



EFFECTIVENESS and EFFICIENCY

The true benefit of SAS in an MCM environment

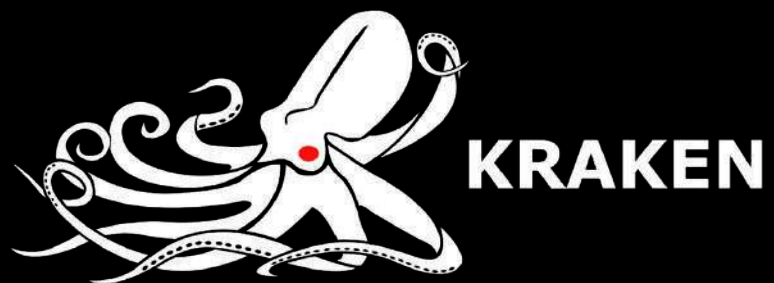
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Kraken Robotics | Underwater. Understood.™

www.krakenrobotics.com

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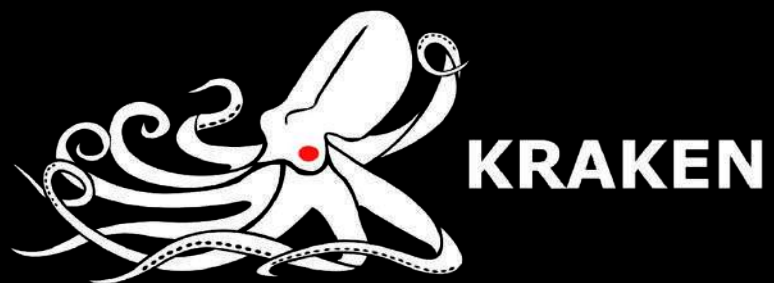
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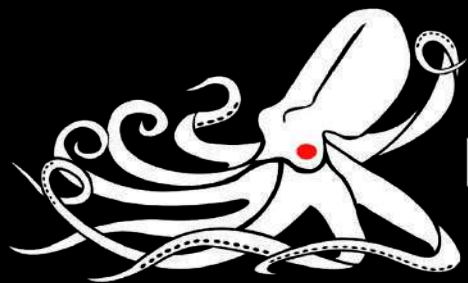
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KRAKEN Robotics – Product line



MINSAS – AUV SAS



KATFISH - TOWED SAS



LAUNCH AND RECOVERY



MAN - PORTABLE SAS

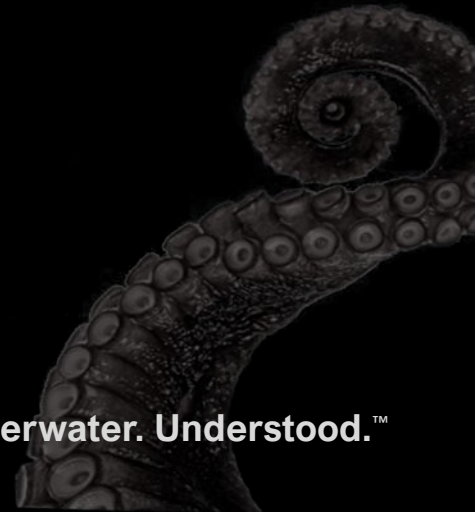


**SEAPOW –
SUBSEA BATTERIES**



SSS vs SAS

A quick introduction



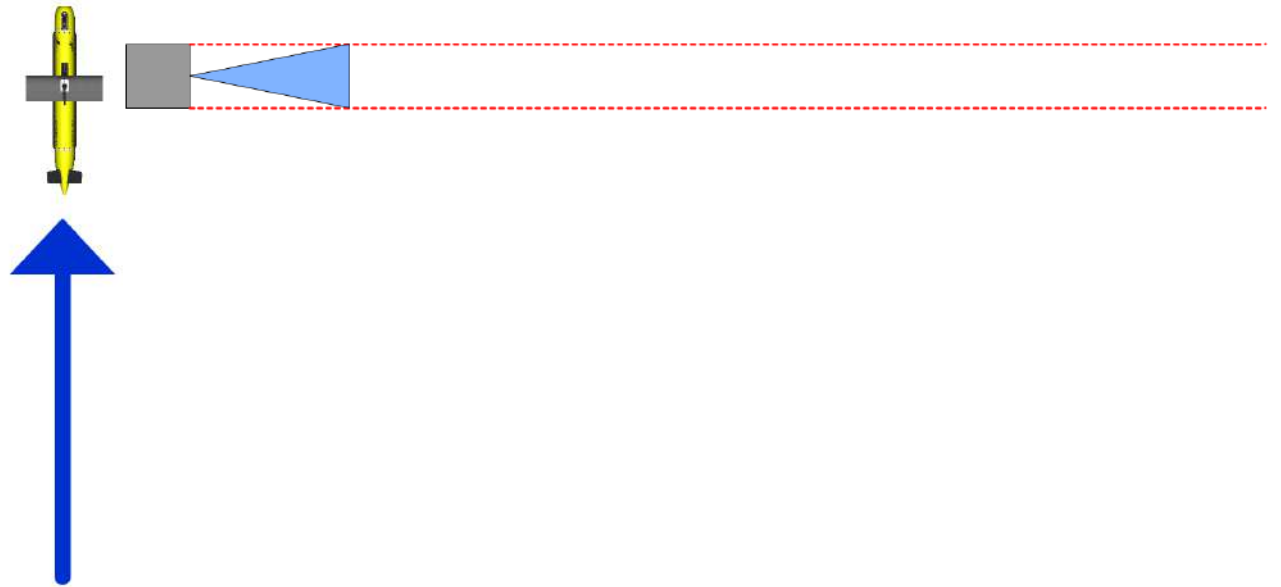
Beam Width

- In practice, side-scan imagery is composed of a series of horizontal beams.
- Resolution is tied to the beam width.
 - Narrower beam width = Higher along track resolution

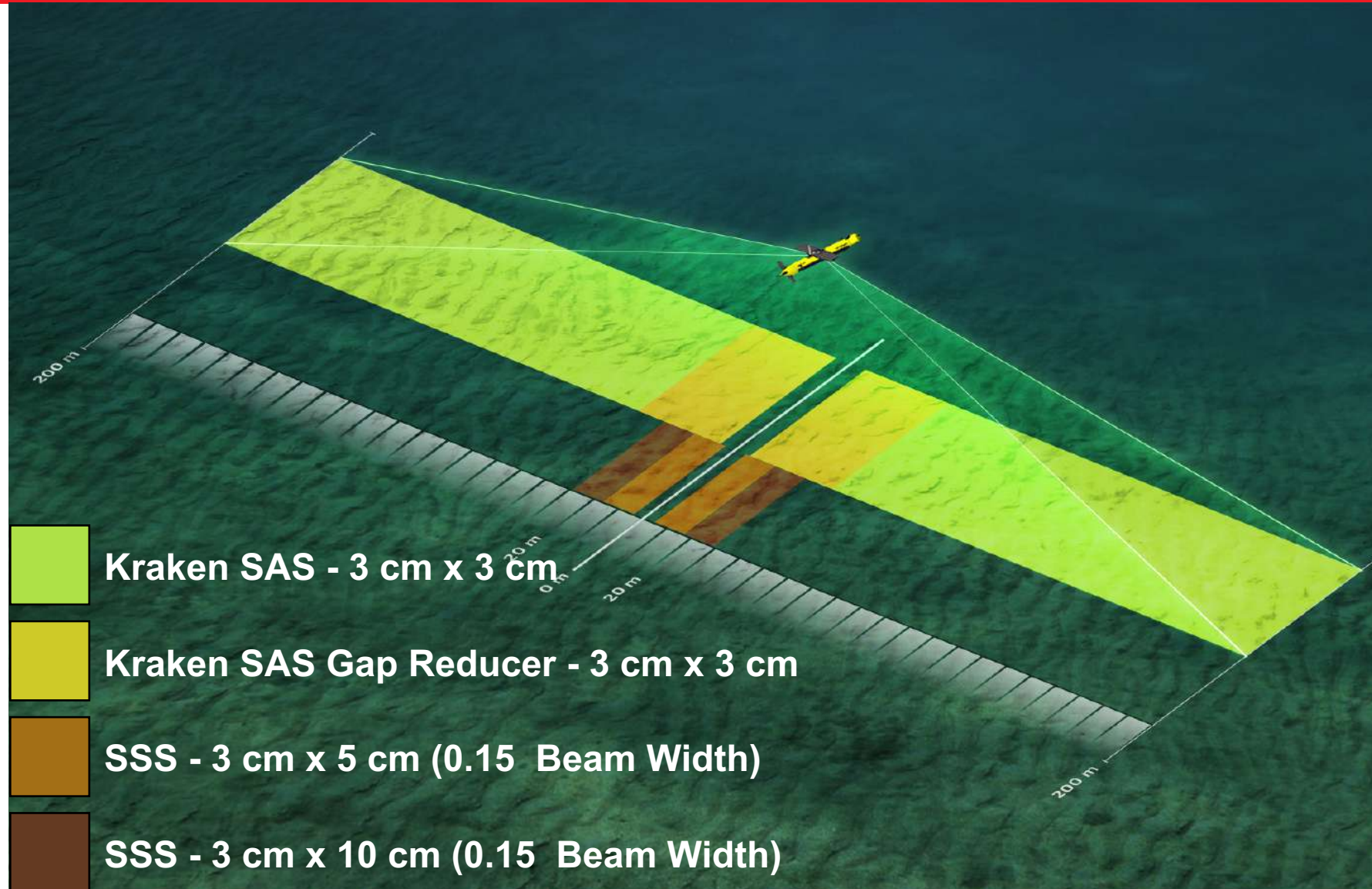


SAS Beam Width

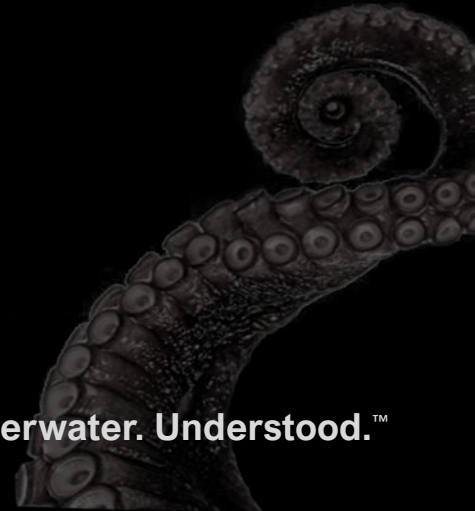
- Combine multiple pings as the sonar is moving through the water to synthesize a significantly larger aperture.
- The length of the synthetic aperture is adjusted to maintain a **constant along track resolution with range**.



