The Global Monitoring for Environmental and Security (GMES) Africa Action Plan

POLICY AND INSTITUTIONAL FRAMEWORK

EXPERTS: Botlhale Tema (Consultant) based on first version by: Jean Ndikumana (ASARECA); Paolo Roggeri (EC-JRC); Emilio Barisano (EUMETSAT Consultant/GEOSAT Technology)

Institutions:
• Association for Strengthening Agricultural Research in Eastern and Central Africa
(ASARECA), Entebbe, Uganda
• Joint research Centre, ISPRA, Italy
• EUMETSAT Consultant/GEOSAT Technology, Antibes, France

1. Introduction

1.1. Thematic Context

The signing of the UN the Millennium Development Goals (MDGs) by the international at the United Nations Millennium Summit held in September 2000, coincided with a period when Africa was also undergoing its own transformation, redirecting its focus from liberation under the auspices of the Organization of the African Unity (OAU) to accelerated socio-economic development driven by a newly formed organization, the African Union. Along with the establishment of the AU, the New Partnership for Africa (NEPAD) was created as the technical arm to translate AU policies into implementable programmes. Recognizing the value of science and technology as an important drivers of development, the AU then developed the Consolidated Plan of Action for Science and Technology (CPA) consisting of a number of flagship projects among which was Space Science. The value of Space Science as an aid to monitoring and managing the environment to address development problems was highlighted in the Summit for Sustainable Development which was held in South Africa in 2002. Since then African countries have not only acknowledged the unique opportunity which space science provides to facilitate evidence-based policy formulation for sustainable development, but some of them started investing in the development of space infrastructure and bold space science programmes e.g. the building of satellites by 4 African countries. However, the majority of AU member states have as yet not made significant investments in the Space programme, perhaps

due to its forbiddingly high costs. Until recently the AU also lacked the necessary policies and strategy to guide Space activities in Africa.

Africa presently hosts numerous initiatives including projects, institutions and networks using satellite-based and in-situ observation data to achieve their specific objectives. There has been a notable increase of these initiatives recently, most of them supported by the international donors. A key feature of these initiatives is that they are uncoordinated such that Africa cannot derive measurable maximum benefits from EO. For example, through these initiatives there has been some training and capacity building but an overall EO skills picture of Africa is not readily available. Another feature of these initiatives is their unassured sustainability due their lack of grounding in an African policy and strategic platform. Recognising importance and the need for a strong continental policy framework to coordinate and regulate Space activities in Africa, the Fourth African Ministerial Conference on Science and Technology (AMCOST IV) set up a Space Working Group in March 2010 to develop the African Union's Space Policy and Strategy with a view to mobilizing African countries to exploit their space resources in a more coordinated and systematic manner. GMES and Africa will thus be contextualized within the African Space Policy and will also seek to ensure continuous communication with stakeholders and policy makers for the achievement of common objectives.

2. Constraints

The key challenge of the African Space Programme is not only to coordinate the disparate initiatives to avoid frequent overlaps but also to ensure that the expected EO benefits reach the end users and have impact on decision and policy making. With a total of 107 EUMETCast receiving stations installed in 47 African countries under the auspices of PUMA and AMESD many African countries have had access to EO data and information. However, the translation of EO data and information to policies for sustainable development remains an issue yet to be fully addressed. Experience from the implementation of AMESD has indicated that there are some challenges in linking with the end users leading to insufficient user feedback. In other words, AMESD seems to have been more supply driven rather demand driven. The challenge for GMES & Africa is therefore to reverse the situation as much as possible so that the end-user demand for EO data and information predominates. A clear on-going interface mechanism between GMES & Africa EO activities and African policy makers is required to ensure the expected reach to the end end-user and feedback on needs as well.

3. Policy Drivers and Needs Analysis

3.1. Policy drivers

The initiative to enhance the use of space-based technologies for environmental monitoring and natural resources management to support sustainable socio-economic development in Africa is driven by bold policy decisions and strong recommendations from high level Summits and policy bodies at global (Earth

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1. Global	• **The 2002 WSSD**	• International community called upon to promote the development and wider use of EO technologies to support sustainable development of African countries. • NEPAD Environmental Action Plan adopted as the framework for implementation of the recommendation.
	• **G8 and High level EO International Summits**	• 28th G8 Summit in 2003 recommended that a specific summit be organized on EO • First EO Summit, June 2003 decided on establishing GEOSS and the development of a 10 Year Operational Plan • Second EO Summit in 2004 discussed the 10 Year Operational Plan (OP) • Third EO Summit approved the 10 Year GEOSS OP.

Summits), European (European Union Summits) and Africa levels (Head of States Summits, Ministerial Declarations). The *GMES and Africa* initiative is an integral part of the **EU-Africa 8th Partnership**, on the Information Society, Science and Space. It has its roots in the consensus reached among European and African stakeholders on the need to define an Action Plan to be submitted to the AU/EU Summit in Lybia in 2010. The Lisbon declaration (2) commits stakeholders to delivery an Action Plan drafted along the lines of the Lisbon Process (2), agreed at the event organized in Lisbon in December 2007 (3,4).
A summary of major drivers is provided in table 1 below. Details about each specific policy driver are provided in annex 2.

	• **UN declarations**	• UN Resolution 45/72 (1990) recommending establishment of regional centres of excellence for space science and technology in developing world including 2 centres in Africa.

2. European Union	• **European Consensus on Development (2005)**	• Calls for a " European Policy Coherence for Development" explicitly referring to supporting the MDGs; • Set EU vision for development and spells out EC objectives for development cooperation. • States that reliable and continuous information on the state of environment and natural resources of Africa will improve effectiveness of EU development aid to Africa.
	• **Joint Africa-EU Strategy**	• To be implemented through successive Actions Plans that identify short term political priorities, policy commitments , programmes and actions to achieve them. • First Action Plan (2008-2010) identified specific "Africa-EU partnerships" including Partnership no. 8 on Climate Change, Science, Information Society and Space.
	• **EU/AU College to College Meeting October 1, 2008**	• Agreement to implement the Lisbon declaration on GMES Africa. • Agreement to implement two projects including (i) Capacity building of the AUC on geospatial sciences through a mirror of the JRC's Africa observatory and (ii) the African Reference Frame (AFREF) implemented by UNECA.
	• **EU Commitment to International Environment Treaties.**	• UNFCCC; UNCCD; UNCBD; MDGs; WSSD.
	• **Other relevant EC policies**	• EC supporting Thematic Programmes in specific areas including (i) Food Security; (ii) Environmental; and Natural Resources: (iii) Energy Initiative for Poverty Alleviation and Sustainable Development; (iv) Water Initiative; (v) Conflict prevention.

3. African Level	• **NEPAD Science and Technology Consolidated Action Plan**	• NEPAD adopted in the 2001 AU Summit as the major framework to eradicate poverty and place African countries on the path of sustainable development. • NEPAD and AU Human Resources, Science and Technology Department developed a Consolidated Action Plan articulated into 5 clusters. Cluster 4 focusing on Infrastructure, Communication and Space Science and Technologies. • Decision to establish the African Institute of Science and technology under Program 4.2. of Cluster 4 of NEPAD Action Plan.
	• **The NEPAD Environmental Action Plan**	• Endorsed by AU Summit in 2003. Is a framework for a strong partnership for protection of the environment between Africa and its partners. • Organized into 7 priority sectors and 2 cross-cutting issues. • Subdivided into Regional Action Plans under the RECs.
	• **AU/RECS Declarations**	• The DAKAR (2002) Declaration calling upon Europe to provide funding to AMESD and Maputo Declaration (2006) calling for EU support to GMES Africa. • The EU/AU Lisbon Declaration (2007) establishing mechanisms for the development of an Action Plan for GMES Africa to be submitted to the 2010 AU/EU Summit for endorsement.
	• **African Ministerial Conferences Declarations**	• AMCEN, AMCW, AMCOST and the AU Ministerial Conference on Finance have identified Space Technology as a priority area for their sector's strategies as indicated by numerous declarations and their Specific Action Plans.

