

# HYSPEx NEWS

*Norsk Elektro Optikk A/S, Solheimveien 62A, N-1473 Lørenskog, Norway*

Dear Reader,

First of all, we wish you all the best for the New Year!

This news letter, issued by the HySpex group at Norsk Elektro Optikk A/S, is the first of its kind. Our main objective with this letter is to provide information, about our ongoing as well as planned future activities, to our distributors and main partners.

Being the first issue of the "HySpex News", it was difficult to decide on the topics to be presented. We have a number of interesting and important ongoing activities that could be presented. We decided to focus on the main technical achievements; new electrical interface, the SWIR-320m-e and the VNIR microscope lens.

During the summer of 2009, the French company ACTIMAR used a VNIR-1600 in an extensive mapping campaign in Africa. The quality and reliability of the HySpex cameras was clearly demonstrated during this demanding mission. Some key figures from this mission are presented in this issue of the HySpex News.

The HySpex Internet site, [www.hyspex.no](http://www.hyspex.no), was released in September 2009. In average, the site has received 199 visits each day. The Internet site will be an important source of information in the future and we appreciate suggestions for changes that may make the site better.

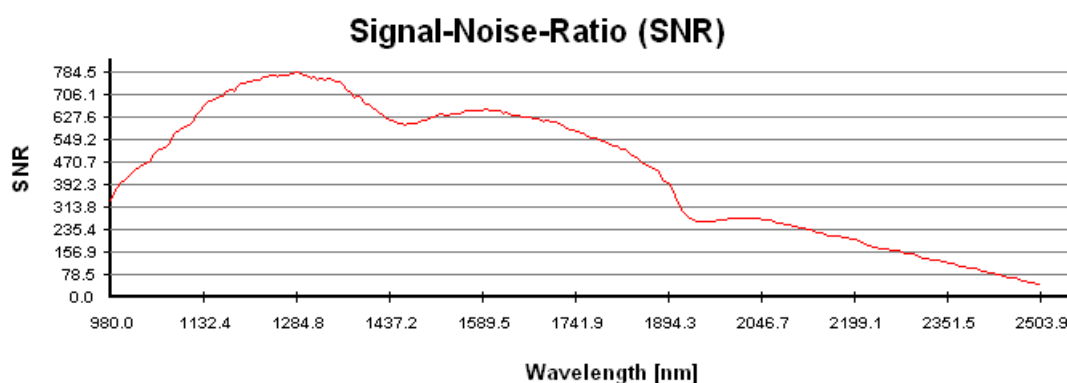
## The SWIR-320m-e

*By Ivar Baarstad*

One of the main objectives with the SWIR-320m-e is to fill the spectral gap between the VNIR-1600/640 and the SWIR-320m, so far covered by the SWIR-320i sensor. The SWIR-320m-e allows the whole spectral range 400 to 2500 nm to be covered with two sensors only.

The first test data from the SWIR-320m-e is available. It turns out to exhibit very good performance, both optically and with respect to SNR as shown on the figure below (the scene was in this case the integrating sphere used for calibration). A technical brochure with more details of the camera performance is under preparation.

Shortly, the first two SWIR-320m-e will be delivered to customers in France.



## Mapping of Coastal French Territories in The Indian Ocean

By Ivar Baarstad

Airborne HySpex sensors have been operated yearly since 2003. An example of a recent airborne campaign is the mapping of coastal French territories in the Indian Ocean.

