

# EM Technical Note

Detector Modes in SIS for EM 2040, EM 2040C and EM 3002



KONGSBERG

## EM Feature Explanation

### The what, the why, the how of EM Detector Modes

Over the years at Kongsberg Maritime we have developed special detector modes that improve the bottom tracking capabilities of our EM multibeam echosounders in very different survey situations.

The *EM Detector Mode* options are mainly for use in shallow water detailed survey work with EM multibeam echosounders. Users can select a detector mode to optimize the systems ability to recognize the bottom, shipwrecks, underwater structures etc. depending on water conditions.

The following are the '*EM Detector Modes*' currently implemented in our acquisition software SIS (Seafloor Information System) to use with Kongsber Maritime shallow water multibeam echosounders EM 2040, EM 2040C (Compact) and EM 3002:

- **Normal:** The normal bottom detection mode historically used in SIS
- **Waterway:** Suitable for shallow channels and rivers
- **Tracking:** A general shallow water mode for tracking of targets and sudden depth changes
- **Minimum Depth:** Designed for detecting shipwrecks and conspicuous underwater features etc.

### How it is done during multibeam data acquisition with SIS?

The *Detector Mode* function is located in *Sounder Main* tab of the *Runtime Parameters* window in the *Kongsberg SIS* software.

**Normal** mode is based on the standard detector, but with improved multipath rejection. A ping-to-ping filter is used to guide the bottom tracking. If there is a problem with aeration, Normal mode is recommended. The ping-to-ping filter will then help the detector to keep track of the bottom. This mode assumes a contiguous bottom.

**Minimum Depth** mode detects minimum depth whatsoever. Used for detecting shipwrecks and conspicuous underwater features etc

**Tracking** detects minimum depth, but tries to avoid signal returns from fish; i.e. the same as minimum depth, but a weak filter is added. Used for tracking of targets or sudden depth changes.

**Waterway:** Like tracking, but adjusted to give a better bottom detection between vertical walls and horizontal seafloor in locks or along quaysides.

*Runtime parameters > Sounder main*

Depth Settings

Force Depth (m): 0

Min. Depth (m): 1.00

Max. Depth (m): 150.00

Dual swath mode: DYNAMIC

Ping Mode: 300kHz

Pulse Type: AUTO

FM disable

Detector Mode: [NORMAL] [v]

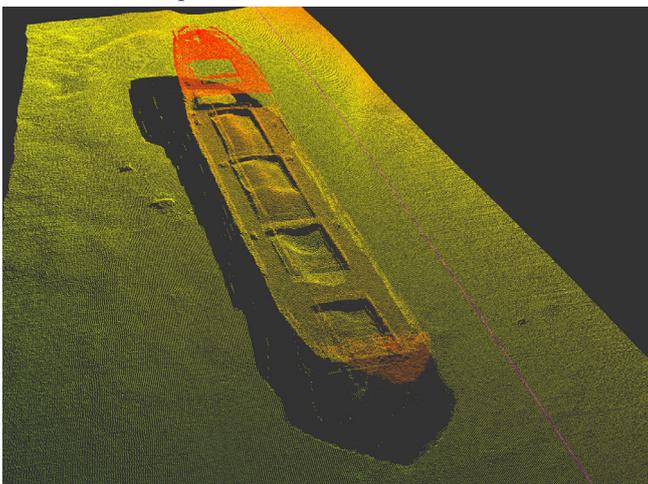
NORMAL  
WATERWAY  
TRACKING  
MIN. DEPTH

### Results after bottom detection

The following are real time images directly taken from the SIS acquisition software to show the different *Detector Mode* options.

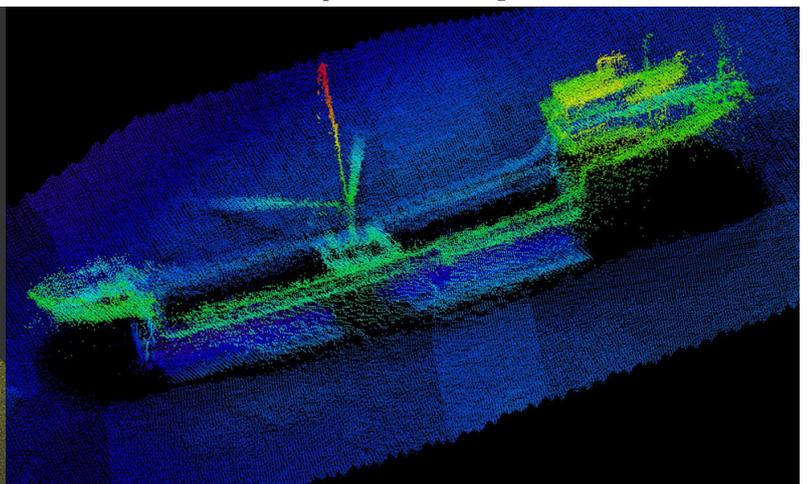
EM Detector Mode: 'Normal'

*Shipwreck with no mast*



EM Detector Mode: 'Minimum Depth'

