DEVELOPMENT OF SIO RAS HYDROPHYSICAL POLYGON IN THE SHELH-SLOPE ZONE OF THE NE BLACK SEA

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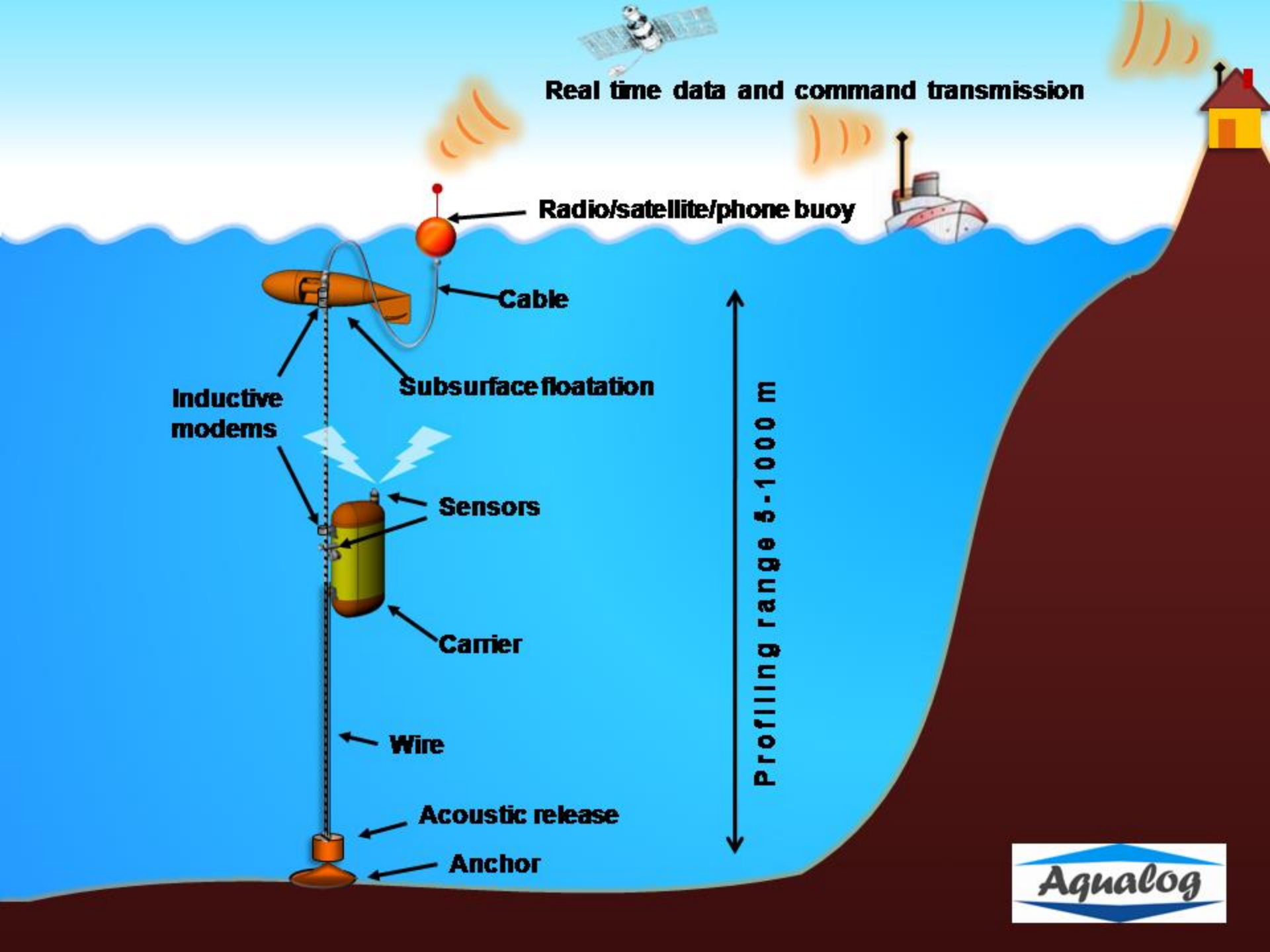
Preamble.

The basic tool for monitoring and research of the shelf-slope zone of the ocean are an anchored automatic stations with near-real time data transmittion placed at selected testing areas.

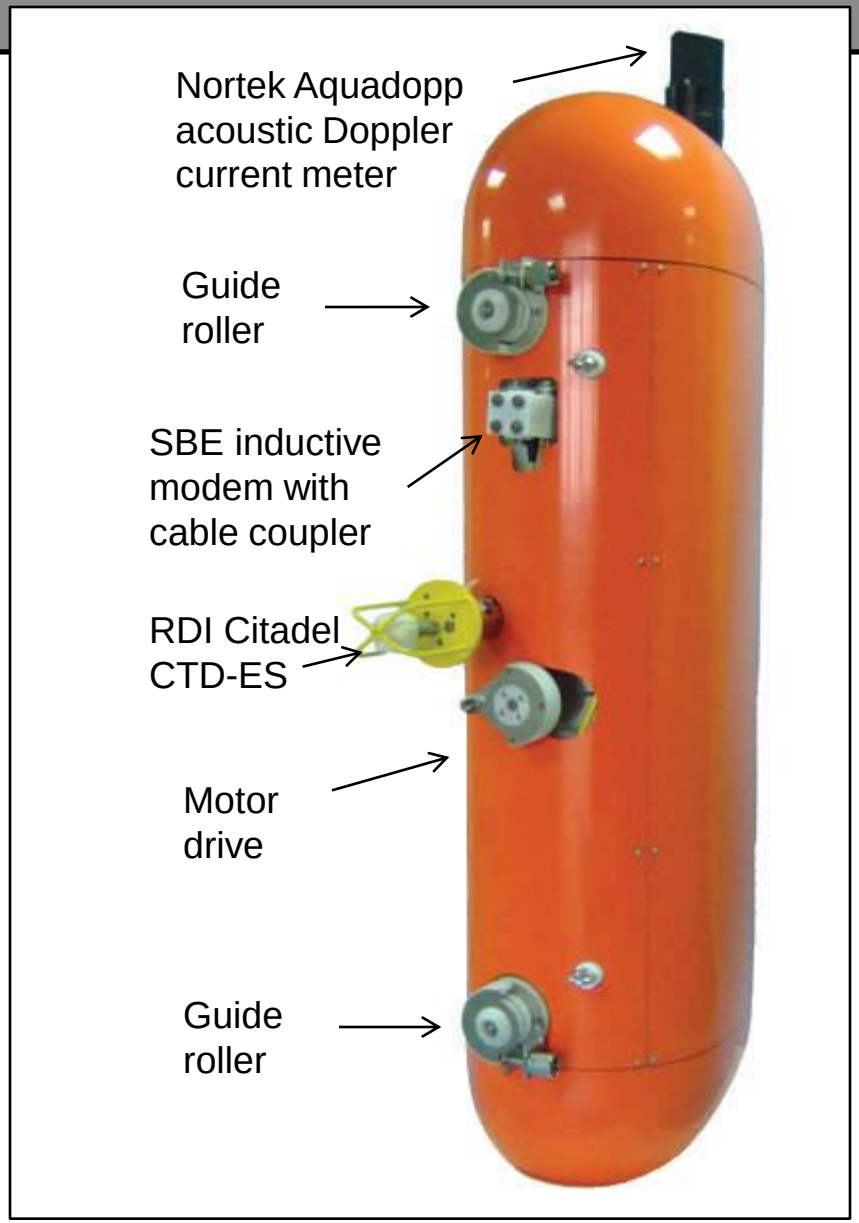
Such testing area was developed in NE Black Sea near Gelendzhik where the Southern Branch of SIO RAS is located.

Brief description of autonomous moored and bottom stations placed at the testing area

