

1 Publishable summary



African-European Georesources Observation System

AEGOS Objectives

The AEGOS project (<http://www.aegos-project.org>) aims to design the pan-African Spatial Data Infrastructure (SDI) of public and interoperable geology-related data as well as user-oriented products and services to foster and strengthen the sustainable use of georesources in Africa, i.e. metallic and industrial minerals, groundwater and geothermal energy. Collectively, European and African geological surveys as well as authorities in charge of the natural resources management have a unique archive of public Africa-related georesources data that needs to be shared and valorised. Providing access represents a major stake for sustainable development, policy making and capacity building in geosciences in Africa.

AEGOS consists in designing the SDI for georesources in Africa as a continental observation system to support a wide range of end-users: policy-makers at all geographic levels, development agencies, private sector actors, research and education geoscientific communities and civil society.

More precisely, the expected results of AEGOS project include:

- operational procedures for data management (SDI, metadata, data specifications and systems architecture),
- user-oriented products and services including the preparation of innovative spin-off projects
- a network of African-European partners and a charter of partnership,
- a geosciences contribution to GEOSS, in the context of the Infrastructure for Spatial Information in Europe (INSPIRE),
- a common strategy for capacity building and training programmes.

When operational (development and implementation subsequent to the present project), this new SDI will produce the required added-value documents and services for well informed decision-making as part of improved governance processes when addressing the critical issues of the sustainable use of georesources for the socio-economic development in Africa.

Description of works implemented so far

With respect to the above mentioned objective and expected results, the tasks executed during the first 18 months of the project (excepted management activities) have been the following:

1. Spatial Data Infrastructure reference model, metadata and data specifications (WP1): the first activities consisted in a survey of existing Spatial Data Infrastructures (SDI) based on the analysis of data models and metadata as well as experiences and lessons learnt from SDI developed by regional and international projects and initiatives. These include GSDI, GEOSS, OneGeology, INSPIRE Directive and several SDI programmes supported by UNECA and AUC. The components and rules of the future AEGOS SDI for georesources in Africa are defined on the basis of international standards for the reference model and metadata profiles. These activities were carried out using questionnaires, bibliography and a joint workshop (1a) with WP2.
2. Architecture specifications (WP2): as the future AEGOS SDI will be interconnected with other existing infrastructures, the first step was to analyse and evaluate the technical architecture and functions of the IT systems currently operating in African geoscientific institutions. Using a questionnaire distributed to partners and geoscientific data producers,

the team conducted an inventory of existing facilities and carried out a critical evaluation of their operation. A preliminary analysis of the responses was discussed during a workshop (2a) jointly with WP1 to define the functional requirements, technical components and administrative procedures. These will form the basis of the proposed AEGOS SDI in order to be adaptable for use by all geoscientific institutions throughout the African continent.

3. Identification of data themes, user-oriented products and services (WP3): work package activities started with an inventory of existing data in Africa and European geoscientific institutions as well as a survey of end-user needs and identification of products and services for the future AEGOS end-users. These activities were completed by distributing two questionnaires to the project partners and different organisations in 34 countries in Africa. The collected responses were organised in a database and presented to the work package team for discussion and synthesis during a project workshop (3a). Additional information was collected through internal technical meetings resulting in the preparation of a technical report and a concept note. These describe the georesources data to be managed by the future AEGOS SDI as well as the corresponding user-oriented products and services.
4. Preparation of innovative projects based on AEGOS (WP4): in this work package also, it started with the assessment of the existing situation. Using two questionnaires, data and information were collected about major projects related to the use of georesources in Africa as well as identification and needs analysis of future AEGOS end-users. These survey results were organised in a database to facilitate their presentation and a gap analysis during a project workshop (4a) and technical meetings also involving national data producers and end-users.
5. Interoperability and interdisciplinarity in support of GEOSS (WP5): the first activities of WP5 focused on highlighting the need to combine the geology-related information, to be provided by AEGOS, with those on soils, surface water, agriculture, forest, natural habitats and others of priority concern for the sustainable management of natural resources. The preliminary work has started, including a workshop (5) for demonstrating the benefits of the “Global Earth Observations System of Systems” (GEOSS) approach by linking up existing data sources through protocols that promote interoperability and interdisciplinarity with the Societal Benefit Areas.
6. Definition of common strategies for capacity building and training (WP6): during the first period, the work package activities were dedicated to (1) describe the thematic fields to be covered by the training curricula and (2) carry out a gap analysis in terms of necessary skills for developing, implementing, operating and maintaining a SDI for georesources in Africa. Therefore, the questionnaire designed jointly with WP1, WP2 and WP3 included a specific section addressing the panel and level of knowledge with regard to the potentially required tasks for the implementation of AEGOS-SDI. Beside this work, an inventory of existing training centres in Africa and Europe including the adequate curricula is elaborated. The results of these surveys have been analysed and discussed through three workshops (6a, 6b and 6c).
7. AEGOS as a geoscience contribution to GEOSS, in the context of the INSPIRE Directive (WP7): The activities began during the kick-off meeting in Cape Town in February 2009 with a series of bi-lateral meetings with other work packages to develop their GEO-related knowledge and potential contributions. This internal linking to GEO was then followed by external linking to GEO, with the Work Package leaders representing AEGOS in a series of GEO meetings throughout the reporting period. These included meetings of the GEO Science and Technology, Capacity Building and Data and Architecture Committees, four GEO European Project Workshops, the 2009 GEO-VI Plenary and the 2010 GEO Work Plan Symposium. It was used to pursue a dialogue with GEO member states and

