Report from Seiland Zircon Research Project 2016

Claim no 0279-1/2013, operated by Jan Erik Larsen

Tomasz Praszkier, ul. Kopernika 11/25, 00-359 Warszawa, Poland

Goal

Goal of the research project was to understand geology of the zircon megacrystals occurrence, as well as check possibility of commercial value of the deposit. As previous research works were done only at the surface at the weathered part of the vein, and later works were done by amateurs searching for zircon crystals, very few geological information were collected and published. During our diggings we were able to understand and describe geological context of the occurrence (see Results chapter).

Location

Occurrence is located at the top of the western bank of the Store Kufjord cliff, on Seiland, Alta commune, Finnmark county, Northern Norway. Pegmatite vein is cutting slope of the fjord from the sea level to the top. At the height of about 500 m above sea level, at almost top of the fjord (photo 1), at the contact of the pegmatite vein with host rock zircon occurrence is placed. The area is very uneven, many small crests and valleys are present, for this reason camp had to be placed at the very top of the cliff. Occurrence is quite difficult to reach from the sea as there is lack of any roads or trails. For this reason, much more efficient was to build camp a few hundred meters further at the plateau.

Expedition

Expedition got place in August 2016. After completing all permissions, with usage of helicopter, crew of 8-12 people (depends on period) landed at the location in first week of August. Most of the crew were geologists and mineralogists (from Norway, Poland, Austria, Italy and USA). During first days camp was built at the top of the cliff, at the border of the National Park (photo 2). After setting up the camp workings at the location began. During first days dumps left by mineral collectors were removed from the pegmatite (photo 3 and 4). Next whole area was cleaned to understand geological structures. Next step was to collect samples from different parts of the pegmatite and contact zone. In this period lenses with zircon crystals were located and the most important samples collected. When this part was finished, whole area was reclaimed and camp packed (see Reclaiming chapter). Expedition left around 20th of August.

During the project, such equipment as was used: generators, jack hammers, water under guns, saws. Number of the lithological and mineralogical samples collected was about 200-250. Over 2000 photographs were done to make documentation of the whole contact zone, as well as pegmatite itself.

General geology

Central and Southern part of the Seiland island is built by mafic and ultramafic intrusion, known as part of the Seiland Igneous Province. At Seiland Island intrusion is zoned and it has circular shape. From inner to outer part of the intrusions following zones are built by: peridotite (center), pyroxenite gabro, syenogabbro and tholeiitic gabbro. Host rocks for the intrusion are Precambrium age metasediments. Age of the intrusion is about 500 +/-50 Ma.

Numerous nepheline syenite pegmatite dykes are cutting external parts of the intrusion, radiating from the center. They are almost vertical. At the area of Store Kufjord dykes are oriented east-west. Their thickness is from 30 cm to over 30 m. Dyke on which contact with host rock zircon megacrystals occurrence is placed is from 5 to 20 m thick. It is built mostly by coarse nephelines, feldspars and biotite crystals up to 10-15 cm in length.

Dykes are younger than host rocks and were dated about 530 Ma.

Zircons megacrystals are occurring mostly on the contact or external zones of the dykes. Probable origin of their concentrations was described by R. Roberts 2007 (PhD).

Zircons megacrystals them self were never scientifically analyzed, and this will be future part of the project – research on their age comparing with age of the syenitic dykes, inclusions and paragenesis.

Geological and mineralogical results

Most of the research work was concentrated in the area of biotite-hornblende zone/lens located on the contact zone of the syenite dyke with host rocks. Pegmatite in this area is about 10-15m thick and it got typical coarse grain texture with dominant nephelines, feldspars and local big concentrations of the biotite megacrystals – up to 15 cm length and 10 cm thick (photo 10). Texture of the dyke is this area do not show any difference from other parts of it.

Biotite lens is about 200 m long, and thick from a few cm to about 1 m thick. It has irregular shape, in some areas is completely or partly included in the pegmatite, but mostly is located exactly on the contact zone. Lens is heavily zoned, usually main part is built by biotite zone, hornblende zone and sometimes magnetite bodies. Shape of the zones is irregular. Usually biotite is present next to the dyke, than hornblende zone. Magnetite forms irregular bodies, usually inside of the biotite zone (photos 5 and 6). Other accessory minerals which are much more are small chalcopyrite grains (up to 2-3 cm) and unknown elongated gemmy, prismatic crystals (?apatite – need to be analyzed). Inside of the lens thin layers of the nepheline syenite are sometimes present. Size of the biotite and hornblende crystals are usually up to 1 cm.

In the most western part of the biotite-hornblende zone, on the contact between biotite and hornblende small lenticular bodies/lenses built by coarse grain biotite/feldspars and magnetite are present. Crystals of biotite in this small lenses can reach up to 5 cm. This areas are the richest in well formed zircon megacrystals (photo 8). Size of they can reach from 1 to 5 cm, colors vary from almost black through brown-red (the most common) to ruby-red. They are formed as tetragonal prism (usually not well developed) and pyramids of 2 or 3 orders. Usually in the biotite zircon crystals are isolated, but in magnetite bodies they are intergrown forming in some places zirconite rock.

Size of the zircon-rich lenses are from few tens cm to about 1 m and up to 20 cm thick. They are quite clearly isolated from host rocks (photo 7). Wall side of the lenses from dyke side are usually dome shape, and outhern wall, from hornblendite side are usually flat.

In the host rocks of the zircon-rich lenses zircons are almost completely absent. They show up only as a small crystals in concentrations of few to a few tens of crystals on the contact zone of the biotite with hornblendite.