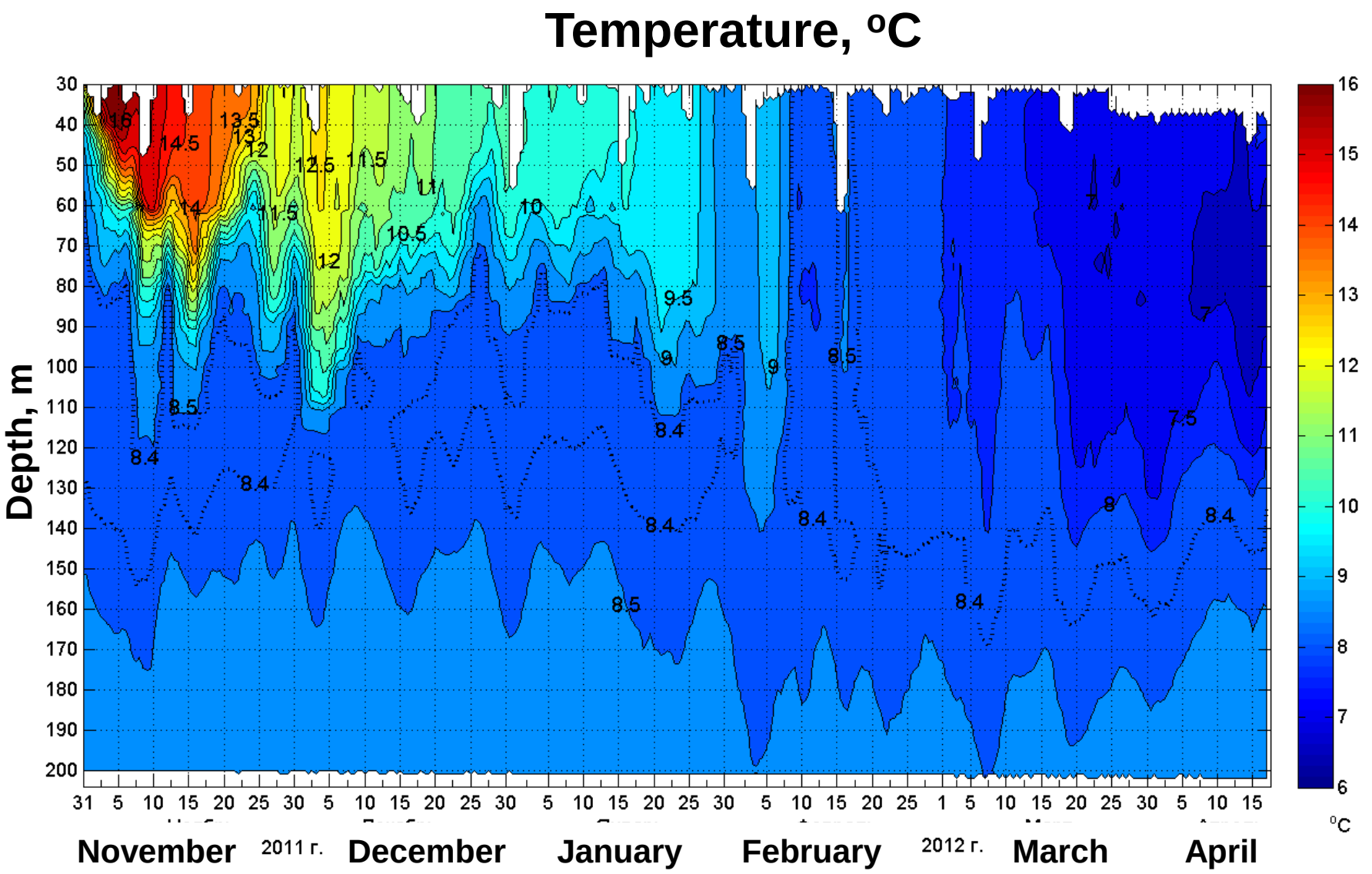
1. **“Aqualog” (SIO RAS)** - a new ocean autonomous profiler for multiparametric surveys at fixed geographical locations.


Real time data and command transmission
Radio/satellite/phone buoy
Cable
Subsurface floatation
Inductive modems
Sensors
Carrier
Wire
Acoustic release
Anchor
Profiling range 5-1000 m
Aqualog

Moored profiler Aqualog, 2009

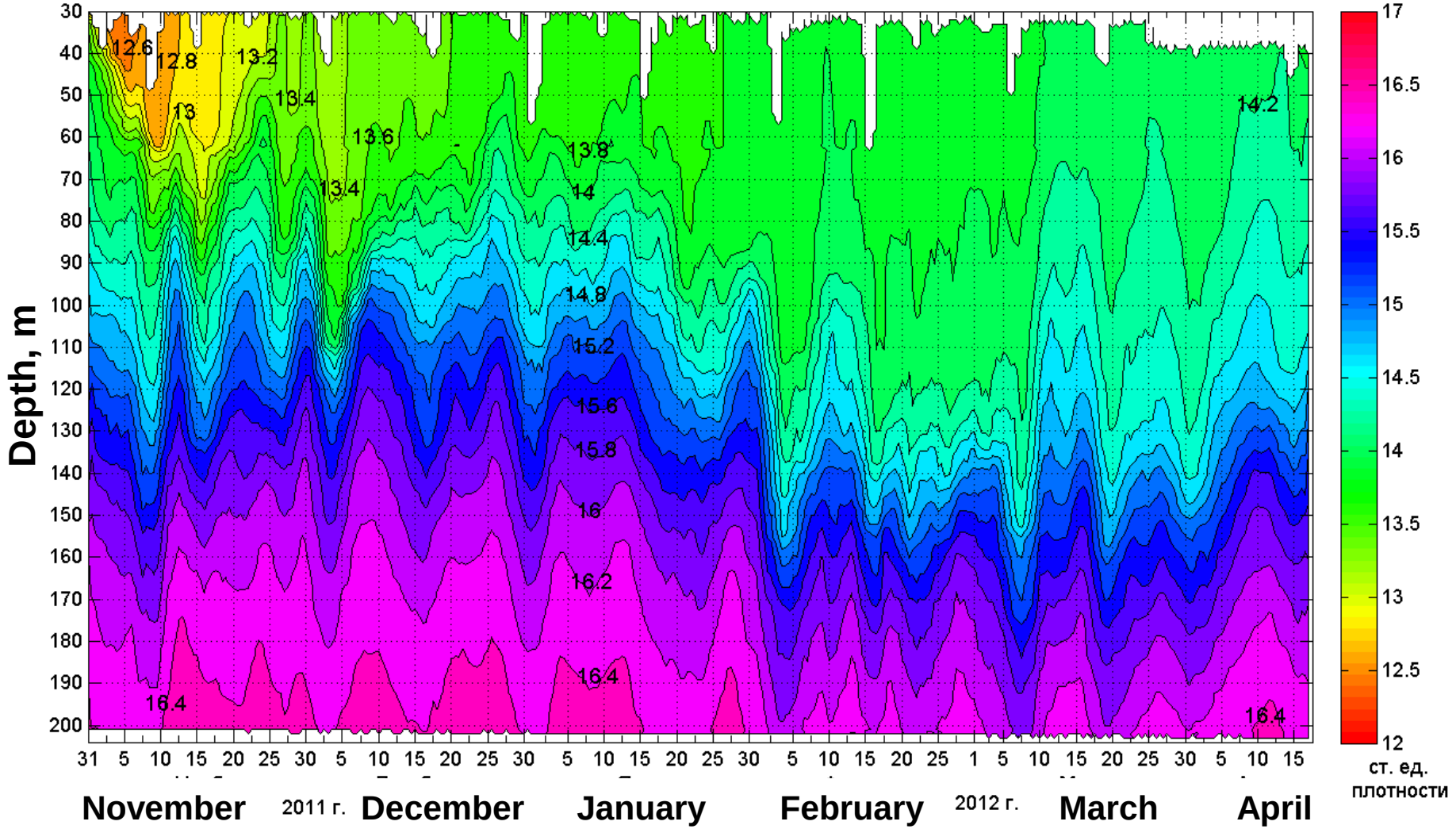


An example of a long-term continuous profiling of the upper 200-м layer (31/10/2011 - 17/04/2012)



An example of a long-term continuous profiling of the upper 200-м layer (31/10/2011 - 17/04/2012)

