



Focus

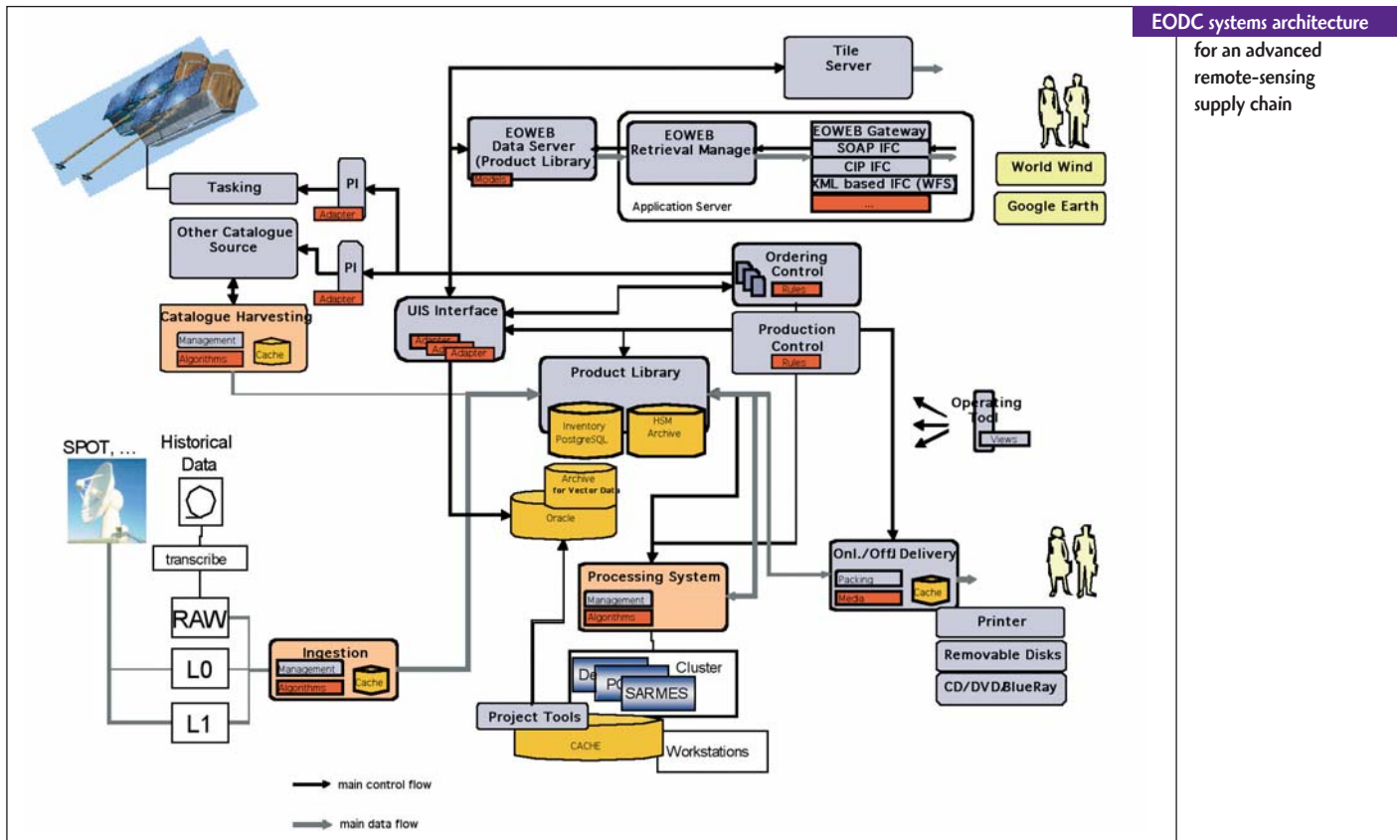
# EARTH OBSERVATION IN SOUTH AFRICA TAKES ITS RIGHTFUL PLACE

**The Council for Scientific and Industrial Research (CSIR) is one of Africa's leading scientific and technology research, development and implementation organizations. Formed by an Act of Parliament in 1945, it undertakes directed and multidisciplinary research, technological innovation and industrial and scientific development to improve quality of life for the country's people.**

As one of its national research centres, the Satellite Applications Centre (SAC) is a key component of the CSIR's efforts to maximize the benefits of information, communications and space technology for industry and society. The centre has a longstanding relationship with Spot Image and has been receiving, archiving and processing SPOT imagery since 1990. It has been receiving SPOT 5 telemetry directly since October 2006, chiefly for the purpose of compiling an annual 2.5-metre natural-colour mosaic of South Africa.

The agreement with Spot Image to receive telemetry under a multi-government licence has raised awareness within the public sector, research community and academia of the importance and value of spatial information. Since the agreement, the CSIR has completed and distributed two mosaics of South Africa, one for 2006 and one for 2007.





EODC systems architecture

for an advanced remote-sensing supply chain

### Supporting local priorities

The SPOT programme is a good fit with the South African Earth Observation Strategy (SAEOS). The objective of SAEOS is to coordinate collection, assimilation and dissemination of Earth-observation (EO) data in order to realise their full potential in supporting policy, decision-making, economic growth and sustainable development

in South Africa. This is achieved by adding value to the existing expenditure on EO and related activities in South Africa, through making information available to a broad spectrum of users in an integrated, timely and easily accessible form.



