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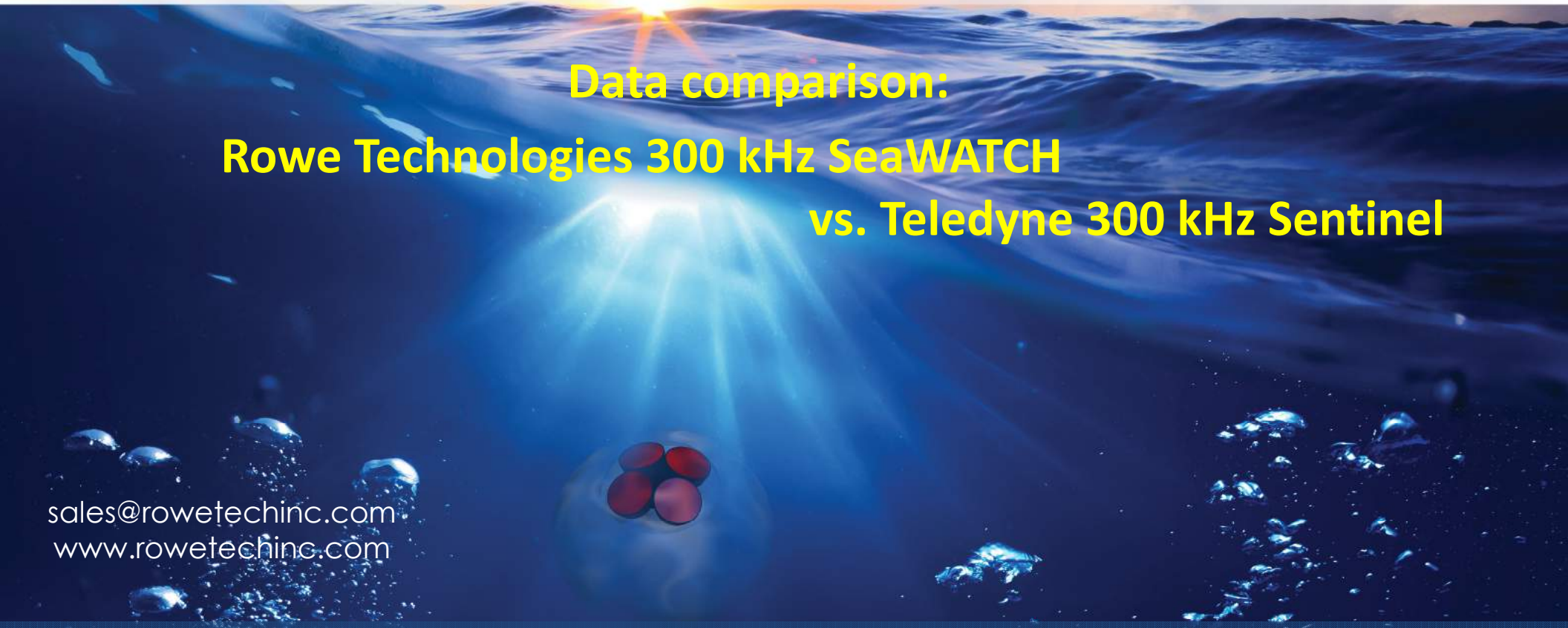
Doppler Pinging The World's Waters



Data comparison:

Rowe Technologies 300 kHz SeaWATCH

vs. Teledyne 300 kHz Sentinel

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SeaWATCH 300 kHz to *Teledyne Sentinel* 300 kHz comparison

Goal

- ✓ **Compare the performance of a Rowe Tech SeaWATCH 300 kHz to the Teledyne Sentinel 300 kHz**

Systems

SeaWATCH 300

Sentinel 300

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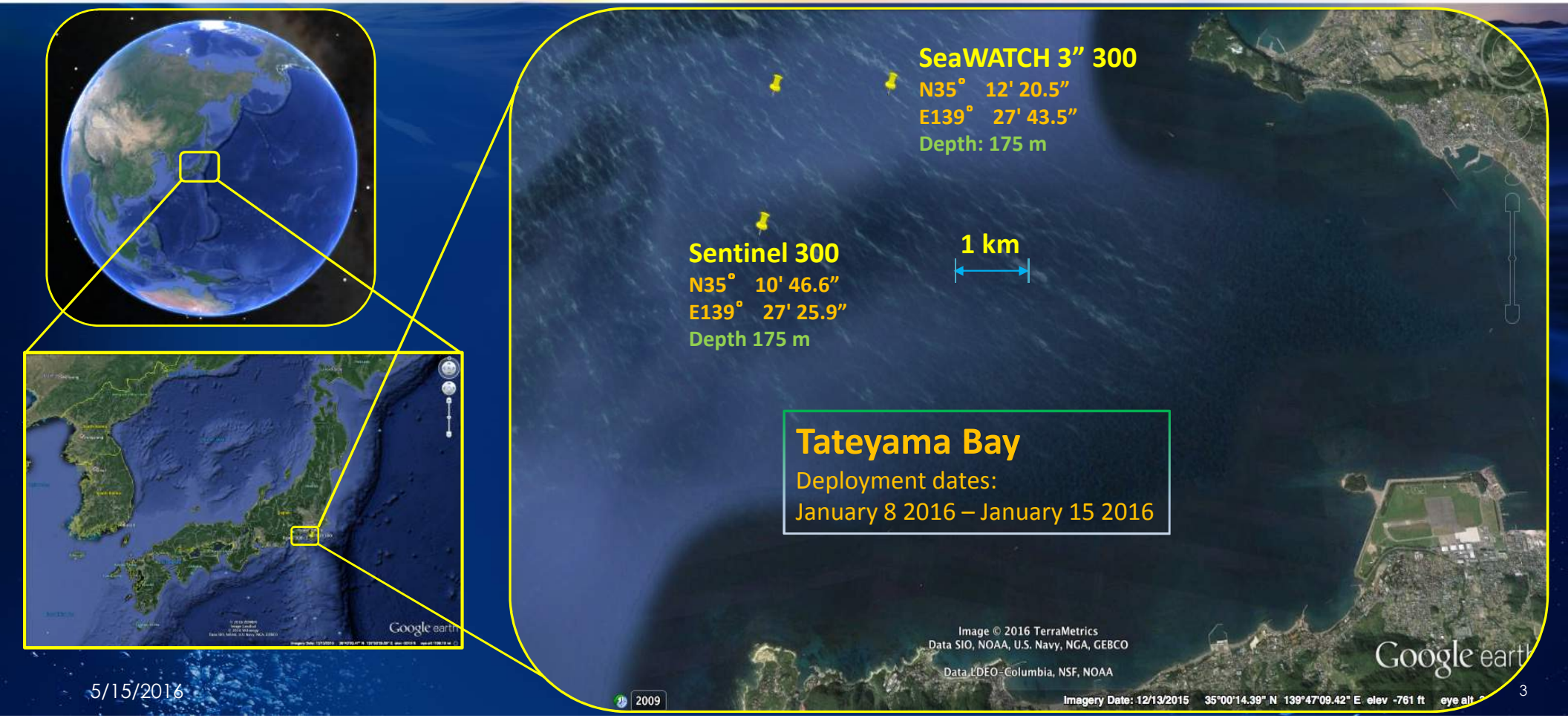
Systems Locations: Japan, Tateyama Bay



