Atmospheric Data Access for the Geospatial User Community

USER REQUIREMENTS
V1.3

KNMI SRON IMAU esa NCAR unidata

Document Status Sheet

*Status)**	*name*	*organisation*	*date*	*signature*
Prepared	Richard van Hees	SRON	12-07-2007	
	John van de Vegte	KNMI	12-07-2007	
	Wim Som de Cerff	KNMI	12-07-2007	
	Raymond Sluiter	KNMI	24-10-2007	
Approved	Richard de Jeu	VU		
	Pepijn Veefkind	KNMI		
	Ronald van der A	KNMI		
Accepted		RGI		

) prepared, checked, approved, authorized, accepted.*

document title : Adaguc User Requirements Document			
document reference id: ADAGUC_UserRequirements_v1			
version	*release*	*date*	*reason for change*
1	0	12-07-2007	Initial creation of document
1	2	24-10-2007	Major revision Raymond Sluiter
0	3	17-12-2007	Changes after review

Document Change Record

document record id: ADAGUC_UserRequirements_v1.3		
date : 12-07-2007		
originator : KNMI		
approved by: RGI		
document title: User Requirements		
document reference id:		
document version/release	*Section*	*reason for change*
0	All	Initial creation of document
0.1	All	Comments Bert van den Oord
0.2	All	Additional edits Raymond Sluiter
0.3	All	Edits Raymond Sluiter

Contents

1 Introduction

1.1 Purpose

The atmospheric and geospatial communities are still separate worlds with their own tools and data formats. It is extremely difficult to easily share data among scientists representing these communities without performing some cumbersome conversions.

This project aims to reduce the need for scientists to invent their own converter tools. Selected space borne atmospheric and land datasets will be made accessible to Geographical Information Systems (GIS) in order to be submitted to data comparison, resampling, selection, manipulation and visualization. The user community is intensively involved in the project.

The deliverables of this project are: Open Source conversion tools, selected atmospheric datasets in GIS format and web services to provide the datasets and to demonstrate the usability of the methodology to the geospatial and atmospheric community. Dissemination of results is pursued by publications, workshops and (inter)national cooperation.

1.2 Scope

This document describes the user requirements that are relevant for the implementation of the use cases [R1] in the ADAGUC infrastructure.

The user requirements described in this document are derived from the use cases that were defined during the first ADAGUC workshop, held at KNMI on 3 & 4 October 2006. Over 60 people were present and revealed an (inter)national view on what they see as high candidate use cases for ADAGUC.

1.3 Definitions, acronyms and abbreviations

ADAGUC	Atmospheric Data Access for the Geospatial User Community
ASCII	American Standard Code for Information Interchange
BIL	Band Interleaved by Line
BIP	Band Interleaved by Pixel
BSQ	Band SeQuential
CF	Climate and Forecast
DID	Data ICT Dienst
ECMWF	European Centre for Medium-Range Weather Forecasts
EOS	Earth Observing System
GALEON	Geo-interface to Atmosphere, Land, Earth, Ocean, NetCDF
GIS	Geographical Information System
GOME	Global Ozone Monitoring Experiment
GRD	ESRI Grid format
GRIB	GRIdded Binary
HDF	Hierarchical Data Format
IMAU	Instituut voor Marien en Atmosferisch Onderzoek

INSPIRE	Infrastructure for Spatial Information in the European Community
ISO	International Organization for Standardization
JPG	Joint Photographic Experts Group Interchange Format
KML	Keyhole Markup Language
KNMI	Royal Nederlands Meteorological Institute
LatLon	Latitude, Longitude
NetCDF	Network Common Data Form
NRT	Near Real Time
OGC	Open Geospatial Consortium
PNG	Portable Network Graphics
QoS	Quality of Service
RD	Rijksdriehoeksmeting (Dutch Grid)
RGI	Ruimte voor Geo-Informatie
RIVM	Rijksinstituut voor Volksgezondheid en Milieu
RT	Real Time
SCIAMACHY	Scanning Imaging Absorption Spectrometer for Atmospheric CHartographY
SHP	ESRI Shapefile
SSD	Software Specification Document
SRON	SRON Netherlands Institute for Space Research
TBD	To Be Determined
THREDDS	Thematic Realtime Environmental Distributed Data Services
TIFF	Tagged Image File Format
URD	User Requirements Document
UTM	Universal Transverse Mercator
VU	VU University Amsterdam
WCS	Web Coverage Service
WFS	Web Feature Service
WMO	World Meteorological Organization
WMS	Web Map Service
XML	eXtensible Markup Language

