



Abstract ID : 54

## Exploration of ice sheets and glaciers as the basis for developing new drilling technologies

### Content

Operation environment at/in ice sheets and glaciers differs greatly from environment in areas with temperate climate and common underground conditions. Although in some cases it would be possible to use conventional rotary drilling technology for drilling in ice, for several reasons they are difficult to use for glacial exploration. Thus, in-depth exploration of ice sheets and glaciers requires severe modernization of conventional or developing purpose-built drilling technologies. Although existing ice drilling systems can achieve important scientific goals, to address various limitations and problems with ice drilling, such as relatively low rates of penetration, limited depths, meltwater refreezing, low safety, new drilling technologies are required to accomplish goals planned for the future. Among several concepts, innovative drilling technologies would include: (1) adaptation of the modern rotary drilling technologies – casing-while-drilling, coiled tubing drilling technology, reverse circulation drilling with continuous core transportation – for drilling in ice; (2) robotic ice drilling systems; (3) unconventional ice drilling systems. The report presents possible ways and recent state of developing these advanced drilling systems.

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**Track Classification:** Advances in drilling engineering and borehole observations