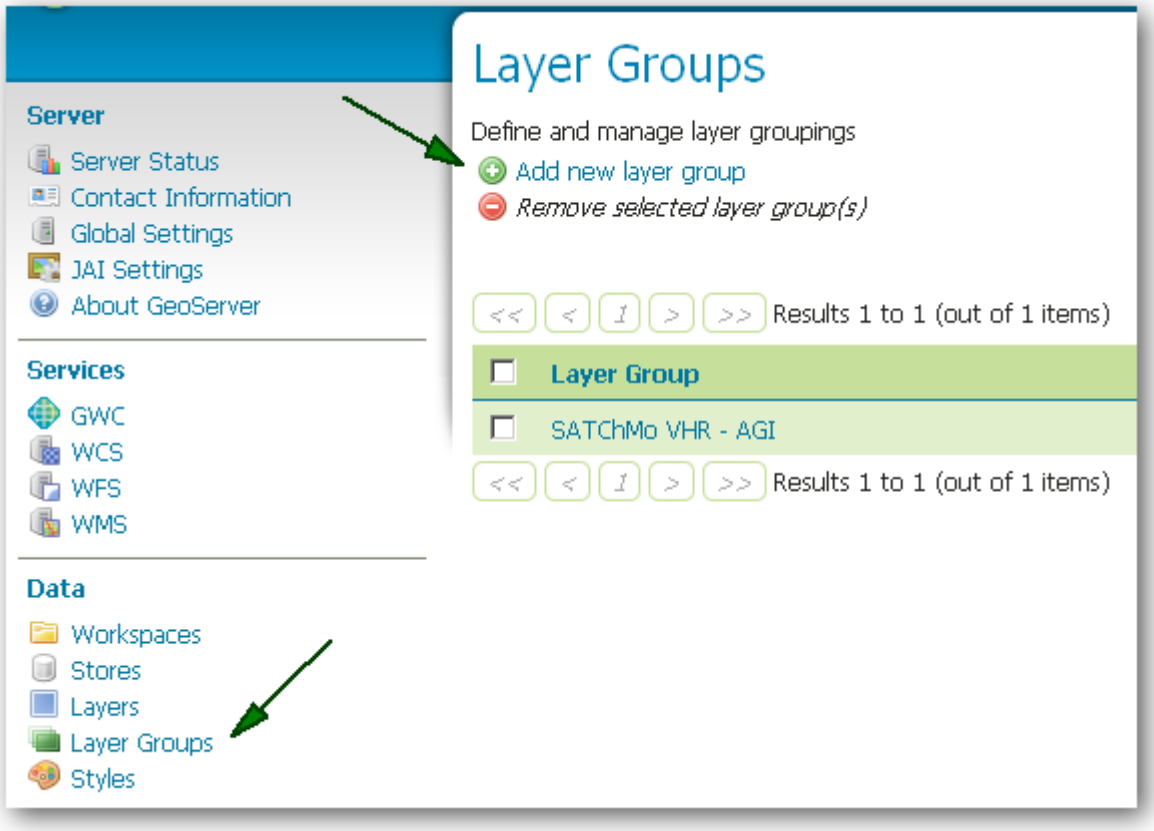
Field	Value
Default style	G2_SATChMo (or your created style)
Additional styles	(none)
Default WMS Path	(leave default)

WMS Attribution and KML Format Settings leave with default values.