1.4 References

R1	ADAGUC use case document version 1.12
R2	ADAGUC workshop presentations, http://adaguc.knmi.nl
R3	PSS-05-lite software engineering standard, http://styx.esrin.esa.it/premfire/Docs/Bssc962.pdf
R4	THREDDS project, http://www.unidata.ucar.edu/projects/THREDDS/
R5	GALEON project, http://www.unidata.ucar.edu/projects/THREDDS/GALEON/Home.html
R6	Geonovum, http://www.geonovum.nl
R7	Rijkswaterstaat Data ICT Dienst (DID), http://www.rws.nl/rws/agi/home/
R8	Dutch Geoservices Profiles, http://www.geonovum.nl/nieuws-services/index.php?Itemid=54
R9	INSPIRE, Infrastructure for Spatial Information in the European Community, http://www.ec-gis.org/inspire/

R10	OGC, Open Geospatial Consortium, Inc.®, http://www.opengeospatial.org/
R11	Netherlands SCIAMACHY Data Center (NL-SCIA-DC), http://neonet.knmi.nl/neoaf/
R12	International Organization for Standardization (ISO), http://www.iso.org/
R13	WMO, World Meteorological Organization, http://www.wmo.ch
R14	NetCDF Climate and Forecast (CF) Metadata Convention, http://cf-pcmdi.llnl.gov/
R15	ISTQB/ISEB Software Testing, http://www.bcs.org/server.php?show=nav.00101000200300v http://www.istqb.org/
R16	NASA-EOS data product levels, http://observer.gsfc.nasa.gov/sec3/ProductLevels.html
R17	SCIAMACHY, http://envisat.esa.int/instruments/SCIAMACHY/

1.5 Overview

For the design and implementation of the ADAGUC software the PSS-05-lite software engineering standard will be applied [R3]. Only the documents relevant in the scope of this project will be written, i.e. the User Requirements Document (URD) and the Software Specification Document (SSD).

The content of this document:

- Chapter 1 introduction.
- Chapter 2 general system overview.
- Chapter 3 functional user requirements and non functional user requirements.
- Appendix 1 detailed description of data requirements per use case.

2 General description

2.1 Product perspective

The product aims at an improved user friendly access to data archives, more specifically remotely sensed atmospheric measurements and soil data archives. Emphasis is put on interoperability and harmonization of data resources such that a GIS user can work with these data sets. These efforts are of current national and international interest as can be seen by the THREDDS project (Thematic Realtime Environmental Distributed Data Services) [R4] and GALEON project [R5]. The ADAGUC project has strong links with the ideas and methodologies adopted by the EU directive INSPIRE [R9]: INSPIRE lays down general rules for the establishment of an infrastructure for spatial information in Europe, for the purposes of environmental policies and policies or activities which may have a direct or indirect impact on the environment. In the Netherlands the implementation of INSPIRE is coordinated by Geonovum [R6] and INSPIRE related efforts to improve the access to geospatial data are currently undertaken at several governmental bodies like RWS-DID (formerly RWS-AGI) [R7].

2.2 General capabilities

The objectives can be defined as follows:

- Providing atmospheric data into GIS friendly format. GIS friendly means that some effort is needed to transform the data into GIS ready format which is fully described and “point and click” data [Wilhelmi 2007, R2].
- Developing tools to convert atmospheric data into open GIS data formats [R10].
- Building web services for the visualization and dissemination of atmospheric data sets and soil data sets.

The ADAGUC system will have the following functionalities (Figure 1 – System Boundaries):

- Ingest and check of atmospheric products and soil data products.
- Extraction, creation and storage of metadata.
- Extraction, creation and storage of geospatial data.
- Conversion and storage of GIS friendly datasets (from i.e. SCIAMACHY [R17]). Conversions may be executed during the processing phase (NADC processing @ KNMI and SOIL processing @ VU) or “on the fly” using (web) services.
- OGC compliant WFS, WMS and WCS [R10].
- Website providing access to, and documentation of the provided services and datasets.
- System management and control facilities for:
    - Data management
    - Managing security
    - Process monitoring
    - Logging and statistics.

