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## The role of SQU in Satellite Meteorology in Oman

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By Dr Andy Kwarteng - WMO Centres of Excellence (CoE) for training in Satellite Meteorology are implemented normally in every WMO Region and sponsored by one or more satellite operating agency. WMO Centre of Excellence in Satellite Meteorology Training in Muscat was founded in January 2006 with EUMETSAT as the main sponsor.

The aims of the centre are: to address the training needs in remote sensing applications for Middle East Countries and especially in Satellite Meteorology; establish and promote the concept of Virtual Laboratory (VL) for Training in Meteorological remote Sensing Applications by organising training sessions and uses VL on-line training tools; establish and organise a Regional Focus Group that is able to meet on line to carry out weather briefings, seminars and other related meetings on a regular basis. Along with other organisations, the WMO Centre in Muscat is co-ordinated by the Remote Sensing and GIS Centre also. In this article, the author, Director the SQU Remote Sensing and GIS Centre, outlines the role of SQU and the Centre in terms of satellite data applications for various purposes. Operational meteorological research and development environmental satellites provide essential data for meteorology, climatology including global change, hydrology, oceanography, and other applications to World Meteorological Organization (WMO) members worldwide.

A wide variety of environmental applications are growing steadily due to the introduction of new satellites equipped with new systems. Several varieties of environmental information are available from the Global Observation System and members are encouraged to strive for full exploitation of the program. In order to accommodate the rapidly increasing sophisticated and diverse users, updated and improved methods must be developed.

Maximum utilisation of satellite data for environmental applications entails research and a strong and continuous training component. Meeting the demands of this challenge is possible through the combined effort of the WMO and the world's producers of operational meteorological satellites through the Coordination Group for Meteorological Satellites (CGMS) in the formation of the Virtual Laboratory for Training in Satellite Meteorology (VL).

The VL is a network system of meteorological satellite operators and 12 Centres of Excellence (CoE) at WMO Regional Meteorological Training Centres in Niamey, Niger; Muscat, Oman; Nairobi, Kenya; Pretoria, South Africa; Moscow, Russia; Beijing, China; Nanjing, China; Melbourne, Australia; Cordoba, Buenos Aires, Argentina; Cachoeira, Paulista, Brazil; Bridgetown, Barbados; and San Jose, Costa Rica. The satellite operators are NESDIS (USA), EUMETSAT (Europe), CMA (China), JMA (Japan), CONAE (Argentina) and INPE (Brazil).

There are two major constellations in the current space-based Global Observation System. The geostationary satellites operate in an equatorial belt and provide continuous view of the weather from roughly 70°N to 70°S. Satellites in this constellation are operated and owned by EUMETSAT (Meteosat), China (FY-2/4), Japan (MTSAT) and USA (GOES). The second constellation comprises satellites orbiting in polar orbits. They are operated by USA (NOAA and DMSP series), Russia (METEOR series) and China (Fen Yung-1/3 series).

The geostationary satellites provide a continuous view of weather systems and provide valuable information on the motion, development and decay of weather phenomena (e.g., severe thunderstorms, dust storms, etc.). Polar orbiting satellites acquire data from all parts of the globe during a series of successive revolutions. These satellites are mainly used for daily global cloud cover, accurate quantitative measurements of surface temperature, vertical variation of temperature, and water vapour in the atmosphere.

Additional up-to-date information on Global Observing Satellites can be obtained from WMO Satellite Activities Homepage: [http://www.wmo.int/pages/prog/sat/index\\_en.html](http://www.wmo.int/pages/prog/sat/index_en.html). Data from international organisations operating environmental observation programs are reliably available to WMO members. Potential applications of Global Observation Satellites' data include;

- \* Tracking atmospheric motions,
- \* Cloud detection and properties,
- \* Surface temperature (sea and land surface temperatures),
- \* Monitoring vegetation changes,

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\* Monitoring suspended dust

\* Monitoring fires – from tropical deforestation and grassland management.

The WMO Center of Excellence, Muscat was inaugurated in February 2006 as the seventh of such centres in the world and is co-ordinated by the Directorate General of Meteorology and Air Navigation (Civil Aviation Affairs) and the SQU Remote Sensing and GIS Center. The Center's activities are well supported by EUMETSAT. Some 150 weather forecasters and environmental scientists from the Arab and southwest Asian countries have been trained since the establishment of the CoE in Oman.

The CoE has actively participated in the High Profile Training Event (HPTE), the first global training event through the internet. The WMO organised this event together with the other partners in October 2006. Among some of the CoE activities is a yearly two weeks workshop on EUMETSAT Satellite Applications sponsored by EUMETSAT.

EUMETSAT is the European operational satellite agency for monitoring weather, climate and the environment.

EUMETSAT operates a robust and sustained system of meteorological satellites monitoring the atmosphere and ocean and land surfaces. The system delivers weather and climate-related satellite data, images and products – 24 hours a day, 365 days a year. This information is supplied with minimum delay to the National Meteorological Services of the organisation's 22 Member and five Co-operating States in Europe, as well as other users worldwide including the Gulf area and the Indian Ocean.

EUMETSAT has an extended ground system to control its satellites and handle the data they collect. The frequent, highly reliable and superb-quality data and images help to enhance and safeguard the daily lives of the countries' citizens. They aid meteorologists in identifying and monitoring the development of potentially dangerous weather situations and in issuing timely forecasts and warnings to emergency services and local authorities, helping to mitigate the effects of severe weather and protecting human life and property.

This information is also critical to the safety of air travel, shipping and road traffic, and to the daily business of farming, construction and many other industries.

EUMETSAT also provides satellite-based climate data records over decades with the highest possible level of accuracy, reliability and stability. This climate mission includes the data processing and archiving processes that are needed to provide reliable information on the status and dynamics of the Earth's climate.

EUMETSAT is thus uniquely equipped to support both scientists and policy makers in their efforts. The Civil Aviation Affairs Department of Directorate General of Meteorology and Air Navigation is playing a leading role in Southwestern Asia and acts as an interface between EUMETSAT Head Quarters, located in Darmstadt, Germany on one hand and WMO Head Quarters, located in Geneva, Switzerland on the other hand on issues related to training satellite meteorology at Oman's CoE.

The Remote Sensing and GIS Centre at Sultan Qaboos University co-ordinates remote sensing and GIS activities and research projects within SQU, and between the University, ministries, industry, and institutions outside the Sultanate. The Centre also provides technical support and guidance to national user agencies and the community at large in order to enhance co-operation, in addition to organising training courses, workshops, seminars and conferences relating to remote sensing and GIS at the national and international levels.



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