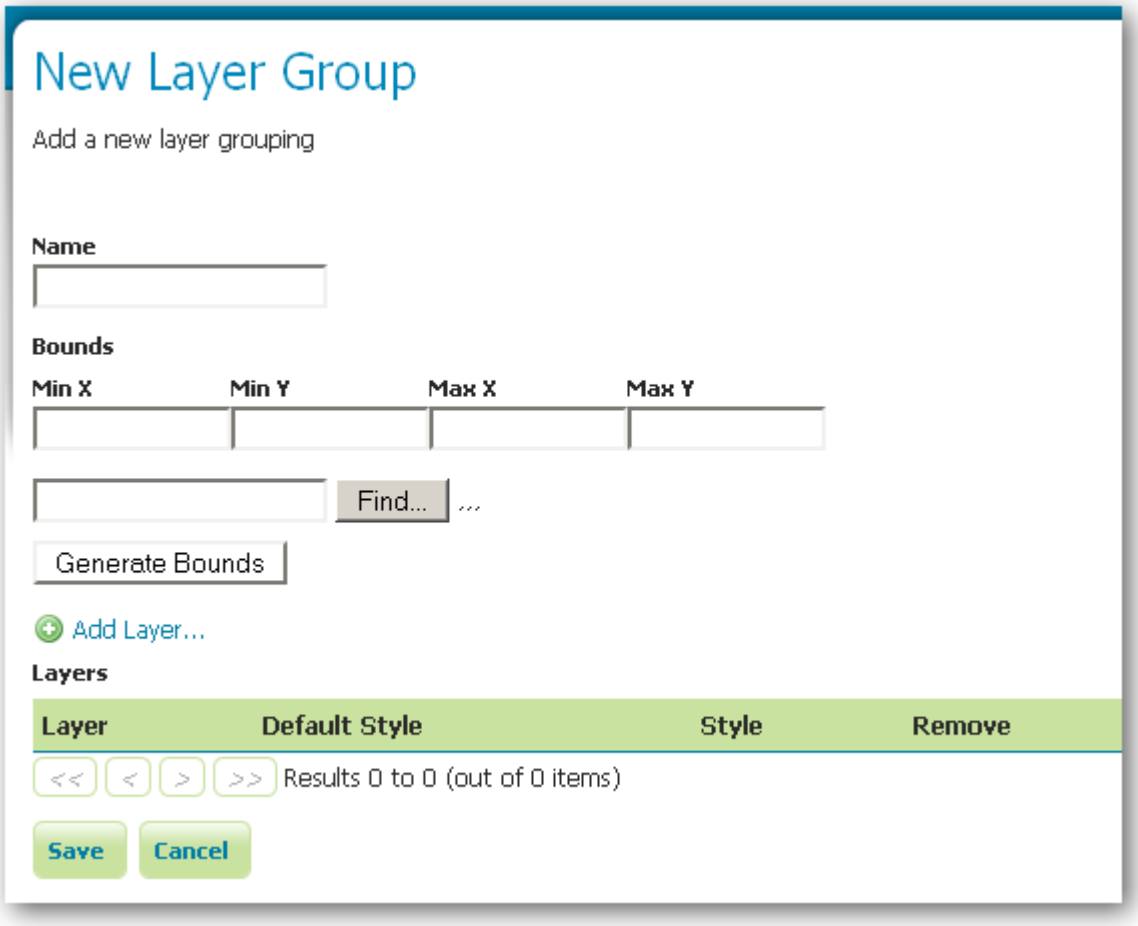
Press “Save”. Congratulations, new WMS layer is published! The web clients will be able to “see” your layers immediately.

7.3.5 Create the layers group

After layers are published, they should be assigned to layer group. This step otherwise is not obligatory, but on the G2 Portal there is a so-called “SATChMo VHR Land Cover Dataset Catalogue”, which is configured to access a layer group, not separate layers – so for SATChMo datasets published on your WMS server creation of a layer group is obligatory. Later, you can add/update layers in that group without reconfiguring Geoland2 catalog.
The procedure is simple: you must select “Data – Layer” groups in left menu, then select “Add new layer group”.