3.2 Needs Analysis

The overall need for GMES Africa is 1) to support the development of an African owned, African led and African-managed capacity for environmental monitoring and sustainable natural resources management in support of socio-economic development and 2) to operate within mainstreamed African decision-making processes, thus securing the interface with African decision-makers and increasing the potential to impact decision and policy making. GMES & Africa support for the development of African EO capacity will take into account and build on existing African EO institutions, expertise and efforts and also collaborate with African policy makers to strengthen them and where possible develop new ones.

Based on the African Policy and Institutional framework, there is need for governance structures that will guide and mobilise participation of African institution in the implementation of GMES and Africa thematic areas. These governance structures would also facilitate the processes of assessing and strengthening the institutional infrastructure at Continental, Regional, and national levels for participation in GMES and Africa. The strengthening of these institutions will enable them to articulate the needs and requirements at the various levels and develop strategies in a coordinated manner. This will also ensure the sustainability in securing long-term availability of space-based observing tools and infrastructures as well as infrastructures for in-situ observations.

Several levels of need will have to be addressed by the future GMES Africa.

- At Continental level: need for low and medium resolution images, maps and data indicating trends in the state of resources; climatic trends i.e climate change effects on environmental degradation; trends in crop, rangeland and fisheries production to assess food security for early warning; extent of soil degradation, deforestation and desertification; trends in availability of water and grazing resources; trend of water resources in terms of quantity and quality, large disaster risks, extent of deforestation and degradation of marine and coastal ecosystems etc.
- At regional level: need for a regional reference system for assessing and characterizing the state of resources including land, forestry, marine resources, rangeland degradation and desertification rates; low and medium scale land use maps, vegetation maps, forest cover maps, water resources, crop production and trends for early warning and food security etc. Capacity to determine seasonal characteristics of natural resources and patterns.
- At catchments level: need for high resolution images and maps on water resources, crop production; soil degradation; land use including capacity to estimate seasonal trends and quantification of available resources. Vulnerability analysis and trends.

- At national and local level: need for high resolution images, maps and tools to assess seasonal variation of resources including crop production, water resources; soil cover; rangeland resources. Need for techniques to quantify quantity of available resources throughout the year. Need for capacity to predict crop yields and rangeland resources and early warning.

Beyond the above considerations, it is crucial to highlight the necessity for ensuring articulation between EO and in situ information as there is a need to validate EO observations by in situ observations before they are used in decision-making processes.

Currently, expertise, infrastructures and mechanisms for in-situ data collection to validate EO data are very weak at all level in Africa and there is a critical need to invest in networks and infrastructures to build a robust in-situ observation system connected to EO to generate reliable information to support decision making in developing socio-economic development programs. One of the opportunities to establish a coordinated mechanism for in-situ observations in the framework of GMES Africa lies in using AUSTAT which has the mandate to harmonise national statistics at continental level under the auspices of AUC/ECO.

One of the major challenges of the GMES and Africa policy and institutional framework will be to develop and implement programmes to build African expertise for EO and in-situ data analysis, packaging, dissemination and utilization through informal, professional and academic training.

4. Identification of communities

GMES products and services will be used by various communities at local, national, regional and continental level. They include high level policy makers at various levels in Africa as well as at international level. Donor agencies, financial institutions are also expected to be among the major users as well as researchers, project and institutional managers at national, regional and pan-African levels. End users at local and national levels will also constitute a major component of GMES Africa users. A summary of major communities of users is provided in table 2:

Table 2: Communities of users of GMES Africa services

Level	Users	Needs
Political	- Head of State Conferences - Ministerial conferences including AMCEN, AMCOW, AMCOST. - AUC. - RECs: ECOWAS, COMESA; SADC; IGAD; CILSS; AMU; East African Community; ECCAS; IOC.	Decision support tools portraying global trends in status of the environment and resources (environmental outlook); global trends

	- UN Agencies: WMO; FAO; UNEP; UNDP; UNECA; Office of Outer Space; UNESCO; WFP etc. - Conventions Secretariats - Governments of African countries - Aid Agencies (EU; USAID; CIDA etc.) - AfDB	in food security situation; early warning .
Technical	- Global and Pan African wide institutions, networks and projects managers. They include NEPAD; ACMAD; GCCA; AGIRN; AARSE; EIS-AFRICA; Managers of pan African wide projects such as AMESD, AFREF, MAFA etc. - Specialized African Regional Centres and projects managers at regional level engaged in capacity building and utilization of remote sensing. They include *inter alia*: AGHRYMET, RECTAS, CASTRE-LF; ARCESSTE-E; RCMD; ICPAC; COMIFAC; OSS. - Mandated National Institutions including relevant ministries, project managers at national levels including NMHSs, National Geographical and mapping services; National Space Agencies; National Environmental Services; National Agriculture and Livestock services, National Forestry Services, National Disaster risk Civil Protection, etc. - Scientific community at international, regional and national levels including CGIAR Centres; Advanced Research Centres (JRC), Advanced Universities, Regional Research Centres; National Research Institutes; National Universities; Regional Networks.	At pan-African and Regional levels, need for low and medium resolution data including vegetation maps, vegetation changes; water resources maps and data; forest cover; land use cover, disaster risk, etc. At national level and for national projects, need for high resolution data and images for vegetation, water resources, weather and crop forecast, land use data, land degradation, disaster risk, etc.
Other End users	NGOs; CBOs, Producers associations; private sector	Need for high resolution images and data on available resources, land use,

		vegetation etc.

5. Mapping exercise

Relevant past and current institutions, projects or networks (Annex 3), which can constitute building blocks for GMES Africa, include:

i. Global or developed countries institutions, agencies or networks with potential to provide support to GMES Africa activities. They include developed countries space agencies (ESA, NASA, Canadian Space Agency; EUMETSAT; Portuguese Space Agency; Chinese Space Agency etc.); projects or global networks including GEOSS, GMES, Global Biodiversity Facility; INSPIRE; GEONET Cast; Global Climate Change Alliance; UN Agencies Global Projects (UNEP, FAO, UNESCO, UNFP, WMO, UNDP; UN Agency for Outer Space etc); Global Climate Change Alliance; Global Spatial Data Infrastructure Association etc.

ii. Pan African wide projects funded by the United Nations, European Union or other international cooperation agencies. The most significant are completed or on-going projects such as AMESD, PUMA, VG4AFRICA; JRC ACP Observatory; SAGA-EO, GOOS AFRICA; ARSIMOWA; CLIMDEV; ODINAFRICA; AMIS; DESERT WATCH; GMFS; TIGER; IBAS; CBERS for AFRICA; UN Agencies projects (UNESCO –IOC, UNECA AFREF and MAFA; FAO; WMO; WFP; UNEP DEWA; UN OFFICE FOR OUTERSPACE AFFAIRS); ROOFS AFRICA; AFRICAN INSTITUTE FOR SPACE SCIENCE; SERVIR-AFRICA; ARM; DEIMOS etc.

iii. Regional institutions and projects such as AGHRYMET, the Observatory of Central Africa Forests of the COMIFAC; OSS; ICPAC; CICOS; RECTAS, CASTRE-LF; ARCESSTE-E; RCMRD etc.

iv. National institutions including national Space Agencies (South Africa; Nigeria; Kenya; Algeria, Morocco, Egypt etc.); NMHSs etc.

6. Identification of Gaps and Suitable Programmes

6.1. Gaps analysis

Despite strong policy drivers at global, European, African and Regional levels, the following are major gaps in the current African Institutional and Policy Framework for use of space technologies:

- Lack of coordination of geo-information activities in Africa. An operational institutional framework is yet to be established at continental, and regional levels as current activities by the various actors are totally uncoordinated.
- Numerous satellites from various space agencies have the potential to provide data to Africa but there is paucity of available infrastructures and capacity at national, regional and continental levels preventing Africa full access. The continent is therefore not in position to fully benefit from the space-based technology opportunities.