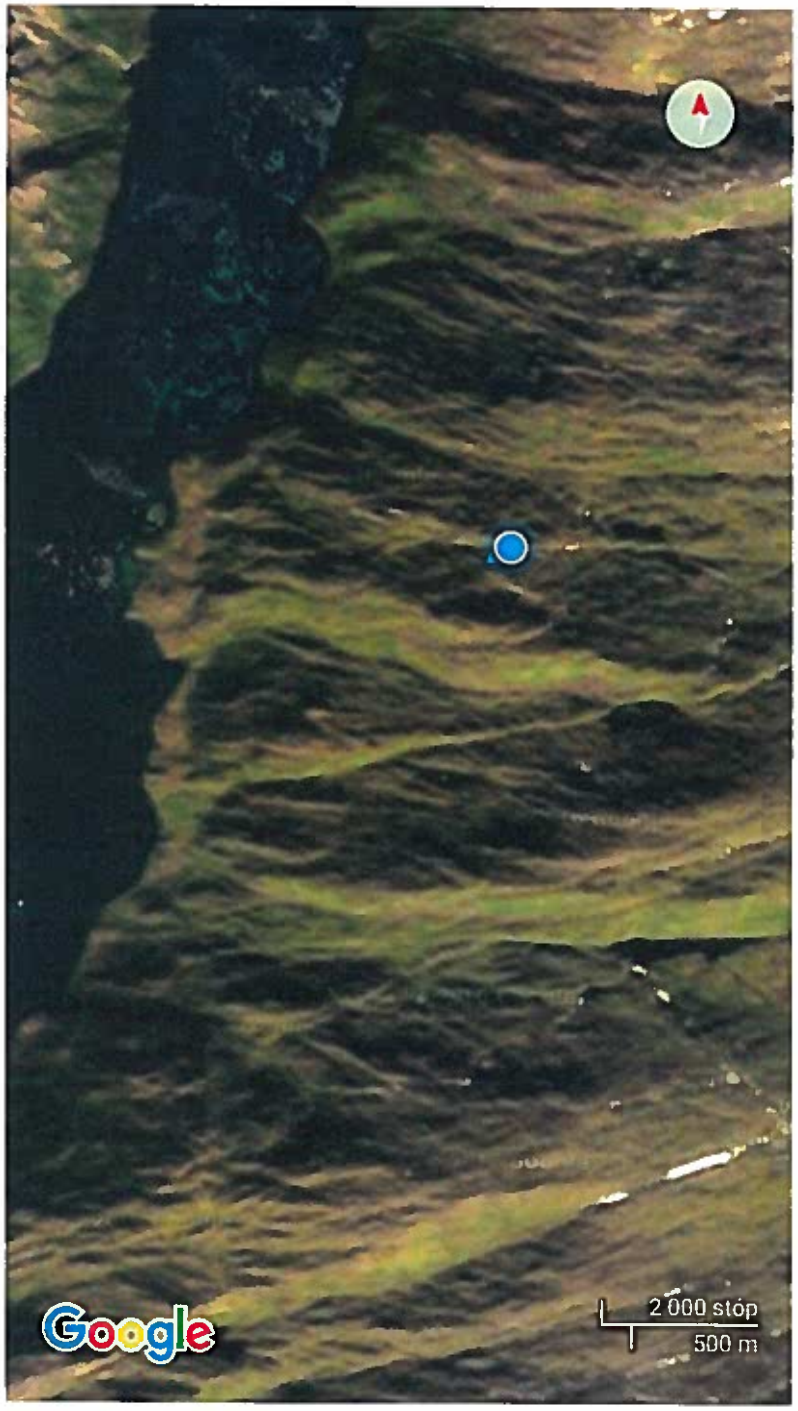
Beside of the zircon-rich lenses, below the main outcrop, in the area next to the stream where pegmatite is also exposed another zircon-rich zone is present. In that area inside of the very coarse gained nepheline syenite small biotite layers are present (thick up to 20 cm). On the contact of this layers with syenite numerous of small but very gemmy zircons crystals are occurring. Usually their size is up to 1 cm.

In general zircons are occurring on the contacts of the biotite leses/zones with surrounding rocks (syenite, hornblendite). In different places size and gemmyness of the crystals vary. The most interesting and important from commercial point of view is the most western part of the biotite zone, on the contact with the dyke. Size, form and concentrations of the zircon megacyrstals is the biggest there.

Unfortunately, because of irregular presence of the small zircon-rich lenses, steep slopes and very hard syenite host rock, extremely difficult area for mining and supplying the camp commercial mining seems to be not interesting in economical point of view. Another problem making mining more difficult is illegal activity of the collectors during last 3 decades. Using small equipment they were digging "rat holes" following zircon-rich lenses (photo 3). This resulted chaotic mining activity, zones were holes are a few meter deep backfilled with dump material. Most of the zircon-rich lenses easy accessible from the surface were mined during this operation. Only dump itself which must be removed is about 2-3 m thick. Than another 1 m of the contact zone is heavily mined. So for future prospecting there is need to remove at least 3 m of the soil to reach interesting zone. In our opinion only quite long, small scale artisanal operations with light equipment can be rentable in the future.

Reclaiming

Whole area was fully reclaimed; all deep workings were backfilled with dump material. Dangerous rocks sticking up from the crest were taken down to the trench. Area of the camp was fully reclaimed too, all garbage removed by the helicopter and no traces of human activity left in whole area. Photographs of the reclaiming were sent to the Alta commune and accepted as satisfying.


Google
2 000 stóp
500 m