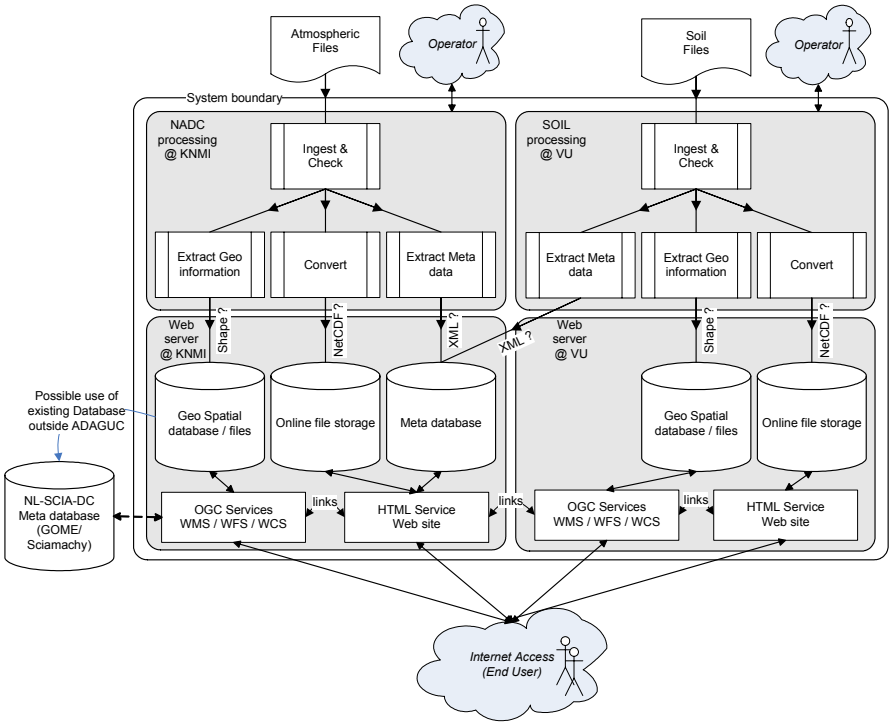

Figure 1 System boundaries

2.3 General constraints

From the product perspective the following constraints can be derived:

- The system will have an interface with the NL-SCIA-DC processing environment [R11].
- The system will have an interface to the NL-SCIA-DC SCIAMACHY and GOME metadata databases.
- The metadata standard used for describing the datasets will be in line with international standards.

Other general constraints:

- The system shall be built using open standards [R10] and where possible use Open Source software.
- The system shall be ready for INSPIRE standards [R9] (i.e. INSPIRE rules will be followed as far as they are known).
- The system shall be compliant with the Dutch Geoservices profiles [R8].
- The produced software will be made available as Open Source software.

2.4 User characteristics

The following actors using the system can be identified [R1]):

- Users:
    - Policy makers
    - Atmospheric scientists
    - GIS users
    - Risk assessment community.
- Operator.

2.4.1 Policy makers

KNMI, RIVM and other relevant parties provide data to the Dutch and international governments that deal with social and political impact of climate change. An important part of this chain of information consists of satellite data. Representation and documentation concerning this data requires mutual understanding of each other needs. By providing the data in a user friendly way (in this case aimed at the policy maker) it becomes easier for both parties to communicate at the same level and to achieve one's goals.

General interest:	level 3 / 4 products, maps, archived
Use Case:	1 - Trend monitoring of air quality on regional scale (China)
Use Case Contact:	Ronald van der A (KNMI), Wim Som de Cerff (KNMI)
Required functionality:	Data suitable for GIS analysis

2.4.2 Atmospheric scientists

Atmospheric scientists are especially interested in fast tracers like aerosols, and trace gases like NO_2 and SO_2. SCIAMACHY measures all of these. The extra value of using GIS for these users is shown by the derivation of cross-correlations with other data sources, e.g. biomass burning and soil type, but also campaign validation with balloon measurements. Usage is foreseen at RIVM, IMAU, WUR and KNMI.

General interest:	level 2 / 3 data, both archived and real-time
Use Case:	2 - NO_2 Map over Europe
Use Case Contact:	Pepijn Veefkind, Ronald van der A (KNMI)
Required functionality:	Optimized processing to level 3 or 4 data in GIS friendly format and access to ECMWF data of tropopause and boundary layer height in GIS friendly format.
Use Case:	3 - Relating Remote Sensing data with vegetation/roads/land cover/ land use change
Use Case contact:	Michael Schaepman, Laurens Ganzeveld (WUR)
Required functionality:	Provide columnar NO_2 measurements from SCIAMACHY in calibrated form and in a commonly available data format. Provide mosaiced images for the extend of the test areas.
Use Case:	4 - Global CH_4 patterns
Use Case contact:	Christian Frankenberg (SRON), Raymond Sluiter (KNMI)
Required functionality:	Provide processed methane measurements from SCIAMACHY in calibrated form and in a GIS friendly data format.