- Most of past and current programmes/projects were/are entirely donor dependent and there is lack of continuity and sustainability of most of the initiatives. Very few African governments have established or are supporting utilization of space-based technologies.
- In general, there is lack of consistency in approaches and methods for data collection, type and quality of data collected and utilized by the various institutions, networks and projects involved in geo-information technologies. The lack of standardization of data leads to difficulties in data sharing at the various levels.
- In Africa, the existing network of monitoring and field validation systems is insufficient and not very efficient. Environmental field data are limited and not always reliable and updated. The socio-economic statistics available are insufficient to respond to the needs and properly underpin decision-making processes in different domains. This situation seriously affects confirmation of validity of EO information and undermines the possibility to make best use of this information through integration with reliable and update information.
- Large areas of Africa are remote due to lack of road and communication infrastructures, rough topography and hostile climate. In-situ observations to support space- based data are difficult to organize in some of the most relevant sites.
- The high cost of infrastructures and infrastructures maintenance and the high cost of data acquisition is prohibitive.
- The potential of internet and other Information Technologies for communication/dissemination of data and information is not yet fully exploited in Africa.
- Inadequate expertise in EO technologies and weak capacity building programmes to exploit EO technologies.
- Inadequate quality of the information to support decision-making processes (available information is either insufficient, or not adapted/appropriate, not reliable, not updated or not formatted).

Major gaps in relation to the policy framework include:

- Most of the providers of space-based data and information have their own access policy particularly in terms of pricing and conditions for utilization. The cost of access to near real time information requires licensing and the cost is generally prohibitive.
- Lack of agreements with relevant data providers for an operational and sustained provision/access to their information.
- Lack of coordination of activities and initiatives aimed at building capacity for enhanced utilization of EO technologies and services.

6.2 Existing or planned thematic funding programs

On-going initiatives with funding support are indicated in Annex 3. The most important in terms of potential contribution to building GMES Africa include:.

- EU funded AMESD, PUMA, GMES, VGT4AFRICA, SAGA-EO, JRC “Africa, Caribbean and Pacific Observatory”, GEONETcast, Desert Watch;

Observatory of Central Africa Forests, INSPIRE; AMIS; EUMETCast; GEOSS.

- UN funded projects including UNECA AFREF, MAFA and CLIMDEV Africa projects; UNESCO ROOFS AFRICA, GOOS Africa, Integrated Management of Ecosystems and Water Resources, ODINAFRICA; FAO projects on Early Warning for Food Security; WMO Africa projects; UNEP DEWA projects.
- Pan African Institutions such as NEPAD which mobilize funding from various donors. NEPAD has a plan to establish the African Institute for Space Science, initiative expected to be supported by UN.
- European Space Agency (TIGER, GMFS), and African National Space Agencies of South Africa; Nigeria; Algeria; Kenya; Egypt; Morocco; partnership initiatives between African countries or between African and external countries such as ARM, or CBERS for Africa.
- The Intra-ACP program to be funded under the 10th European Development Fund (EDF) to support the consolidation of the achievements of AMESD, as contribution to the implementation of GMES & Africa (post-AMESD shall be intended as a program of GMES & Africa.)
- Other thematic programs to be funded under the "Intra-ACP EDF10" envelop could contribute to the implementation of aspects of thematic Action Plans of GMES & Africa.
- Programmes funded directly from AU core budget such as AU-STAT or support to activities of the AU HRST/NEPAD activities related to space Sciences and Technologies. Several levels of need will have to be addressed by the future GMES Africa.

7 Building GMES and Africa

7.1 Service Definition and Provision

GMES Africa will guide effective integration of earth observation data, technologies and services in support of sustainable development. GMES & Africa should be set-up in a way that it provides timely, reliable and updated information in support of decision-making GMES Africa will strive at mainstreaming EO and field data, as well as scientific information, into the development agenda and particularly into development planning for Africa and program implementation. This necessitates institutional capacity strengthening, developing appropriate infrastructures, developing technologies, promoting an appropriate policy framework and building human resources supporting African ownership of the necessary capacities allowing the exploitation of EO technologies for sustainable development.

To ensure a coordinated approach to GMES and Africa, continental and regional structures which would ensure coordination of activities are required. These structures may have been already identified as part of the infrastructure for the African Space Policy and strategy or they may be created specifically to serve the needs of GMES and Africa and later be strengthened to serve the African Space Policy and Strategy. These governance structures for the GMES and Africa would comprise an AUC-based governance structures to coordinate and

facilitate of the implementation of thematic areas in 8 AU Regional Economic communities (RECs) as well as coordinating structures in each of the RECs to oversee regional implementation.

The creation of a high-level structure as a forum for dialogue on Space Science and Earth Observations applications in Africa would be an additional advantage for the success of the Space programme under the joint EU-AU 8th partnership.

Also, decision-making, both at the political and the technical level – could benefit from targeted and tailored analysis based on the integration of EO, of *in situ* and of statistical information. The opportunity and the modalities to develop these services at the geographic and the thematic levels, should be carefully assessed in the frame of the overarching political framework.

7.2. Capacity Building

7.2.a Necessary elements to provide capacity building services.

Research and capacity building are fundamental issues for the success of GMES Africa. To ensure that GMES Africa services and products are user friendly in response to user demand (user-pull), GMES Africa will, taking into account the capacity building prescripts of African Space Policy and Strategy, build the capacity of African experts, scientists and engineers to ensure that they have the required expertise and technical capabilities in Earth Observations data collection, analyses, processing, packaging and dissemination. Linkages with the Pan-African University on Space will be forged to develop higher level skills

GMES & Africa capacity building strategy will:

- Utilize and strengthen the capacities of existing institutions in Africa such as the current UN-Affiliated Centres of Excellence for Space Science and Technology Education (CASTRE-LF and ARCESSTE-E) as well as RECTAS to ensure that they are very active and efficient in building African experts and other users' capacity. A needs assessment of potential users would be undertaken with a view to enhance the operational capacity of Centres of Excellence by improving the facilities, strengthening human resources and developing appropriate training modules.
- Take in due consideration and create linkages with new Space training initiative under the auspices of the Pan African Universities (PAU) program also carried out under the framework of the AU-EU Partnership n° 8 and the development of the African networks of Centres of Excellence in the Water and the Energy domains.
- Strengthen the capacity for GMES Africa data management, packaging and dissemination bodies identified at continental and regional levels to promote and coordinate the GMES Action Plan. One or more specialized Institution(s), operating at the continental level shall be designated, to provide services and ensure coordination of GMES & Africa capacity building related activities at the continental level. Useful support could be offered by ECA, through the

transformation of its geo-information unit into a continental Centre of Excellence for training GMES users.

- Support research programmes carried out by the Centres of Excellence and other relevant Academic /University institutions in Africa and strengthening partnerships between African researchers and advanced Research Institutions scientists such as partnerships in the framework of the implementation of Africa-EU Partnership Strategy on “Science, Information and Space”.

7.2b Implementation Strategy

A specialized structure to ensure coordination of the GMES and Africa Action Plan and Capacity Building activities should be established. For more details on these aspects, refer to section “Organisational scheme”.

7.3 Prioritization of requirements and actions

Prioritization of requirements and Timelines
In the framework of a 10 year Strategic Plan, the GMES and Africa shall be implemented in three phases.

7.4 Organizational Scheme

The establishment of the required governance structures to coordinate GMES and Africa continentally and regionally would include the creation of a continental Earth Observation coordination (EOcoord) team which draws on the already existing expertise in the management of previous EU programmes (AMESD etc). The team led by a Programme Director would have the following functions:

i. Mobilise continental stakeholders and experts towards the implementation of the thematic areas;
ii. Facilitate the establishment of similar coordinating teams at the regional level for implementation;
iii. Liaise with the EU technical team to support the implementation process;
iv. Liaise with the AUC deputy-chairperson in his role as delegated authorising DRAO to effect payment of relevant GMES and Africa activities in the RECs;
v. Ensure the development of a coherent capacity building and training programme based on needs in all RECs;
vi. Facilitate the interphase with a relevant AU high-level Space governance structure as both a stakeholder and user of GMES and Africa services.