SAS vs SSS



From *legacy* FLS to SSS to SAS



- Relative high range, but low resolution;
- Baseline for amount of MILCO's;
- All MILCO's need identification



- Transition to stand-off MCM doctrine: introduction of AUV's to MCM assets;
- Lower range than FLS, but higher resolution;
- Resolution not high enough, resulting in big increase in MILCO's;
- All MILCO's still need identification?;



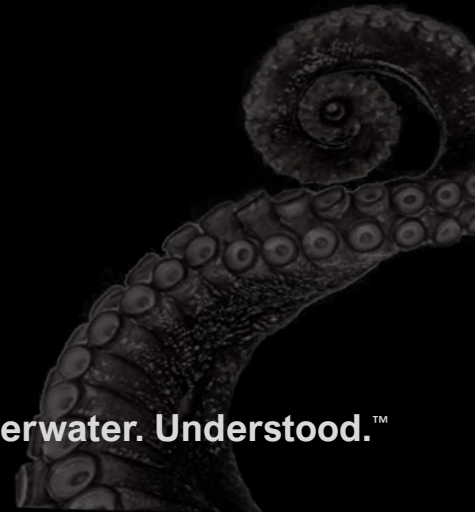
INTRODUCTION of SAS



- Higher range and resolution across full range than SSS;
- Less reported MILCO's;
- Less identification needed;
- **Effective and efficient;**



EFFECTIVENESS and EFFICIENCY



EFFECTIVENESS and EFFICIENCY

‘The ability to be successful and **produce the intended results**’

(source: Cambridge dictionary)

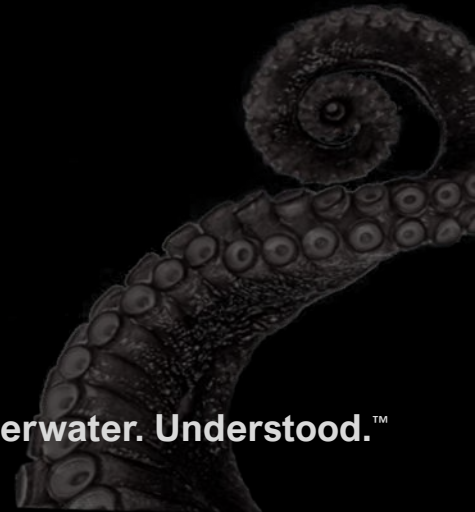
PERCENTAGE MINEFINDS

EFFECTIVENESS and EFFICIENCY

‘The quality of achieving the **largest amount of useful work using as little energy**, fuel, effort, etc. as possible’

(source: Cambridge dictionary)