2.4.3 GIS users

GIS users are characterized as non-experts in the field of atmosphere, their focus is more on earthbound features and earth-atmosphere interactions. This community uses atmospheric data for adding extra value to their own products/projects. This can range from a real estate manager who wants to know the seasonal air quality for a building project in Spain, to a near real-time precipitation product for a river capacity calculation. In general: GIS users are interested in the spatial distribution of concentrations of trace gasses, like methane, ozone and CO_2 and all kinds of meteorological data.

General interest:	level 2 / 3 data, archived access
Use Case:	5 - Improving the Performance of River Basin Simulation Models with ADAGUC data
Use Case Contact:	Richard de Jeu / Jeroen Aerts (VU)
Required functionality:	Provide the data to feed the hydrological model STREAM: 0.25 degree global daily products of Satellite derived Soil Moisture (VUA-NASA), Precipitation (ECMWF) and Air Temperature (ECMWF), and LDAS Land Cover

2.4.4 Risk assessment community

These users are interested in products at an urban scale that are focused on industrial calamities, like gas leakage or chemical fire. It provides in combination with other data sources input to crisis information teams. For example, real time information of wind direction during industrial calamities or water flow models that are fed with meteorological (rainfall) data deriving flooding scenarios that can be used for possible evacuation plans.

General interest:	map data, real time
Use Case:	6 - GDI rampenbestrijding/Weather Alert
Use Case Contact:	Henk van Dorp / John van de Vegte (KNMI)
Required functionality:	Providing real-time meteo information during calamities in a dynamic way to show the movement of severe weather during a weather alert . This information can be provided to the general public by a dynamic map on internet and to the professional users like the police, fire departments and traffic information centers as GIS compatible data.

2.4.5 Operator

The operator is responsible for maintaining and monitoring the day-to-day ADAGUC operations. The operator interacts with the ADAGUC system through the ADAGUC operational environment interface. The operator will also update the ADAGUC website on a regular basis and answer questions from users regarding the use of the website and services.

2.5 Operational environment

The operational environment will be in line with the NL-SCIA-DC environment. The system will be available on a best effort basis, which means the system will be operated, monitored and maintained during office hours. In the cases were QoS (Quality of Service) is an issue, the ADAGUC project is regarded as a pilot project that will only recommend on implementation of the system in data critical situations.

2.6 Assumptions and dependencies

For realizing the ADAGUC services the following basic assumptions are made:

- The data collection is performed by the NL-SCIA-DC, provided by VU or by external parties. Within ADAGUC no extra data will be collected.
- To improve the accessibility of the data, international compliant metadata standards will be provided by the data providers (NL-SCIA-DC, VU)
- NL-SCIA-DC and VU will not provide software to read the provided datasets: the delivered data formats will be compatible with mainstream applications like ESRI GIS and mapping software, IDL, open source GIS programs, etc.

3 Specific requirements

In this chapter, the capabilities of the system and the applicable constraints are described. The capability requirements are split into sections describing what the system must do (functional requirements) and describing the performance capabilities. The constraint requirements are grouped according to the categories set out for an SSD.

3.1 Capability requirements

3.1.1 Scope of work

UR-SOW-1	ADAGUC services will be built using open standards
UR-SOW-2	ADAGUC services will use open source software solutions where practically possible.
UR-SOW-3	ADAGUC will make maximum use of existing NL-SCIA-DC solutions
UR-SOW-4	ADAGUC services shall be compliant with international standards (ISO [R12], OGC [R10])
UR-SOW-5	ADAGUC services shall be “INSPIRE ready”
UR-SOW-6	ADAGUC services shall be compliant with the Dutch Geoservices profiles

3.1.2 Scope of product

UR-SOP-1	ADAGUC will provide data files in a GIS friendly format
UR-SOP-2	ADAGUC will provide OGC compliant web service access to datasets
UR-SOP-3	ADAGUC will provide access to SCIAMACHY related datasets (appendix 1, NL-SCIA-DC)
UR-SOP-4	ADAGUC will provide access to soil moisture datasets (VU)
UR-SOP-5	ADAGUC will provide access to meteorological datasets specified in appendix 1.