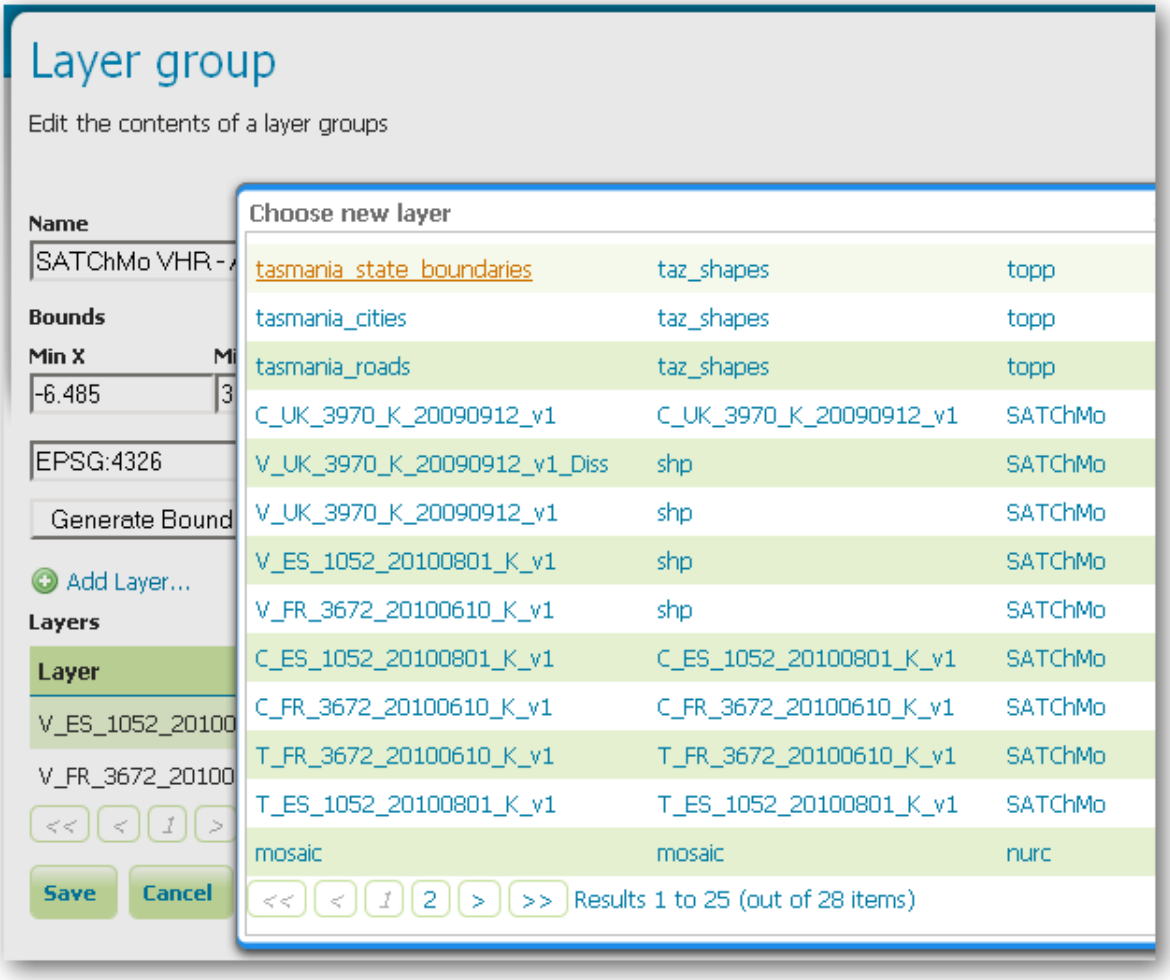
In next page, enter layer group name, coordinate system (EPSG:4326), then add layers. After that, press “Generate Bounds” button.



Field	Value
Name	SATChMo VHR – [data provider]
Bounds	(Press “Generate bounds” after adding layers)
(coordinate system)	EPSG:4326 (for G2 portal; may be other for different portals)

Note, that layer group coordinate system may differ from layer(s) coordinate system. Layer group can also have member layers with different coordinate systems.

Finally, select “Add layer” link (below “Generate bounds” button). In pop-up window, select layer, you want to add to the group:



Repeat “Add layer...” for all layers you want to add. When done – press “Save” button.

7.4 Security considerations

As always, there are essential rules to follow while dealing with internet servers. For security considerations, see the GeoServer user manual: http://docs.geoserver.org/stable/en/user/security/index.html

8. TECHNICAL SUPPORT

A limited technical support on installation, configuration and maintenance of AGI SDI Server will be provided free of charge within FP7 "Geoland 2" project. Requests for technical support, comments, inquiries and suggestions and can be addressed to the main designer of this system, who is also responsible for it's further development :

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9. LICENSING

AGI SDI Server is built on free software and therefore it is free software as well; you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation; either version 2 of the License, or (at your option) any later version. The Debian GNU/Linux 5.0 (Lenny) license text can also be found at http://www.gnu.org/copyleft/gpl.html and /usr/share/common-licenses/GPL-2 on AGI SDI Server.

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2011.04.15