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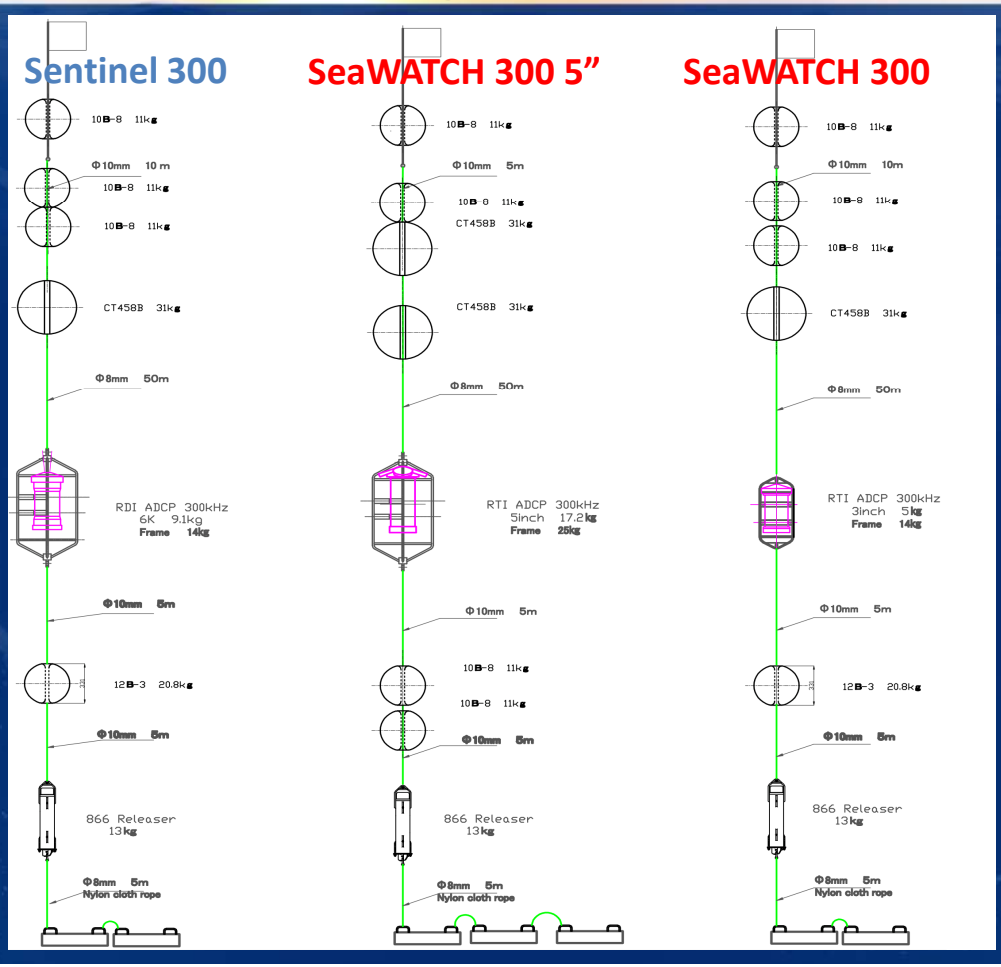
Mooring schematics



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SYSTEM SETTINGS

All systems were programmed identically

- Offset pings to prevent interference
- 6 minute ensembles
- 60 pings, 1Hz ping rate
- Four meter bins
- Deployed on common depth gradient line
- Deployed 25 meters off the bottom
- Default screening thresholds were used

Parameter	Teledyne 300	Rowe Tech 3"	Rowe Tech 5"
System Frequency	**307.2 kHz**	**288.3 kHz**	**288.3 kHz**
Firmware Version	**50.40**	**0.2.81 - 4**	**0.2.81 – 4**
Beam Angle	**20 Degrees**	**20 Degrees**	**20 Degrees**
False Target(WA)	**50 counts**	**n/a**	**n/a**
Band Width (WB)	**25%**	**8.33%**	**8.33%**
Corr. Threshold (WC)	**64 counts**	**50 counts**	**50 counts**
Blank (WF)	**1.76 m**	**1.6 m**	**1.6 m**
Mode (WM)	**1**	**1**	**1**
Pings/Ens (WP)	**60**	**60**	**60**
Bin Size (WS)	**4.00 m**	**4.00 m**	**4.00 m**
Time/Ping (TP)	**00:01.00**	**00:01.00**	**00:01.00**
Hardware	**4 Beams**	**4 Beams**	**4 Beams**
Lag	**53 elements**	**28 elements**	**28 elements**
Code Reps.	**9**	**5**	**5**
Lag Length	**0.48 m**	**0.98**	**0.98**
Xmt Length	**4.28 m**	**4.9 m**	**4.9 m**
1st Bin	**6.14 m**	**6.05 m**	**6.05 m**
Orientation	**UP**	**UP**	**UP**