3.1.3 Functional and data requirements

3.1.3.1 General web access

UR-FUDA-1	ADAGUC shall provide interactive access to the data specified in appendix 1.
UR-FUDA-2	Data shall be direct accessible from applications through the internet
UR-FUDA-3	Data shall be (direct) accessible from stand-alone (GIS) applications like ESRI GIS, IDL, MATLAB, etc.
UR-FUDA-4	Data shall be direct accessible from Google Earth (KML)
UR-FUDA-5	ADAGUC shall give access to archived, Near Real

	Time (NRT) and Real Time (RT) data
UR-FUDA-6	ADAGUC shall provide datasets covering the entire world
UR-FUDA-7	Data shall be accessible from C, Python, Java and Fortran APIs
UR-FUDA-8	All created software shall comply with the RGI guidelines (OGC, Geonovum).

3.1.3.2 Web viewing access

UR-FUDA-9	Data shall be made available as images (PNG, JPG) via the internet (quick viewing/mapping)
UR-FUDA-10	ADAGUC shall provide (web)tools with basic functionality to visualize different datasets
UR-FUDA-11	ADAGUC shall provide (web)tools with basic functionality to overlay different datasets
UR-FUDA-12	ADAGUC shall provide (web)tools with basic functionality to compare datasets

3.1.3.3 Transformations and projection

UR-FUDA-13	ADAGUC should support different projections and map datums
UR-FUDA-14	ADAGUC shall provide reprojection options for the provided datasets.
UR-FUDA-15	The interpolation scheme for reprojection can be selected by the user (supported methods: nearest neighbor, linear, bi-cubic)
UR-FUDA-16	ADAGUC shall deliver data in a geographic coordinate system using Latitude-Longitude with WGS84 datum.
UR-FUDA-17	ADAGUC should be able to deliver data in the ERTS89/UTM coordinate system (INSPIRE)
UR-FUDA-18	ADAGUC should be able to deliver data in the RD (Rijksdriehoek) coordinate system.
~~UR-FUDA-19~~	~~ADAGUC shall provide unit conversion tools~~
~~UR-FUDA-20~~	~~ADAGUC shall provide dataset sub setting tools~~
~~UR-FUDA-21~~	~~ADAGUC shall provide dataset collocation tools~~
UR-FUDA-22	ADAGUC shall provide subsets of the data based on location/region
UR-FUDA-23	ADAGUC shall provide subsets of the data based on time
UR-FUDA-24	ADAGUC shall provide subsets of the data based on date
UR-FUDA-25	ADAGUC shall provide subsets of the data based on quality

3.1.3.4 Data import and export

UR-FUDA-26	ADAGUC shall import data in the ASCII format

UR-FUDA-27	ADAGUC shall import data in the HDF-4 format
UR-FUDA-28	ADAGUC shall import data in the HDF-5 format
UR-FUDA-29	ADAGUC shall import data in the NetCDF format
UR-FUDA-30	ADAGUC shall import data in the BIL format
UR-FUDA-31	ADAGUC shall import data in the GeoTIFF format
UR-FUDA-32	ADAGUC shall import data in the GRD format
UR-FUDA-33	ADAGUC shall import data in the GRIB format
UR-FUDA-34	ADAGUC shall export data in the GRD format
UR-FUDA-35	ADAGUC shall export data in the NetCDF format
UR-FUDA-36	ADAGUC shall export data in the HDF-5 format
~~UR-FUDA-37~~	~~ADAGUC shall export data in the HDF-EOS format~~
UR-FUDA-38	ADAGUC shall export data in the GeoTIFF format
UR-FUDA-39	ADAGUC shall export data in the SHP (Shapefile) format
UR-FUDA-40	ADAGUC shall export data in KML (Google Earth) format
UR-FUDA-41	ADAGUC shall use the HDF-5 format as the common format for storage

3.1.3.5 Metadata

UR-FUDA-42	Metadata shall be provided conform the INSPIRE guidelines
UR-FUDA-43	Metadata shall be provided conform the Dutch Geoservices profiles
UR-FUDA-44	ISO-19115 shall be used to document product metadata

3.1.4 Performance requirements

UR-PERF-1	The response of the service will be quick (interactive use) and if a response is known to take longer (UR-PERF-2/3), signals will be given to the user
UR-PERF-2	The response of the viewing service will be quick, images should be loaded within 20 seconds on the internal network
UR-PERF-3	The response of the download service will be quick, datasets of 15MB should be provided within 2 minutes on the internal network
UR-PERF-3	The service should be able to nominally serve 25 concurrent connections.
UR-PERF-4	The service should be scalable when demand and load on the system increase.

