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# Resource Assessments in Greenland

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Understanding resource potential is crucial for planning exploration activities, governmental support, infrastructure development and legislation. Systematic quantitative assessment of selected commodities give a good understanding of available data and knowledge, and of risks and uncertainties, and is an important tool for planning new targeted research activities.

The Greenlandic basement is mainly high-metamorphic grade Archean and Paleoproterozoic granite-gneiss terranes, with only a few preserved granite-greenstone belts. Proterozoic to Paleozoic basins developed in the Precambrian shield and are inverted and metamorphosed by Paleozoic orogeny in northern and eastern Greenland. Several rift stages influenced the Greenlandic shield, forming Mesoproterozoic alkaline provinces (Gardar Province) in the south and kimberlite-lamprophyre-carbonatite intrusions in the west. Mesozoic to recent rifting related to the opening of the North Atlantic Ocean formed the North Atlantic Large Igneous Province and sedimentary basins off West and East Greenland. Such diverse geological record warrants a high potential for a wide variety of both mineral and oil-gas resources.

Since 2009, GEUS has conducted annual assessment workshops on selected mineral commodities in collaboration with the Greenlandic authorities, USGS and partners from academia and industry. The Cu, REE, Zn, Ni, W, Au and Ti-V potential have been assessed so far, and in 2016 a U potential assessment will follow. These assessments define areas of mineral potential and rank them based on the opinion of selected geological experts. The result is a mineral potential map that can be used to define metallogenic belts to target research and exploration. They further help the government to direct their support for development and help attract investments and junior mineral exploration companies to the region.

With regard to oil and gas resources, Greenland was included in the USGS Circum-Arctic Resource Appraisal (CARA) from 2008. Separate fact sheets were released on East and West Greenland indicating very significant petroleum resources, but also high risks. The results of the assessment have been important for attracting industry to invest in Greenland and a large number of licenses were granted in the years following the assessment. Several joint papers between USGS and GEUS document the results in detail and describe the need for new data, and the assessment has been a driver for new focused research projects on key elements of petroleum systems, especially source rock parameters.

Despite their inherently large uncertainties, quantitative assessments of resources, provide means of comparing both resource potential and risk, thus providing investors, companies, governments and environmental stakeholders with tools for choosing and prioritizing efforts. It is, however, important that the assessments are carried out critically, and with transparent and systematic methods based on all available data.

For Greenland, quantitative resource assessment studies have been an effective tool for compiling large amounts of geo-scientific data, a convenient way of showing the geological potential for occurrence of mineral deposits and oil-gas accumulations. Potentially assessments are strong tools for aiding administrative strategies, decisions and policies.