

## Geometrics Knowledgebase

### **Will the magnetometer find gold?**

1. There are basically three types of "gold": low concentration disseminated gold in ore, placer gold deposits and solid gold such as that associated with treasure. Magnetometers are used to find disseminated gold by its association with mineralized zones which also contain magnetite or other magnetic minerals. Magnetometers are often used in conjunction with airborne Electro-Magnetic surveys to find the conductive ore bodies. Placer gold is the type found in buried stream channels such as the gold which sparked the California gold-rush in 1849. Gold dust and magnetic minerals have been concentrated in river banks over thousands of years. Where there is gold there is often magnetite and therefore the magnetometer can be used to locate placer gold deposits. Gold treasure is a different story and being non-magnetic gold, silver, and other precious minerals are not directly detectable by the magnetometer.
2. The magnetometer can only detect ferrous (iron or steel) objects. If the gold is stored in an iron box or has iron materials next to the gold (such as colonial ship ballast stones in the marine environment), there is the possibility of detecting the iron material. This is true for land and marine (sunken galleon) gold bullion. The vast majority of target search surveys are performed on a grid in a "lawn mower" back and forth manner to cover the area of interest. Lane spacing is dependent on target size (magnetic mass).
3. At a sensor to target distance of 2 to 3 meters there will need to be at least 1-2 kilograms of iron. This can produce a 1-2 nT anomaly that is detectable in a magnetically clean environment. The ideal environment would be in a plowed farm field or the bottom of the ocean away from human activity i.e., away from a port or harbor. You will probably not be able to detect this small of an anomaly in a city or port location. The more iron mass there is, the better the detectability.
4. Training to use the magnetometer can take 1-2 days depending on experience with setting up computerized survey equipment and a GPS.
5. Processing the magnetic data requires several days of training and would require a geophysical background to interpret the final maps. We provide free software to make maps and estimate the target depth of burial (inversion). If you are unfamiliar with this procedure, we would recommend that you find a local geotechnical firm to look at the data to determine if there are anomalies that should be investigated further. Remembering that non-ferrous materials do not cause anomalies (gold, silver, copper, brass, aluminum, gems) you will be looking for anomalies either associated with the container OR associated with ground disturbance (i.e., gravesite). In this way some anomalies can be detected where there has been an excavation such as a gravesite.
6. In order to understand the process more fully, we strongly suggest that you download and read the Applications Manual for Portable Magnetometers from our web site. Many additional references are available from Geometrics and from your local library. Understanding how the magnetometer functions and how the earth's field responds to distortions due to ferrous materials will help you make good decisions about how to interpret and use the data to direct recovery or exploration efforts.

<http://support.geometrics.com/kb/questions.php?questionid=58>