blueSeis, a revolution in the history of geosciences!

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blueSeis, a business unit of the iXblue Group, has introduced into the seismology market two brand-new rotational seismometers, blueSeis-3A and blueSeis-1X. Allowing to obtain a complete measurement of a seismic wave, the new sensors represent a notable advance and will bring much to the understanding of ground motions.

Characterizing fully and precisely a seismic wave truly is one of the major issues that seismology is facing today. In fact, when the ground shakes, it not only translates (up-down, sideways) but also undergoes rotational motions (yaw, pitch and roll). To fully characterize seismic sources and wave fields, it is necessary to measure both the translational and rotational movements of the ground. However, until now, this was not possible simply, locally and directly in the field.

iXblue, a global leader in navigation, positioning and imaging markets, identified the need of measuring rotational seismology and wanted to provide it a reliable and unequaled technological solution. Relying on 30 years of experience in the Fiber-Optic Gyroscope (FOG), a unique field-proven technology developed by the Group, iXblue has designed the blueSeis product line, a full range of dedicated rotational seismometers.

Found at the heart of blueSeis systems, iXblue’s Fiber-Optic Gyroscope, dedicated to navigation and positioning in extreme environments, is the ultimate precision rotation sensor that uses the path of photons through an optical fiber as its sensing element. By using light (massless particles) for the measurement, the FOG is entirely insensitive to linear accelerations and no cross coupling can happen.

Relying on iXblue’s core technology, the new business unit blueSeis, composed of senior experts in seismic sensors and Fiber-Optic Gyroscope technology, offers to the seismology market new field-proven solutions that give the possibility to explore rotational ground motions.

blueSeis-3A, officially launched at EGU 2017 in Vienna, is a portable 3-component rotational seismometer able to complete the measurement of ground motions locally and directly in the field. Composed of the FOG technology, blueSeis-3A delivers great
performances based on unique features, including broadband (0.01 to 100 Hz), very low noise (< 20 nrad/s/√Hz) and high dynamic range.

Many field tests were performed successfully throughout Europe and others will soon be conducted in other continents. blueSeis-3A seismometer stood out by its ease of use and deployment, as well as its maintenance-free design.

The new observable – ie rotational ground motions - is expected to have an impact in a wide range of fields, in particular seismic and volcanic instrumentation, ground tomography, ocean bottom system (with blueSeis-3A underwater version), infrastructure monitoring and large scientific instruments.

And the blueSeis product line keeps expanding: blueSeis’ range of sensors also includes blueSeis-1X, a mountable and removable 1-component system especially dedicated to seismologic stations. Planned to be officially released at 2017 AGU Meeting, this industrial field-proven product is composed of a large FOG for extremely precise rotational measurement and delivers outstanding performances with broadband ranging from 0.01 to 100 Hz, extremely low noise (~1 nrad/s/√Hz) as well as very high dynamic range.

Frédéric Guattari, Head of blueSeis Business Unit, says delighted: “With the new measurements allowed by blueSeis-3A and blueSeis-1X rotational seismometers, we expect significant advances in the study of seismology at a global level. These developments include for example, recovering local sub-receiver seismic velocity information (i.e. local tomography), improving the recovery of earthquake source characteristics (point and finite source inversion), enhancing the quality of seismometer records (removing tilt-translation ambiguity) as well as constraining crustal scattering properties. These advances are confirmed and supported by ROMY, an ERC granted project with iXblue as partner, led by Prof Heiner Igel from LMU Munich.”

Along with these two products, blueSeis can provide as well a turnkey service, blueSeis-Survey, to ensure its customers the best performance of their seismic stations or scientific instruments. blueSeis-Survey offers high precision seismographic surveys aiming at measuring the rotational noise where the seismic station or large instrument is installed. The customers thus can find the best place for their systems and be able to subtract the noise coming from rotational motions. Frédéric Guattari specifies: “blueSeis-Survey is a key asset in our global offer and is critical to our customers. With excellent performances, the system can characterize the rotational stability of the ground up to 2 ArcSec and 2.10^{-5} deg/sec @ 1Hz. Plus, it is an effective way to check the performances of our systems in the field, to observe relevant results about the rotation environment and to obtain a first dataset of a 6-component station.”
blueSeis’ committed teams are there to provide to their customers tailored and complete solutions that best answer their needs and fit their requirements. Caring about their peace of mind, blueSeis’ highly trained support teams offer as well 24/7 assistance.

blueSeis product line definitely stands today as a new milestone for seismology. The iXblue Group is now offering unique and reliable solutions that are pushing back the boundaries and opening up a broad field of possibilities. One thing is certain: the adventure has only just started... Seismologists from all over the world, stay tuned!