Specific density



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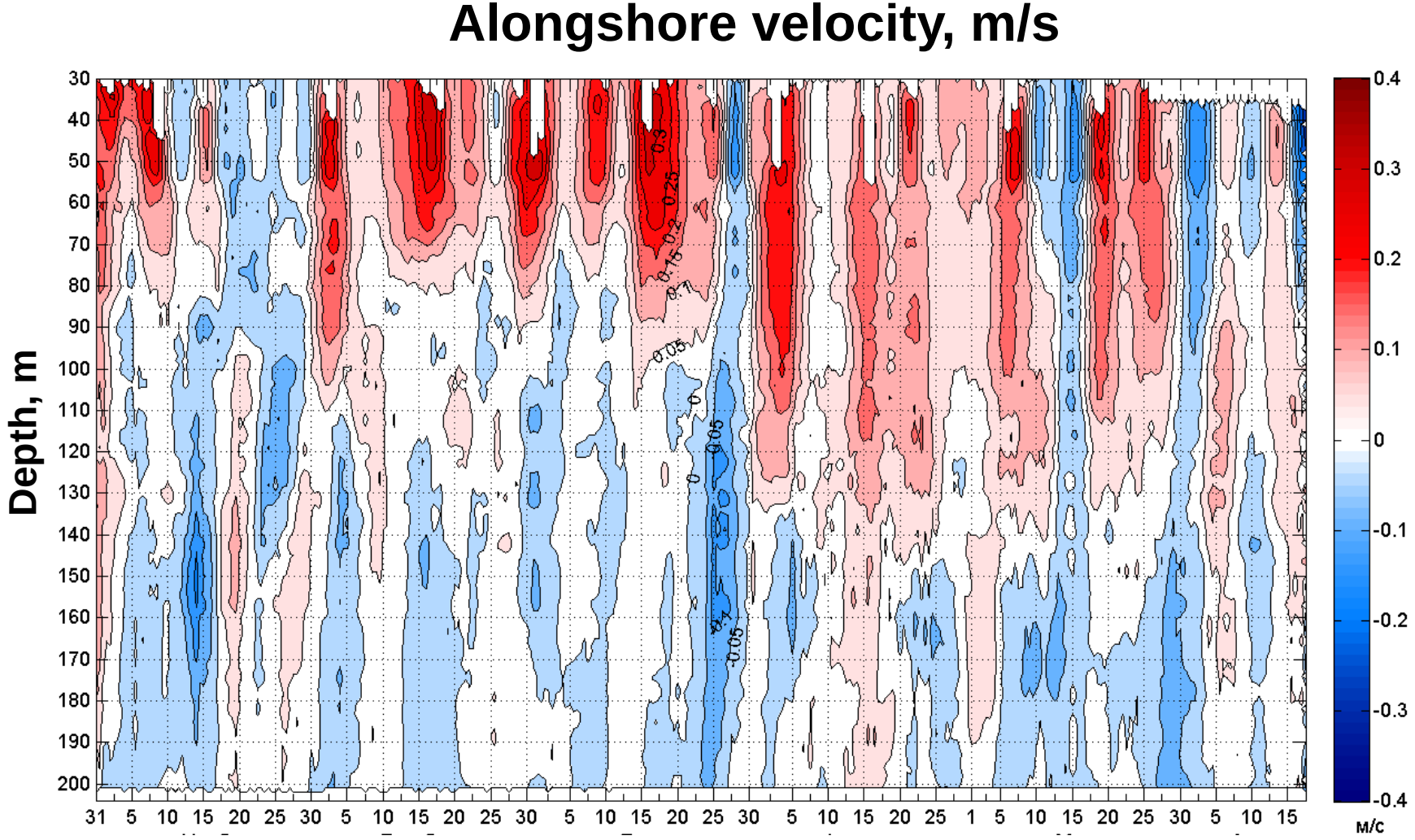
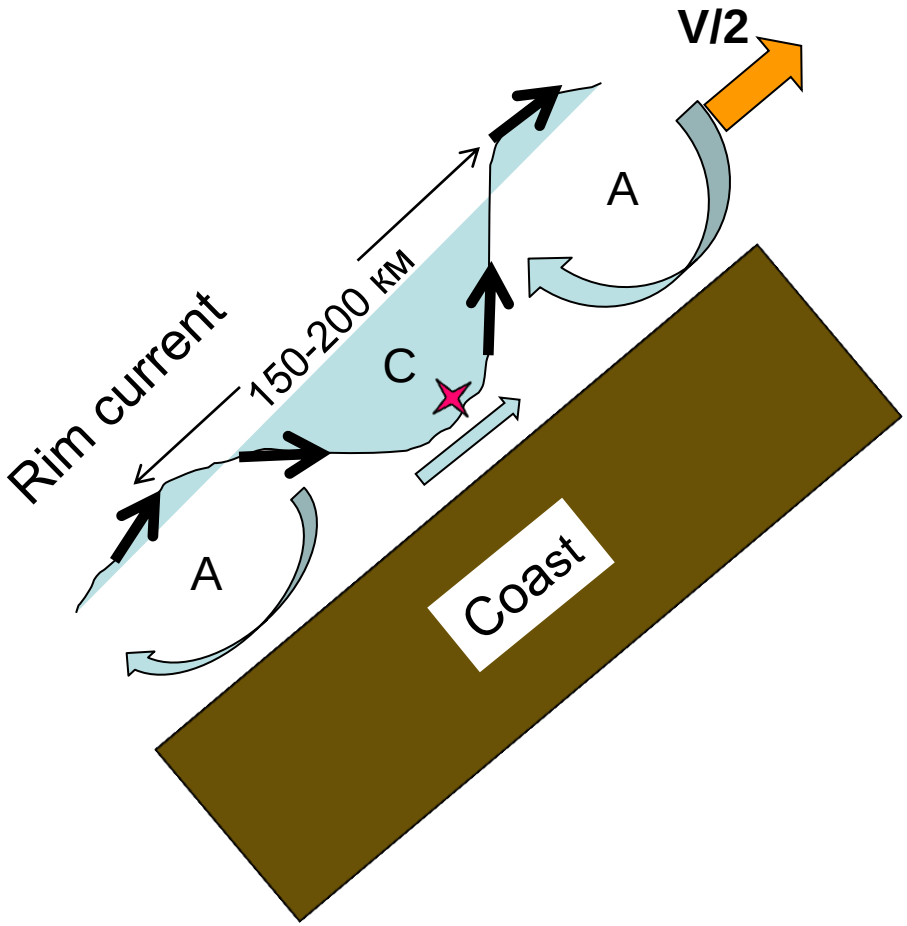
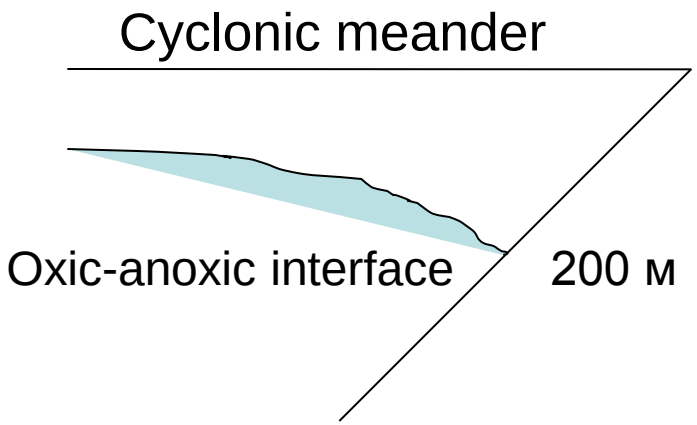
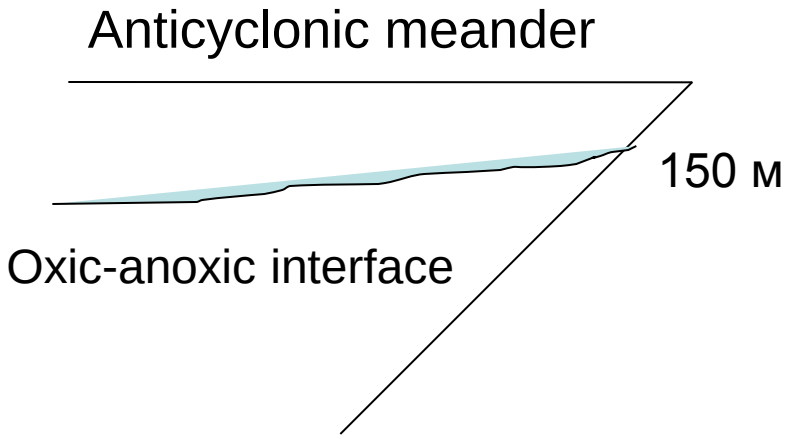