In the event of the absence of such governance structures emanating from the African policy and strategy, the continental EOcoord could propose to the AU decision-makers, the establishment of a high-level GMES and Africa operational and policy interphase which can take the form of a Space Ministerial Council consisting initially of chairpersons of bureau of ministers conferences related to the 3 thematic areas and Infrastructure. This means the Council would include bureau chairpersons of AMCEN (Ministers responsible for the environment) and AMCOW (Ministers responsible for water) Ministers responsible for Infrastructure as well as AMCOST (Ministers responsible for science and technology) as the custodian of the Space Science programme in Africa. This Ministerial Council served by a steering relevant senior officials and experts would have the value of a communications forum which would also assesses the alignment of GMES and Africa to the African Space policy and strategy, its ability to meet users’ needs based on its report, consider infrastructure needs in member states and to advice accordingly. The Ministerial Council could also have the additional function of

advising AU Heads of State and Governance about progress GMES and Africa towards their participation in the EU-AU Summits.

At the Regional level: The EOcoord would operate under the auspices of the RECs who will provide oversight on implementation.

The regional EOcoords would serve to:

i. To mobilise regional and national institutions and centres of excellence in order to form networks of implementation related to the three thematic areas, Water, Marine and Coastal areas and long term management of natural resources.
ii. To liaise with regional member states towards the identification of national focal points for each thematic area and available infrastructure for GMES and Africa;
iii. To identify in collaboration with the RECs, suitable institutions/centre of excellences that can drive the implementation of each of the three thematic areas;
iv. To mobilize and strengthen capacities of existing National Space Agencies to provide consolidated data sets and feed it into regional inventories;
v. To support the establishment of regional steering committees for each thematic area;
vi. To identify regional institution that can be involved in capacity building in the region;
vii. To liaise with the continental EOcoord and the EC technical team in support of the implementation and capacity building in the region;
viii. To create linkages with the Pan African University towards long term training in Space science.

At National level, National Focal Points (NFP) shall be designated by Governments and clearly attached to a relevant national service. The GMES NFPs will build the necessary operational national network for EO exploitation, coordinate all activities, including infrastructures, institutional and capacity building activities carried out at national level and will report to the *regional EOCoord*, as well as to the national Governments using appropriate structures set at national level. One of the main roles of the NFP will be to ensure the access to information and analysis by relevant National services through adequate capacity building. NFPs will also ensure that strong linkages with decision-making processes are strengthened at the national level. Relevant operational/functional linkages will be established to ensure appropriate support and coordination of activities by the various institutions at national level.

7.5. Time Table

12 – 24months

At continental level:

- The AUC to establish the continental EOcoord and appoint head and staff.
- Assume partial delegated responsibility to make payments for outsourced services in regions

The continental EOcoord shall:

- Facilitate the establishment of equivalent structures in the RECs
- Mobilize continental and partner organizations' participation in GMES and Africa Action Plan.
- Propose the establishment of a high-level Space governance and communication structure if it does not exist already.

Regionally the EOcoords shall:

- Mobilize regional member states for participation in the GMES and Africa programmes and request them to identify national focal points
- Facilitate the assessment of technical capacity or infrastructure regional institutions and organizations related to EO and the three thematic areas as well their capacity to host EO services;
- Make recommendations regarding measures to strengthen them;
- Facilitate the selection competent Regional Implementing centres and strengthen the where necessary and support in developing national networks for implementation;
- Facilitate the initiation of pilot projects of high priority products.

***Phase 2* : 24 – 36 months**

- Develop strategies for long-term financial and technical support for GMES and Africa;
- Review and up-scale pilot projects initiated in Phase 1 for continent-wide implementation;
- Support and enhance data collection, processing and product generation and dissemination;
- Develop comprehensive training programme across all RECs.
- Assess the effectiveness of the identified centres of excellence to perform the assigned responsibilities and strengthen them accordingly.

Phase 3 : 36 months onwards

- A fully operational GMES and Africa programme in all regions
- Effective coordination of services at continental and regional levels;
- Established support for the African Space agenda as well as mutually beneficial outcomes between the AU and EU;
- A continuous pipeline for GMES and Africa short term training and long-term training in African universities especially the Pan African University for Space
- Preparations for evaluation and long-term planning.

7.6. Indicative development plan and budget estimate

The tentative budget below covers high level “management aspects” as well as capacity building and network building. Funds to support the implementation of activities specific to the identified priority thematic areas should be budgeted under each thematic area. They will include specific budget to cover management cost, expertise, capacity building, and communication for the Regional Centers of Excellence for the thematic area.

Phase 1: 8 million Euro.
Phase 2: 10 million Euro
Phase 3: 22 million Euro

NB: At national level, it is expected that the NFPs will be supported by the Governments as a counter-part to the project.

Briefs considerations on the Funding strategy

For sustainability, it is highly recommended that the GMES Africa Coordination Offices receive budget allocation directly from the AU core budget at continental level and from the relevant Regional Economic Community at regional level.

Considering the importance of the budget required to operationalise the whole set up at continental, regional and national levels, it is crucial to address the funding issue in a coordinated and ”priority oriented” approach. The funding strategy should aim at mobilizing African resources as well as resources from the donor community, i.e. the EC via its various financial instruments (EDF, DCI, FPs, Joint EU/AFRICA Strategy, other thematic instruments), EC-MS bilateral cooperation, Development Banks, the UN system, etc. Through the Space Ministerial council, the inclusion of Space infrastructure development as part of the new programme for infrastructure development in Africa (PIDA) could be negotiated.

With particular reference to ECA, a specific allocation from the UN General Assembly as a component of its core funding for its activities related to GMES and Africa could be mobilised. Other UN specialized institutions including FAO, UNEP, UNDP and UNESCO could also be mobilized to be involved and provide funding support to GMES projects.

Space Agencies including ESA, Canadian Space Agency, NASA, Japanese Space Agency, and other European Space Agency can also be approached to support GMES and Africa activities through direct funding of projects, exchange of data and capacity building.

National governments in Africa will be mobilized to contribute to funding of GMES activities carried out at national level.

10. Recommendations

GMES Africa is an initiative aimed at positioning Africa to fully benefit from the tremendous progress made in Space Earth Observation science. This is a rapidly advancing scientific discipline that can provide powerful decision support tools for natural resources management, environmental monitoring and communication to support economic transformation and achievement of the MDGs and sustainable development in the continent. The following recommendations can drive the reflection:

- Success of GMES and Africa will depend on the establishment of an effective institutional and policy framework that will ensure that the development of a strong space programme in Africa including related entrepreneurial activities.
- Space policies and strategies should be supported by effective coordination structures at continental and regional levels to ensure effectives implementation of GMES programmes and ensure also synchronize the activities of the numerous projects, institutions and networks that are operational in Africa.
- Sound and updated African-wide socio-economic statistics to integrate Earth Observation in situation analysis should be made available. AU-STAT or equivalent Institution could be strengthened and operational links established with GMES & Africa, ensuring coordination at continental and regional levels.

- GMES and Africa will contribute to building of African EO capacities and skills that will change African environmental policies and can also be utilized in a growing space industry and also open up possibility for joint Africa and European ventures in other space development initiatives. As much funding as is available should be provided for capacity building

- Periodic policy dialogues which involve policy makers and various actors in the GMES and Africa programme should be organized to promote the use of EO information for policy formulation and planning, to obtain user feedback and ensure that users' needs are addressed.

- Once the mechanism for coordination under the GMES and Africa is agreed upon, the GMES Management will carry out a need assessment study to identify strengths, weaknesses and opportunities for building centres of excellence that will constitute the GMES Africa network. The next step will be in mobilizing resources to invest in building infrastructures for earth observations and in-situ data collection, packaging, archiving and dissemination to users, as well as build capacity to ensure that GMES and Africa is operated by qualified human resources at all levels in the various thematic areas. Capacity building programs will mainly be carried out at the appropriate centers of excellence components of the GMES Africa network.

- Beyond its “physiological” tasks of collecting, coordinating, processing, disseminating and storing Earth Observation Information, GMES & Africa aims at providing relevant, reliable and up-date information to decision-makers. In this objective, in the medium term real functions of “Observatory for Sustainable Development in Africa” should be considered by carrying out assessments and analysis building on EO and socio-economic statistical information and producing targeted thematic/geographic reports for decision-makers. This would provide a very important added value. Decision to assign to GMES this particular responsibility should be taken at high political level.
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11. Summary

Although space science based technologies and applications are largely recognized by the international community as powerful tools to guide socio-economic development, most African countries still lack of the human, technical and financial resources to utilize space-based infrastructures and services for economic transformation and sustainable development.