Actimar ([www.actimar.fr](http://www.actimar.fr)), who have previously used both CASI and HySpex sensors, selected the HySpex VNIR-1600 for this demanding mission of mapping 9 French islands around Madagascar, including Ile de La Réunion and Mayotte. The camera worked perfectly during:

- 5 months mission duration
- acquisition of hyperspectral data from:
  - 3500 km<sup>2</sup> land and sea area (flown 2 times at different altitudes, leading to a 7000 km<sup>2</sup> survey)
  - approximately 1,000 flight lines

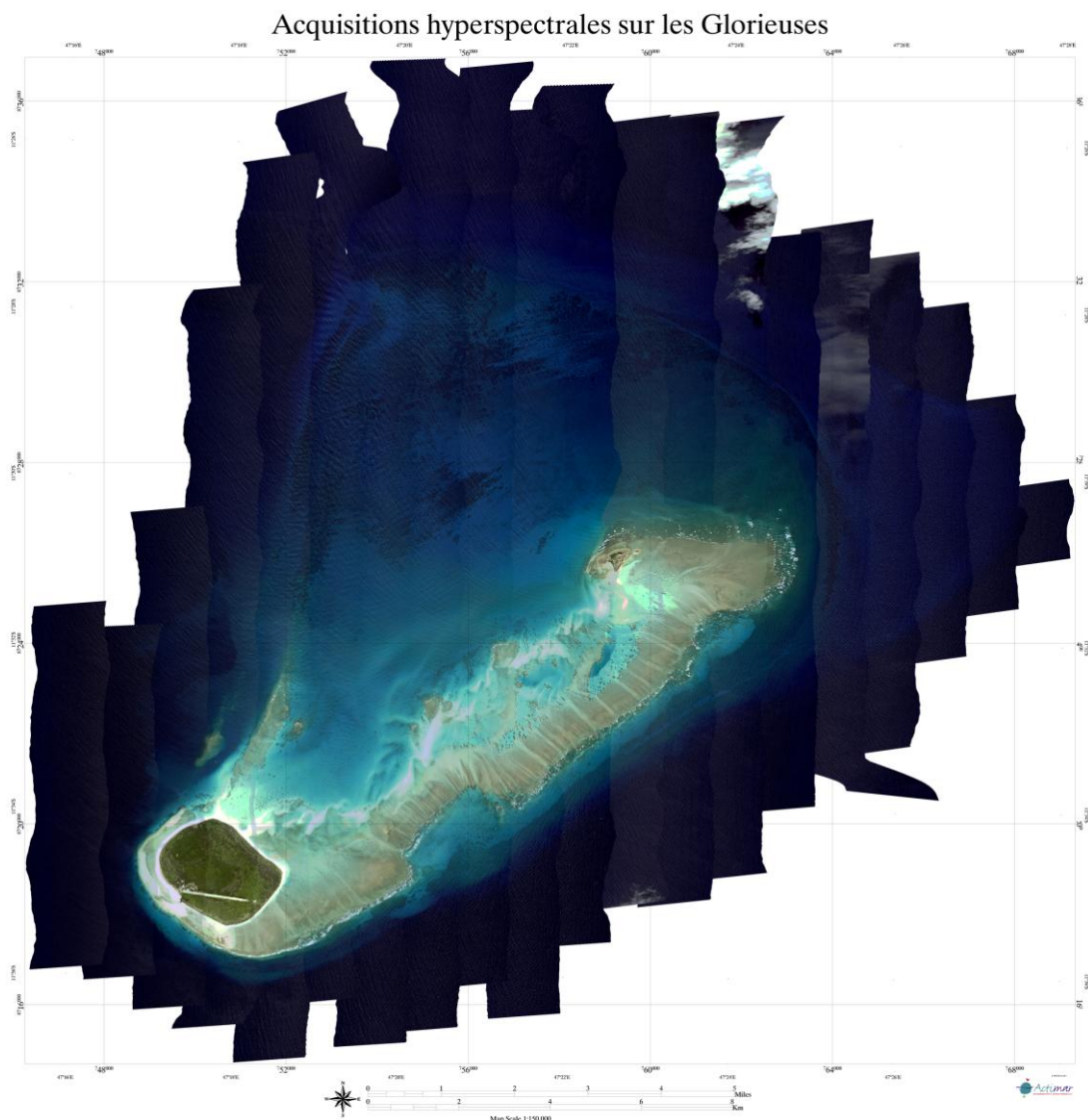
- 400 – 500 flight hours, including transits between islands

Approximately 100 Tb of data was generated during this mission, including raw, radiance, and reflectance data.