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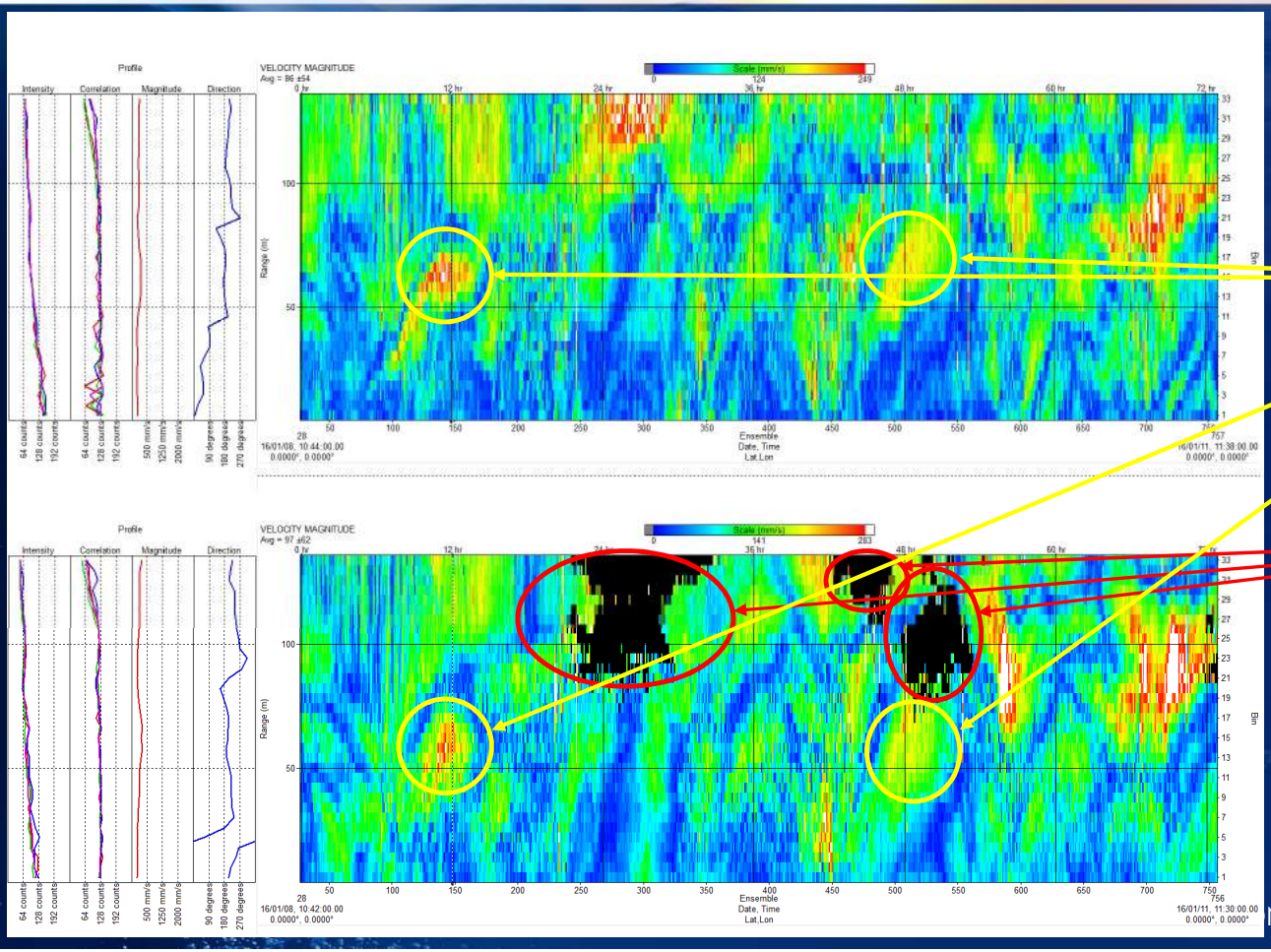
Magnitude



Velocity Magnitude

SeaWATCH 300

Velocity magnitude of each system shows same magnitude structure, spatially and temporally.

The Sentinel system suffered from low echo intensity causing decorrelation of the data (black regions in the data)