REPORTED MILCO's



REPMUS24

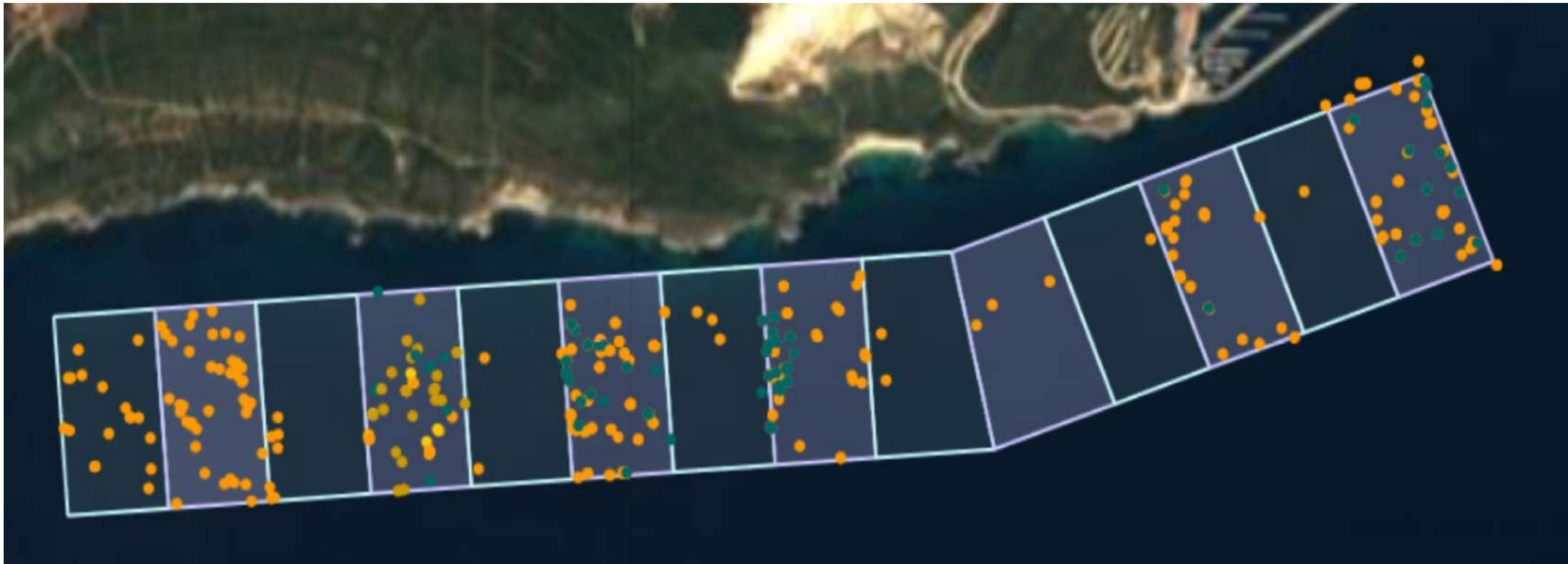
Case study



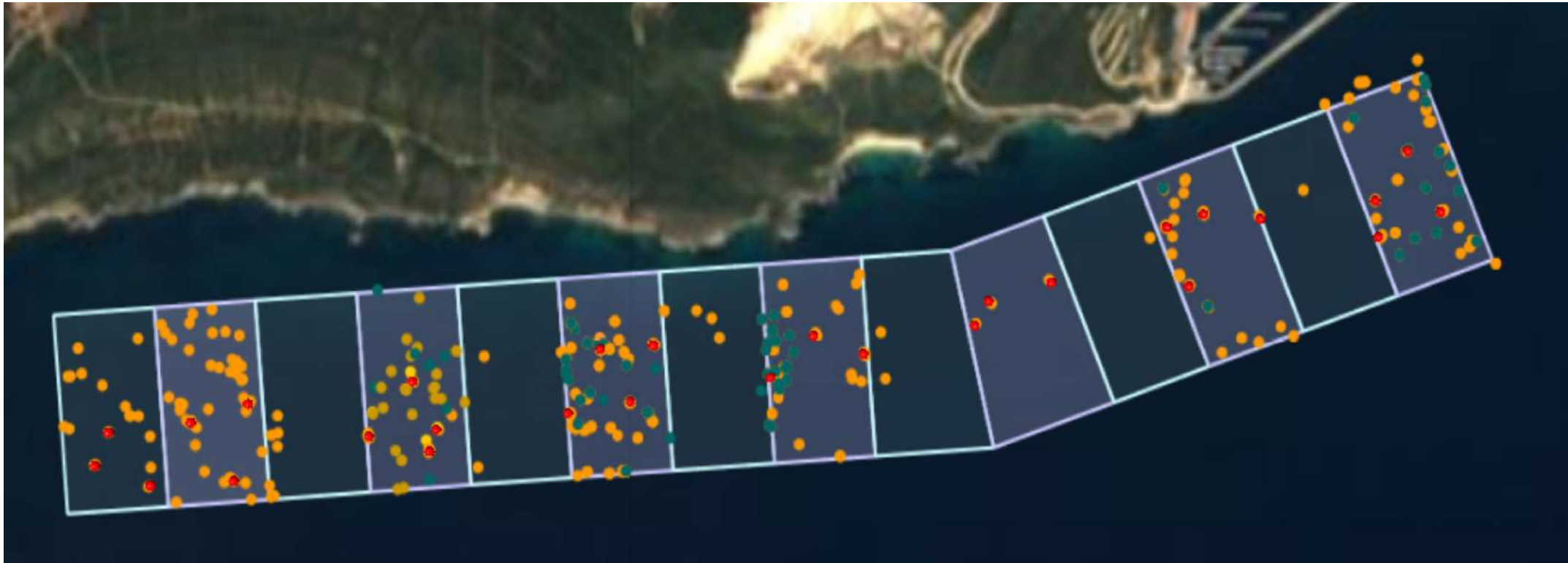
REPMUS24 – overview



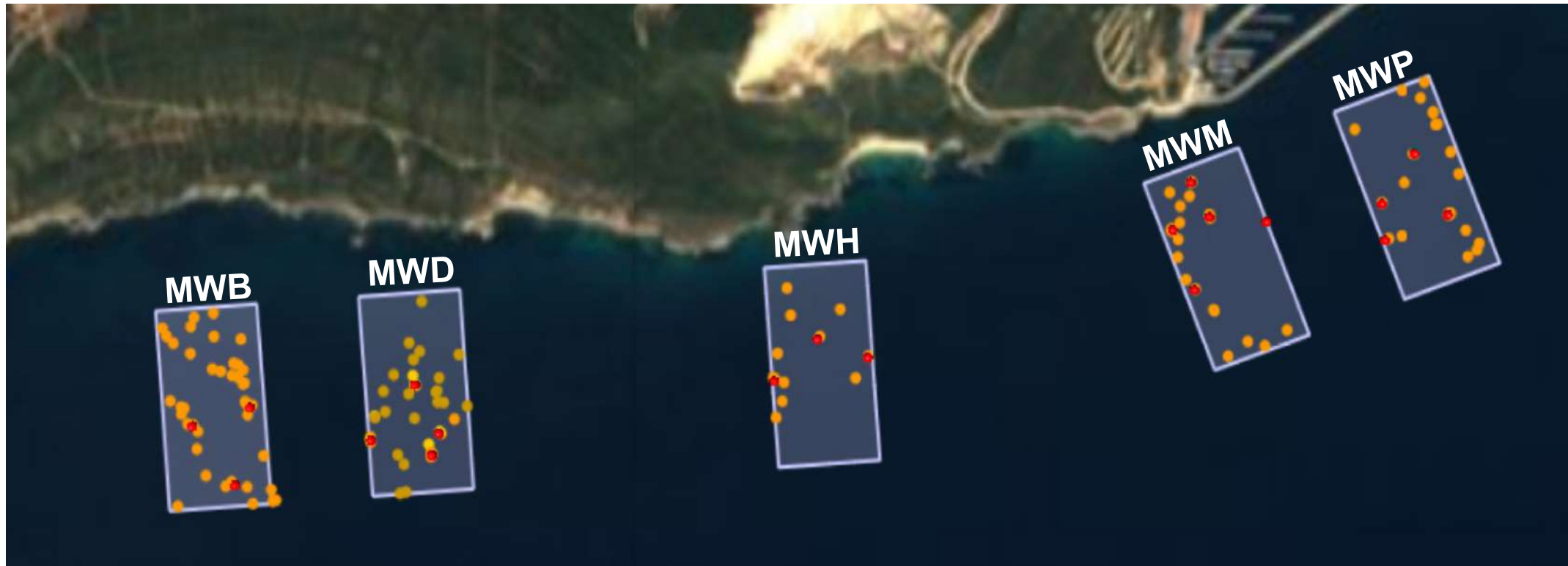
REPMUS24 – overview



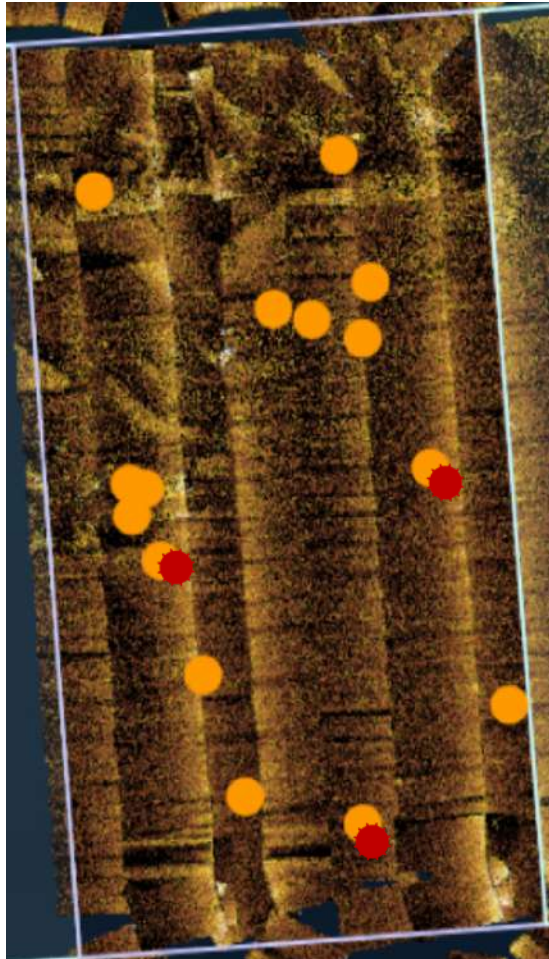
REPMUS24 – overview



REPMUS24 – overview



MP-SAS 1

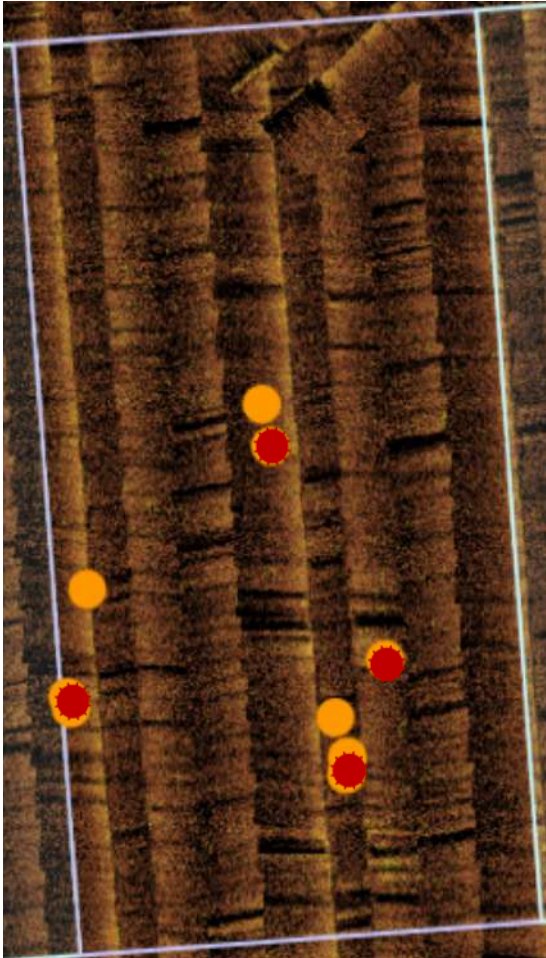


SSS 1