participating organisations on the place of geo-resources in the GEO Work Plan that informed an analysis of the place of geology within the plan. Other WP7 activity centred on preparation of the GEONETCast trial, which is scheduled to start later in 2010.

8. Evaluating the “Sustainability of the Georesources Observation System” (WP8-Task 8-5): The activity began during the Kick-off meeting in Cape Town in February 2009 with a series of bi-lateral meetings with the other work packages to identify the potential contributions: products (WP3 and WP4), training programmes (WP6) and charter of partnership (WP9). A couple of internal meetings were conducted with the team members in order to specify the final structure of the AEGOS operational system (Phase III) and the path to reach this target (Phase II project).
9. Information and dissemination system of the Support Action (WP9): during the first period, the work package activities were dedicated to implement and run the official website of AEGOS project as part of the dissemination system which also includes quarterly newsletters, press releases, press publications, posters and flyers, as well as participation in external events. Two public conferences (Launch and Mid-Term) were organised. Two versions (initial and first update) of the AEGOS Charter of partnership have been prepared.

Main results

The main results of the project are listed below for each of the tasks related to the first period:

- **Task 1.1 - Analysing existing Spatial Data Infrastructure reference models, metadata and data specifications (see Del. D1.1 and D1.2):**

This analysis was carried out using the answers to the questionnaire designed jointly with work packages WP2, WP3 and WP6. Although it was sent to the AEGOS partners and a wide panel of data producers over 34 countries, the collected information needed to be complemented about the existing metadata standard and reference data models. Websites of relevant African and European infrastructures and initiatives have been surveyed. Additionally, a study has been conducted about the integration of bibliographic information and reports in a geo-referenced system. A standard-based reference model is proposed in order to describe all the components and the implementation rules of the future AEGOS SDI. The recommendations include the ISO metadata standards, the INSPIRE profile and methodology as well as the GeoSciML and EarthResourceML data models.
- **Task 2.1 - Analysing of the functionality and infrastructure of existing systems (see Del. D2.1 and D2.2):**

The first stage of work was focused on an assessment of existing facilities and a critical evaluation of their operation. It covered the technical infrastructure (hardware and software, communication networks), the operation (operational procedures, interfaces, system of work, dataflow, maintenance and security), the personnel involved (system management and staffing, qualifications), and the potential for development (new trends and possibilities for improvements of the existing services). The main difficulties are caused by inadequate technical equipment, out-dated software, missing standards and metadata, problems in obtaining access (view and display) and downloading data. Data delivery is often restricted by technical problems and access rights not being defined. Incompatible data structures and non-uniform terminology (lack of harmonization) mean that the interoperability of data is poor. Problems have been identified in staffing and with the allocation of responsibility for the maintenance of the IT systems. The currently existing IT systems for geoscientific data and associated human resources need to be improved to meet the requirements of the future AEGOS distributed infrastructure.

- **Task 3.1 - Identifying data themes and their relevant attributes for a sustainable use and monitoring of georesources, and Task 3.2 Defining innovative, user-oriented products and services (see Del. D3.1, D3.2 and D3.3):**

The assessment covering governmental, non-governmental and private sectors in 34 African countries gave a good overview of the existing situation regarding the type and availability of data, databases and information frameworks in Africa and on the needs of potential future end-users of AEGOS. The results of this assessment were analysed also for data models and standards in use, status of the metadata, access rights and IPR.

In many countries, work is underway to develop a national data and service infrastructure. The major problems relate to limited coverage of digital data, lack of common data models and missing standards for metadata, service interfaces and data transfer. Digital data for many African countries can be found on web sites, but it is generalised, whereas higher resolution data is usually not publicly available.

The end-users will need easy access to reliable and interoperable digital data, products and web-enabled services. A guideline for the future AEGOS is therefore to develop a system that makes good quality georesources data available publicly or charged at a nominal fee, and which enables an end-user to produce value added data products and to carry out customised data processing services.