Sentinel 300

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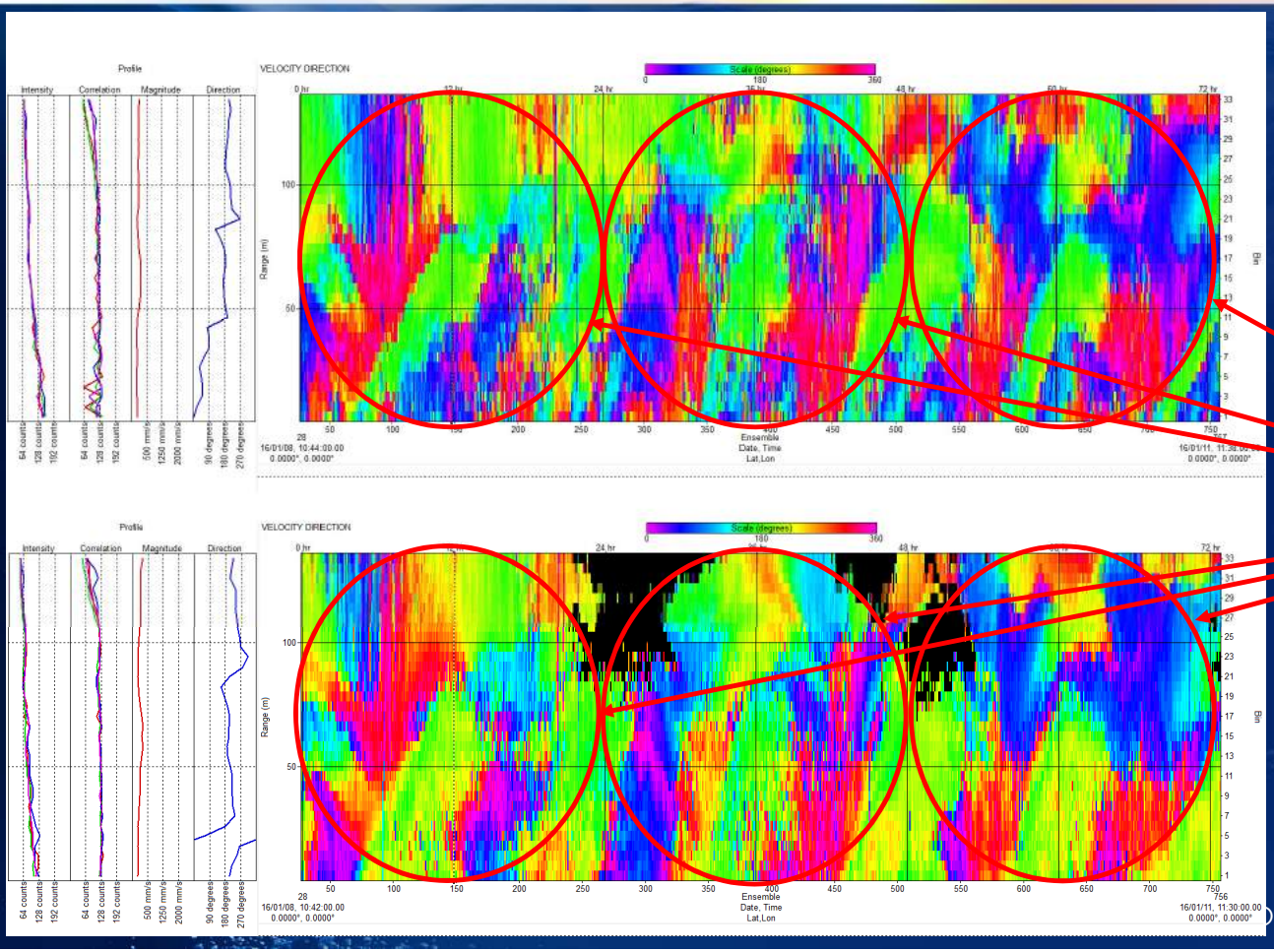
Direction



Direction

SeaWATCH 300

Direction contours of each system shows same direction structure, spatially and temporally.

Both systems measure the direction changes of the semidiurnal tides exhibited in this region

Sentinel 300

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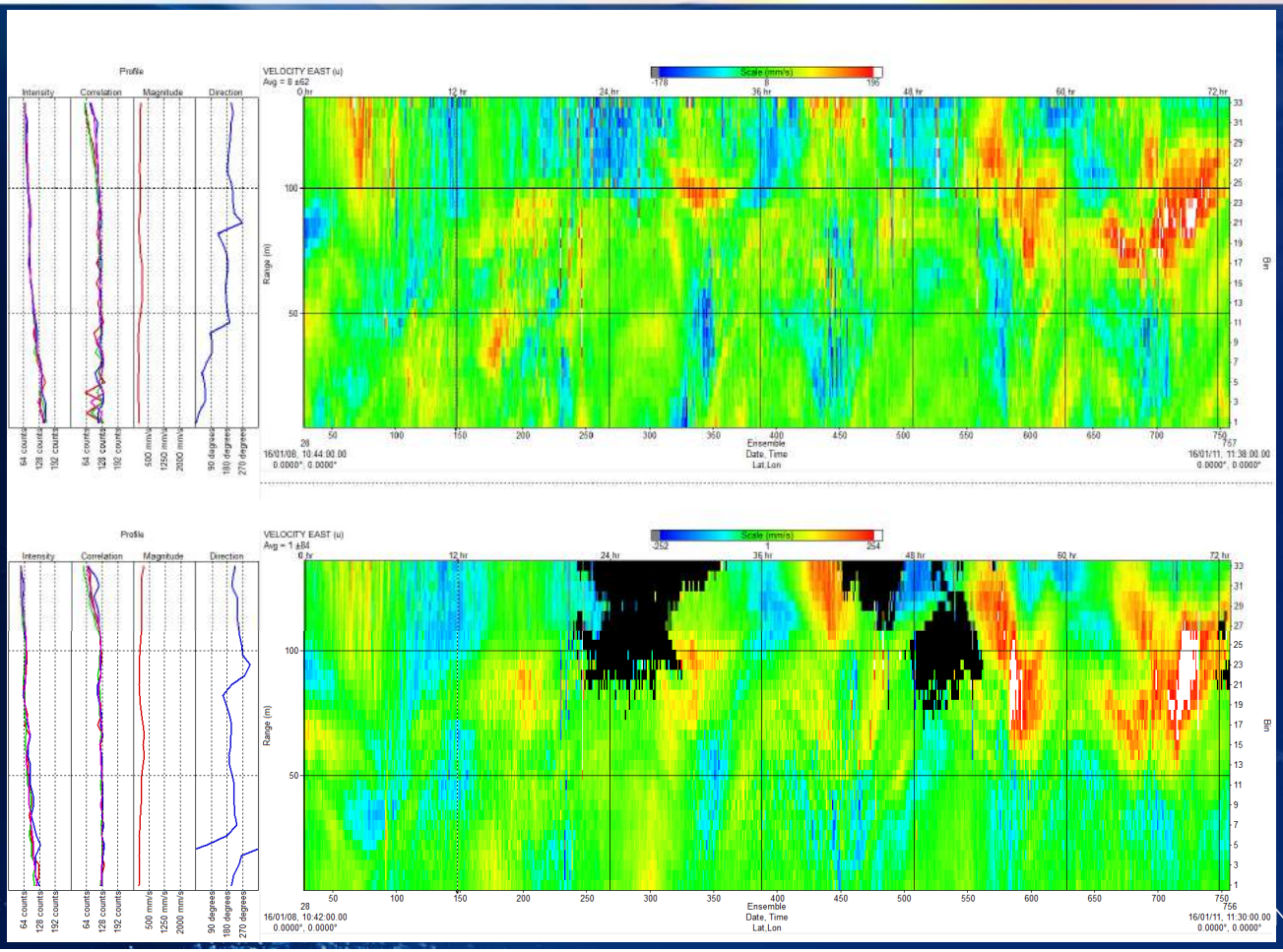
East Velocity



East Velocity

SeaWATCH 300

East Velocity vector contour of each system shows same velocity structure, spatially and temporally.