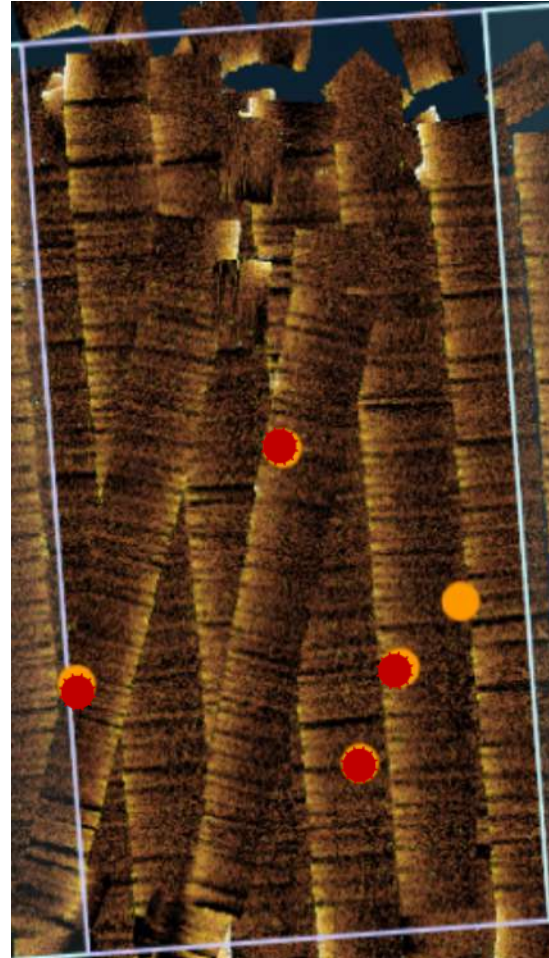


	SAS 1	SSS 1
REPORTED MILCO's	15	23
MINES FOUND	3/3	2/3

MP-SAS 1



MP-SAS 2



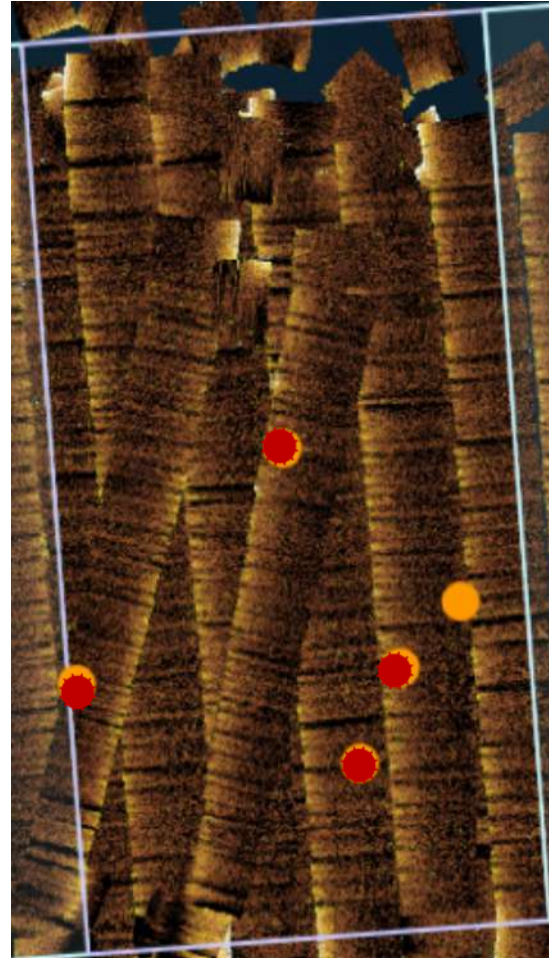
SSS 1



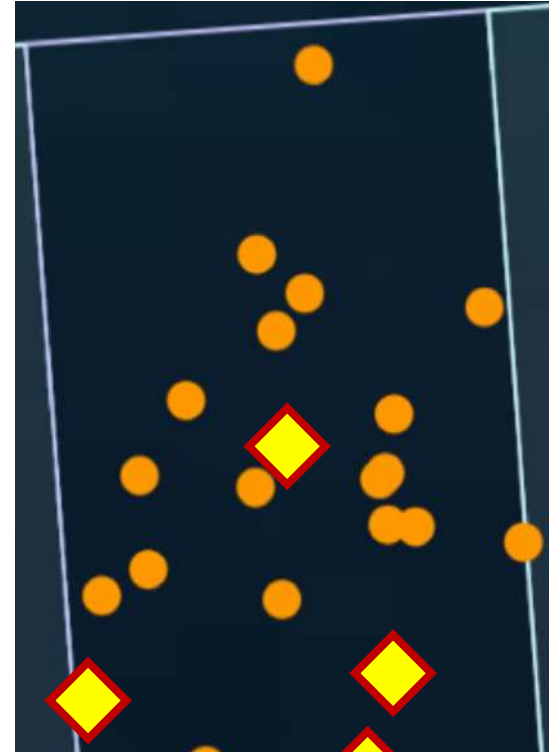
MP-SAS 1



MP-SAS 2

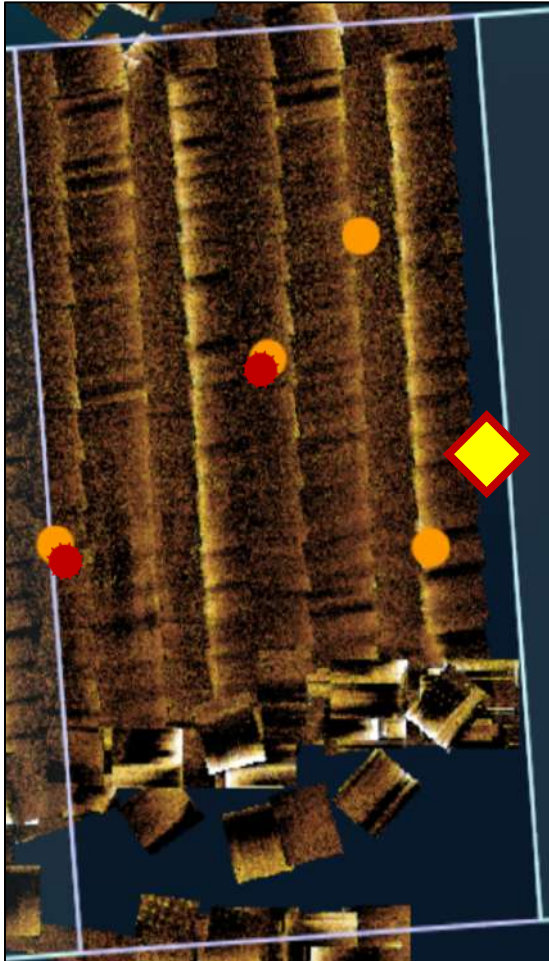


SSS 1

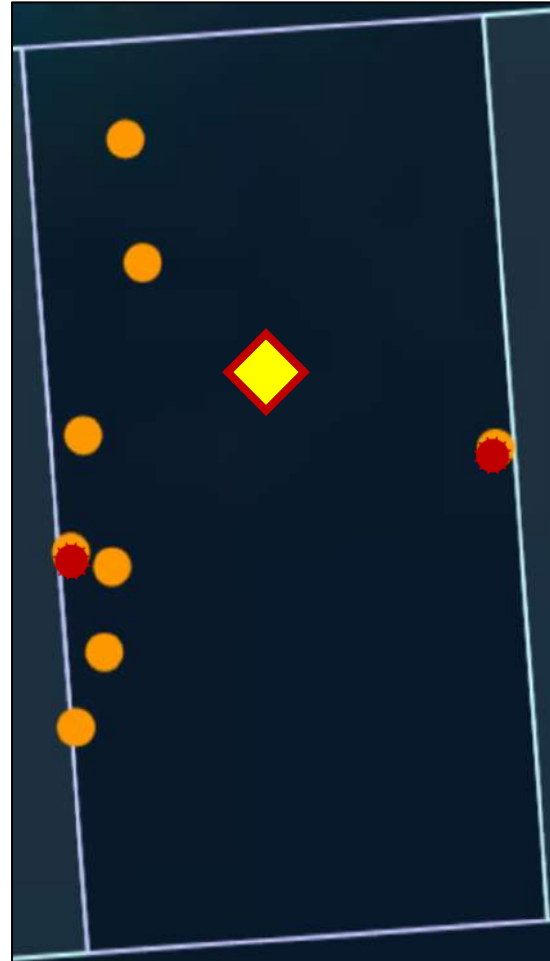


	SAS 1	SAS 2	SSS 1
REPORTED MILCO's	9	5	21
