**CSAC Applications – Underwater oil and mineral deposits**

**Existing technique for underwater oil and mineral deposits**

The underwater oil and mineral deposits is an application where oil and mineral industries use for detecting oil and minerals before extracting them.

The existing technique that these industries use is reflection seismology, or seismic reflection method, where the industries use the reflected energy from interface between subsurface layers (sea surface and sea bed) to determine the location. The reflections are recorded as two-way (down and back up) travel times instead of depth. The sensors/autonomous vehicles in this technology is used to track how long the reflection takes for a sonic pulse to travel through the ocean floor creating a three-dimensional map of potential oil and mineral deposits, in other words, the positions of potential resources.

**Why using CSAC??**

Since the application is a subsea application and applies underwater, it is impossible to use GPS to detect the position where oil and/or mineral deposits exist. Therefore a new method or system is needed for positioning purposes.

The method for navigating the potential resources is to use a synchronised clock with high accuracy. This is used to provide a synchronised and accurate map.

The chip scale atomic clock can be used in subsea technology by mounting the CSAC onto the sensors, which in this case, the inertial navigation system with Inertial measurement unit (IMU). It has low power consumption and higher precision. Therefore it is used for underwater oil and mineral deposits.

**Needs Analysis**

1. To create a synchronised and accurate underwater map for positioning the potential resources
2. High accuracy synchronisation
3. Need high stability
4. Need high product life