The purpose of GMES Africa is to assist effective integration of earth observation data, technologies and services in support of sustainable development. GMES Africa will strive to align EO and field data, as well as scientific information with the African development agenda and particularly in relation to planning..

Currently, the African continent is host of numerous initiatives including projects, institutions and networks using satellite based and in-situ observation data to achieve their specific objectives. These initiatives which are operating at local, national, regional or continental level are completely uncoordinated as a common vision, common purpose or community of action is yet to be developed.

There is therefore a compelling need for a policy and an institutional framework through which a coordination would be established to facilitate collaboration and networking between actors of the current and future initiatives using the space technology to achieve the economy of scale, build synergies and ensure collective vision, purpose and action towards socio-economic development on the African continent.

GMES and Africa is an initiative aimed at positioning Africa to fully benefit from the tremendous progress of Space Earth Observation science, a rapidly advancing scientific discipline that can provide powerful decision support tools for natural resources management, environmental monitoring and communication to support economic transformation and achievement of the MDGs and sustainable development in the continent.

Suggested priorities for the implementation of GMES and Africa programmes are as follows:

- Formal establishment of the GMES & Africa continental Coordination structure.
- Formal establishment of equivalent EOCoords at the regional levels, at RECs Headquarters or at other agreed locations and identification of GMES Africa National Focal points.
- Approval of terms of reference, working modalities and work plan for EOCoord and related homologue structures at the regional level

The main tasks of both continental and regional EOCoord should be as follows:

- Agreement, both at the continental and at the regional levels, on priority actions to enforce continental and regional coordination (backbone of GMES & Africa)
- Agreement on priority capacity building and infrastructure priorities to sustain and develop E.O. at the continental and the regional levels
- Agreement on thematic priorities
- Building on the recommendations of the thematic chapters of the GMES & Africa Action Plan and on the priorities identified above, formulation of concrete initiatives/activities to be funded under different financial mechanisms (including supervision and coordination of targeted studies when relevant
- Permanent exchange with African Countries, Regions and Institutions and with the donor community to ensure the implementation of GMES & Africa in its priority actions
- Formulation of E.O. related policies, including an African policy for data access, utilization and dissemination

Beyond the above tasks, "*EOCoord*" shall agree on the best alternatives and the practical modalities to set-up in the medium term operational "observatory functions" ("*Observatory for Sustainable Development in Africa*"), specifically conceived and tailored to support decision-making processes at different levels. This implies as pre-condition the set-up of ad hoc technical interface, acting as "clearing house", to support the work of EOCoord, to stimulate synergies and networking, to develop baselines and references and to ensure storage, processing and dissemination of data to relevant institutions, both at the decision-making and at the technical levels. This or these (to be defined) technical interface/s shall be identified building on existing realities and capacities and shall imply the formulation of precise mandate/s.

For sustainability, it is highly recommended that the *EOCoord* at continental and regional levels get budget allocation directly from the AU core budget at continental level and from the relevant Regional Economic Community at regional level.

Annex 1. Acronyms

AARSE	African Association of Remote Sensing for the Environment
ACMAD	African Centre for Meteorological Applications
ACP	African Caribbean and Pacific
AFREF	African Geodetic Reference Frame
AfDB	African Development Bank
AGIRN	African Geo-Information Research Network
AGRHYMET	Centre Régional de Formation et d'Application en Agrométéorologie et en Hydrologie Opérationnelle
AISS	African Institute of Space Science
AMCEN	African Ministerial Council Conference on Environment
AMCOST	African Ministers' Council on Science and Technology
AMCOW	African Ministers' Council on Water
AMU	Arab Maghreb Union
AMESD	African Monitoring of Environment for Sustainable Development
AMESD RIC	AMESD Regional Implementation Centre
AMIS	African Marine Information System
ARCESSTE-E	African Regional Centre for Space Science and Technology Education- in English
ARM	African Resource and Environmental Management
ARSIMEWA	Application of Remote Sensing for Integrated Management of Ecosystems and Water Resources
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
AU	African Union
AUC	African Union Commission
AUC/ECO	
AUSTAT	
CAADP	Comprehensive Africa Agriculture Development Programme
CASTRE-LF	Centre Régional Africain des Sciences et Technologies de l'Espace en Langue Française
CBD	Convention on Biological Diversity
CBERS	China-Brazil Earth Resources Satellite
CGIAR	Consultative Group on International Agricultural Research
CICOS	Commission Internationale du Bassin Congo-Oubangui-Sanga
CIDA	Canadian International Development Agency
CILSS	Comité Inter-Etats de Lutte Contre ma Sécheresse
CLIMDEV	Climate for Development in Africa
COMESA	Common Market for Estern and Southern Africa
COMIFAC	Commission des Forêts d'Afrique Centrale
CR	Coarse Resolution
CSIR	Council for Scientific and Industrial Research (South Africa)

CSO	Civil Society Organisations
DCI	
DEWA	Division of Early Warning and Assessment
EC	European Commission
ECA	Economic Commission for Africa (United Nations)
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
EDF	European development Fund
EIS-AFRICA	Environmental Information Systems in Africa
EO	Earth Observation
ESA	European Space Agency
EU	European Union
EUMETCast	EUMETSAT's Broadcast Service for Environmental Data
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
EUROSTAT	
FP	
GBIF	Global Biodiversity Information Facility
GCCA	Global Climate Change Alliance
GEO	Global Earth Observation
GEOSS	Global Earth Observation System of Systems
GMES	Global Monitoring for Environment and Security
GMFS	Global Monitoring for Food Security
GOOS Africa	Global Ocean Observing System
GSDIA	Global Data Infrastructure Association
ICPAC	IGAD Climate Prediction and Applications Centre
IGAD	Intergovernmental Authority on Development
INSPIRE	Infrastructure for Spatial Information in European Community
IOC	Indian Ocean Commission

JRC	Joint Research Centre
LANDSAT	Land Satellite
MAFA	Mapping Africa for Africa
MDGs	Millennium Development Goals
MSG	Metoesat Second Generation
NASA	National Space Agency
NEPAD	New Partnership for Africa Development
NESDA	Network for Environment and Sustainable Development in Africa
NGOs	Non-governmental Organizations
NMHSs	National Meteorological and Hydrological Services
NOAA	National Oceanic and Atmospheric Administration
ODINAFRICA	Ocean Data and Information Network in Africa
OFAC	Observatoire des Forêts d'Afrique Centrale
OSS	Observatoire du Sahara et du Sahel
PUMA	Préparation à l'Utilisation de Metoesat en Afrique
RCMRD	Regional Center for Mapping of Resources for Development

RECs	Regional Economic Communities
RECTAS	Regional Centre for Training in Aerospace Surveys
ROOFS AFRICA	Regional Ocean Observing and Forecasting System Africa
SAC	Satellite Application Centre (South Africa)
SADC	Southern Africa Development Community
SERVIR	Regional Visualisation and Monitoring System
SPOT	Satellite pour l'Observation de la Terre
UN	United Nations
UNCBD	United Nations Convention of Biological Diversity
UICN	Union Internationale pour la Conservation de la Nature
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
UNOOSA	United Nations Office of Outer Space Affairs
USA	United States of America
USAID	United States Agency for International Development
VG4AFRICA	Vegetation for Africa
WB	World Bank
WFP	World Food Programme
WMO	World Meteorological Organization
WSSD	World Summit on Sustainable Development

Annex 2. – Policy Drivers

At Global level

The 2002 World Summit for Sustainable Development (WSSD)..
Organised in Johannesburg, the Summit called specifically the international community "to promote the development and wider use of earth observation technologies, including satellite remote sensing, global mapping and geographic information systems for environmental monitoring and natural resources management to support sustainable development of African countries. It is recommended that the NEPAD Environmental Action Plan be used as the framework for implementation of all its recommendations.