MINES FOUND	4/4	4/4	0/4

MP-SAS 1

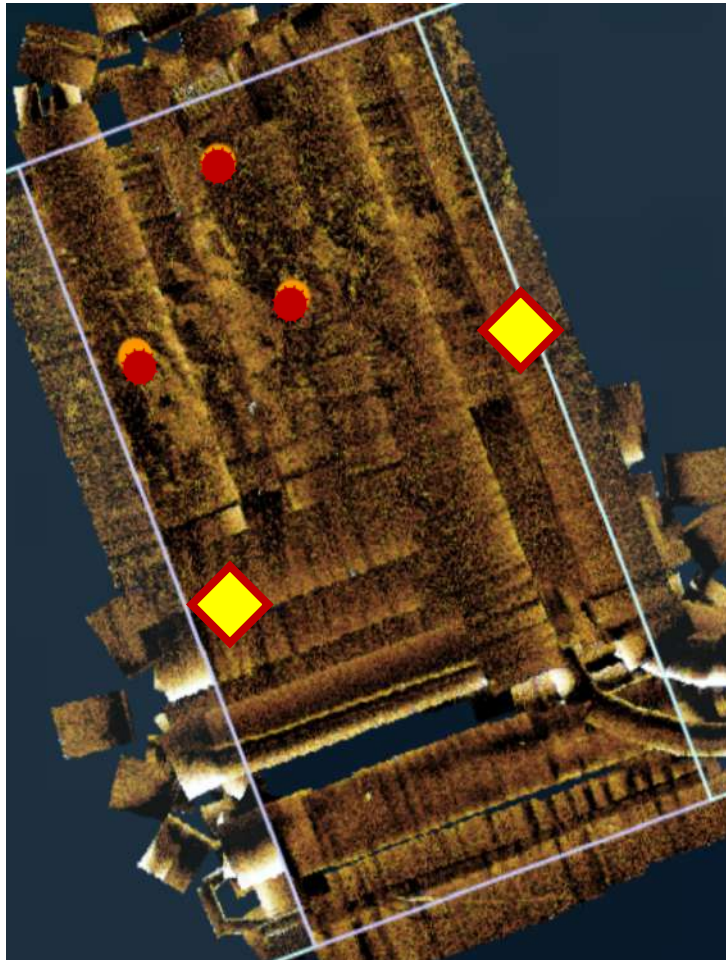


SSS 1

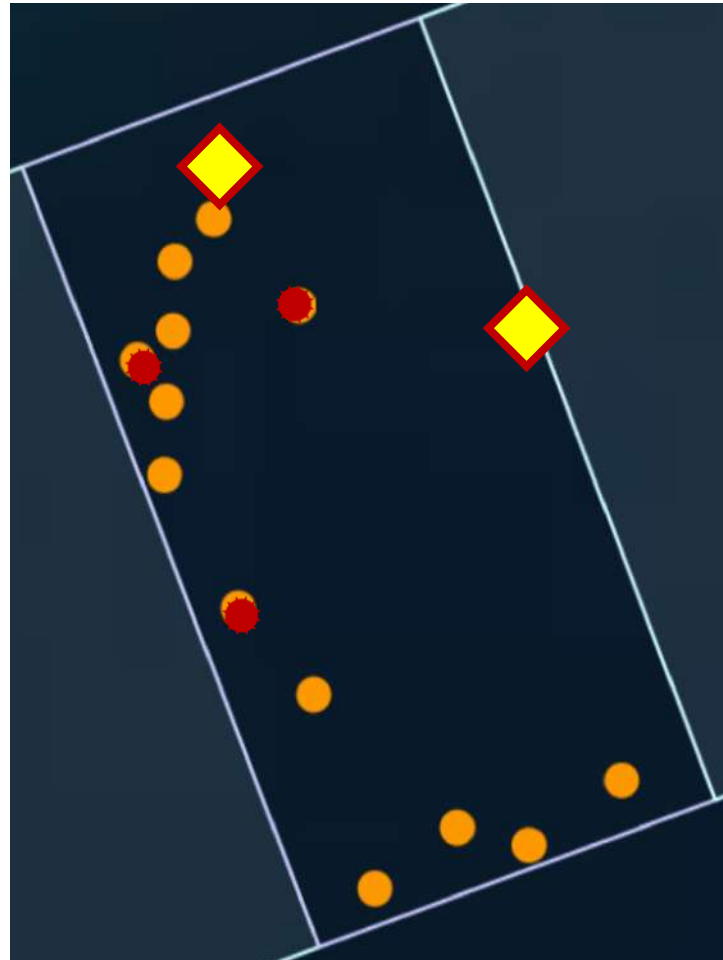


	SAS 1	SSS 1
REPORTED MILCO's	4	8
MINES FOUND	2/3	2/3

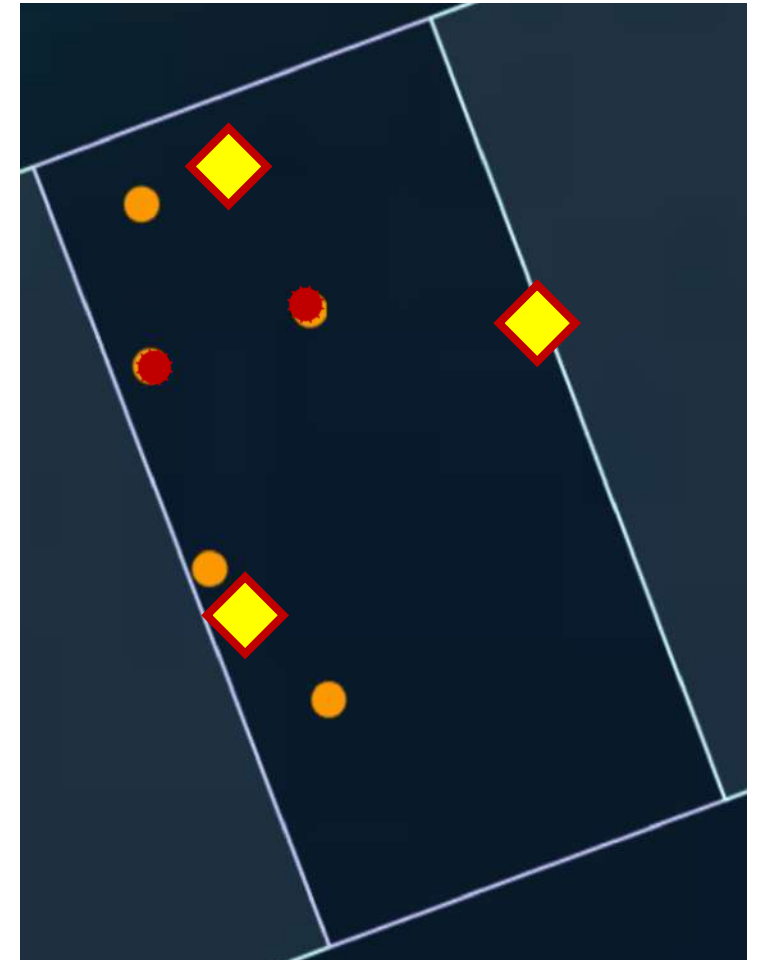
MP-SAS 1



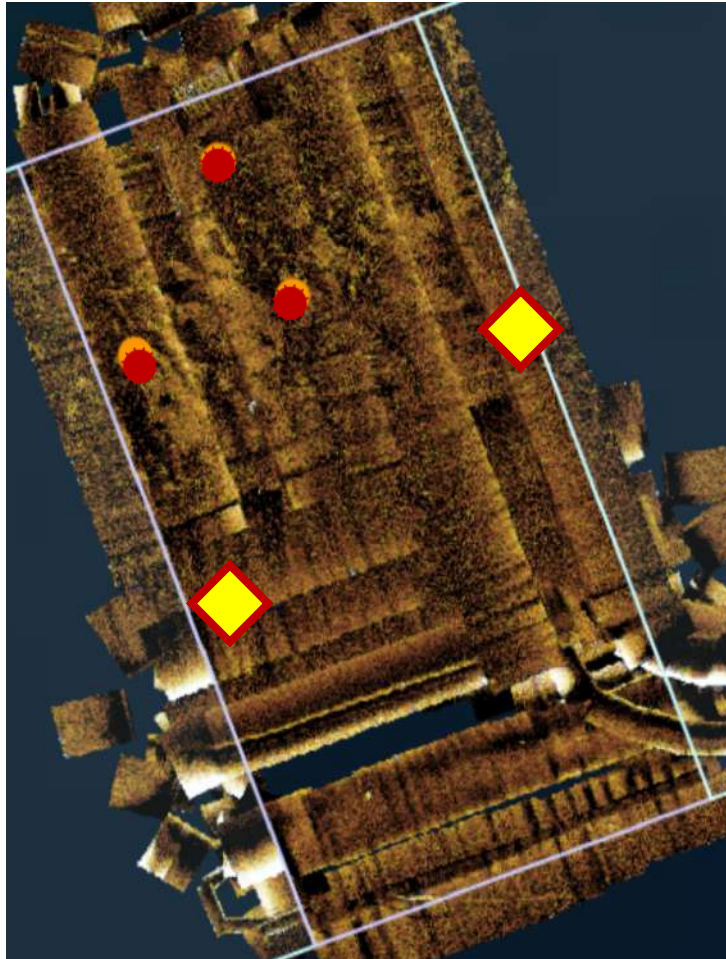
SSS 1



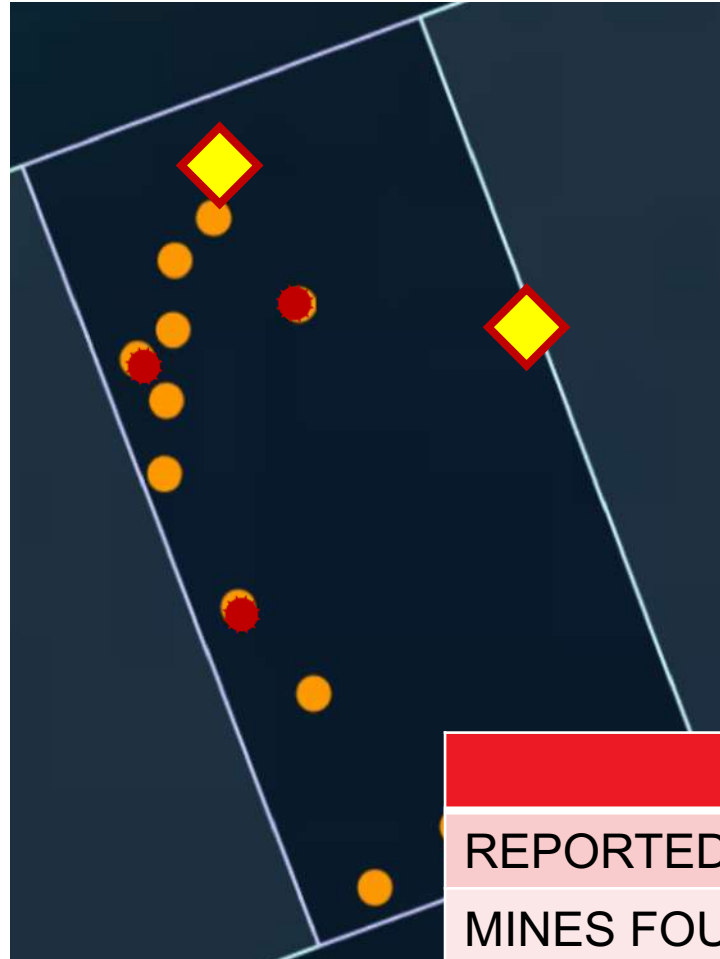
SSS 2