Sentinel 300

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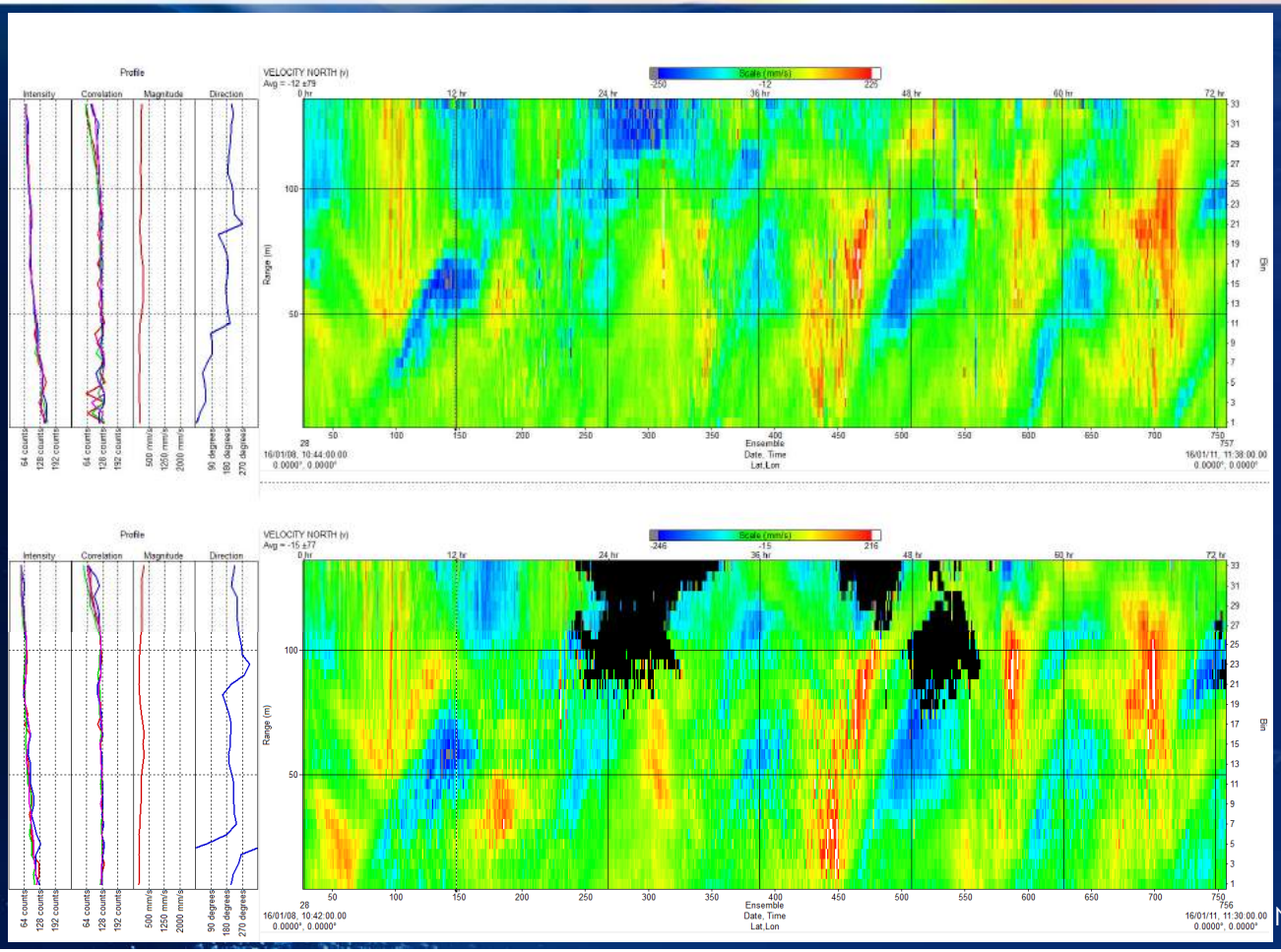
North Velocity



North Velocity

SeaWATCH 300

North Velocity vector contour of each system shows same velocity structure, spatially and temporally.

