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Improving technologies for sub seafloor sampling and instrumentation

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Investigation of the sub seafloor is a key component of the EC funded "Deep Sea and Sub Seafloor Frontier" (DS3F) project. The scientific community in Europe has currently access to scientific ocean drilling through the membership of ECORD (European Consortium for Ocean Research Drilling) to the international program IODP (Integrated Ocean Drilling Program). Although IODP and its predecessors ODP (Ocean Drilling Program) and DSDP (Deep Sea Drilling Program have been extremely successful in providing data from the sub seafloor, it is now apparent that new research targets require additional technological developments to meet with the scientific needs. These needs focus on investigations of sediment dynamics, of fluid flow in the subsurface and associated active processes, of the deep biosphere in sediments as well as in the lithosphere, and of the climate archives recorded in the subsurface.

Within the frame of WP7 the DS3F project and in consultation with the scientific work packages, we have identified critical needs for technological developments in the next decade and beyond. Although scientific ocean drilling obviously remains essential for sampling the subsurface, broadening the range of tools utilized with a concerted approach is crucial. Critical areas include in particular: improvement of hole stability and recovery; improvement of seabed drills and associated logging devices; improvement of long piston coring technology to minimize disturbance and better constrain sampling depths; development of new sampling devices to avoid contamination and maintain in-situ conditions; developing tools for drilling in high temperature conditions. Improving the instrumentation for long term monitoring of boreholes is also an important target to allow study active processes.

We review were we stand now and what needs to be done during the next ten to fifteen years. We identify areas where Europe can make significant progress in the technology required and discuss possible strategies for making these technologies available to the science community in general and the scientific ocean drilling community in particular.