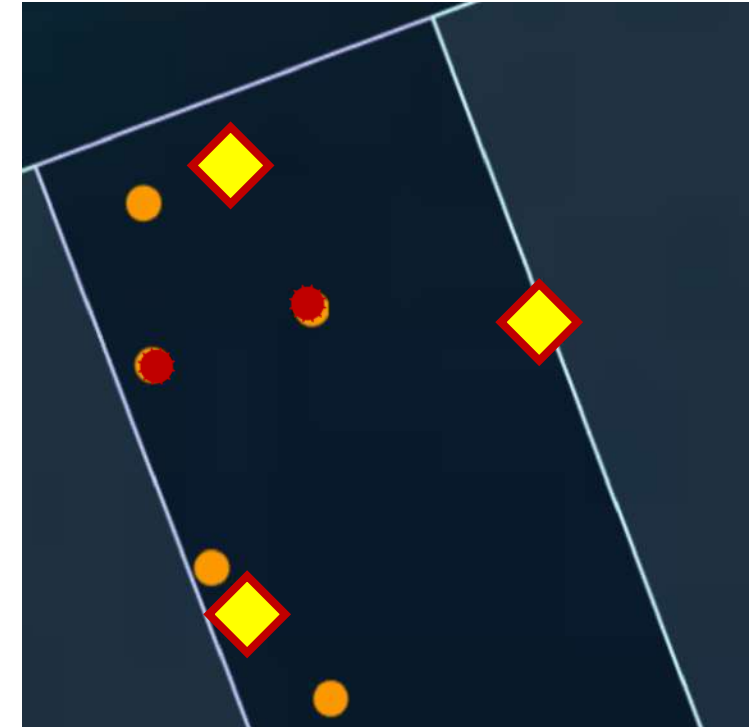
MP-SAS 1



SSS 1

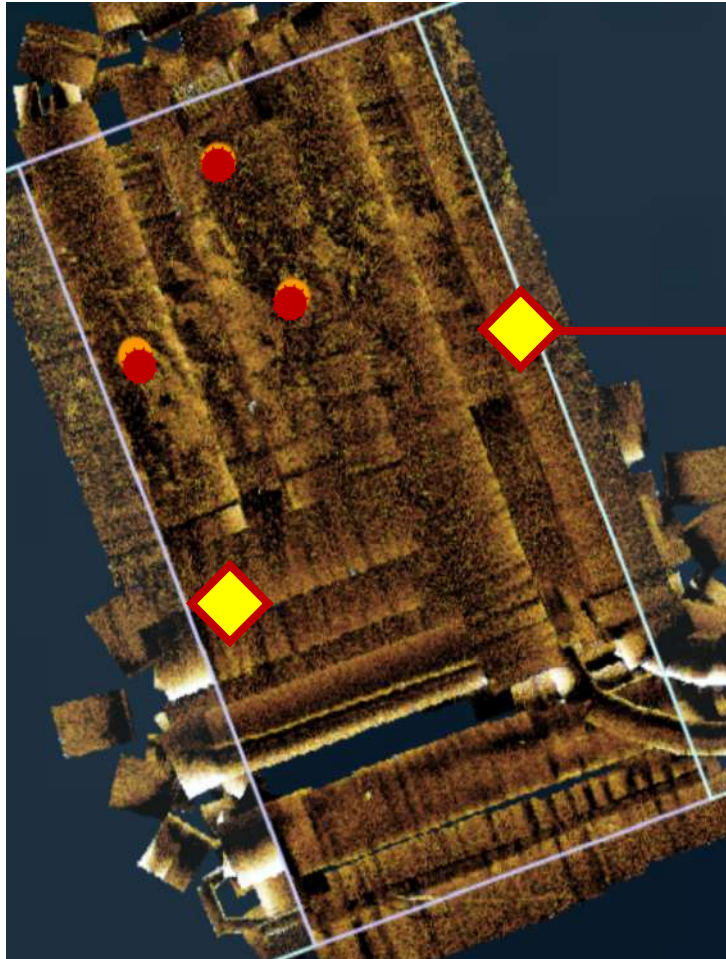


SSS 2



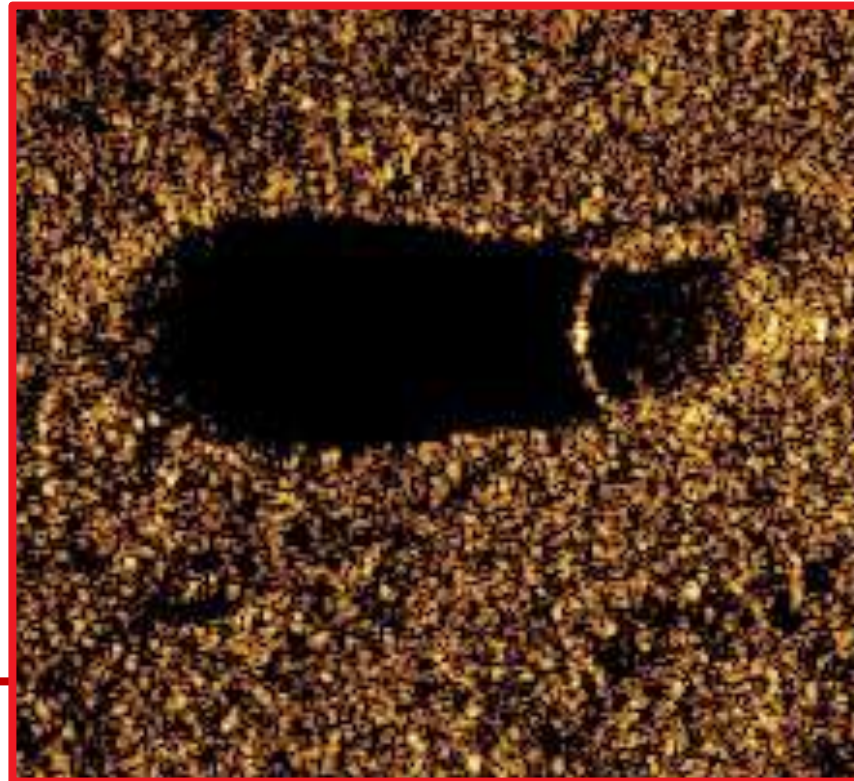
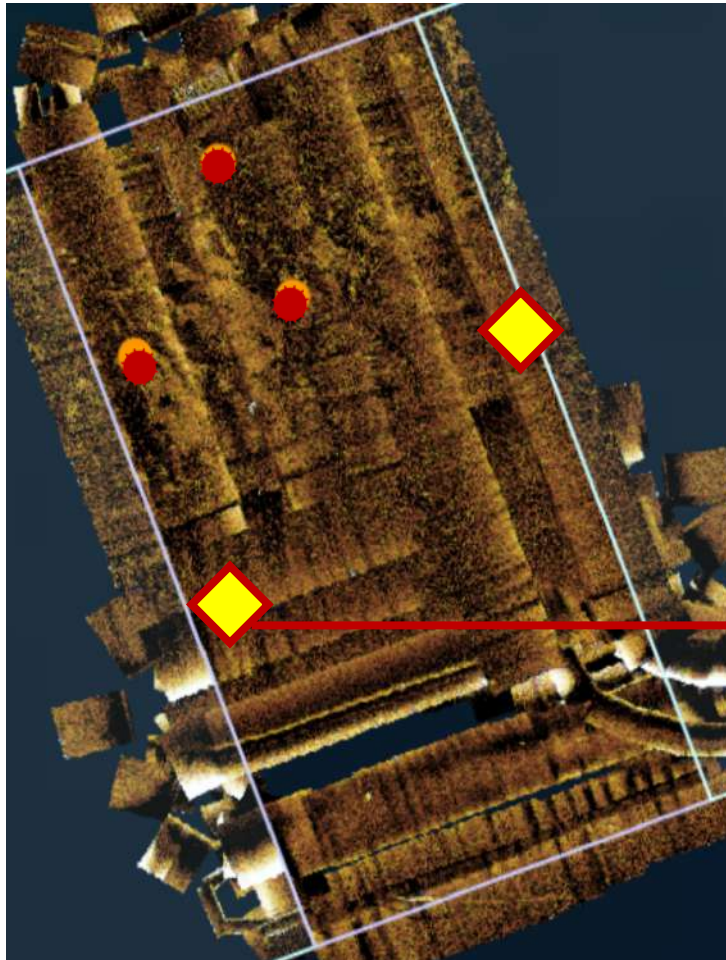
	SAS 1	SSS 1	SSS 2
REPORTED MILCO's	3	13	5
MINES FOUND	3/5	3/5	2/5

MP-SAS 1



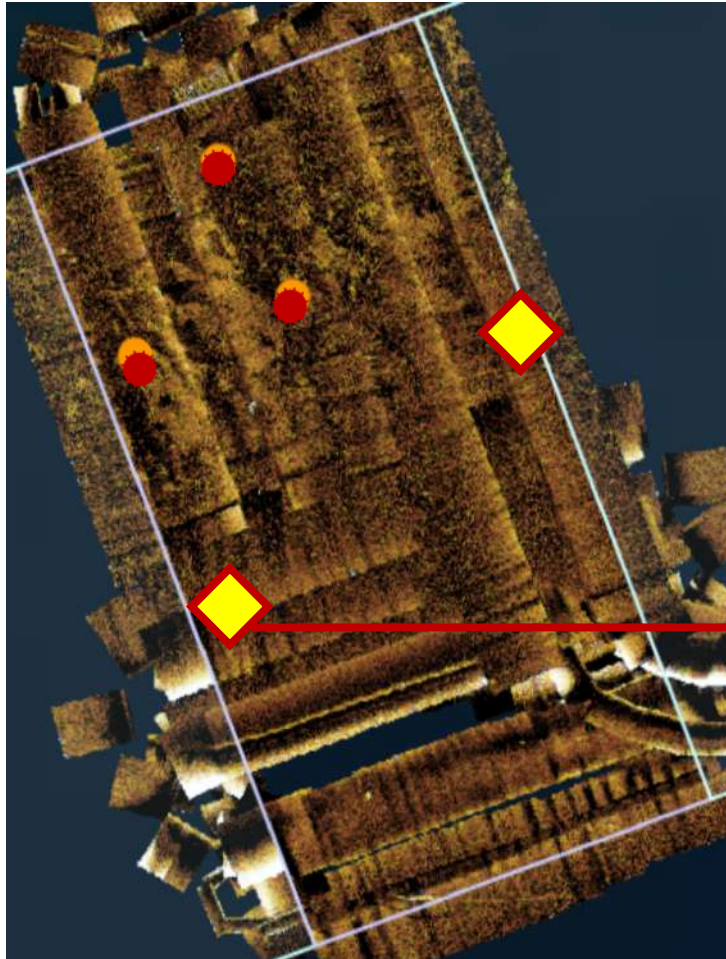
	SAS 1	SSS 1	SSS 2
REPORTED MILCO's	3	13	5
MINES FOUND	3/5	3/5	2/5