Sentinel 300

Both systems show the main component of the tides are in the Northerly direction

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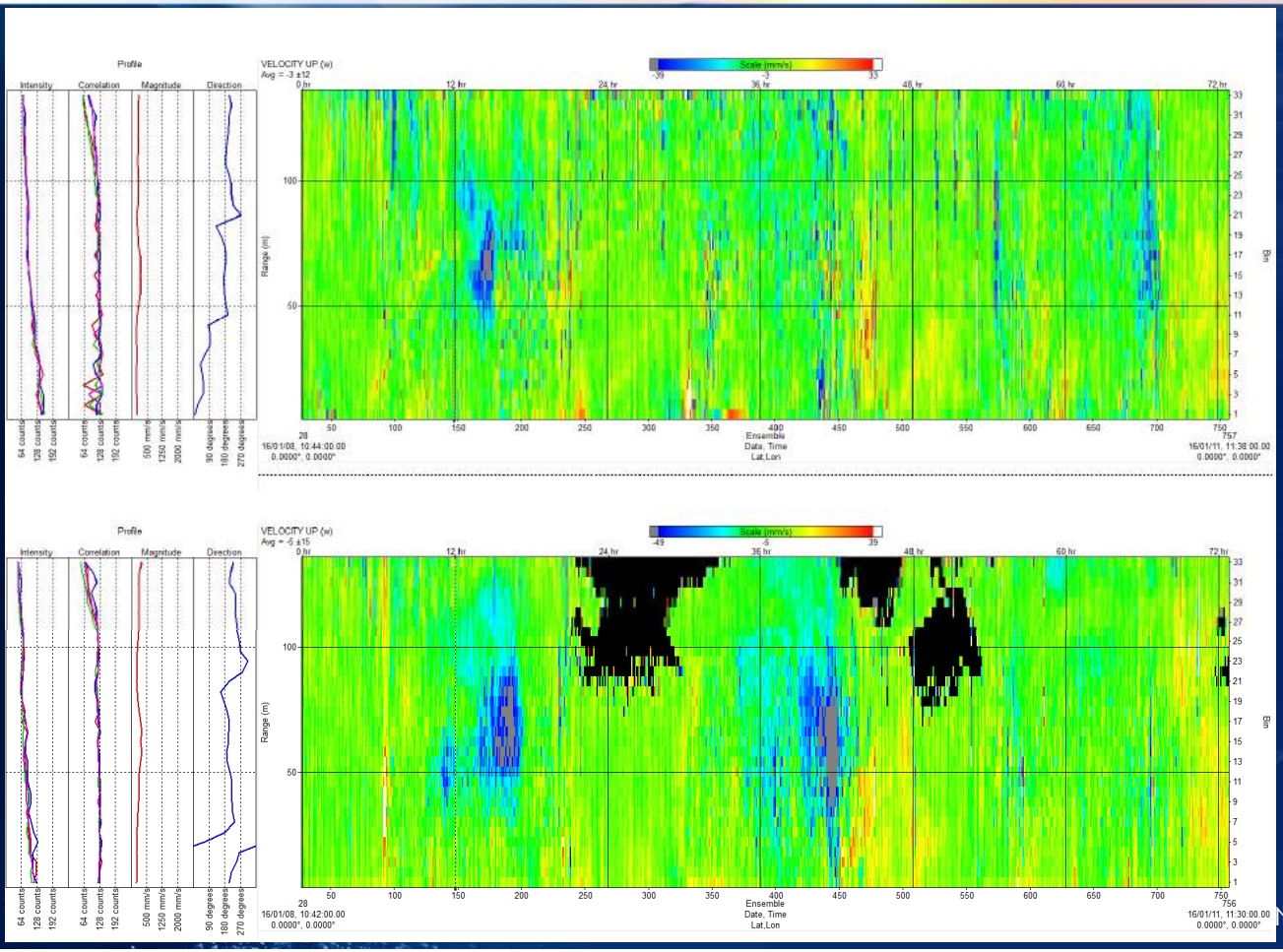
Vertical Velocity



Vertical Velocity

SeaWATCH 300

Vertical Velocity vector contour of each system shows same velocity structure spatially and temporally.

Sentinel 300

Both systems show the same structure of the upwelling and down welling

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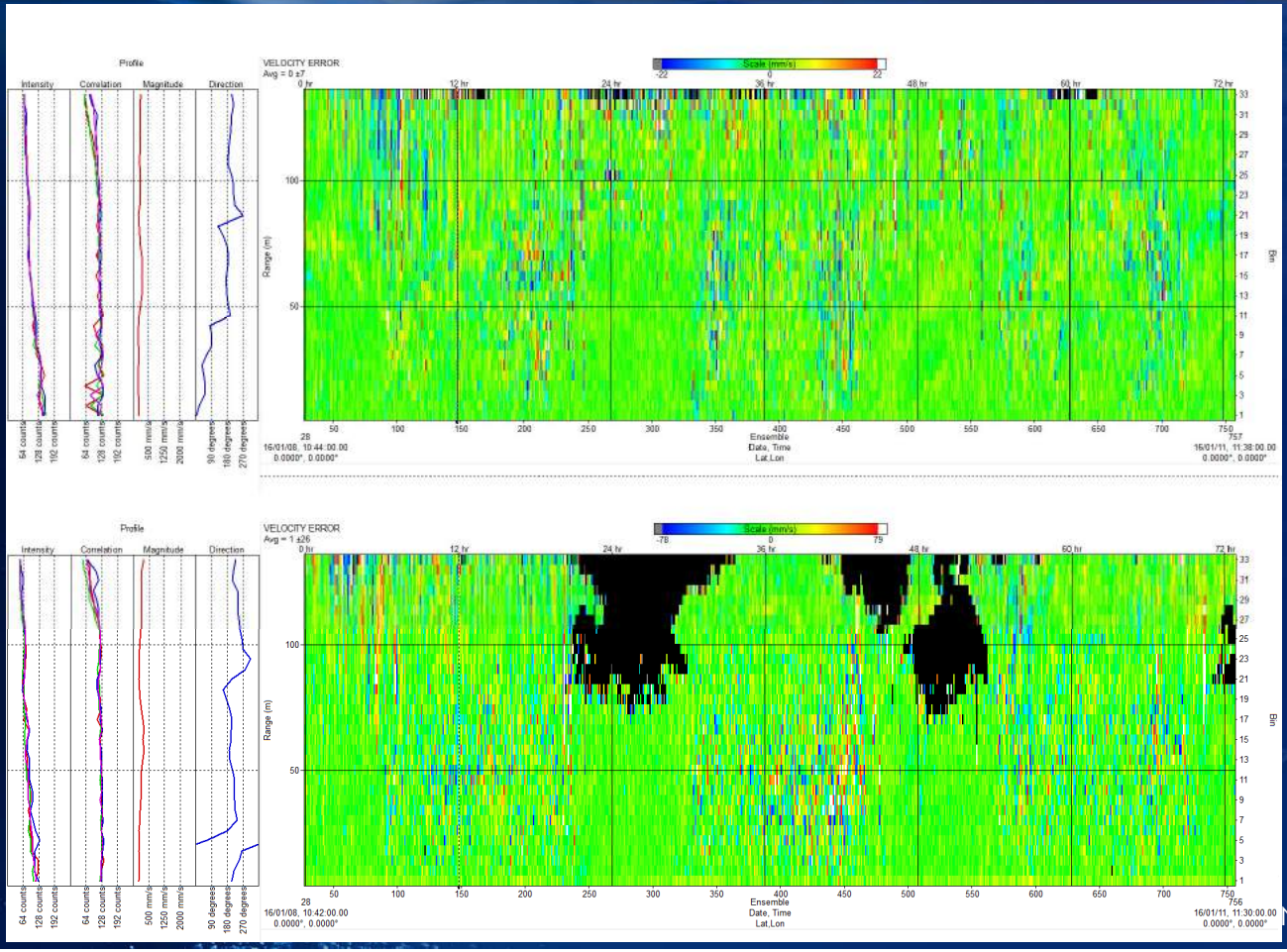
Error Velocity