Scheme of formation of 5-10 daily fluctuations



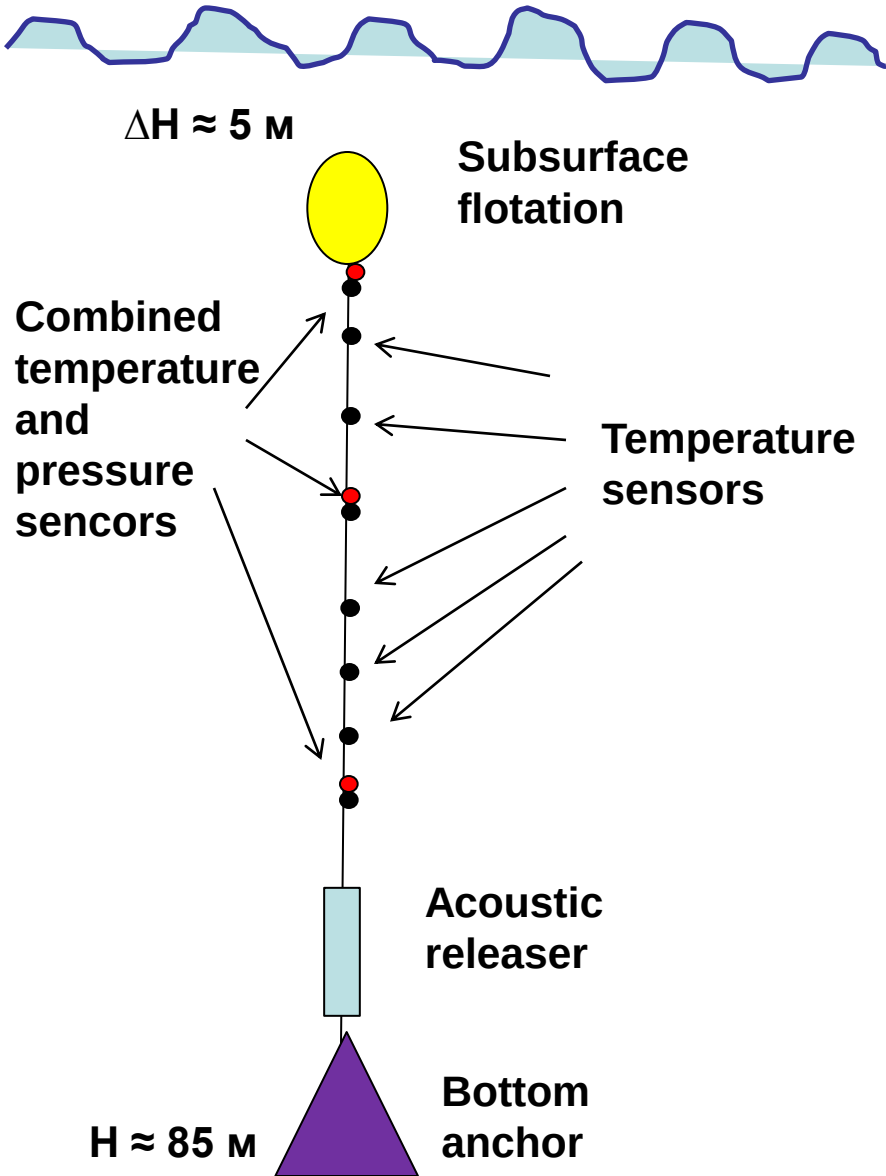




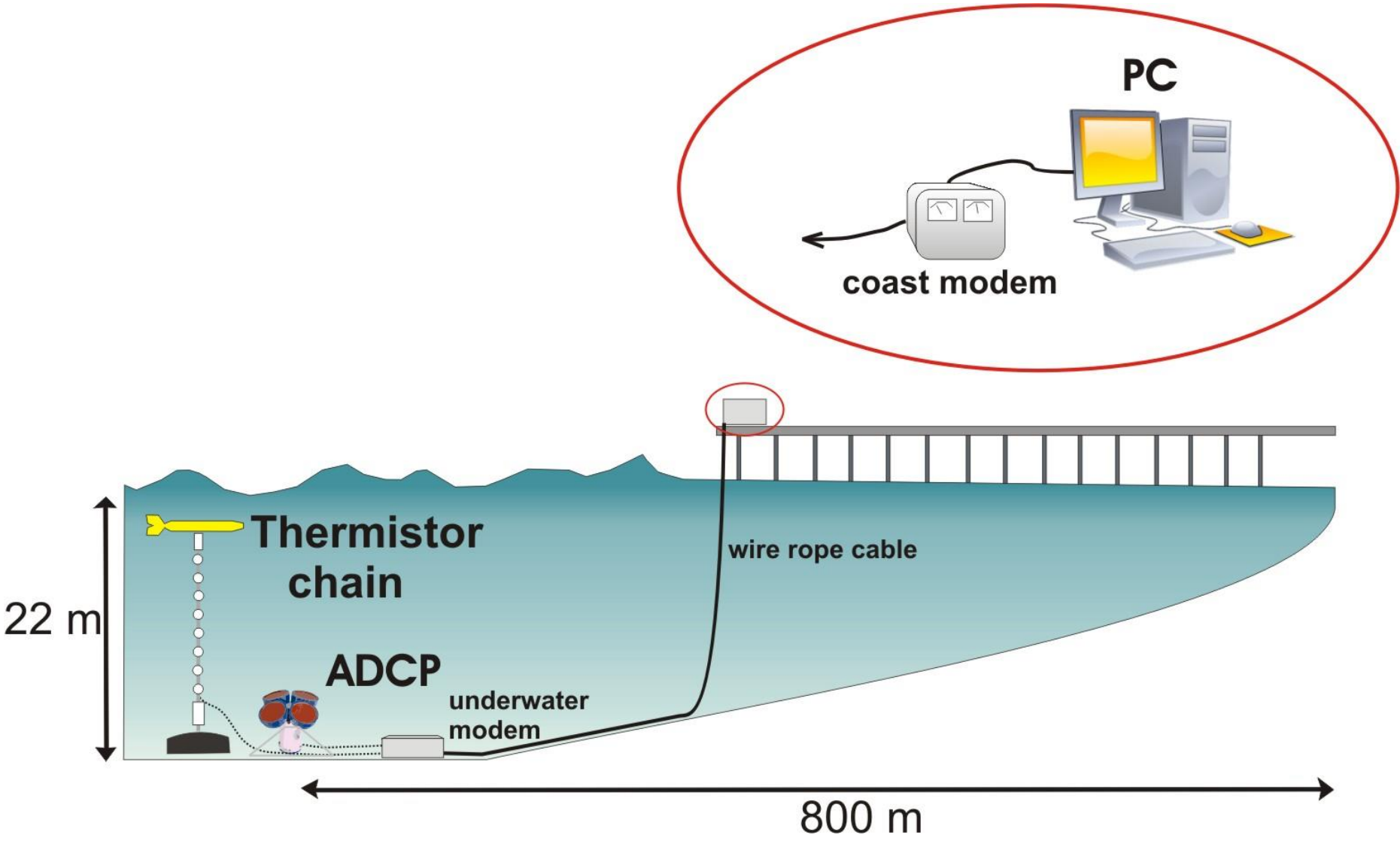
- Moored profiler “Aqualog”

2. Bottom mounted ADCP

3. Moored thermistor chain



Real time data transmission from bottom ADCP and moored thermistor chain: connection scheme



ADCP online data - 1

WaveMon software by RD Instruments

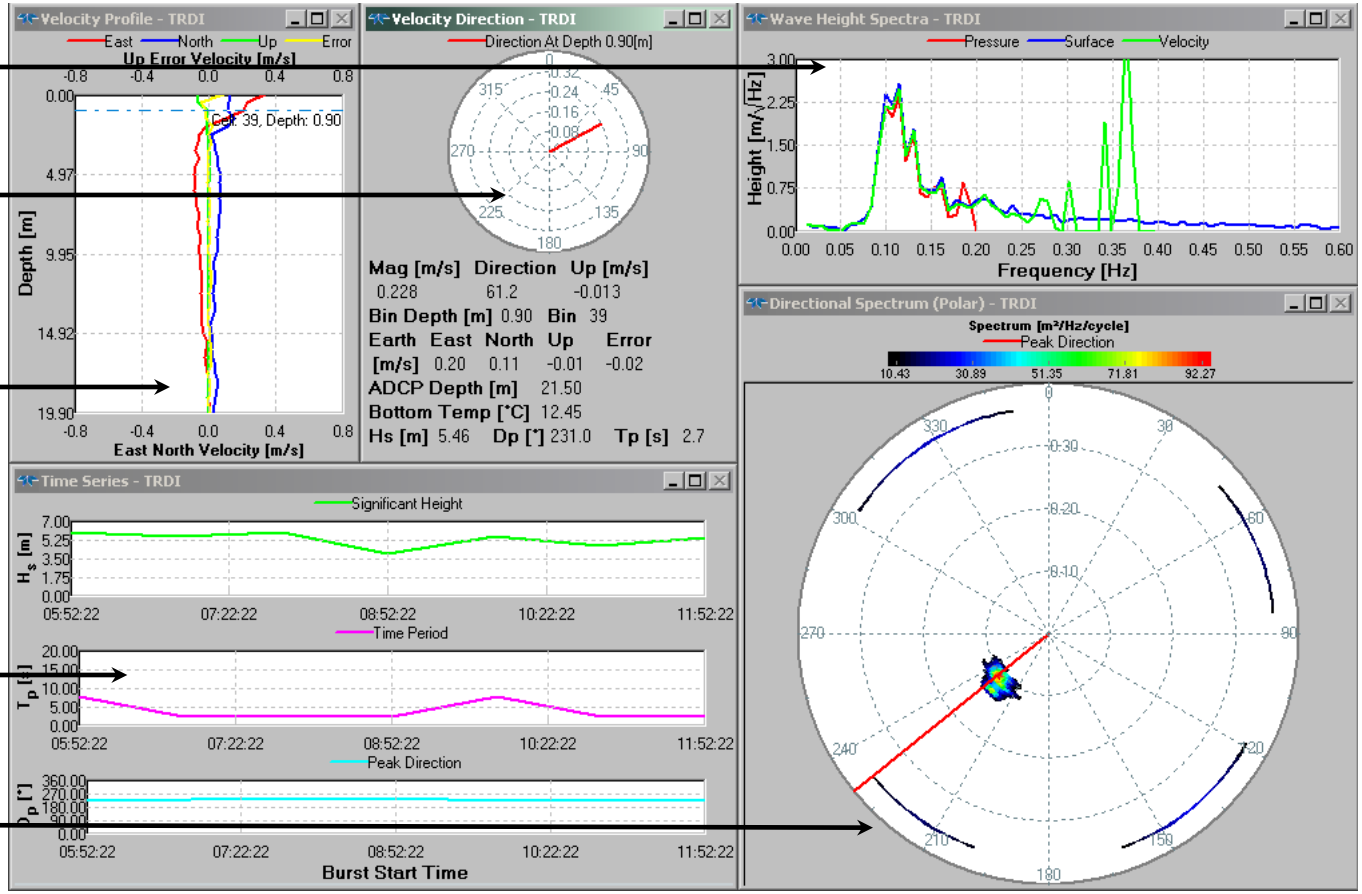
Wave height spectra

Velocity direction on a particular depth

Velocity profiles (east-north-up)

Time series (significant wave height, time period, peak direction)

