

ESA's Harsh Environments Initiative – Space Sensors for Ground Applications

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In 1997, ESA initiated the HEI to demonstrate that the transfer of European and Canadian space technologies can bring substantial benefits to industries operating in harsh environments. With C-CORE and MIRARCO in Canada being the responsible institutions, the first two phases targeted the oil&gas and mining sectors. The next phase, which was launched in November 2000, will extend the initiative to the forestry and pulp&paper industry and see the formation of a European network, emphasising on arctic, deepwater and tunnelling operations. The co-ordination of these efforts will be the responsibility of the Norwegian Geotechnical Institute and the Helsinki University of Technology.

The HEI projects show a great variety in technologies and concepts, nevertheless more than 50% rely on sensors and instruments from space. One example would be the Remote Monitoring Station (REMOST) to determine contamination of water bodies. Considered space technologies are optical sensors for biological fluids, an artificial nose (array), a paramagnetic oxygen sensor, an alpha-Proton-X-Ray spectrometer and a Mössbauer spectrometer.

Another example is SMART – a national Canadian project with the goal to develop an autonomous mining robot. Two HEI activities investigate the use of space technologies for this robot – one for the man-machine interface and the other for vision system. The latter will use the GINGER ground penetrating radar, which was developed for Mars robots, in conjunction with a conventional camera – combining the advantages of both technologies in one system. Other examples of space technologies used in HEI projects are a smart camera, image processing and data compression software and simulation packages.

So far the HEI has been a great success. With a seed funding of 1.8MEuro, more than 2.8 MEuro were levered from industry and governmental institutions. 6 technologies were transferred and 2 spin-off companies created. The initiative has received recognition from the major oil and mining companies and is projected to match 3 MEuro ESA funding by 8 MEuro from industry in Canada alone within the next 3 years. Space technology has proven to be a viable option when it comes to improving existing or inventing new solutions for operations in harsh environments.