Error Velocity

SeaWATCH 300

Error Velocity contour plot of each system shows same indications of homogenous flows, typical of ocean deployments. Centered on zero with equal distribution of the highs/lows (red/blue)

Sentinel 300

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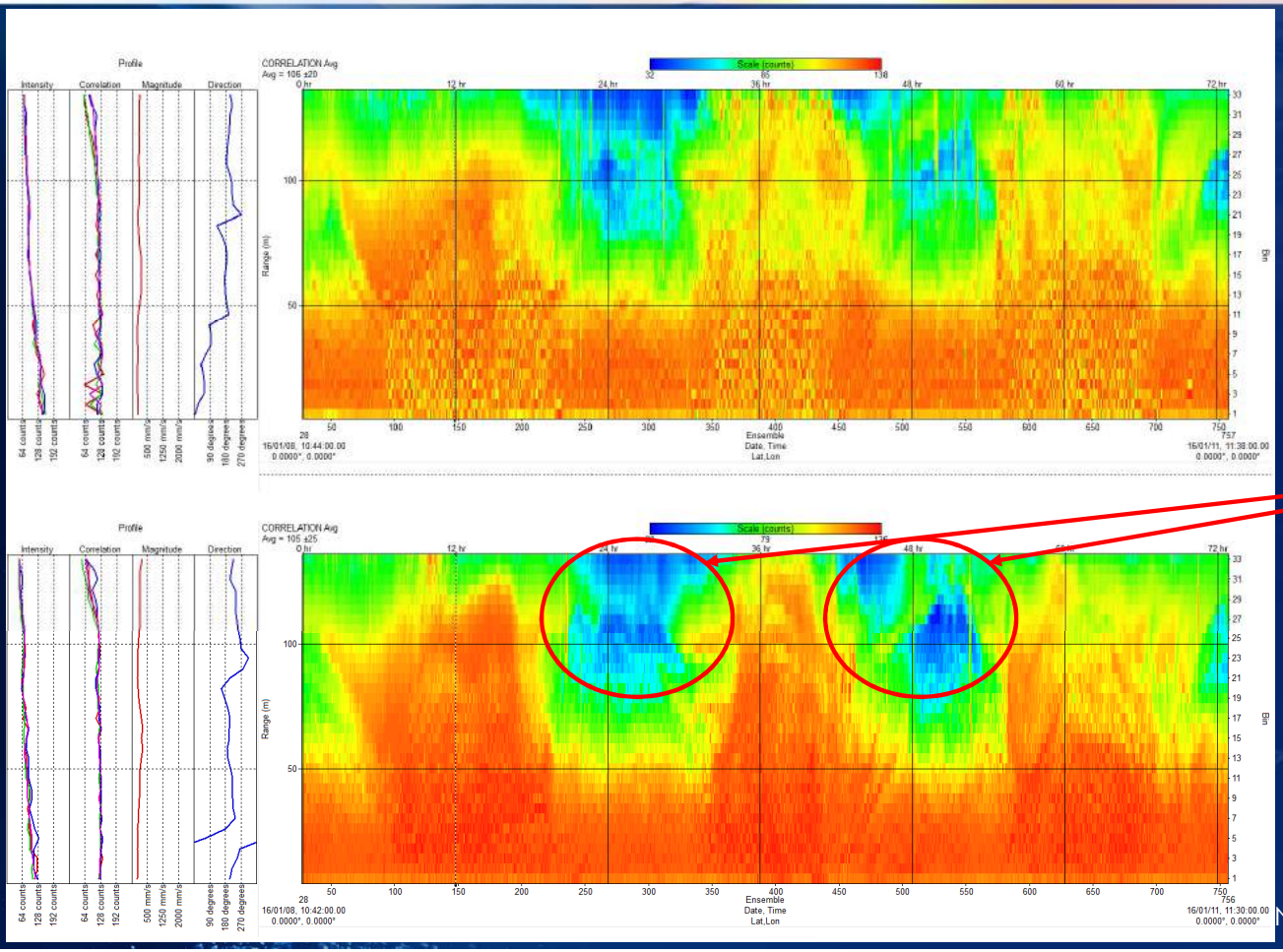
Correlation



SeaWATCH 300

Sentinel 300

Correlation

Correlation of each system is nearly identical.

The Sentinel 300 has regions where the ping return de-correlated due to lower signal to noise ratio. Data in this region is marked bad and is not recoverable