Directional spectrum



ADCP online data - 2

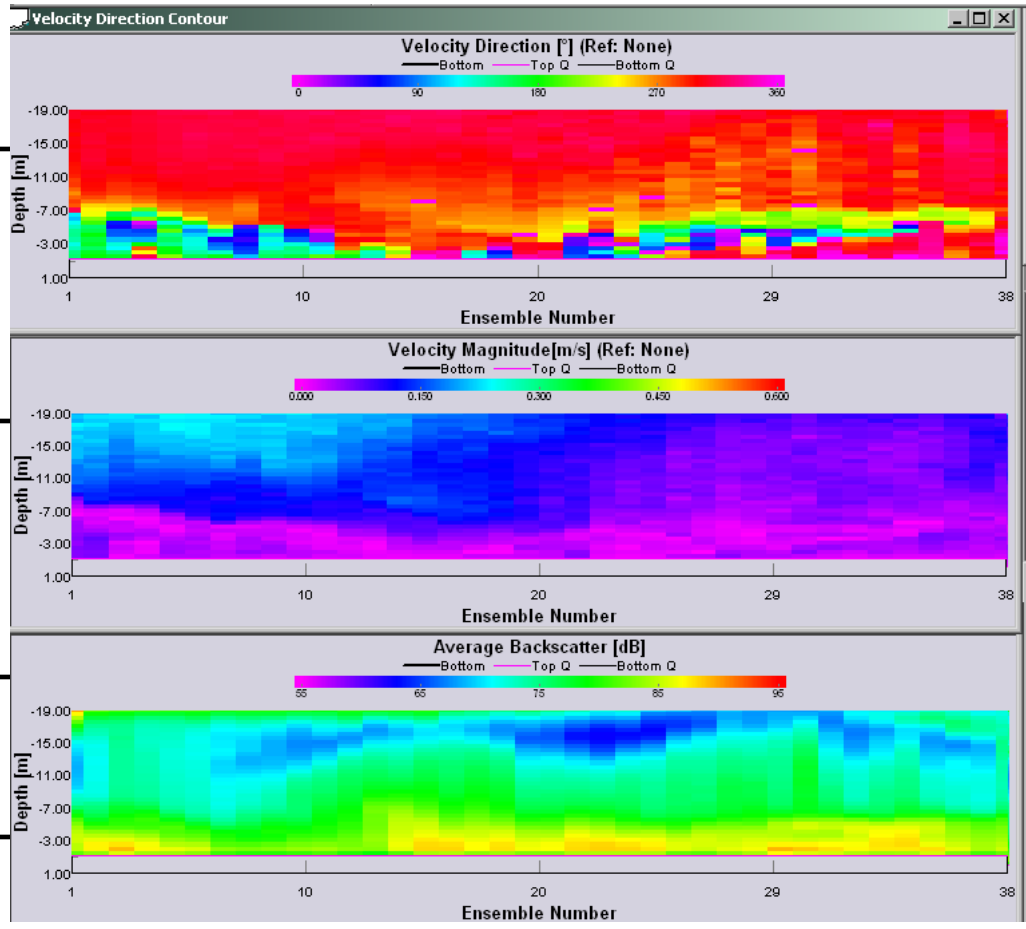
WinRiver software by RD Instruments

Horizontal velocity direction

Horizontal velocity magnitude

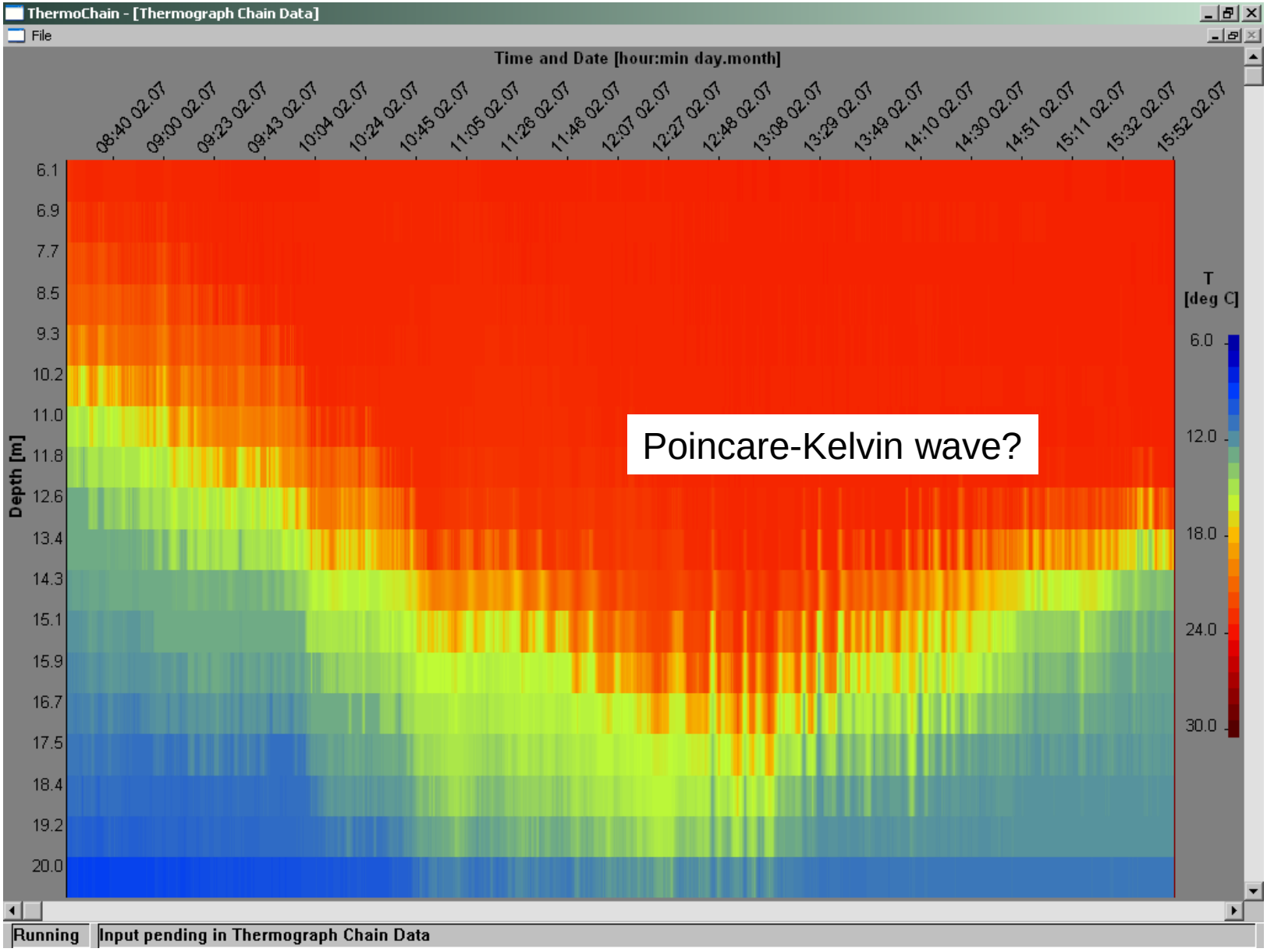
Average backscatter

Tables



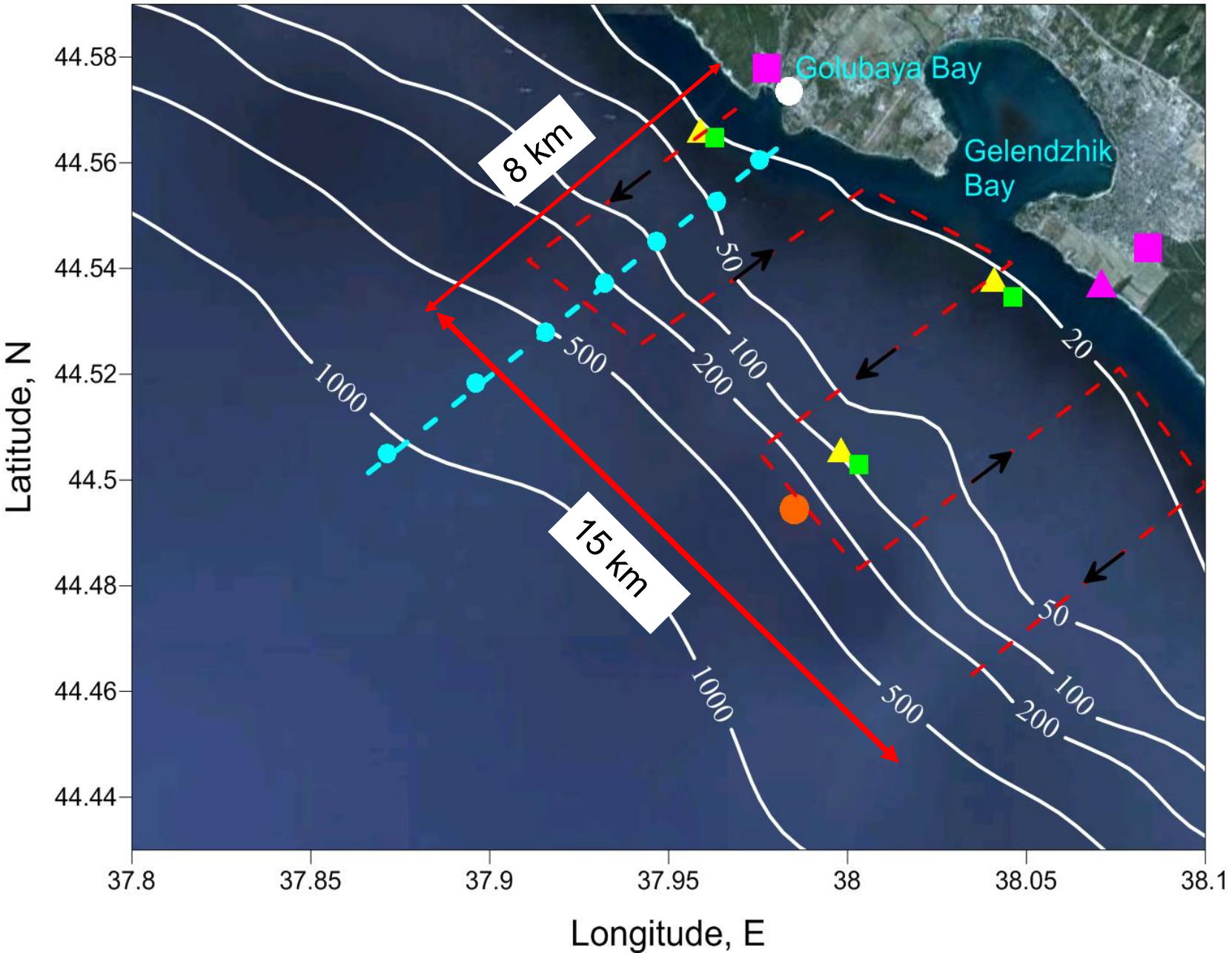
6 hours

Thermistor chain online data



6 hours

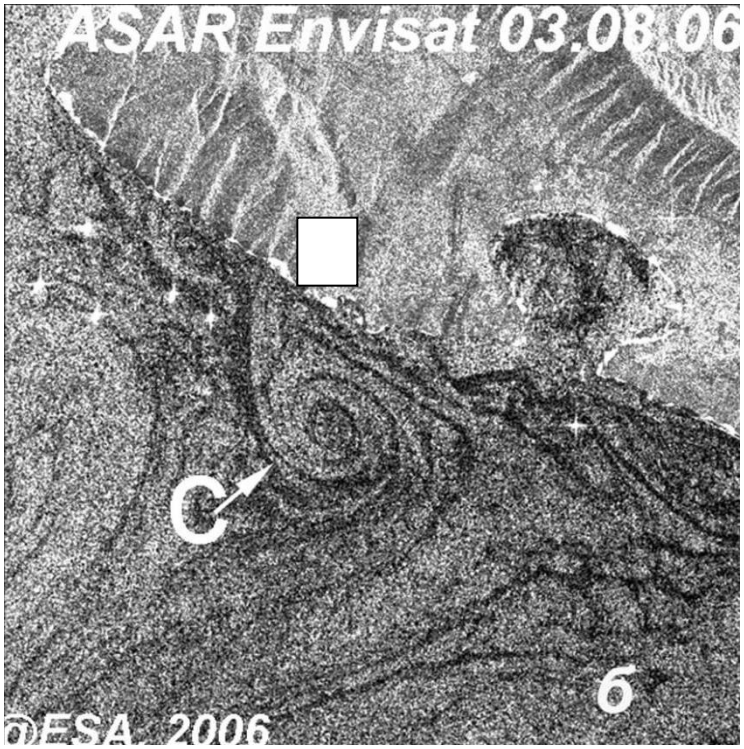
The scheme of the SIO RAS testing area

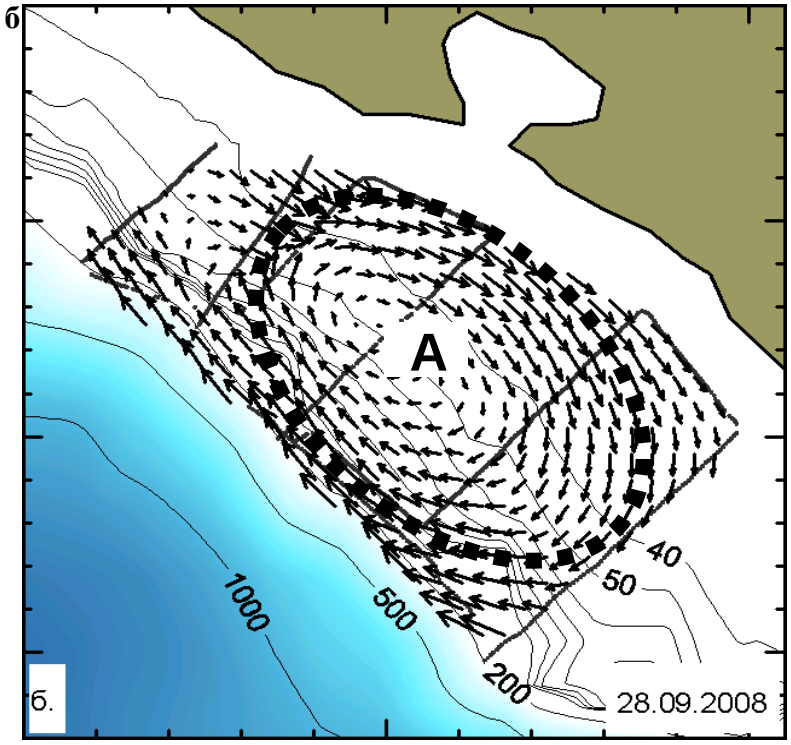