The image below is a mosaic of rectified and atmospherically corrected dataset acquired over Iles Glorieuses during several flight lines.

The main application of the campaign was benthic habitat mapping in the intertidal zone and shallow waters, including coral reef biodiversity and health mapping.

For more information, please contact: [marc.lennon@actimar.fr](mailto:marc.lennon@actimar.fr)



## New camera interface

By Trond Løke

The HySpex cameras have, till now, been equipped with separate electrical cables for CameraLink, electrical power, I/O-box and USB connection (exact configuration varies between the different models).

In airborne applications, especially in configurations with two or more HySpex cameras, organisation of the cameras may become bulky due to the number of cables.

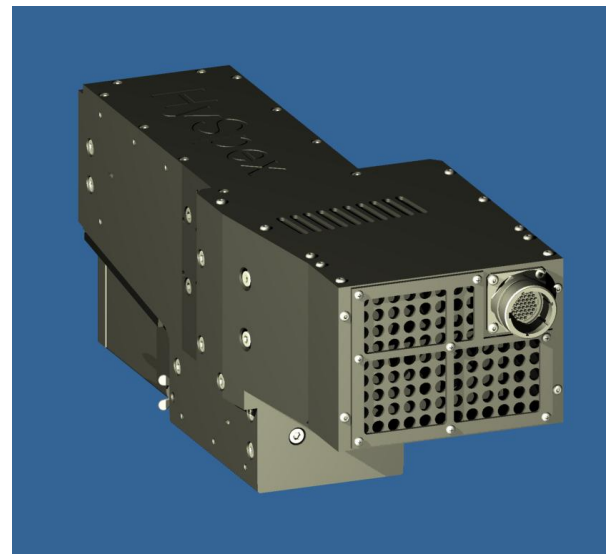
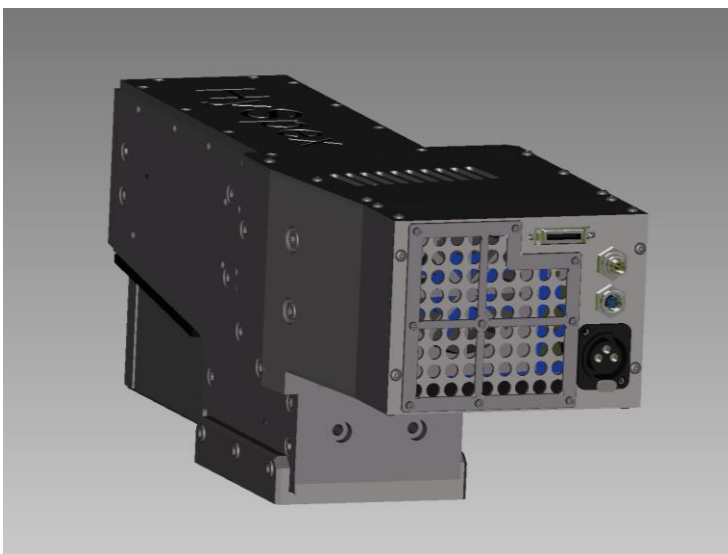
HySpex cameras manufactured after January 1<sup>st</sup> 2010 will be equipped with a new electrical interface. The changes comprise:

- A single cable, equipped with a 55-pin 38999-connector, replaces the discrete cables in the previous camera versions.

- The functionality of the I/O-box is implemented on a dedicated PCB, which is located inside the HySpex camera. The separate I/O-box is, consequently, no longer needed.
- The SWIR-320m was previously equipped with an electrical switch, allowing the user to choose between two fan speeds. On the new camera models, the switch is removed and the fan speed is set via software.

In total, we are confident these changes will improve the robustness of the HySpex cameras and make them even easier to work with.

Despite these improvements, the recommended camera sales prices will be kept unchanged in 2010.



**Figure 1.** Old and new electrical interface of the SWIR-320m-e to the left and the right respectively. Note that the switch for the fan is not shown on the image of the old model.

