

# NEO EARTH OBSERVATION SERVICES

## No Business like Space Business



Based in the Netherlands, independent earth-observation service company NEO has some twenty employees and works closely with outsourcing partners in India and the Philippines. NEO operates in markets such as forestry, drought monitoring and particularly change detection. This article illustrates the typically rough relationship such a company has with space infrastructure.



NEO was founded in 1996 by its current managing director, Rob Beck, with the idea of adopting the then new and very high-resolution satellite missions for monitoring in Western Europe, in particular in the Netherlands. Things, of course, went differently. The first high- and very high-resolution Ikonos-1 and Early Bird missions never made it into



orbit. Up until 1999, IRS 1C and 1D were the highest resolution sensors (6 metres), but had too limited an imaging capability for ordering products-yet-to-be-acquired on behalf of a customer.

### Carbon Monitoring

NEO began developing monitoring services for forest plantations on behalf of green investors and forestry companies with an eye to certification of sustainable forest management and plantations. This is the oldest element in NEO services, applied on four continents and central to its portfolio. In the second half of the nineties Spot, Landsat and ERS, occasionally augmented by Indian and Russian satellites, provided the only operationally available imagery. Now aging sensors are being replaced by more modern satellites, such as the RapidEye constellation, Terrasar-X, and sometimes even higher-resolution optical missions. Objective monitoring of carbon stocks, including forest resources and human activity, is growing in proportion to the increase in commodity value of carbon.

### Extreme Events

In its second year of business NEO met a joint research centre (JRC) student working on the retrieval of soil moisture information from the ERS-scatterometer. Up until 1999 NEO applied the then operational sensor with amazing success in drought monitoring and yield forecasting in Western Africa and Russia; however, operational data supply of real-time scatterometer data restarted only in early 2009, when the Meteorological Operational satellite programme (METOP) Advanced Scatterometer (ASCAT) finally came on-line. Had we known that a decade would pass before new data became available, we would have left the field to the scientists. In the meantime, the JRC student had become Professor Wagner of the Technical University of Vienna and NEO had time to develop a processing chain for the new instrument. We are currently intensively marketing our renewed DRYMON services: daily provision of the fastest possible early warnings of worldwide dry or wet extreme events. The data stream is guaranteed by the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) for the coming two decades.

### Ikonos Pros and Cons

The first Ikonos image of The Netherlands was acquired on 3rd April 2000, depicting Enschede town centre. This was where the S.E. Fireworks complex was situated, the illegal placement of containers at the site of which led to a devastating explosion on 13th May. Twenty-three people were killed, 950 injured, and hundreds of residential buildings destroyed. A satellite image, unlike an aerial photograph, is collected one day and processed and printed over the following few. This is what NEO did with the Ikonos image, showing it to press and municipal staff weeks ahead of the catastrophe. In the immediate aftermath it clearly illustrated the presence of partially illegal containers in the yard. By the time later details, including aerial photography, became available, the use of a satellite image was proven

beyond doubt. This was the strange beginning of successful delivery to Dutch customers of Ikonos imagery for analysis and map updating in several fields.

Unfortunately, the Ikonos imagery was received via a ground-station near Athens, exploited by a Greek company which entered into conflict with satellite owner Space Imaging. Because our contract with the Greek company could not be transferred to Space Imaging, NEO was unable from end 2000 to mid-2003 to meet customer requests. Most, of course, quickly lost confidence in this imagery. No business like space business!

### **Detecting Change**

The first very high-resolution satellite images demonstrated their potential in the rapid detection of very small changes: not only could new buildings be detected, but even a new roof window in an existing building. Since 1999 NEO has focused its R&D and applications development activities on the production and use of change information.

Managers in both public and private sectors are interested in any change occurring to objects under their responsibility; certainly if they have not been previously informed of them. Information required is then: 'a building has been torn down at address X,Y, Z' or 'a road has been opened between x and y': an advance on noted change in value of one or more pixels on two images. NEO learnt that change information had always to be related to physical objects known to the customer; evolving data from change detected on an image to, for example, a mapping instruction, became the second step in SIGNALEYES, an annual, fixed-price service that has been developed in projects for more than a hundred customers. The first step was detection of change when new satellite imagery and aerial photography became available. Subsequent steps will involve mapping new buildings.

### **Rough with the Smooth**

In each of our experiences with satellite imagery there has been a major set-back relating to technology and human organisation in space infrastructure. Examples of bad space business are:

- satellite missions that offer services and data prior to launch and for whatever reason never or only belatedly get into orbit
- satellite systems that function as the technical miracles they are, but only to discover shortcomings in the ground segment or over-complex satellite tasking
- satellites wrapped in red tape for which endless proposals have to be written and only very complex datasets can be obtained; for (more) commercial satellite systems, image pricing, ordering and delivery can be amazingly tedious.

It seems to take years for a satellite-operating organisation to attain an appropriate level of service. We note that the European Commission, in beginning Global Monitoring for Environment and Security (GMES) operations, seems intent upon repeating all the same mistakes. Precipitous overselling of GMES will result only in greater damage to service providers at a later date. Again, the first priority when considering any reliance on space infrastructure is to certify that the satellite you intend using has a successor ready and waiting in the wings.