3.2 Constraint requirements

3.2.1 Interface requirements

UR-INTF-1	A uniform filename convention for all ADAGUC datasets shall be used
UR-INTF-2	The ADAGUC filename convention shall be based on existing international initiatives (ISO, OGC).
UR-INTF-3	All internet services from ADAGUC shall be OGC compliant.
UR-INTF-4	All datasets shall use the appropriate WMO [R13]/OGC/CF [R14] standard for variable names
UR-INTF-5	All datasets shall use the ISO standard for metrics
UR-INTF-6	The ADAGUC web services shall be interoperable with international initiatives, like GALEON
UR-INTF-7	The ADAGUC system shall be interoperable with the NL-SCIA-DC system
UR-INTF-8	Dataset metadata shall be exchangeable between different instances of ADAGUC (NL-SCIA-DC and VU)

3.2.2 Operational requirements

UR-OPR-1	The service will be provided via the internet and will be operated, maintained and monitored during office hours
UR-OPR-2	The service shall be robust and able to handle off nominal situations to minimize operator efforts
UR-OPR-3	The service shall report off-normal situations to the operator

3.2.3 Resource requirements

UR-RES-1	TBD

3.2.4 Verification requirements

UR-VER-1	Verification requirements will be included in a test plan conform ISTQB/ISEB [R15] that will be written after the SSD.

3.2.5 Acceptance testing requirements

UR-ACT-1	Acceptance testing requirements will be included in a test plan conform ISTQB/ISEB [R15] that will be written after the SSD.

3.2.6 Documentation requirements

UR-DOC-1	The project documentation is conform PSS-05-lite. An URD and SRD will be written

3.2.7 Security requirements

UR-SEC-1	Backups of the databases are generated regularly and

	stored on a different system than the operational one
UR-SEC-2	Critical components of the system shall be protected by firewalls
UR-SEC-3	For database access username password access shall be used for certain datasets
UR-SEC-4	Write access to the databases is restricted to the Operator

3.2.8 Portability requirements

UR-PORT-1	The system shall be written in ANSI-C, Python, PostgreSQL/MySQL, Perl or Java
UR-PORT-2	The system shall be able to run on Linux platforms (RedHat, SuSe, or Debian)

3.2.9 Quality requirements

UR-QUA-1	Quality of datasets shall be documented and described using the appropriate metadata fields.
UR-QUA-2	Dataset quality information shall be provided by the dataset provider

3.2.10 Reliability requirements

UR-REL-1	ADAGUC shall provide services on best effort base

3.2.11 Maintainability requirements

UR-MNT-1	The software shall be modular built and sufficient comment shall be put into the source code

3.2.12 Safety requirements

UR-SAF-1	TBD

3.2.13 Delivery requirements

UR-DLV-1	The deliverables to RGI are: • URD • SRD • Final Report

Appendix 1 – usage matrix

Table 1 shows detailed (data) characteristics of the Use Cases in matrix form with the following categories:

Use Case
The number of the Use Case [R1].

Community
The community to which the Use Case belongs as identified on the ADAGUC workshop: policy makers, atmospheric scientists, GIS users, risk assessment community.

Dataset
Describes the desired dataset.

Data-source
Describes the source (sensor and/or producer) of the desired dataset.

Source
The number corresponds to the following (internet) resources:

1) http://www.temis.nl/airpollution/no2.html
2) http://www.temis.nl/fresco/fresco.html
3) http://neonet.knmi.nl/neoaf/
4) http://edcsns17.cr.usgs.gov/srtmbil/
5) http://kodac.knmi.nl
6) http://www.knmi.nl/onderzk/CKO/data.html
   http://badc.nerc.ac.uk/data/ecmwf-era/
7) http://www.geo.vu.nl/~jeur/lprm/
8) http://www.knmi.nl/omi/research/product/Ozone/omdoao3.html
9) http://www.knmi.nl/samenw/SCIAMACHY/products/index.php?species=CH4

Level

Product level is specified according to NASA-EOS [R16].

Level 0:
Level 0 data products are reconstructed, unprocessed instrument/payload data at full resolution; any and all communications artifacts, e.g. synchronization frames, communications headers, duplicate data removed.

Level 1A:
Level 1a data products are reconstructed, unprocessed instrument data at full resolution, time-referenced, and annotated with ancillary information, including radiometric and geometric calibration coefficients and georeferencing parameters, e.g., platform ephemeric, computed and appended but not applied to the Level 0 data.

Level 1B:
Level 1A data that have been processed to sensor units (not all instruments will have a Level 1B equivalent).

Level 2:
Level 2 data products are derived geophysical variables at the same resolution and location as the Level 1 source data.