Small (27-ton) R/V “Ashamba”

Spatial velocity field survey by towed ADCP in a streamlined body

Submesoscale eddies at the Black Sea shelf

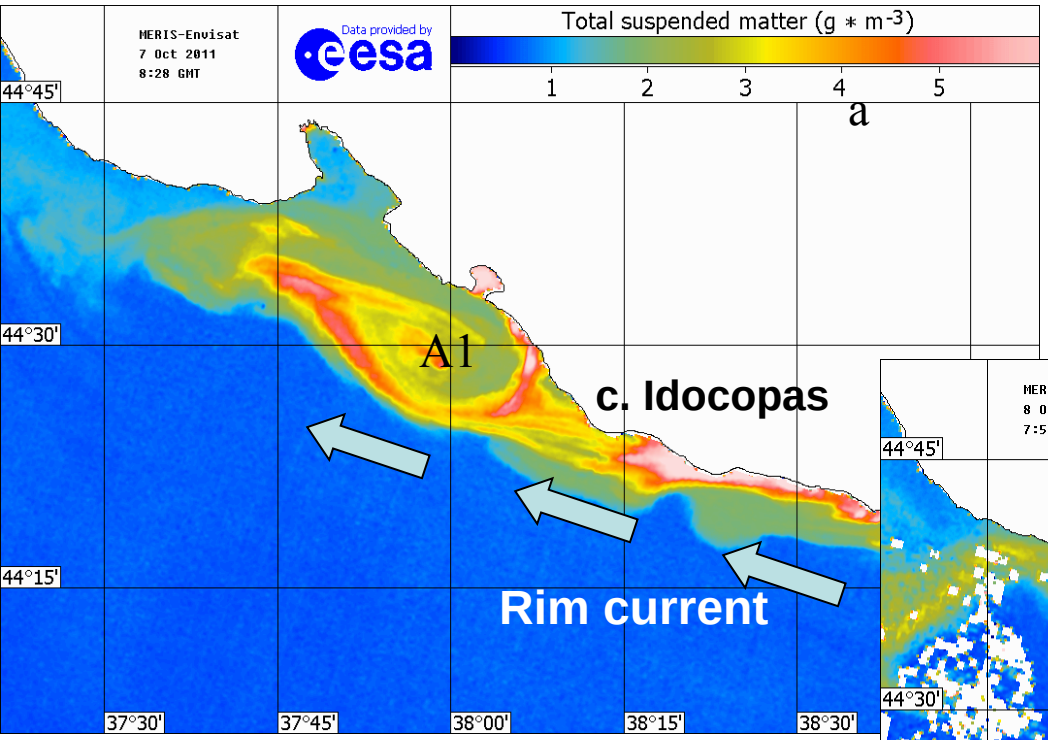




Right picture: microwave radar image of the sea surface with well pronounced cyclonic (**C**) submesoscale eddy.

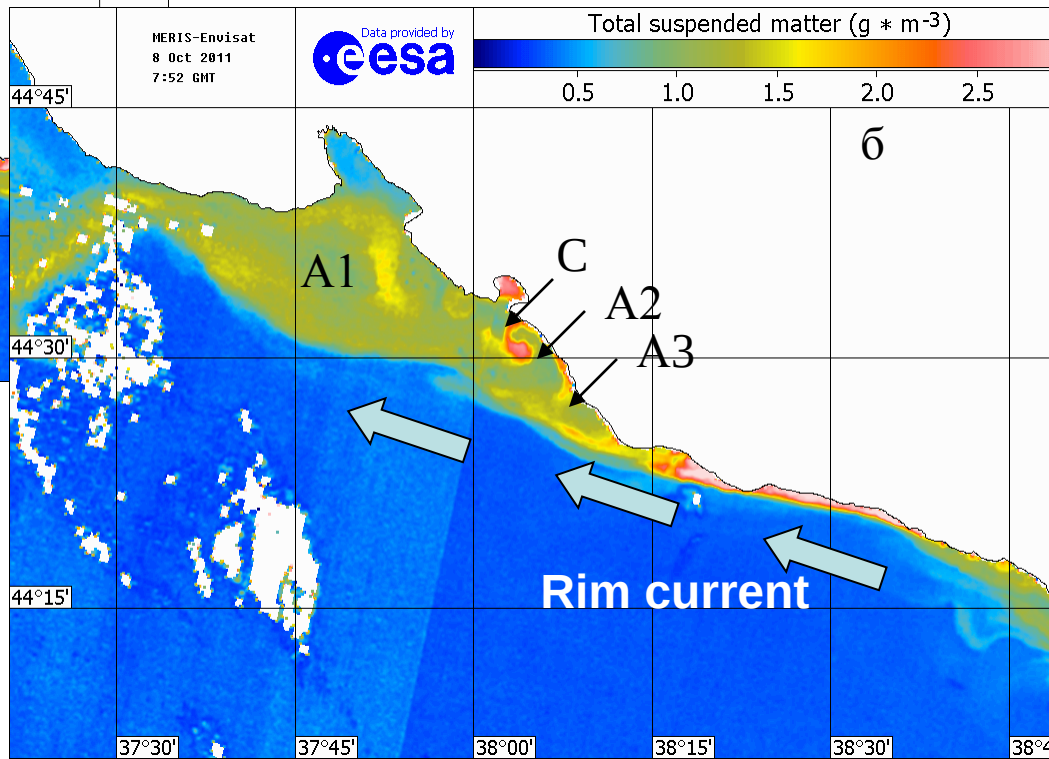
Left picture: submesoscale anticyclonic (**A**) eddy in the upper mixed layer identified from the velocity field obtained by towed ADCP survey.