- **Task 4.1 - Formalising a generic approach for the generation of user-oriented products and services (see Del. D4.1 and D4.2):**

The information collected (about 87 projects) was analysed to initiate the definition of user-oriented products and services and spin-off projects. On the basis of the results of the follow-up questionnaire (56 potential end-users answers), end-users' preliminary priority research themes and choice of themes for preparing future spin-off projects were obtained. The process of creating End-User Committee has been initiated and the National and Regional End-user Committees under leadership of AEGOS partners will be implemented. The flowchart for the Generic Approach to Project Generation and the general scheme for project selection have been prepared. Analysis of information and some preliminary offer of innovative spin-off projects have been carried out based on the database with information from the questionnaires. Preliminary proposals of future innovative spin-off projects based on the definition of products and services were formulated. They cover several themes: mineral resources, groundwater and environmental issues.

- **Task 5.1 - Identifying a test-case area and relevant data sources and services for interoperability and interdisciplinarity in support of GEOSS:**

Since mineral extraction has important consequences on ecosystems and biodiversity, the focus is put to the impacts of mining sites located close or inside protected areas with high ecological value. This analysis builds on the established "Protected Areas Vulnerability Assessment" developed by partner 13-JRC. A first test-case is selected in Tanzania for developing combinations with the TANRIS database set up by partner 22-IRA. In parallel, the evaluation of a second test-case area is under consideration. It focuses on the prediction of water erosion at the regional scale in Africa. Soil erosion by water is regarded as one of the most widespread forms of soil degradation in Africa, and as such, poses potentially severe limitations to sustainable development.

- **Task 6.1 and 6.2 - Analysing existing curricula and infrastructures in Africa and Europe dedicated to capacity building and training for the sustainable use of georesources; Proposing an organisation for building capacities and training (see Del. D6.1, D6.2, D6.3 and D6.4):**

The first set of requirements for capacity building was identified using mind maps on professional profiles covering the skills and specializations in the fields of project

management, information technology, data management, information management and user management. These are based on the future needs to implement and operate the AEGOS SDI as well as on the gap analysis concerning the present skills and knowledge level at various African organisations dealing with georesources. A guideline to be used for generating information on adequate educational institutions in Africa and Europe was developed. The activities and necessary professional profiles for implementing and running the AEGOS-SDI have been described by the WP6 team. Now, it requires further input from WP1, WP2 and WP3 during the upcoming project stages.

- **Tasks 7.1 and 7.3 - Building a GEO Geoscience Targets working group; Testing data/information upload and download issues:**

The GEO Geoscience Targets working group (task 7.1) began life in the bi-lateral meetings held in Cape Town and evolved through correspondence and an AEGOS-GEO mapping exercise undertaken by partner 17-CGS. The aim was to have a mature analysis by the end of this reporting period, ahead of the AEGOS-GEO Workshop on Geoscience Observations and Observing Systems scheduled for July, 2010 (M20). This was achieved by the Mid-Term Conference (May, 2010) and as a result presentations were identified there to populate a workshop agenda. These cover a range of georesources topics from mapping and 3D modelling, through mineral resources and associated environmental issues to geothermal energy and palaeo-climate. The outcome was a strong, well-prepared agenda for the Workshop. For task 7.3, BGS and BRGM prepared the contract with EUMETSAT for the GEONETCast Trial, made the local links in Burkina Faso for the reception of the data and the BGS developed the necessary EO datasets to be broadcast during it. The result is well advanced preparations, with almost everything needed in place by the end of this reporting period.

- **Task 8.5 – Evaluating the “Sustainability of the Georesources Observation System”:**

This consists in designing a Plan for Sustainable Operation (PSO) of the future AEGOS system. This PSO has a wider scope than the business plan initially identified as the main deliverables of task 8.5. It is extended from the system to the overall AEGOS organisation and includes the links and support from existing organisations such as the African Union, the Organisation of African Geological Surveys and the Geological Society of Africa. The first design of the PSO has been documented and discussed within the AEGOS team and with external potential partners. It was presented and approved at the Mid-Term meeting.

- **Tasks 9.1 to 9.5 – Setting up the official website; Defining the publication policy; Setting up the dissemination system; Participating in the organisation of conferences and workshops; Defining the AEGOS Charter of Partnership (see Del. D9.1, D9.2, D9.3 to D9.8, D9.13 and D9.16):**

Since its setting up at month M5, the project website (www.aegos-project.org) has been continuously updated and populated with documents produced by each work package and the Coordination. Six quarterly newsletters were published in two formats: a PDF file downloadable from the website and also in HTML format. The mailing list is regularly updated with self-registered readers on the website and contacts identified by the project team members. New posters, fact sheets and flyers are regularly generated upon request for communicating about the project in external events including workshops, conferences and exhibitions. The work package team contributed with the project coordination and the local hosts to organise two public conferences (Launch and Mid-Term). The AEGOS publication policy has been defined (framework for reporting and external communication). The Charter of Partnership stage 1 was prepared during the first semester and revised during the recent Mid-Term Conference.