The G8 and other High Level Earth Observation International Summits.
The 29th G8 Summit held in Evian, France in June 2003 affirmed the importance of Earth Observations as a priority activity and recommended that a worldwide Summit be specifically on Earth Observations.

The First Earth Observation Summit was convened in Washington in July 2003. Attended by officials from 33 countries, the EC and 21 international organisations, the Summit adopted a declaration expressing a political commitment to move towards development of a comprehensive coordinated and sustained Earth Observation System of Systems (GEOSS) and established an *ad hoc* intergovernmental Group (GEO) tasked with the development of an initial 10 Year Implementation Plan for GEO. The Plan was discussed during the second Earth Observation Summit in Tokyo, Japan in 2004 and approved during the third Summit in Brussels in 2005.

GEOSS provides the overall conceptual and organizational framework towards integrated global Earth Observations to meet users needs at global level. GMES Africa is expected to be the African contribution to the GEOSS.

The United Nations Declarations
The UN General Assembly adopted in 1990 the Resolution 45/72 recommending that UN lead, with the active support of its specialized agencies an international effort to establish regional centres for space science and technology education in developing countries.

At European Union Level

The European Union has committed itself to support development at global level through active international cooperation and support to programmes aimed at poverty alleviation, particularly supporting developing countries to attain the Millennium Development Goals. Key European policies and declarations that support the establishment of GMES Africa as a powerful tool for African socio-economic development include:

(i) The European Consensus on Development.
Formulated in 2005, the "European Consensus on Development" is a key policy statement that calls for a "European Policy Coherence for Development (PCD)". It explicitly refers to supporting the achievement of the MDGs, sets out the EU vision of development and spells out EC and Member States common objectives for development cooperation. It identifies priorities to be reflected in cooperation programmes and states that reliable and continuous information on the state of environment and natural resources of Africa will help improve the effectiveness of European Development aid delivery and improve coherence between different policy domains underpinning development.

(ii) The Joint Africa-EU Strategy.
The Joint Africa-EU Strategy is another strong policy driver which will be implemented through successive Action Plans that identify short-term political priorities, policy commitments, programmes and actions to achieve them. The First Action Plan (2008-2010) has identified 8 specific "Africa-EU

Partnerships" which include *inter alia* a Partnership on Climate Change, Science, Information Society and Space.

(iii) The EU Africa Declaration during the College to College meeting of October 1, 2008 in Brussels.

The EU and AU Commissions issued a statement that they agreed *inter alia* to implement the process launched in Lisbon on GMES/Kopernicus and Africa and decided on early implementation of two projects under space priority of the Partnership no. 8. of the Joint Africa-EU Strategy. They include a project on Capacity Building of the AUC on geospatial sciences by implementing a "mirror" of the JRC's Africa Observatory so as to increase the use of scientific information by the AUC. The second project is the African Reference Frame (AFREF) aimed at setting up in each African Country a reference GPS receiving station to ensure harmonisation of basic maps via the establishment of a continental -wide highly accurate geodesic system.

(iv) EU Commitment to international environmental treaties

The EU and Member States are Parties to many Multi-lateral Environmental Agreements (MEAs) including:

The UN Framework Convention on Climate Change (UNFCCC); the UN Convention to Combat Desertification (UNCCD); the UN Convention of Biological Diversity (UNCBD) and the UN Millennium Development Goals. Another important driver is the EU commitment to support the implementation of the recommendations from the 2002 WSSD. Its revised Strategy for Sustainable Development (SSD) integrates the outcomes and targets set by the WSSD including the target of protecting and managing the natural resource base with particular attention to Africa through the Cotonou Agreement and Support to NEPAD.

iv) Other relevant EU policy drivers.

Other relevant EU policy drivers of GMES Africa are EC commitments, communications or regulations establishing Thematic Programmes funded by EC or articulating rationale for EC intervention in specific thematic areas. Relevant Programmes to GMES Africa include (i) t*he Thematic Strategy on Food Security* which gives details on priority areas for interventions for food security; (ii) *the Environmental and Natural Resources Thematic Programme* (ENRTP) which establishes a financing instrument for development cooperation in the areas of environment and natural resources management to meet their obligations under Multi-lateral Environmental Agreements and to take international policy leadership; (iii) t*he EU Energy Initiative for Poverty Alleviation and Sustainable Development (EUEI)* which is a commitment to give priority to the role of energy in poverty alleviation ; (iv) *The EU Water Initiative (EUWI*), a tool for meeting the international community's goals on water at global level in the context of an integrated approach to water resources management (v) t*he EU Communication on Conflict Prevention* designed to address the root causes of conflicts and build sustainable peace and (vi) article 6 of *the EU Treaty* that enshrine the EU long commitment to natural resources and environmental protection into EU legal obligations.

At African Level

Pursuing its vision of " *an Integrated, Prosperous and Peaceful Africa Driven by its own Citizen; a Dynamic Force in the Global Arena*" Africa Union, the African Regional Economic Communities (RECs) and other Pan African wide institutions has formulated landmark policies and established institutions and programmes that are key drivers to the establishment of GMES and Africa.

(i) The NEPAD Science and Technology Consolidated Plan of Action

The New Partnership for Africa's Development (NEPAD) was adopted by the African Union Summit in Lusaka, Zambia in 2001 as the major framework of endeavours to eradicate poverty on the continent and to place African countries, both individually and collectively, on a path of sustainable growth and development and, at the same time, to participate actively in the world economy and body politic.

Consistent with the 2003 Maputo AU Summit which instructed that NEPAD structure be fully integrated into the structures of the African Union, NEPAD Secretariat and the African Union Commission for Human Resources, Science and Technology developed an Africa's Science and Technology Consolidated Plan of Action articulated into five Programme Clusters including Programme Cluster 4 which is focusing at Infrastructure and Communication Technologies and Space

Science and technologies. Programme 4.2. of Cluster 4 aims at establishing "**The African Institute of Space Science (AISS**)" which was has been proposed since 2002 but has not yet materialized.

(ii) The NEPAD Environmental Action Plan

NEPAD developed an Environmental Action Plan to address Africa's environmental challenges while at the same time combating poverty and promoting socio-economic development.

Endorsed by the AU Heads of States Summit in Maputo, Mozambique in 2003, the Plan provides a framework for the establishment of a strong partnership for the protection of the environment between Africa and its partners. It is organized into seven priority sectors and two cross-cutting issues including combating land degradation, drought and desertification, wetlands, invasive species, marine and coastal resources, cross-border conservation of natural resources, climate change, capacity building and technology transfer. The Plan is sub-divided into Regional Action Plans (RAPs) to be implemented by the Regional Economic Communities (RECs) i.e. ECOWAS, IGAD, COMESA, SADC, IOC, ECCAS.

(iii) The Dakar, Maputo and Lisbon Declarations

The African Union and the Regional Economic Communities in their Dakar (2002) and Maputo (2006) Declarations called upon Europe to provide funding for the "African Monitoring of the Environment for Sustainable Development – AMESD- " project (Dakar) and to extend its GMES Europe Initiative to Africa (Maputo). The EU-AU 2007 Lisbon Declaration established mechanisms for the development of an Action Plan on GMES Africa to be submitted to the AU-EU Heads of States Summit in 2010.

(iv) African Ministerial Conferences Declarations

The AU Ministerial Conference on Environment (AMCEN), the AU Ministerial Conference on Water (AMCW) and the AU Ministerial Conference on Science and Technology (AMCOST) and the AU Ministerial Conference on Finance have identified space development as a priority area for their sectors strategy as indicated by various declarations. For instance, during their 12th Session in Johannesburg in June 2008, the AMCEN called upon Governments to take advantage of earth observation technologies to undertake regular national integrated environmental assessments to strengthen the strategic positioning of the national environmental agencies and departments in national development planning processes.

Operating under the of the African Council of Ministers of Finance, the United Nation Economic Commission for Africa (UNECA) has established a Geo-Information Division within its operational structure. The stated vision for Africa is "to ensure that special data permeates every aspect of society and that they are available to people who need them, when they need them and in a form that they can use to make decisions with minimal pre-processing".