Separation of Rim current from the cape Idocopas as a generation mechanism of submesoscale anticyclons (MERIS-Envisat, 07-08.10.11)

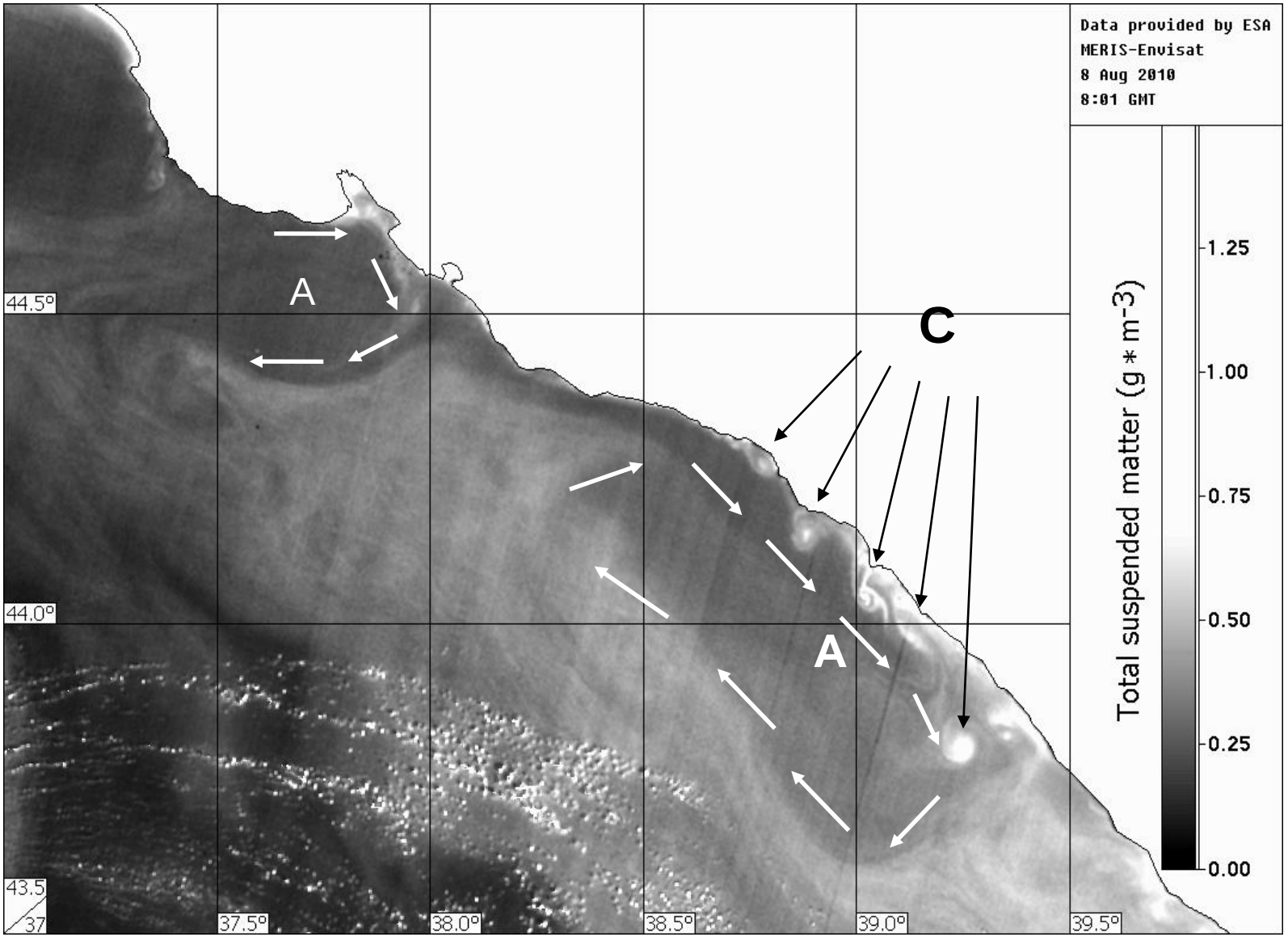


a) submesoscale anticyclon A1 (MERIS-Envisat, suspended meter, 07:52 07.10.11)

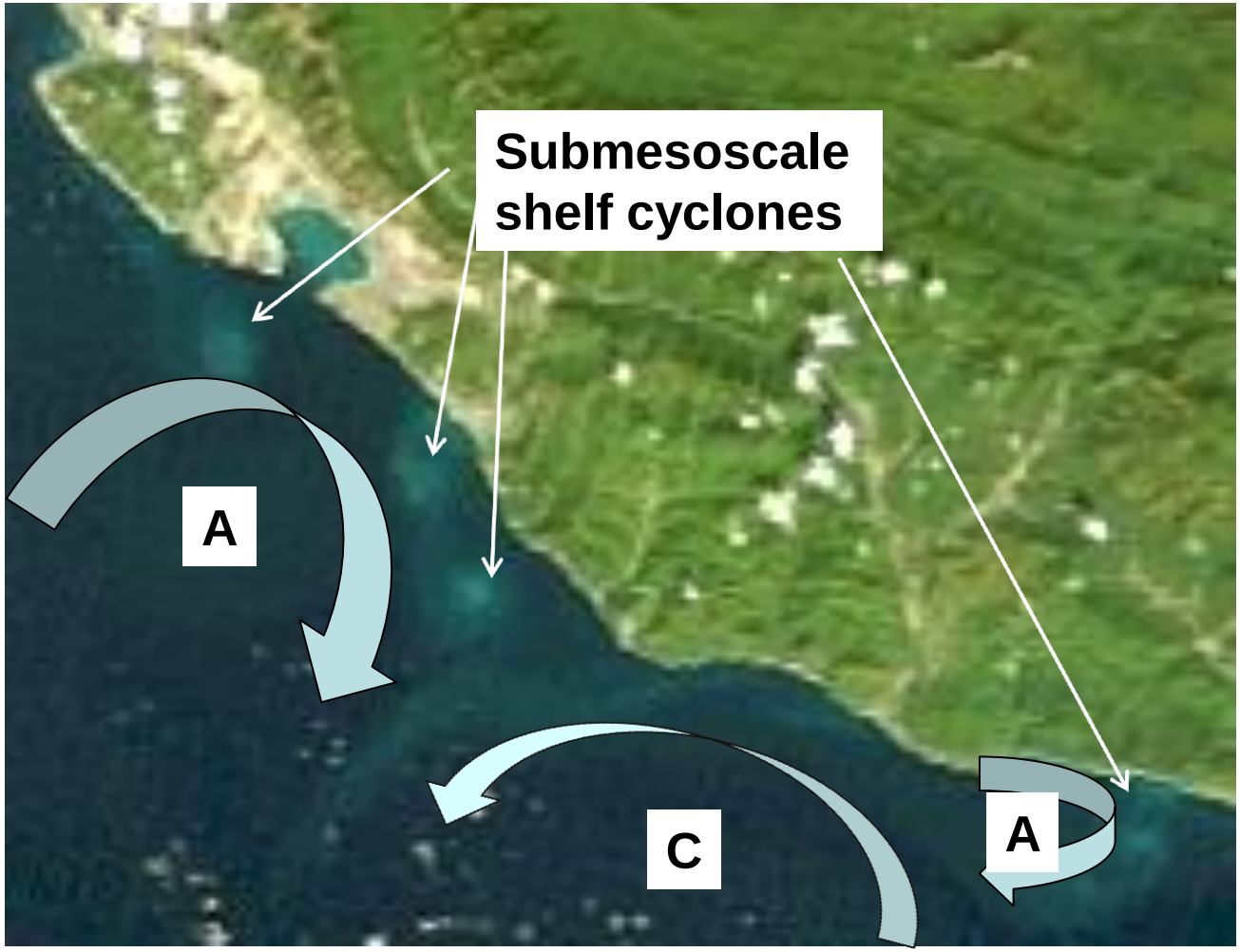
b) submesoscale anticyclones A1, A2 and A3(?) and small cyclone C (MERIS-Envisat, suspended meter, 08:28 08.10.11)



