



SATELLITE OBSERVATIONS FOR CLIMATE CHANGE

KEY OFFERINGS

Data Management

- Meta-data harvesting / cataloguing
- Expertise with atmosphere, land and ocean-based climate data
- Climate impact indicator provision
- Data quality information

Systems Definition / Development

- Visualisation tools
- User interface development
- Data dissemination protocols
- Market / requirements analysis

Expert Managed Services

- Service KPI's definition / compliance
- Data processing & dashboard monitoring
- Help desk provision
- Training development & delivery
- Project / Consortium management

BACKGROUND

Climate change is arguably the most difficult global challenge facing governments, business and society in the 21st century. Satellite observations have enabled major scientific advances in our understanding of climate change, with their measurements on large temporal and spatial scales key to understanding the evolution of parameters about the atmosphere, land and ocean in our Earth system. The business ecosystem for climate services is evolving rapidly with estimated revenues exceeding £16bn in 2015. In recent years Telespazio VEGA UK (TVUK) has built a European industry leadership position in the provision of satellite observations for the climate change marketplace. Several key initiatives give TVUK major involvement in the provision and use of satellite observations to help stakeholders monitor, mitigate and adapt to climate change.

The funding for these projects comes from two main Programmes:

- Climate Change Initiative (CCI), funded by the European Space Agency.

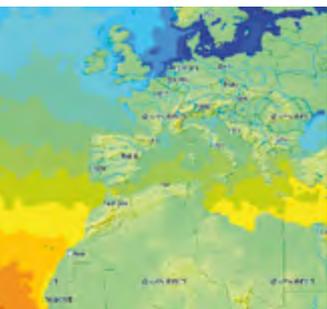
- Copernicus Climate Change Service (C3S), operated by the European Centre for Medium-Range Weather Forecasts (ECMWF) on behalf of, and funded by, the European Commission.

TVUK climate capabilities span all aspects of the value chain and example projects across the value chain are shown below:

MARKET / REQUIREMENTS ANALYSIS

SECTEUR (Sector Engagement for C3S, Translating European User Requirements) is engaging with a wide range of stakeholders to establish existing policy needs and user requirements for potential C3S services across the following sectors: agriculture & forestry, health, coastal areas, insurance, tourism, infrastructure. TVUK is leading the construction of a market-wide requirements database for the C3S and making recommendations (with a focus on data quality and visualisation) based on the gathered requirements.

SYSTEMS BUILD & INTEGRATION



The **ESA CCI Open Data Portal** provides a single point of access to a stable, long-term set of satellite-based Essential Climate Variable (ECV) data products for climate modellers and researchers. There are currently 14 ECV projects focusing on ECVs such as Sea Surface Temperature, Aerosols, Glaciers, and Soil Moisture with

more to be added in the forthcoming CCI+ programme. TVUK is the prime contractor for the project, which acts as a “shop window” for the CCI programme, consistently presenting all ECV data to users. The portal enables data discovery, access and visualisation with a variety of data access protocols available, including WMS, WCS, FTP and OPeNDAP. TVUK are also involved in the **CCI Toolbox**, which allows manipulation and further processing of ECV data.

The **Climate Data Store (CDS)** will be at the heart of the C3S infrastructure and will provide information about the past, present and future climate in terms of Essential Climate Variables and derived climate indicators. It will be designed as a distributed system, providing improved access to existing datasets through a unified web interface. Data from the CDS will underpin the sector-specific applications developed as part of the C3S. TVUK is the prime contractor for the CDS and leads all aspects of the software / systems design & build, using an Agile development approach. A highly diverse set of users (that will include policy makers, experts and scientists) will be able to browse the catalogue, refine searches, retrieve products, view tools compatible with the data search results, and execute operations on the data using these tools. Users will also be able to develop

applications that make use of the content of the CDS.

SERVICE OPERATIONS

TVUK is prime contractor for a C3S service to provide **Sea Surface Temperature (SST)** data records which will be made available to users on demand via the CDS. The service builds on leading edge scientific work performed in the CCI programme in order to enhance the availability of the observations to <5 days from acquisition for a variety of SST data products. A clear set of Key Performance Indicators (KPI's) have been defined to ensure a reliable and high quality data stream, as well as a dashboard to display KPI and service status metrics. TVUK is also involved in the service provision of **Atmospheric Ozone** data records to the C3S and has developed a dashboard and set of service KPI's consistent with that provided for the SST service. TVUK also provides project management, end user requirements capture, website hosting, technical user support & system engineering support to the **Ocean Colour CCI ECV Project**.

SECTORAL APPLICATIONS

TVUK is prime contractor for a **C3S Agricultural System**, which is investigating the impact of climate change on woody perennial crops such as vines, olives and beech forests in southwest France and the Tuscany and Molise regions of Italy. These types of crops take years to cultivate and therefore understanding expected changes in climate can significantly aid decisions on the optimal regions for their growth. Further climate downstream initiatives with TVUK involvement are a **C3S Insurance System**, which is investigating the impact of climate change



on the frequency and severity of wind storms and the associated effect on the insurance sector; and a study for a commercial customer to understand the impact of climate change on infrastructure assets such as roads, rail, bridges and dam networks.

TRAINING

The European Commission has funded a series of InfoSessions to promote awareness of the many uses of Copernicus data and information, while providing the opportunity for hands-on demonstrations and basic training. TVUK is responsible for the development of the climate change adaptation & mitigation module, which has already been delivered at events in Denmark (Aarhus) and Greece (Athens).