Level 3:
Level 3 data products are variables mapped on uniform space-time grid scales, usually with some completeness and consistency.

Level 4:
Level 4 data products are model output or results from analyses of lower level data, e.g. variables derived from multiple measurements.

Input data format
The data format in which the original data is provided:

ASCII = American Standard Code for Information Interchange, data represented in text format.

HDF-4/5 = Hierarchical Data Format release 4/5, a library and multi-object file format for the transfer of graphical and numerical data between computers.

NetCDF = Network Common Data Form, a machine-independent, self-describing, binary data format standard for exchanging scientific data.

BIL = Band Interleaved by Line (or row-interleaved), a binary format which is a compromise format compared to BIP and BSQ, allowing fairly easy access to both spatial and spectral information.

GeoTIFF = a public domain metadata standard which allows georeferencing information to be embedded within a TIFF (Tagged Image File Format) file.

GRIB = GRIdded Binary, a mathematically concise data format commonly used in meteorology to store historical and forecasted weather data.

GRD = ESRI Grid format (Arc/INFO Grid).

Input coordinate system
The coordinate system in which the original data is provided:

LatLon = Latitude, Longitude (degrees)
UTM = Universal Transverse Mercator
RD = Rijksdriehoeksmeting (Dutch Grid)

Output data format
The desired data format in the ADAGUC system:

GRD = ESRI Grid format (Arc/INFO Grid).

NetCDF = Network Common Data Form, a machine-independent, self-describing, binary data format standard for exchanging scientific data.

HDF-5 = Hierarchical Data Format release 5, a library and multi-object file format for the transfer of graphical and numerical data between computers.

HDF-EOS = a specialized form of HDF used by NASA, which deals specifically with the kinds of data that the Earth Observing System (EOS) produces.

GeoTIFF = a public domain metadata standard which allows georeferencing information to be embedded within a TIFF (Tagged Image File Format) file.

SHP = ESRI Shapefile

KML = Keyhole Markup Language, an XML-based language for describing three-dimensional geospatial data and its display in application programs. KML is the data format used in Google Earth.

Output coordinate system
The desired coordinate system in the ADAGUC system

LatLon = Latitude, Longitude, degrees
UTM = Universal Transverse Mercator
RD = Rijksdriehoeksmeting (Dutch Grid)

Output Projection / map datum
The preferred output projection (and map datum) in case the data is delivered in re-gridded form.

Data description
Describes which parameters are needed within a dataset to make it usable for this community.

Region
The preferred extent of the dataset.

Mapping
Describes if the community is interested in a (bitmap) image of the selected scene/day, with maybe some layer features. WMS delivers bitmap maps through a web service that can be accessed by any OGC compliant client. Maps delivered by a web service may also be delivered in KML format for direct use in Google Earth.

Client
The application used for further processing of the data.

Processing
Describes what kind of operations have to be performed once the data are into the (GIS) application.

Application usage

Describes the usage: the result of all the data manipulation is part of a web service, or input for scientific research.

QoS

Describes if the system is part of an operational suite which has certain time constraint on it. E.g. warning notifications to calamity centers, delivery of data in critical situations.

