Ministry of Science, Research and Technology

Iranian National Institute for Oceanography and Atmospheric Science

Deep Caspian Basin Research: a key to answer long standing questions

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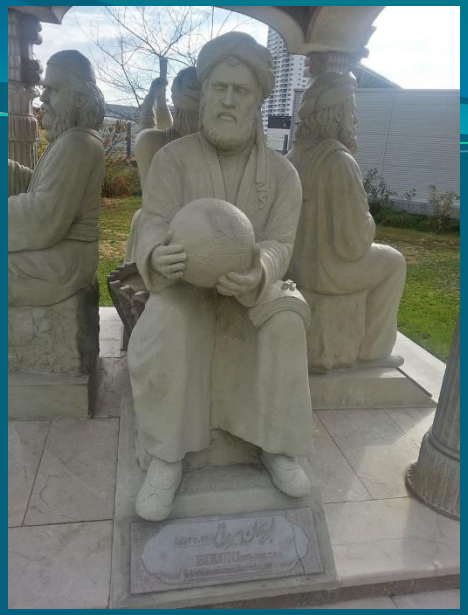


Biruni, 973–1050 AD

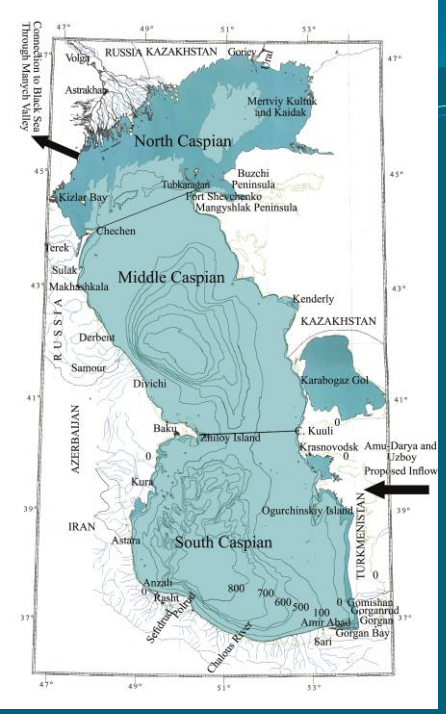
Agr gard ta gard darya begardi, hich mane to nabashad joz chand rood,
ab-e an talkh ast-o tarik, az an hich bar nayayed joz mahi, bar khalaf-e darya-ye Pars

Если вы оборачиваетесь вокруг моря, вам нет препятствий, кроме нескольких рек,
вода горькая и темная, оно не богато,кроме рыбы, в отличие от Персидского моря

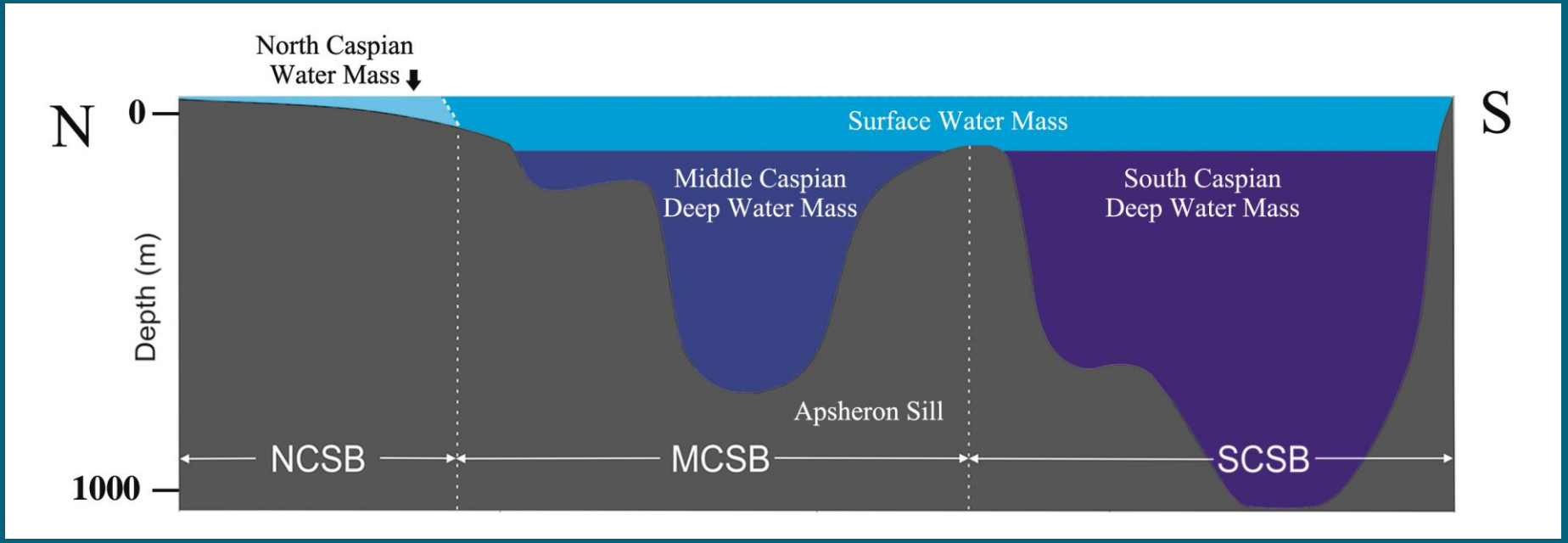
If you turn around the sea, you have no obstacles except a few rivers. ,
the water is bitter and dark, it is not rich except fish, unlike the Persian Sea