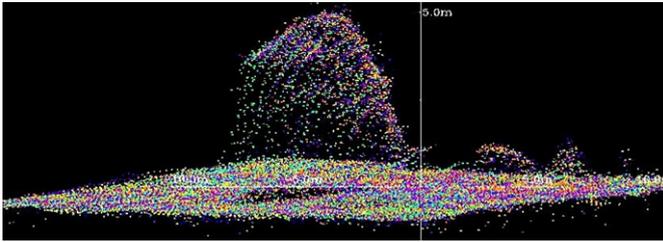
*Shipwreck with a large mast*



*Courtesy of Swedish Maritime Administration*

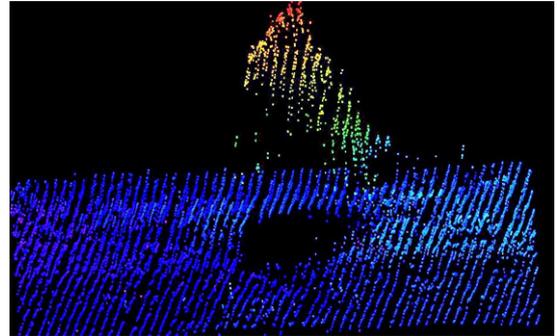
## EM Detector Mode: 'Tracking'

Large stone (ca. 5x5x5m). Minimum Depth: 21.5m  
Various survey lines on the same target



Courtesy of Swedish Maritime Administration

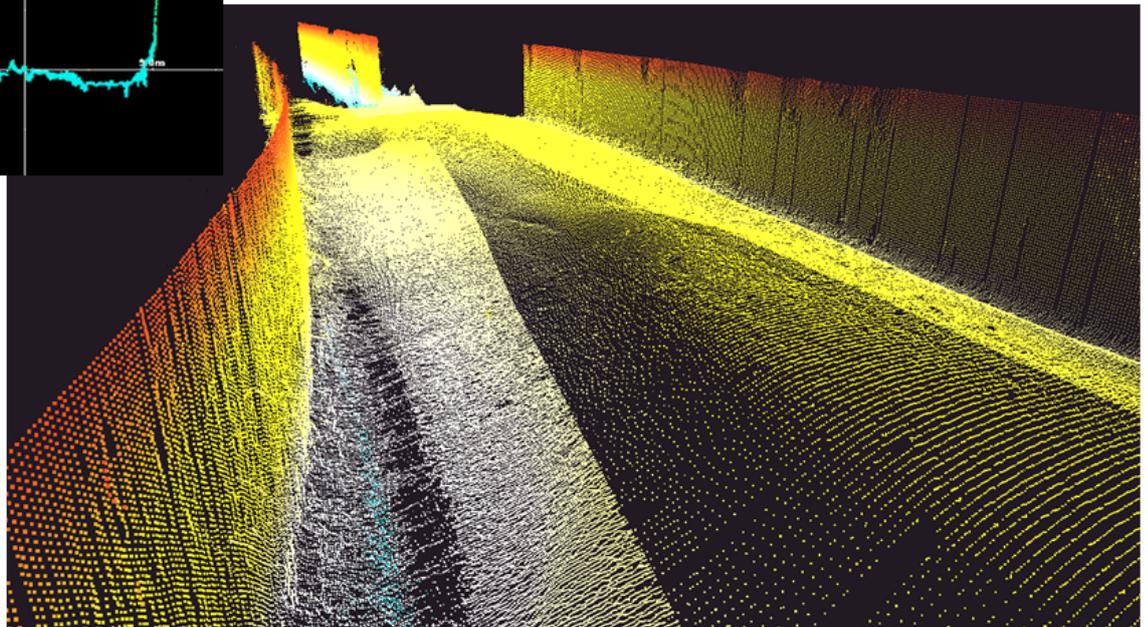
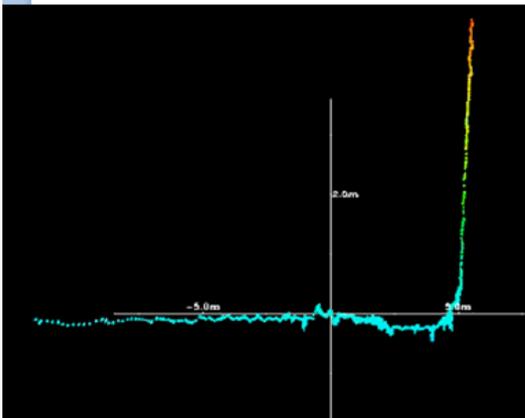
Large stone (ca. 5x5x5m). Minimum Depth: 21.5m  
Only one survey line straight over



Courtesy of Swedish Maritime Administration

## EM Detector Mode: 'Waterway'

Large channel surveyed in a port area. Two different views are shown  
to demonstrate the quality of the datasets acquired in real time.  
(No data post-processing performed yet)



Courtesy of Swedish Maritime Administration

## Facts and tips

*EM Detector Mode* is a standard software feature that has been present in our SIS software since version 3.7. By 'standard' we mean that there are no extra charges for the users to have this function available in SIS. Other competitors' products require an expensive software upgrade for less efficient features.

Surveying on vertical objects should be done with a wide coverage setting. For the *Waterway*, *Tracking* and *Minimum Depth* modes it is important that the normal incidence is within the receiver fan. Use at least 90 degrees coverage along pier walls to ensure that strong normal incidence from the pier is detected.

September 2013

### Kongsberg Maritime AS

Strandpromenaden 50  
P.O.Box 111  
N-3191 Horten,  
Norway

One third of the world is covered by land, the rest is covered by Kongsberg

Telephone: +47 33 02 38 00  
Telefax: +47 33 04 47 53  
[www.kongsberg.com](http://www.kongsberg.com)  
subsea@kongsberg.com



KONGSBERG