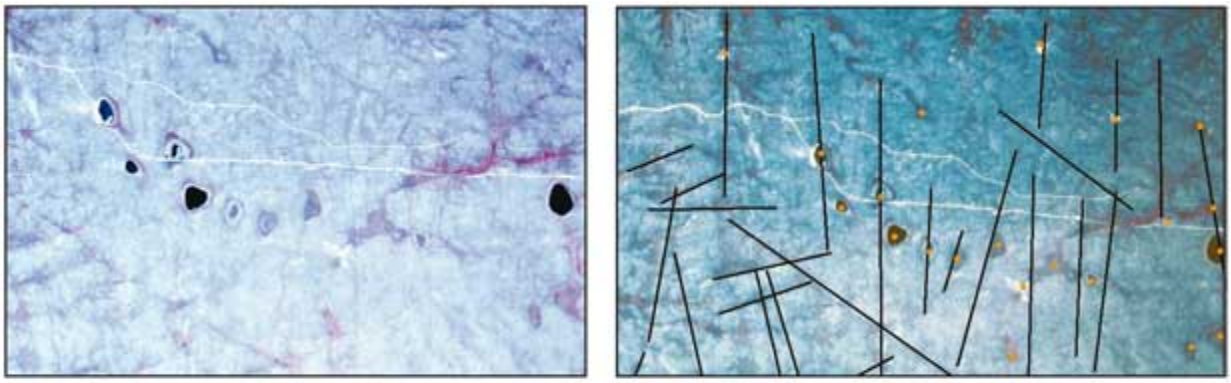
Finding Diamond Deposits With Your PC—Part II
by W. Dan Hausel

Let's look at some known diamond mines. Access Google Earth or Virtual Earth and search for Ekati in Canada. A search should take you to the Ekati diamond mine at 64º42'58.6"N and 110º36'33.6W. As you search this area you will see a desolate area (with no trees), a small airport, three circular open pit diamond mines (in a line), and if you are observant, you will see nearby circular to linear depressions (lakes)—most are kimberlites. Zoom in and you will find smaller open pit mines.

Aerial photo of the Ekati mine showing two large open pit mines, with a smaller pit in between and another near the top of the photo.

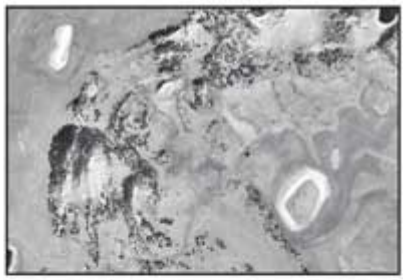
Now look at the reclaimed Kelsey Lake diamond mine near the Colorado-Wyoming border (40º59'37.7"N; 105º30'25.5"). This property produced several high-quality diamonds up to 28.3 carats in weight, was never mined out, and has about 10 years of unmined diamond resources.

As you search for cryptovolcanic structures in Colorado and Wyoming look to see if the anomaly has white soil. If the anomaly lies within a forest of pines, often the depression will occur in a distinct treeless area outlined by aspens and willows. On the ground, one can usually see a distinct stand of high grass in kimberlite. From the air, some depressions occupied by intermittent lakes will have white soil due to calcium-carbonate leached out of blue ground. Such stains are not useful in adjacent basins because sedimentary rocks are already a good source for calcium carbonate and other salts, whereas old metamorphic and granitic rocks are very poor sources for calcium carbonate.



(Left) False-color infrared photo showing structurally-controlled depressions at Indian Guide west of the Iron Mountain kimberlite district. Some are filled with water (black) & have distinct white salt (calcium carbonate) stains along shorelines. Most show strong structural control. (Right) In this photo, I mapped several prominent fractures and identified some of cryptovolcanic structures (orange dots). This district lies along trend of the Iron Mountain kimberlites about 6 miles due west. The white line in the photo is a dirt road (search 41º37'58"N and 105º21'33.2"W).

After anomalies are identified, field reconnaissance is necessary. Carry a small bottle of dilute hydrochloric acid. When weak HCl is placed on kimberlitic blue ground you should have a notable reaction. Look for rounded boulders in the depression.



This cluster of cryptovolcanic structures lies within Precambrian rocks. I found at least 50 distinct anomalies. A few represent some of the larger cryptovolcanic structures in North America. Note the large circular anomaly surrounded by the white bullseye. This anomaly lies in a much larger depression outlined by a slightly darker soil anomaly. If kimberlite, this would represent one of the largest in North America. On the left side is another white depression. The soils are likely carbonate rich and the white soils again are surrounded by a larger depression. The host rocks in this area are folded, Precambrian (1.8 billion years old) crystalline schists.

The first kimberlites discovered in Kimberly, South Africa were thought to be placers because they were filled with abundant rounded boulders and cobbles. If such rocks are found only within a small depression, there has to be some explanation. Kimberlite magma was tough on foreign rocks trapped in the pipes and tended to polish cobbles and boulders during eruption to produce smooth, rounded cobbles. Now look for megacrysts (large rounded grains) of garnet, ilmenite, and chrome diopside in the soils, mantle nodules of peridotite or eclogite. Once these are found, look for diamonds.

Kimberlites are gregarious and occur in clusters, so follow structures on the ground to find more kimberlite. Kimberlites are seldom obvious. I once walked a group of more than 50 geologists and prospectors across the Chicken Park kimberlites and told them I was going to do so and asked them to let me know when we crossed the kimberlites. Not one person saw the indicators until I took them back to show them what they missed. And this is one of the more obvious groups of kimberlite. It takes time to get use to hunting these.

Sources

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Follow-up field reconnaissance show many cryptovolcanic anomalies in the Colorado-Kansas-Montana-Wyoming region to form open areas in forests with carbonate-rich soil. The soil will react with dilute hydrochloric acid. In these two examples, one anomaly remains unexplained (above) while another (below) is a known kimberlite (Maxwell pipe) near the Kelsey Lake diamond mine.

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