MP-SAS 1



	SAS 1	SSS 1	SSS 2
REPORTED MILCO's	3	13	5
MINES FOUND	3/5	3/5	2/5

MP-SAS 1

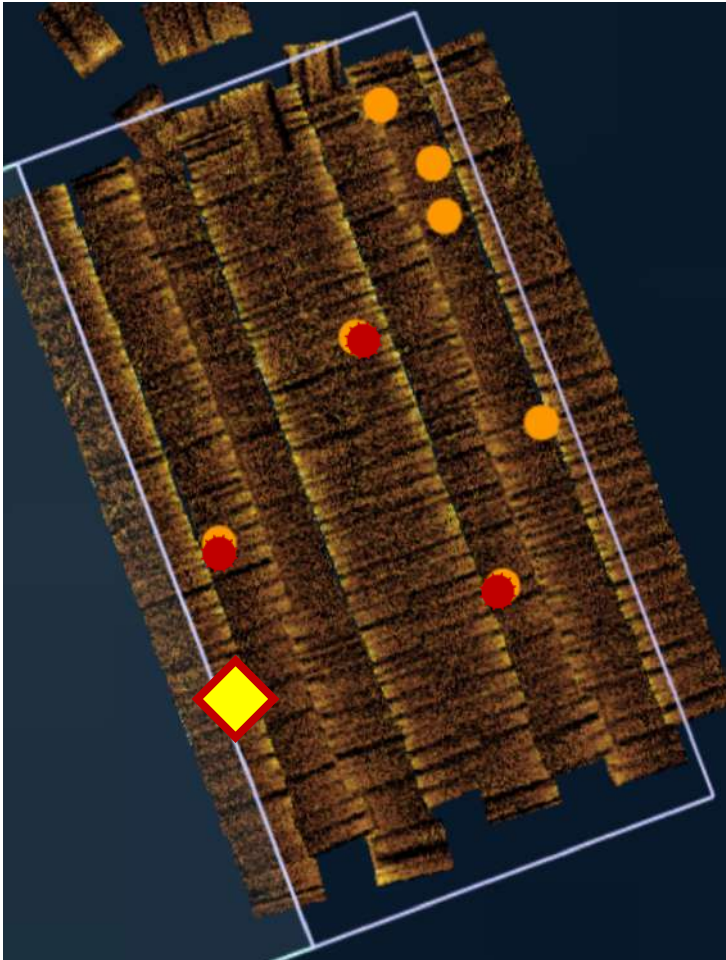


CAMERA IMAGE TAKEN BY IQUA SPARUS II

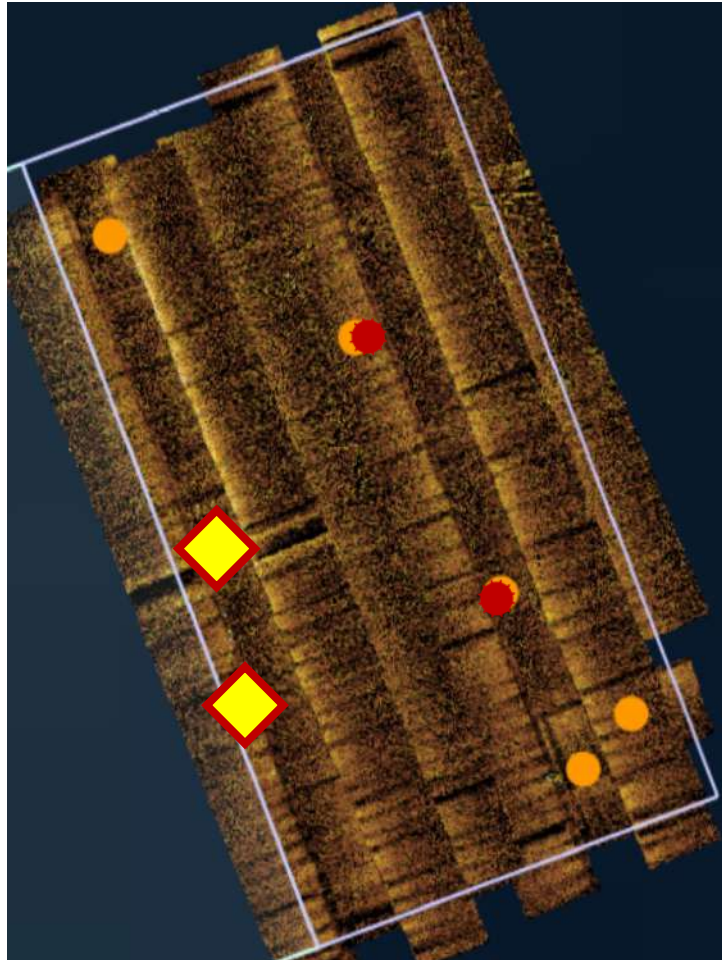


	SAS 1	SSS 1	SSS 2
REPORTED MILCO's	3	13	5
MINES FOUND	3/5	3/5	2/5

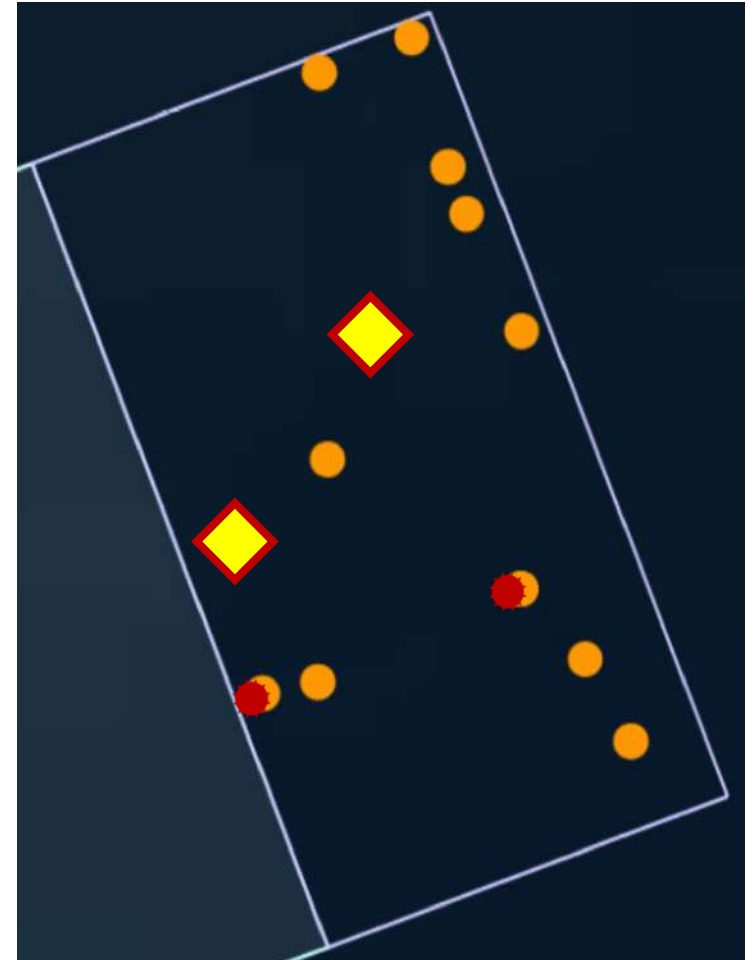
MP-SAS 1



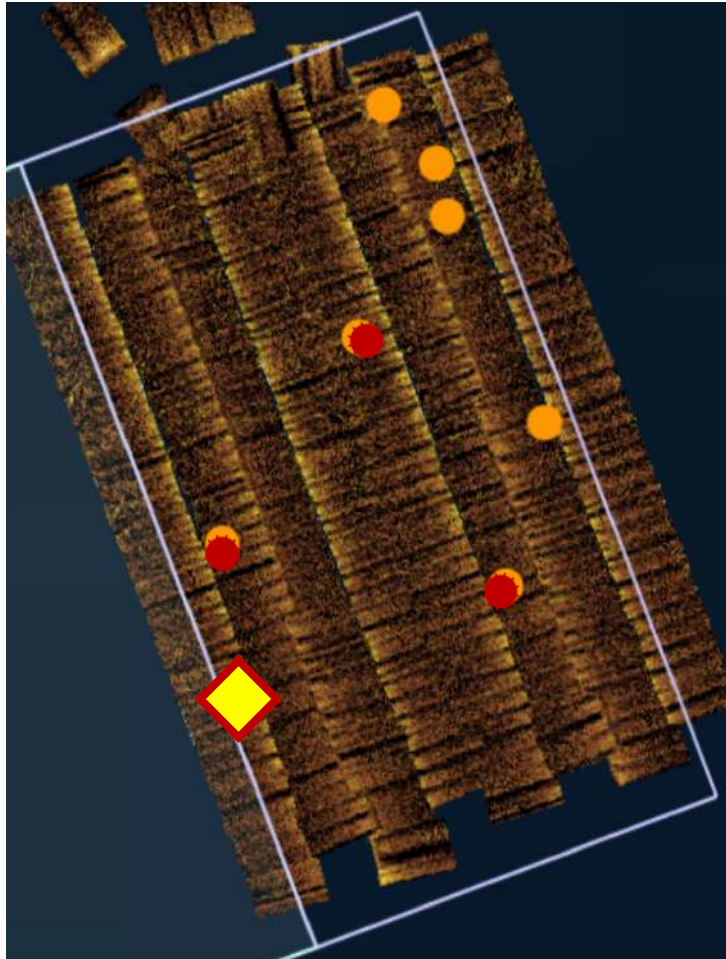
MP-SAS 2



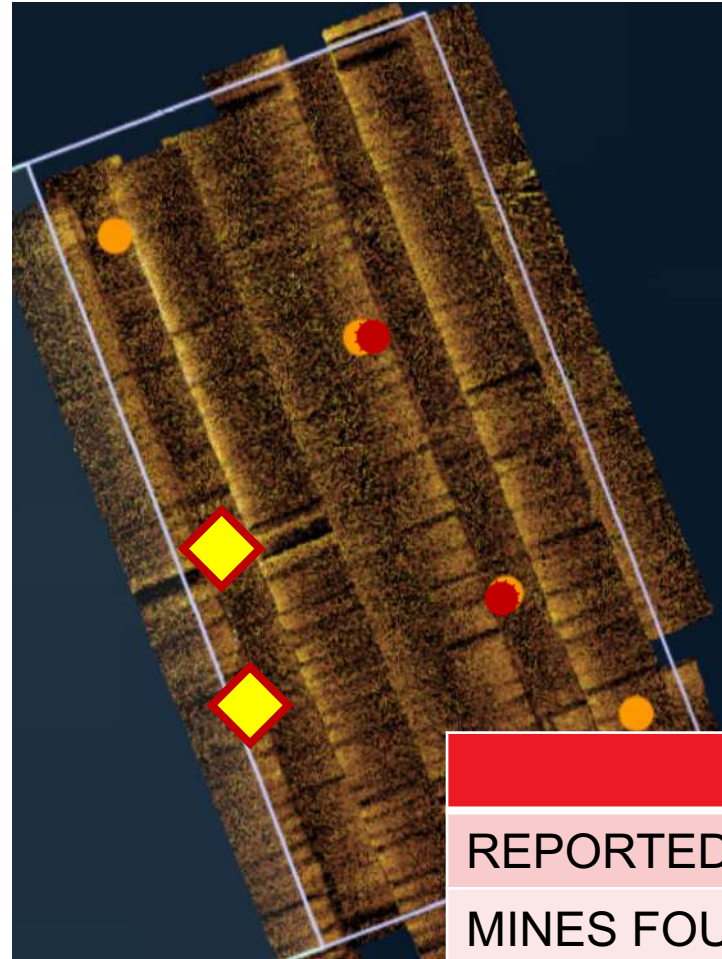
SSS 1



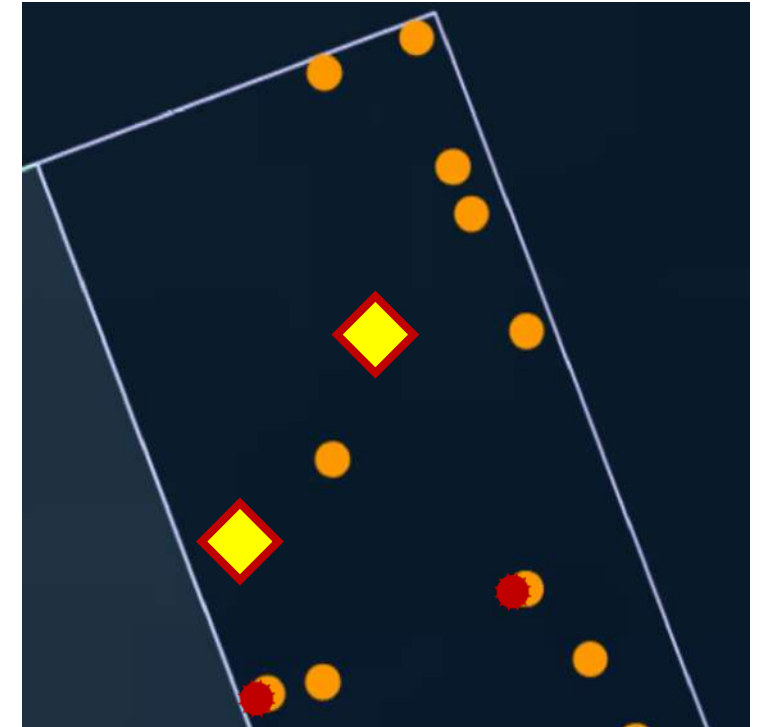
MP-SAS 1



MP-SAS 2

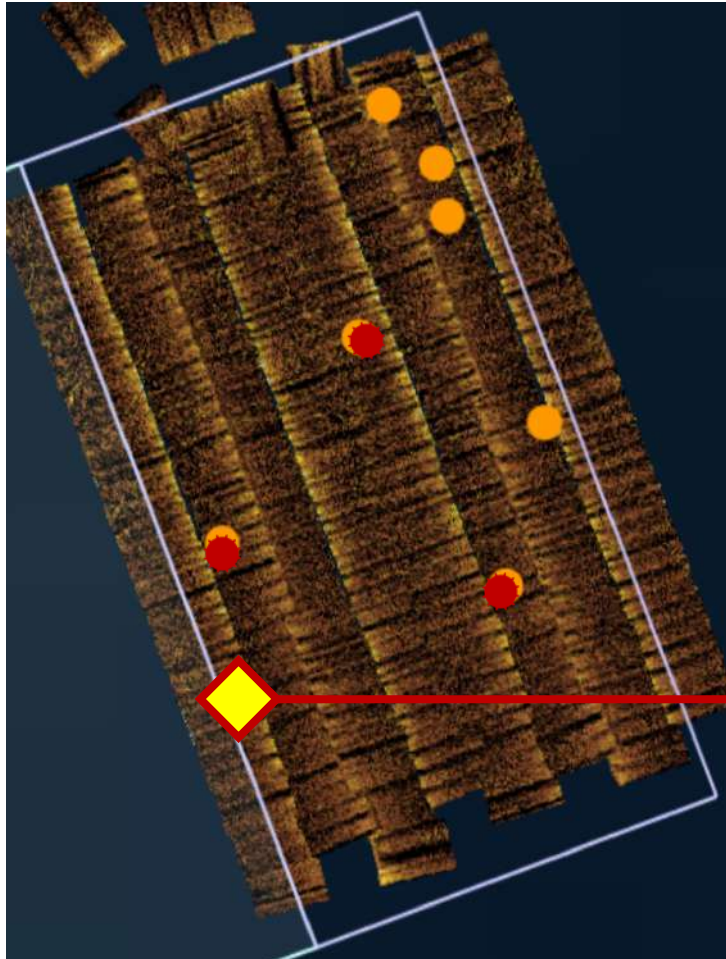


SSS 1



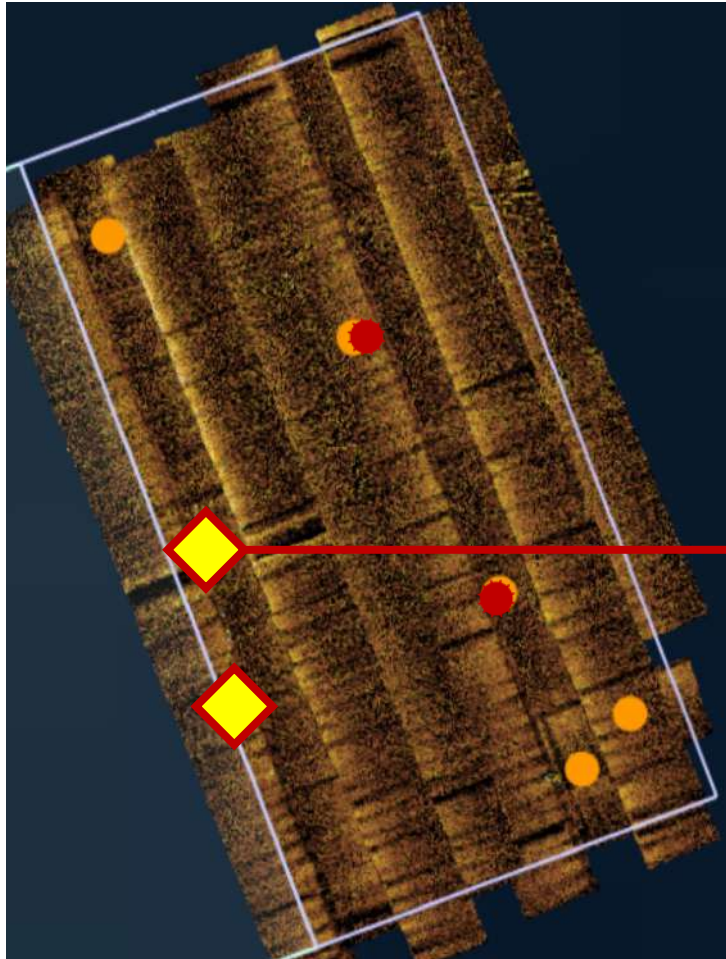
	SAS 1	SAS 2	SSS 1
REPORTED MILCO's	7	5	11
MINES FOUND	3/4	2/4	2/4

MP-SAS 1