#### EODC system component description

##### The DIMS-EO system elements depicted in Figure 1 consist of the following modules:

###### Product ingestion

This service accepts data from the various data producers and coordinates archiving and inventorying of the data. It implements a workflow that consists of data detection, metadata extraction, and data and metadata submission to the product library.

**Catalogue harvesting**  
This module retrieves metadata from third-party catalogues to make the data available for ordering and implements a workflow performed at regular intervals, consisting of new entry detection and metadata retrieval, transformation and submission to the product library.

###### Product library with relational database management system and data archive

The earth observation data product is the central management unit of the EODC product library (PL). A product typically groups metadata describing the item and several logical components.

**Production control**  
This controls and monitors complex production workflows in DIMS.

**Processors and processing management**  
Processors like the South African Resource Management and Expert System (SARMES) or Definiens workflows are wrapped into operational processing systems. Processing systems consist of one or several processors and a framework layer – the processing system management.

###### Online/offline product delivery

This generates customised delivery packages of ordered product items, either for online transfer or on media.

###### UIS interface

The components user interface loader and user information services interface employ the PL insert and update event subscription to upload product data into the EOWEB User Services and external data management systems.

**EOWEB**  
EOWEB is the user information service of the DIMS. It provides catalogue, ordering and data services to end users and external systems.

**Order control**  
This component handles and processes user orders and covers aspects from validation and on-demand production to accounting.

###### Production interface

This component facilitates exchange requests and, optionally, data with external production or acquisition systems.

###### Definiens Intelligence Suite

This suite provides image analysis for earth observation data to generate higher-level thematic mapping from earth observation data, such as thematic maps and feature extraction information.

###### PCI Geomatics

The PCI Geomatics software suite is integrated into the system to support post-processing workflows during ordering, e.g. to extract subsets from mosaics to be supplied to the user.

###### SARMES

The SARMES system, based on PCI Geomatics software, is used to perform various processes. Level 1 satellite

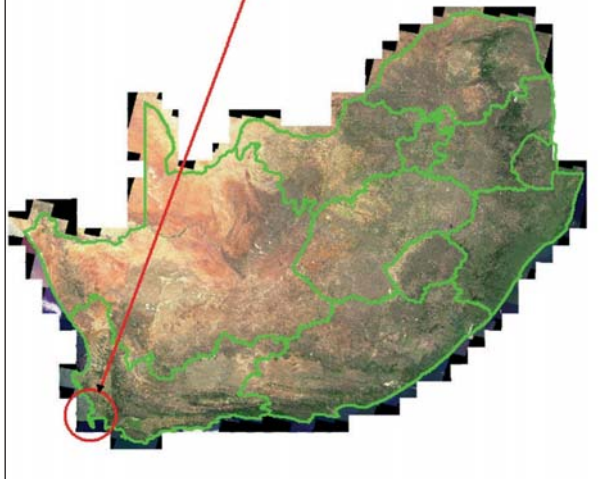
image data are converted to Level 3 (L3) and Level 4 (L4) data products. The L3 products are stored in the PL, the geographical query capabilities of which can then be used to select all relevant L3 products for the generation of the L4 product (Figure 2).



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**Mosaic 2007**

SPOT 5 2007  
South Africa  
mosaic, est.  
1,200,000 sq.km



SAEOS is implemented by the SAC on behalf of the South African Department of Science and Technology (DST). Its ultimate goal is to contribute directly or indirectly to the nine societal benefit areas identified by the Group on Earth Observations: natural disaster monitoring and assessment, health, energy, climate change, water, weather, ecosystems, agriculture and biodiversity.

The SAEOS systems architecture consists of two main elements: the Earth Observation Data Centre (EODC) hosted and implemented by the SAC, and an advanced EO portal. Figure 1 shows how the components in the EODC systems architecture mesh to form an advanced image-processing supply chain. Figure 2 gives a brief description of each component. This system is also known as the Data Information Management System – Earth Observation, designed by WERUM in Germany.

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The relevance of the SAEOS project is that it enables the infrastructure necessary to provide a world-class image-processing service to the CSIR's key stakeholders. Components such as the SARMES system were used to produce the SPOT 5 mosaics, which consist of over 1,500 images each. The product deliverable in each case was a fully-orthorectified, natural-colour tiled image with a spatial resolution of 2.5 metres. The production turnaround time per mosaic amounts to four months, for the period December to March each year. The 2007 South Africa mosaic is shown in figure 3.

Distribution of SPOT 5 imagery makes a direct and valuable contribution to all tiers of the public sector, helping national, provincial and local government with decision-making and spatial planning. Applications such as land degradation evaluation, crop yield forecasting, land-use and land-cover classifications, change detection, security applications, environmental impact studies and city planning are some that have benefited from the SPOT 5 initiative and clearly had an overall positive impact on South Africa.

### **South African National Space Agency: the role of Earth observation**

The envisaged establishment of an official South African National Space Agency (SANSA) within South Africa in the near future will determine the next-generation sensor portfolio for southern Africa. SANSA will manage programmes associated with EO, satellite communications, navigation, satellite science and exploration. The future for space applications in South Africa is a big challenge for DST and much emphasis will be placed on this theme in the short and medium term to develop it. Building up the local space industry within South Africa to stimulate the economy and nurture skills is a key objective for SANSA. In this regard, international partnerships and business relationships are acknowledged as an indispensable ingredient of the agency's future success. ■

#### **MORE INFORMATION:**

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