Annex 3 - Mapping Exercise

Existing institutions/projects	Objectives/activities	Implementers/membership	Supporting institutions	Coverage	Status
African Monitoring of the Environment for Sustainable Development (AMESD) project	Facilitating access to African-wide environmental information derived from EO technologies.	Project management unit at continental level; A Steering Committee at Continental level; regional coordination offices attached to the RECs; National focal points in all the 53 African countries	EU; AU; RECs; AMCEN.	Pan African	On going
Preparation for Use of Meteosat Second Generation in Africa (PUMA) project	Provision of meteorological and hydrological services to all African countries	National Meteorological and hydrological services of the 53_African countries	RECs: COMESA, ECOWAS, IGAD, SADC, ECCAS. EUMETSAT	Pan African	Completed (2001-2005)
Global Monitoring of Envronment and Security (GMES)	Deliver Earth Observations-derived information on environment and Security to support EU policies	National institutions in EU member countries; European research centres; ESA.	EU; ESA	Europe	On going
Global Earth Observation System of Systems (GEOSS)	Provide the overall conceptual and organizational framework to build integrated global Earth Observations to meet users needs. System of systems consisting of existing and future Earth Observation systems.	National and international space agencies all over the World.	UN; EU; AU; National and International Space Agencies of developed and developing countries.	Global	Under development
African Caribbean and Pacific (ACP) Observatory for Sustainable Development	To respond to the needs of the EC and ACP countries for data, maps and models in the areas of space based environmental monitoring and monitoring of Natural Resources.	JRC	EU; ACP countries	ACP countries	On going
Tiger project	Provision of geo-information for integrated water management. Research and technology transfer projects	More than 200 experts from national water and basin authorities; universities and national technical centres; North-South joint projects.	ESA, AMCOW, Regional technical centres; UN organizations i.e. UNECA, UNESCO; AfDB	Pan African	Completed
The Vegetation	Setting up an	National institutions	EUMETSAT; EU;	Pan African	Completed

for Africa (VGT4Africa) Project	operational and timely distribution system of vegetation data from SPOT satellites to African countries.	in African countries	AU; SPOT Image		
Ocean Data and Information Network in Africa (ODINAFRICA)	Clearing house for coastal and ocean data and information	National institutions in 25 African countries with coastal areas	AU/NEPAD; UNESCO	Coastal areas of Africa	On going
Climate for Development in Africa (CLIMDEV AFRICA)	African Development Programme to integrate Climate Risk Management into pertinent policy and decision processes throughout the continent. Expected outcome is improved availability and use of climate information and services addressing needs of local, national and regional level decision makers in support of sustainable development in critical climate-sensitive sectors and areas of Africa.	Coordinated by UNECA and implemented by national Meteorological and Hydrological Institutions in all Africa member countries.	AU, UN (UNECA), EU.	All Africa	On going
Application of Remote Sensing for Integrated Management of Ecosystems and Water Resources (ARSIMEWA)	Education, training and research to promote the use of remote sensing , communication and information systems for integrated management of ecosystems and water resources	African Universities and specialized centres	UNESCO	Pan African	On going
Desert Watch project	Developing a decision support system based on EO technology to help some Western Europe Countries in reporting to the UNCCD Convention.	Implemented by national institutions in Italy, Turkey and by the ESA	ESA, EU.	Some Western Europe Countries	On going
African Marine Information System (AMIS)	Provide User communities with an appropriate set of bio-physical information to conduct water quality assessment and resource monitoring in the coastal and	Implemented by JRC	EU, JRC	African coastal areas	On going

	marine waters.				
Global Monitoring for Food Security (GMFS)	Global network integrating Earth Observations and in-situ data collection for improved information on food security. Strengthen early warning systems.	Thirty users organizations and networks including FAO, WFP, JRC, AGRHYMET, RCMRD, SADC,etc.	UN (FAO, WFP) EU, JRC	Pan African	Ended in 2008
Observatory of Central Africa Forests	Regional platform for monitoring Central Africa forests.	National institutions in 10 central Africa countries under COMIFAC.	EC (JRC), FAO,	Central Africa	On going
Portuguese and Spain Satellite for Space Application for Africa: DEIMOS	High resolution satellite of the Portuguese and Spanish Governments providing high temporal resolution images for resource, environmental and disaster monitoring every two weeks in Africa. DEIMOS activities include data collection, processing and product development.	The Portuguese Government	Portuguese Government	Europe and Africa	On going
Global Biodiversity Information Facility	Is a global initiative to mobilize bio-diversity data to underpin sustainable development. Make the world's biodiversity data freely and universally available via internet.	Member countries all over the world. Managed by a governing board elected by member countries. Day to day activities carried out by a secretariat Located in Copenhagen, Denmark	Member countries governments	Global	On going
BirdLife International, Africa Partnership projects	One of the most important project is Monitoring IBAS project, a global partnership for monitoring birds species and their habitats. Implemented by JRC, RSPS and RCMRD	More than 100 countries including 22 African countries	EC.	Pan African	On going
United Nations Economic Commission for Africa (UNECA) Geo-information Systems Section projects	The vision is to ensure that spatial data permeates every aspect of society y in Africa and that they are made available to people who need them in a user friendly form for decision making. Is	All African countries	AU; UN	Pan African	On going

	implementing three projects relevant to GMES Africa i.e. AFREF, MAFA and CODIST GEO				
Infrastructures for Spatial Information in European Community (INSPIRE)	Infrastructures for Spatial Information in the European Community to support environmental policies and activities which have an impact on the environment. Can be used as a model by GMES Africa	European Union	EC	European Union	On going
African Resource and Environmental Management (ARM)	Algeria, Kenya, Nigeria and South Africa partnership to launch and operate a constellation of low earth orbiting satellites. Provide a daily African imaging at high resolution. Can be one of the centres of excellence for GMES Africa	National Space Institutions of member governments	Member Governments	All Africa	On going
GEONETCast	Satellite receiving stations, based on the concept of EUMETCast system adopted by the GEO, transmitting data about diseases, drought, biodiversity, natural disasters, air and water quality, ocean conditions, ecosystems in near real time. South African ground stations are part of the GEONETCast value chain.	All African countries	EUMETSAT, EU	All Africa	On going
Global Climate Change Alliance (GCCA)	Is an alliance on climate change between EU and developing countries to work jointly to integrate climate change into development cooperation and poverty reduction strategies. Potential framework for EU support to GMES activities	All African and EU countries	EU, AU	All Africa	On going

China Brazil Earth Resources Satellite (CBERS) for Africa	Partnership between China, Brazil, South Africa, Italy and Spain to develop and manage Earth Resources monitoring satellites. Distribute data to more than 20 countries. Plan to strengthen sustainable development and risk management throughout Africa.	National space agencies of participating countries	Member Governments	All Africa and European countries	On going
UNESCO-IOC Initiatives	UNESCO supporting implementation remote sensing based projects including Integrated Management of Ecosystems and Water Resources in Africa; GOOS Africa; AU/UNESCO High level Scientific and Technical Advisory Mechanism for Earth Observations and Geo-Information.	UNESCO and National Institutions participating in the projects.	UN; AU	African coastal countries	On going
OTHER UN AGENCIES	Besides UNESCO, UNECA and WMO, other UN agencies such as UNEP (Division for Early Warning); FAO (Early Warning and Food Security projects) or the UN Office for Outer Space Affairs has established infrastructures for in-situ and EO observations for Early Warning, Environmental Monitoring or Capacity building for use of space science.	National, Regional and International Institutions throughout the world, particularly in developing countries	UN	Global	On going
Regional Ocean Observing and Forecasting System (ROOFS) Africa project	Is a multi-modular approach for an integrated African ocean observing and forecasting and information delivery. Combine in situ observing stations and satellite based observations. Capacity building in	UNESCO and National institutions in 29 African coastal countries.	UN, AU (NEPAD)		