Use Case	Community	Dataset	Data-source	Source	Level	NRT /archive	Input Data-type	Input Coordinate System	Output Data-type	Output Coordinate System	Output Projection/ map datum	Data Description	Region	Mapping	Client	Processing	Application usage	QoS
1	Policy makers	NO_2, monthly average	GOME SCIAMACHY OMI	1	4	archive	ASCII (TOMS)	LatLon	GRD (NetCDF)	LatLon		Location Region Time Quality	World	WMS	ArcGIS IDLiTools	GIS analyses	Report	No
1	Policy makers	NO_2, daily images	GOME SCIAMACHY OMI	1	3	archive	HDF-4	LatLon	GRD (NetCDF)	LatLon		Location Region Time Quality	China	WMS	ArcGIS IDLiTools	GIS analyses	Report	No
1,4	Policy makers Scientists	Cloud fraction and pressure, daily images.	GOME SCIAMACHY	2	3	archive	ASCII	LatLon	GRD (NetCDF)	LatLon		Location Region Time Quality	World	WMS	ArcGIS IDLiTools	GIS analyses	Report	No
2	Scientists	NO_2, monthly average	OMI	8	2	archive	HDF-5	LatLon	HDF-5 NetCDF GRD	LatLon		Location Region Time Quality	World	WMS	ArcGIS QGIS	GIS analyses	Report	No
2	Scientists	Tropopause height	ECMWF			archive	NetCDF	LatLon	HDF-5 NetCDF GRD	LatLon		Location Region Time Quality	World	WMS	ArcGIS QGIS	GIS analyses	Report	No
2	Scientists	Boundary layer height	ECMWF			archive	NetCDF	LatLon	HDF-5 NetCDF GRD	LatLon		Location Region Time Quality	World	WMS	ArcGIS QGIS	GIS analyses	Report	No
3	Scientists	Daily columnar NO_2	SCIAMACHY	1	3,4	archive	HDF-4	LatLon	HDF-5	LatLon	Mercator	Location Region Time Quality	Continental Europe / Amazon	WMS	ArcGIS IDLEnvi	GIS analyses	Report	No
4	Scientists	CH_4	SCIAMACHY	9	2	archive	HDF-5 ASCII	LatLon	GRD HDF-5 HDF-EOS SHP	LatLon		Location Time Quality	World	WMS KML	ArcGIS	Interpolation GIS analyses	Report	No
4	Scientists	Cloud fraction	MERIS, (SciaMAX)[1]	3	3	archive	HDF-4 ?	LatLon	GRD HDF-5 HDF-EOS SHP	LatLon		Location Time Quality	World	WMS KML	ArcGIS	Interpolation GIS analyses	Report	No
5	GIS Users	Precipitation	ECMWF[2]	6	?	archive	GRIB	LatLon	HDF-5 GRD GeoTIFF KML	LatLon		Location Time Quality	World	WMS	IDRISI Matlab	GIS modelling	Report	No
5	GIS Users	Air temperature	ECMWF[1]	6	?	archive	GRIB	LatLon	HDF-5 GRD GeoTIFF KML	LatLon		Location Time Quality	World	WMS	IDRISI Matlab	GIS modelling	Report	No

[1] SciaMAX data will be incorporated as soon as the product is available.

[2] The use of ECMWF data is restricted to scientific users, in the Netherlands members of the CKO (Centrum voor Klimaatonderzoek).

5	GIS Users	Global daily soil moisture maps	AMSR (TRMM, SSMI, SMMR)	7	4	NRT	HDF-5 ASCII	LatLon	HDF-5 GRD GeoTIFF KML	LatLon		Location Time Quality	World	WMS	IDRISI Matlab	GIS modelling	Report	No
5	GIS Users	Global daily surface temperature maps	AMSR (TRMM, SSMI, SMMR)	7	4	NRT	HDF-5 ASCII	LatLon	HDF-5 GRD GeoTIFF	LatLon		Location Time Quality	World	WMS	IDRISI Matlab	GIS modelling	Report	No
5	GIS Users	Global daily vegetation content maps	AMSR (TRMM, SSMI, SMMR)	7	4	NRT	HDF-5 ASCII	LatLon	HDF-5 GRD GeoTIFF	LatLon		Location Time Quality	World	WMS	IDRISI Matlab	GIS modelling	Report	No
6	GIS Users	Daily NO_2	OMI	8	2	archive	HDF-5	LatLon	GeoTIFF GRD	LatLon		Location Region Time Quality	World	WMS	ArcGIS QGIS	GIS analyses	Report	No
6	GIS Users	NO_2, monthly average	OMI	8	2	archive	HDF-5	LatLon	GeoTIFF GRD	LatLon		Location Region Time Quality	World	WMS	ArcGIS QGIS	GIS analyses	Report	No
7	Risk assessment community	Wind direction	KNMI		4	RT	?	LatLon RD?	GRD GeoTIFF	RD		Location Time	Netherlands	WMS KML	ArcGIS Sherpa[3]	Layer combination	Real time images	Yes
7	Risk assessment community	Wind speed	KNMI		4	RT	?	LatLon RD?	GRD GeoTIFF	RD		Location Time	Netherlands	WMS KML	ArcGIS Sherpa	Layer combination	Real time images	Yes
7	Risk assessment community	Weather forecasts in case of extreme weather	KNMI		4	RT	?	LatLon RD?	GRD GeoTIFF	RD		Location Time	Netherlands	WMS KML	ArcGIS Sherpa	Layer combination	Real time images	Yes

Table 1 – Data that should be provided through ADAGUC according to the use cases.

[3] Sherpa is a Dutch system consisting of a GIS, aerial photographs with national coverage, a navigation system and a message server as bridge between the GIS system and the navigation system. At the moment Sherpa 1.0 is being implemented within the Dutch police, which should be finished in 2007.