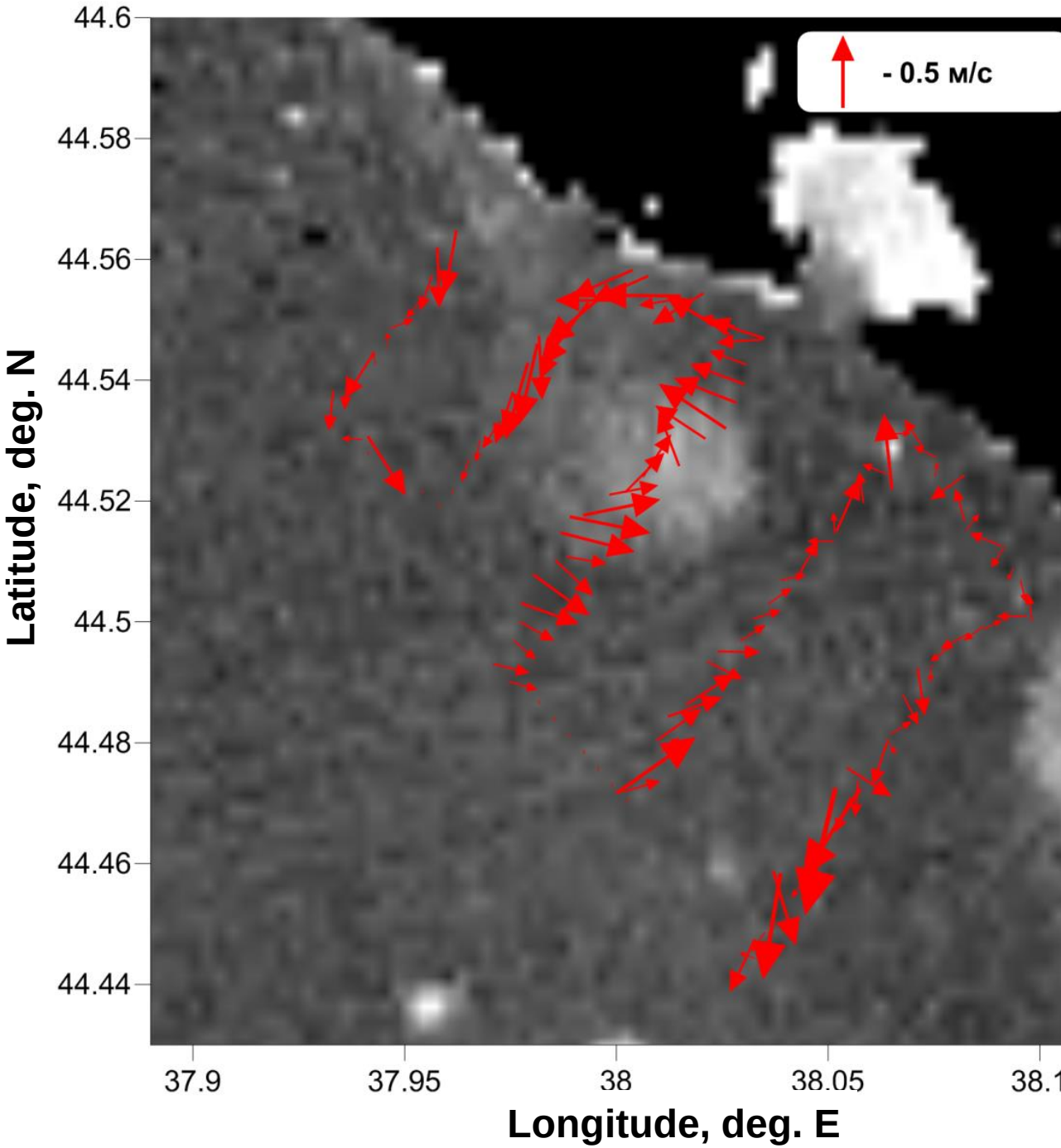
Formation of submesoscale cyclones due to shear instability of the alongshore current



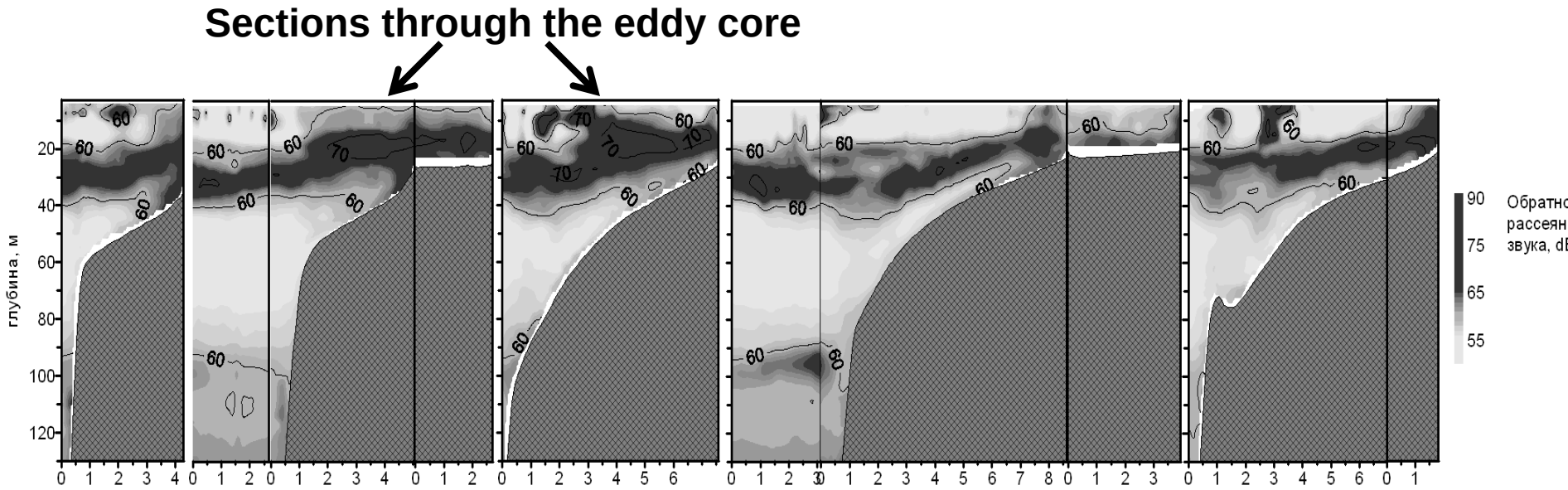
Circulation scheme in the NE Black Sea imposed at the Modis-Terra satellite image of 25/09/2012. “A” and “C” – mesoscale anticyclones and cyclone, correspondingly



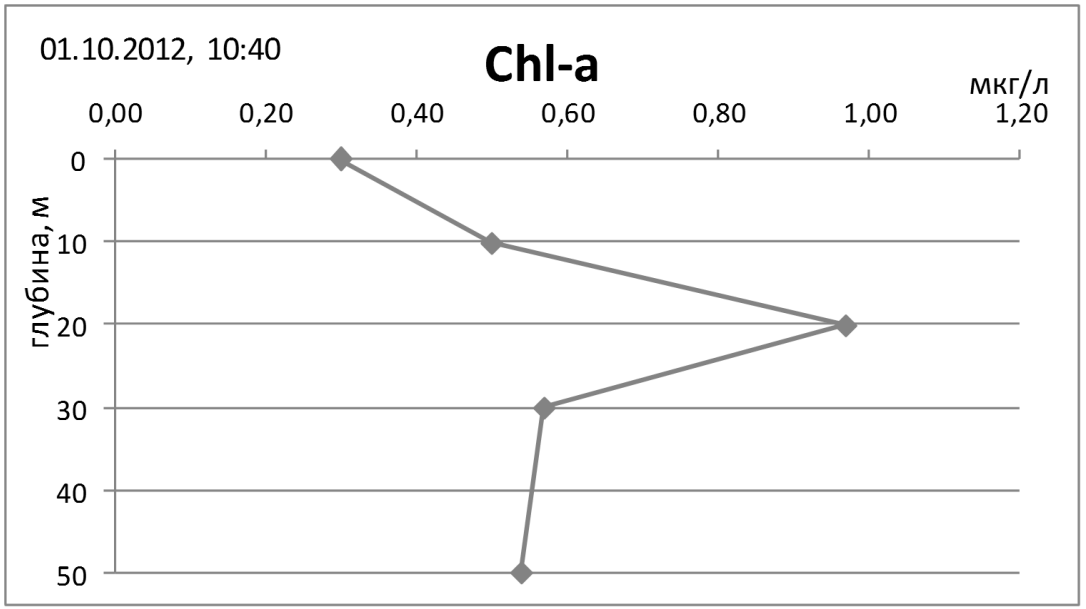
A study of the velocity field in identified at the satellite image submesoscale cyclone by means of towed ADCP



Towed ADCP acoustic backscatter signal at the sections across the submesoscale cyclone: signs of upwelling in the eddy core



Typical vertical profile of *in situ* measured cholorophyll_a concentration in the NE Black Sea (01/10/2012)



Some plans

1. Further development of measurement technology and real time data transmission. Spreading of the testing area to the deeper part of the sea.
2. Collaboration with other Black Sea countries in order to develop a set of similar testing areas at the coastal zone around the whole sea.
3. The usage of the obtained data for the verification of numerical modeling results

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Thank you!