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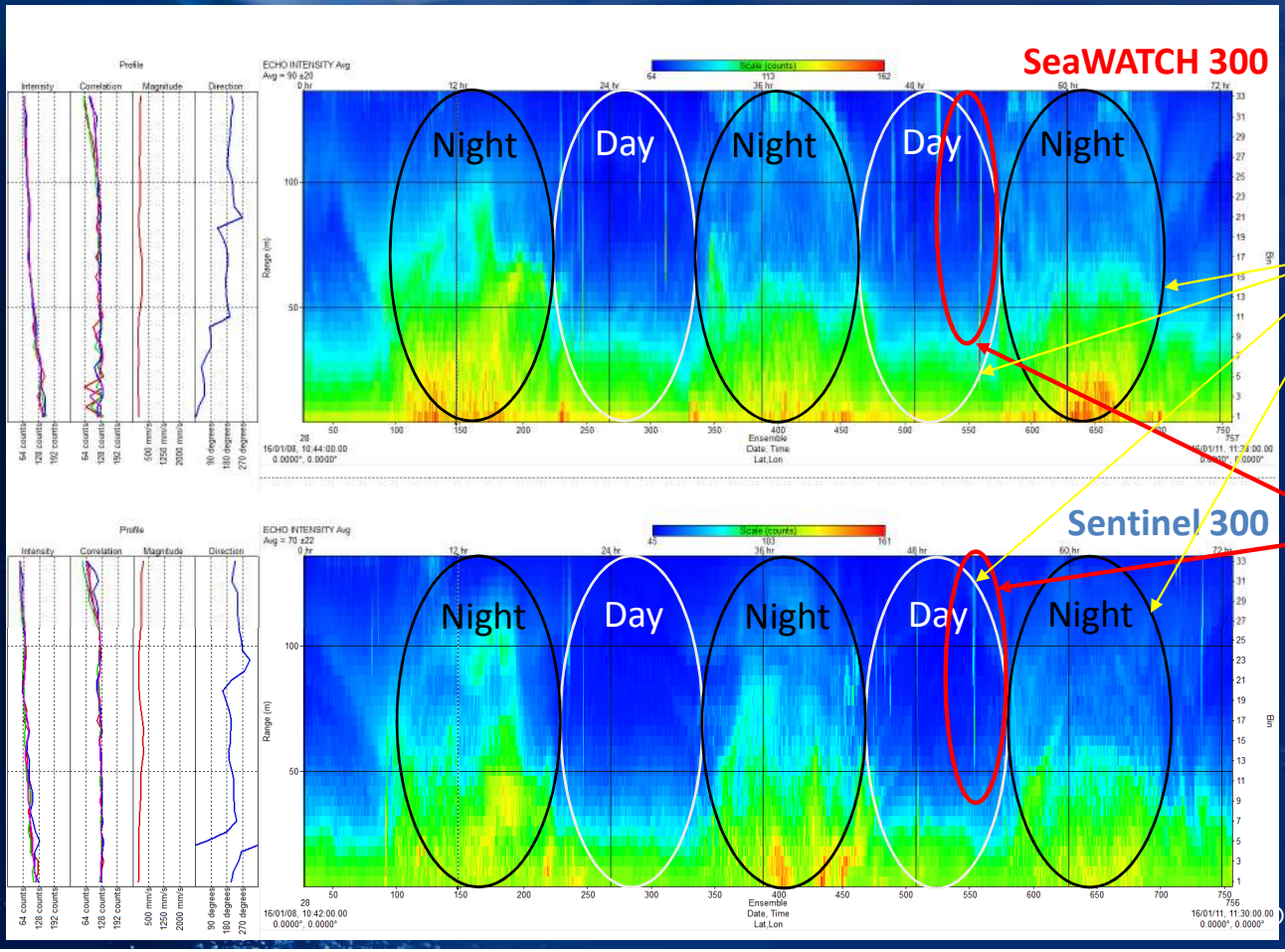
Echo Intensity



Echo Intensity

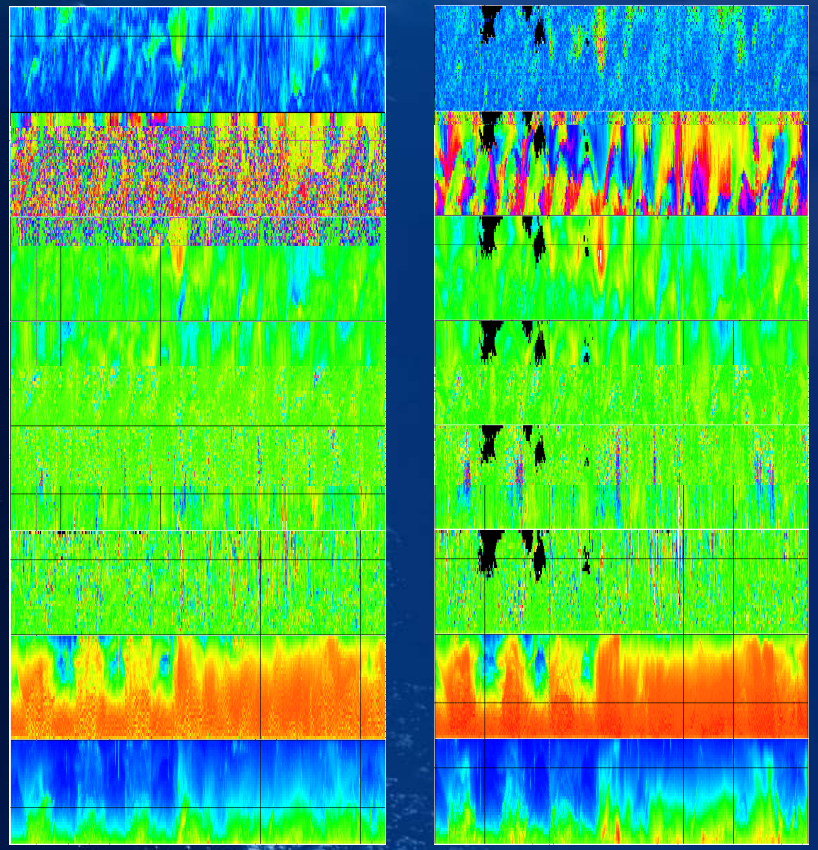
Echo intensity shows the same structure in each system.

- Diurnal migration of the backscatter indicates the return is off biological material, typically plankton, that come to the surface during night when lower visibility protects them from predators.
- Long cycle interference terms are seen by both systems. Origins of these are unknown

Conclusions

RoweTech SeaWATCH

Teledyne Sentinel 300



Magnitude

Direction

Velocity East

Velocity North

Vertical Velocity

Error Velocity

Correlation

Echo Intensity

Conclusions

The data analysis shows that the RoweTech SeaWATCH 300 and the Teledyne Sentinel 300 both make the same measurement under identical conditions. The RoweTech system shows an overall higher signal to noise return than the Sentinel. This contributes to increased range in normal conditions, or better sensitivity in regions or times when there is less backscatter

Data collected by: SEA Corporation Chiba Prefecture Tokyo Japan,