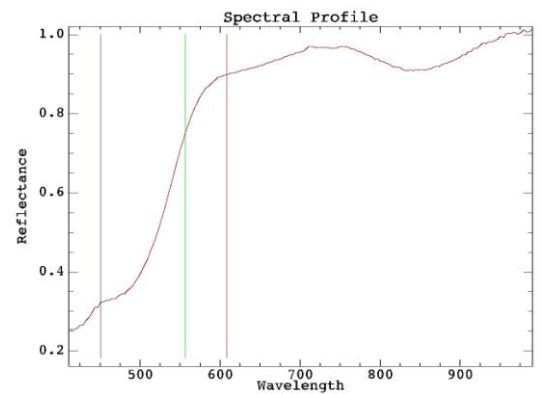
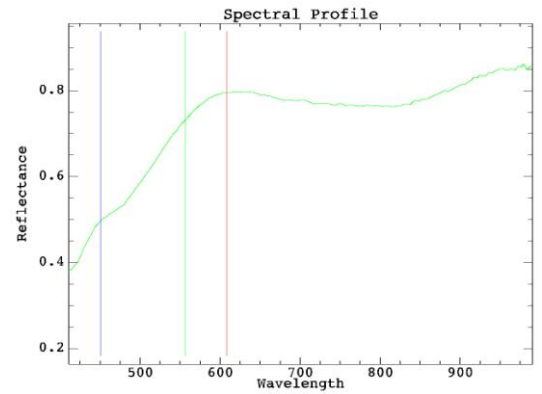
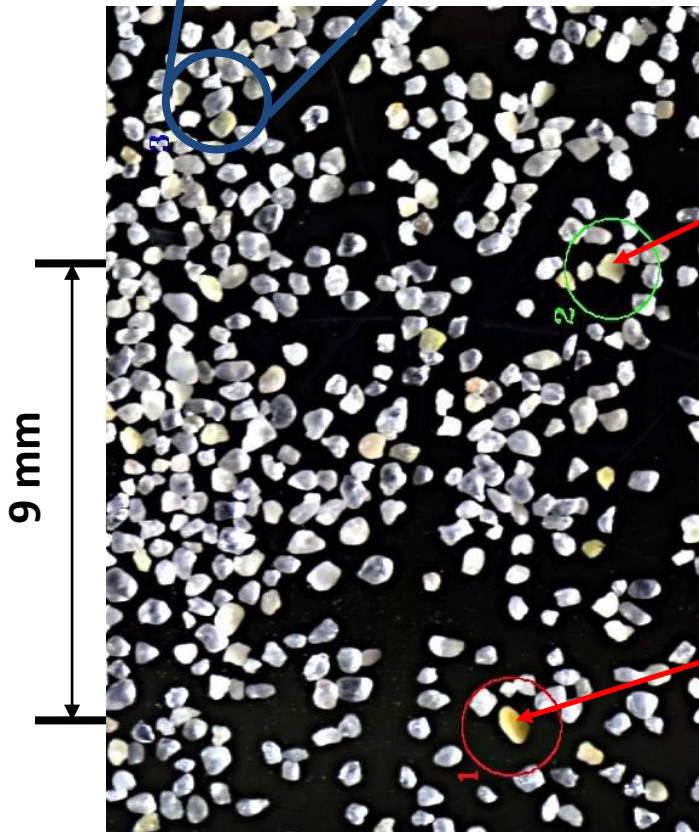
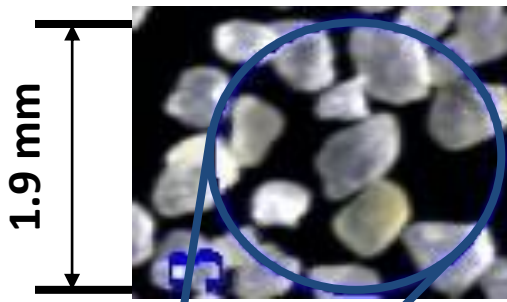
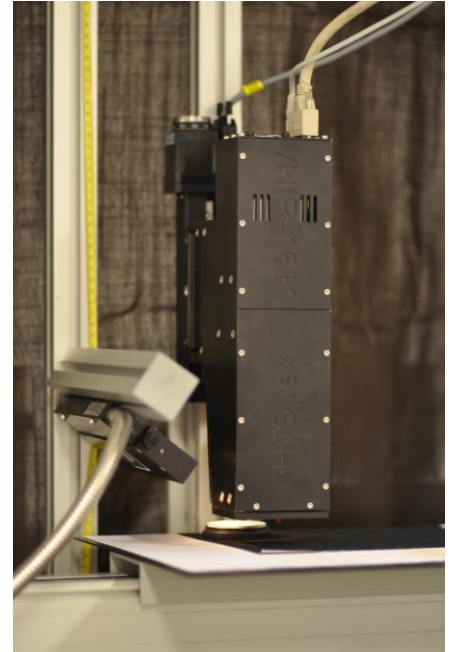
## VNIR Microscope