	participating countries. Modeling and forecasting. Is currently a component of the NEPAD Environmental Action Plan.				
African Institute for Space Science (AISS)	Aimed at promoting and coordinating cross-cutting multidisciplinary research and applications in space science and technologies to address the development needs of Africa.	National space agencies and space related institutions in all African countries.	AU	All Africa	Still under discussion
World Meteorological Organization (WMO) African projects	The WMO has established a number of Global Observation Networks including the Global Climate Observing System; the Global Ocean Observing System; the Global hydrological Observing System; the Global Weather Watch; the Global Aerosol Watch. WMO has also established communications systems in each country as well as product development and dissemination. Combination of *in situ* and Earth Observations.	National Meteorological and Hydrological Services (NMHSs) in all countries throughout the world.	UN	Global	On going
South Africa Earth Observation Strategy (SAEOS)	South African Earth Observation Strategy aimed at coordinating the collection, assimilation and dissemination of Earth Observation data for decision making, policy development to ensure economic growth and sustainable development. Provide a mechanism for the observing system to work together more effectively including	National Space Agency of South Africa	South Africa Government	Southern Africa	Strategy approved by the Governme nt in 2003. On going

	systems at national, regional and global levels.				
SERVIR	Is a visualization and monitoring system that integrate satellite and other geospatial data for improved scientific knowledge and decision making. Monitors and forecast ecological changes and severe events such as fires, floods, volcanoes, storms etc.	Implementing agencies include NASA, USAID, World Bank, the Water Centre for the Humid Tropics of Latin America and the Caribbean and the Central America Commission for Environment and Development (CCAD). Is developing a regional component for Africa named SERVIR Africa.	USA (NASA, USAID); World Bank; CCAD.	Global. Specific programme for Africa	On going
National Space Agencies in Africa	Well established space agencies with involvement in satellite launching and maintenance in South Africa, Nigeria, Kenya, Algeria. For instance; South Africa has established the Council for Science and Industrial Research (CSIR) which has the needed infrastructure for EO data acquisition, processing, archiving and analysis. Can be strengthened to become components of GMES Africa	National institutions or National Space Agencies (South Africa, Nigeria).	National Governments	National and regional coverage in Africa	On going
Global Spatial Data Infrastructure Association	Is an inclusive organization of organizations, agencies, firms and individuals all over the world aimed at promoting international cooperation and collaboration in support of local, national and international spatial data infrastructure development that allow nations to better address social, economic and	Open to national, regional and international institutions, agencies and individual throughout the world.	National, Regional and International Organizations	Global network	On going

	environmental issues of pressing importance.				

Annex 4. – GMES Africa Potential Centres of Excellence

The following considerations are not exhaustive and are proposed to facilitate reflections leading to the set-up of an efficient GMES&Africa operational scheme:

Major African Centres of Excellence to be strengthened through appropriate infrastructures for space based and in-situ data acquisition, analysis (analysis laboratories), packaging and dissemination to users might include:

At continental level, some specialized Agencies/Institutions could play an important role in providing thematic/specific services at the continental level. Among these Agencies, Institutions it is possible to envisage the African Centre for Meteorological Applications (ACMAD), the Division of Geo-Information of the ECA and the two UN-affiliated Regional Centres for Space Science and Technology Education i.e. CASTRE-LF and ARCESSTE-E.

At Regional level, the Centres of Excellence to be considered include:
In **West Africa**, AGRHYMET and RECTAS, each one in its specialization, should be strengthened and empowered to take the lead in the implementation of the future GMES activities. Negotiations could be initiated to strengthen the Nigeria Space Agency, transforming it into a agency serving all ECOWAS member countries for space applications. An option for the creation of the Regional Programme Management Unit is to build on the current ECOWAS AMESD coordination to build on the experience acquired through AMESD project activities that might be very similar to those that shall be implemented under GMES Africa. The new office will harmonize its activities with the activities of the ECOWAS/UEMOA Environmental Action Plan. The new office will ensure coordination of AGHRYMET, RECTAS, Nigeria Space Agency and other relevant regional Centers of Excellence and space based programmes and projects implemented in ECOWAS member countries.

For the Maghreb Arab Union Countries (UMA), the OSS could serve as the Centre of Excellence for the region and negotiations chould be initiated to develop an Agreement between the National Space Agencies of Egypt, Morocco and Algeria to ensure the set-up of a RPMU, that could operate as Regional Earth Observation Application Agency serving the **North Africa Region**.

For the countries of the **Eastern & Southern Africa Region (ESA)**, members of IGAD, EAC and COMESA, ICPAC should be strengthened to transform it into the regional Centre of excellence for Climate Change by Earth Observation Applications, particularly for the Horn of Africa. For island and coastal countries and for coastal management and oceanographic applications, the role of Regional Centre of Excellence could be played by the current *IOC RIC for AMESD*, based in Mauritius. For COMESA member countries, the RCMRD could be strengthened as another regional Centre of Excellency. The RPMU of COMESA will harmonize its activities with activities of the COMESA Regional Environmental Plan under NEPAD and other relevant Action Plans in the Region.

For **Southern Africa**, the AMESD branch of the Botswana National Meteorological Services which is operating as a regional centre for SADC countries could be transformed into a Regional Centre of Excellence. An important role at the regional level as Centre of Excellence in different themes could be efficiently be played also by CSIRO in South Africa. Also, negotiations could be initiated to transform the South Africa Space Agency into a regional space agency operating under the coordination of the RPMU..The new coordination office will harmonize its activities with those of the SADC Environmental Plan of NEPAD.

For **Central Africa**, the Central Africa Forest Observatory Centre for terrestrial application and CICOS for Water management application, both based in Kinshasa could be transformed in a Centre of Excellence for CEMAC/ECCAS RECs and for the COMIFAC, under the coordination of a RPMU to be established at CEMAC/ECCAS Headquarters. The new coordination office will work in close collaboration with the coordination of the Regional Environmental Plan under NEPAD.

At national level, GMES Africa will build on the infrastructures, human resources, technologies, institutional and operational mechanisms established through TIGER, PUMA, AMESD, VEGT4AFRICA, SAGA-EO and other relevant projects and activities carried out at national level. The National Space Agencies (wherever established), the National Meteorological Services and the National Mapping Agencies are expected to be major actors at national level at the service of he other

national relevant thematic structures (e.g. Direction of Agriculture and Livestock, Dir. of Forest, Dir. of Rural Developmlent; Dir. of Civil Protection, etc.…).

Taping on current networks and project activities to build the GMES Africa - Synergies

GMES Africa activities will also build on activities and human resources mobilized by pan-African wide networks and projects involved in remote sensing, GIS and space based monitoring of the environment and natural resources. The linkage will be established by the future GMES Africa Programme Management Unit operating under the direct auspices of the AU. The most important continental networks to be considered are AMESD, EIS-Africa, AARSE and AGIRN.

Beyond AMESD which can be considered as the initial phase of GMES Africa, other pan African-wide projects to be considered in setting the foundation of GMES Africa include *inter alia* the ACP Observatory for Sustainable Development, CLIMDEV Africa, GOOS Africa and the UNESCO ARSIMEWA .

In developing its Operational Plan, the PMU will link with all activities carried out by relevant Pan-African Networks and Projects and will tap on the human resources and facilities established by those networks and projects.vIt will also ensure close collaborative partnership with GMES Europe, EUMETSA, ESA and other European National Space Agencies as well as with other non European National Agencies (NASA, Canadian Space Agency, Japanese Space Agency etc.). The PMU will also promote strong partnerships between European Users and African Users particularly between African Centres of Excellence and their European counterparts and between scientific institutions and scientists from Europe and Africa.

Communication and dissemination strategy

Using the facilities and expertise developed at the Economic Commission for Africa (ECA), GMES Africa Management Unit should establish at ECA a unit for data processing, analysis and products dissemination to provide near-real time environmental data, information products and analysis for a wide range of users.

The data processing and dissemination unit will comprise:

- GMES Africa data access Web Portal allowing access to GMES Africa data and products based on an agreed system of archiving data by the various stakeholders. The Portal will provide direct web interface with users access and enabling search for information and services.
- A clearing house connecting directly to data from the various GMES thematic components, projects and services. The service will collect and search components information and distribute data and services via the Portal to users.
- A GMES Africa Components and Services Registry i.e. a data, services and products catalogue;
- GMES Africa Standards and Interoperability Registry enabling contributors to GMES Africa to configure their system so that they can share information with other systems.