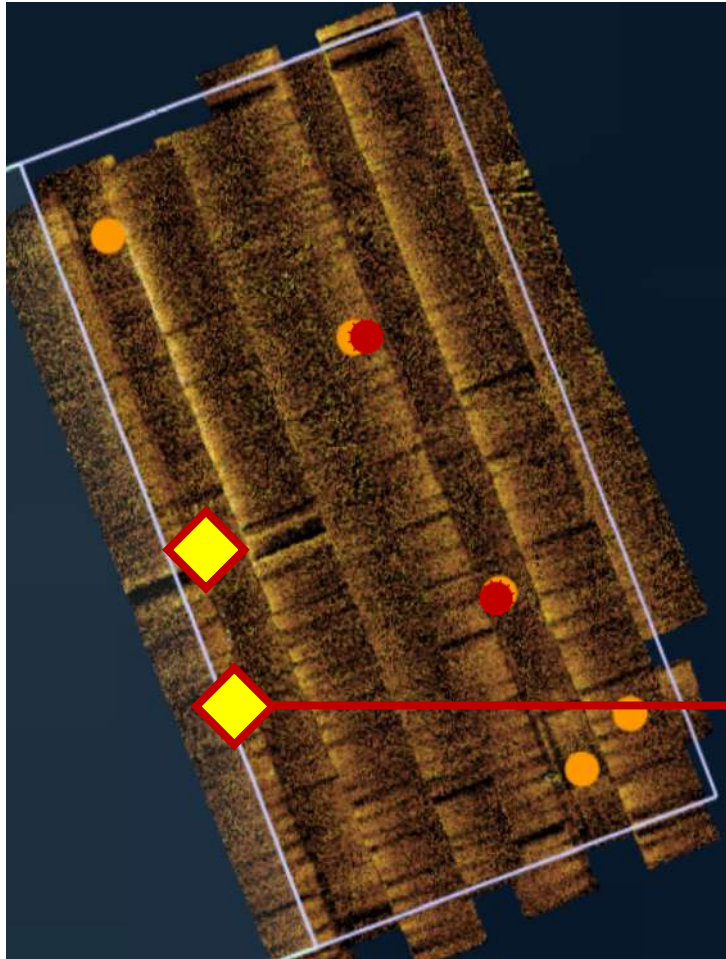
	SAS 1	SAS 2	SSS 1
REPORTED MILCO's	7	5	11
MINES FOUND	3/4	2/4	2/4

MP-SAS 2



	SAS 1	SAS 2	SSS 1
REPORTED MILCO's	7	5	11
MINES FOUND	3/4	2/4	2/4

MP-SAS 2



	SAS 1	SAS 2	SSS 1
REPORTED MILCO's	7	5	11
MINES FOUND	3/4	2/4	2/4

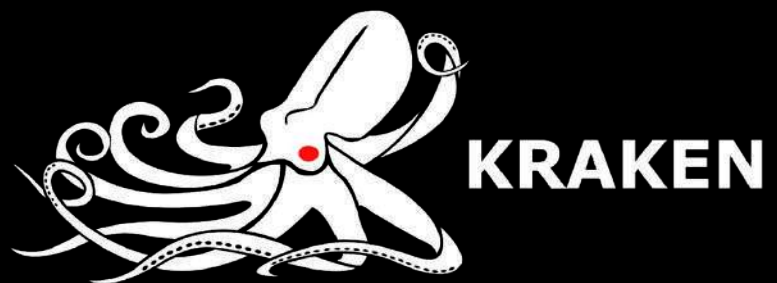
	MP-SAS (7 tasks)	SSS (6 tasks)
TOTAL REPORTED MILCO's	53	76
AVG. REPORTED MILCO's PER TASK	7	13
AVG. % REPORTED MILCO's PER TASK	52%	100%
TOTAL MINES FOUND	21/27	11/24
AVG. % MINES FOUND PER TASK	78%	46%

**EFFECTIVENESS: SAS vs SSS, INCREASE OF 32%
MINEFINDS**

**EFFICIENCY: SAS vs SSS, REDUCTION OF 48%
REPORTED MILCO's**







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