By Andrei Fridman and Lars Lierstuen

A new close-up lens, for the VNIR-1600, has recently been completed. With this lens denoted “24  $\mu\text{m}$  VNIR Microscope” the linear field of view is 37.6 mm, corresponding to an on-axis pixel size of 24  $\mu\text{m}$ .

The picture to the right shows a VNIR-1600 mounted on a lab rack and equipped with the 24  $\mu\text{m}$  VNIR Microscope. Note the small translation stage, which is used for focusing the camera.

The image below, acquired with this set-up, shows sand sprinkled over an even surface. Average grain size is < 0.5 mm but still the reflectance of a single grain is easily discriminate since it comprises hundreds of pixels.



## HySpex Real Time software and hardware package

By Pesal Koirala and Trond Løke

NEO is currently developing a system for real time processing of hyperspectral images. The system will comprise software and hardware.

The software package, HySpex RT, is based on a framework, developed by the Norwegian Defense Research Establishment (FFI), employing the CUDA technology that takes advantage of the great processing power of state-of-the-art Graphical Processing Unit's (GPU's). HySpex RT will offer many standard algorithms for image analysis (like Principle Component Analysis, Spectral Angle Mapper, Clustering, Classification, etc.), and in addition allow the user, alone or in cooperation with NEO, to include its own algorithms.

The real time hardware will be a dedicated computer, connected to the HySpex acquisition computer via Gigabit Ethernet.

NEO believes the real time processing system will be of great importance in many applications; real time georectification of airborne hyperspectral data, real time process control etc.

NEO aims to have a prototype ready in April/May 2010.

## The HySpex internet site

By Lars Lierstuen

The HySpex internet site ([www.hyspex.no](http://www.hyspex.no)) has been in operation for some months now. According to the website statistics, we have on average 200 requests for pages each day, which is quite impressive.

We intend to keep our internet site updated and reflecting the current status of our activity:

- Technical changes
- Agents/distributors

Proposals for improvements of the site are of course welcome.

**HySpex** High resolution, high speed hyperspectral cameras for laboratory, industrial and airborne applications. **norsk elektro optikk..**

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### The company

Norsk Elektro Optikk A/S (NEO) was established in 1985 as a privately owned research oriented company within the field of electro optics. The founders had their scientific and technical background from the Norwegian Defence Research Establishment which for the last 30-40 years have been the leading research organisation in electro optics in Norway.

The company has since its start grown to be the largest independent research and development organisation in electro optics in Norway, and has in addition established itself as a manufacturer of advanced electro optical products for an international market. Further information can be found at [NEO's web site](#).

HySpex is NEO's line of hyperspectral cameras. More information is available under the "Products" tab.

For a brief overview of NEO's activities in hyperspectral imaging, please download our [general brochure](#).

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#### Company Policy

The company policy may be summarised as follows:

- Develop, manufacture and market electro optical products based on our own in-house technology.
- Develop and manufacture electro optical products for specific customer requirements.
- Participate in research oriented projects together with larger companies or research organisations where applications of electro optical methods are essential.

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