Translation into modern language:

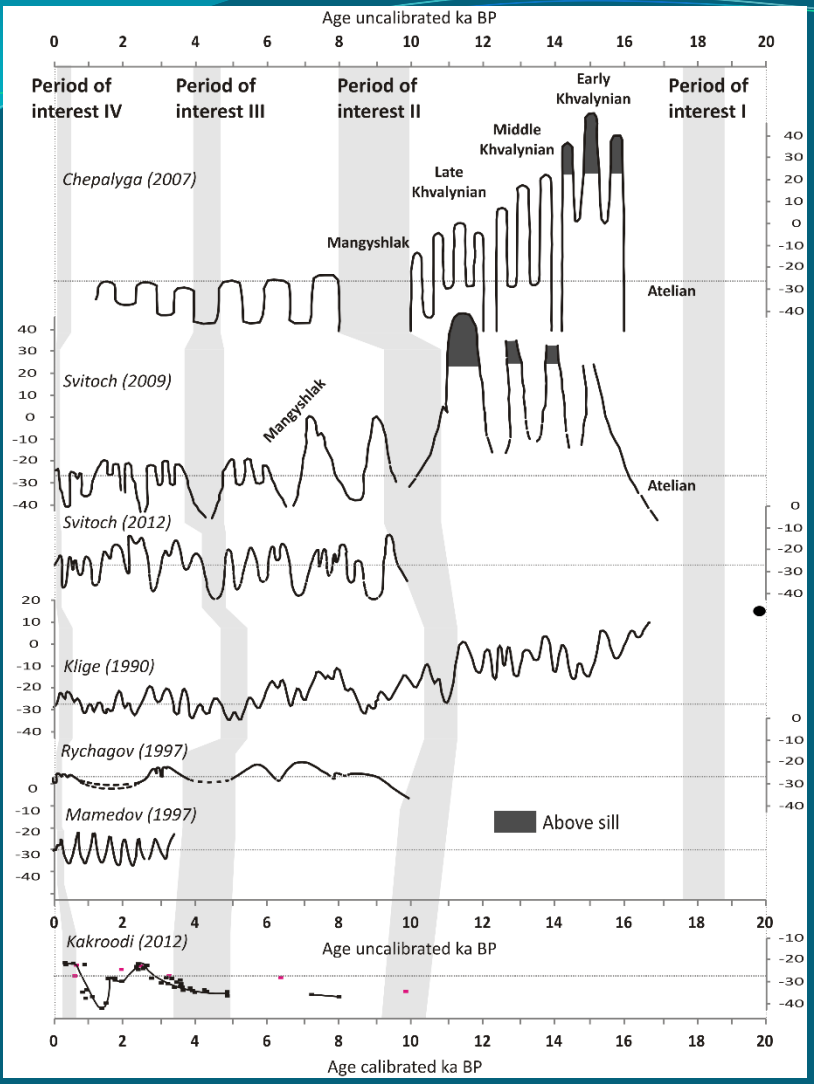
1) The Caspian is a lake
2) Its water is bitter than marine waters and has lesser transparency (know based on different ionic composition of the Caspian water, conductivity should be calibrated then converted to salinity)
3) Except fish (at that time), it has poor biodiversity compared to the Persian Sea



In the current condition two deep Caspian sub-basins (middle and south) encompass main water area and volume, their free connection is prevented by Apsheron Sill. Geochemical specification in two sub-basins differs in highstand and lowstand during instrumental measurement. Water column and bottom sediment were subject of extensive investigations since the Soviet Era. The past researches uncovered many questions, however several questions unanswered yet. Here a few of main questions Will be entangled.



1- Age and altitude of the past extreme sea level changes, their causes and consequences



The Caspian Sea level curve since mid Holocene backward has many disputable aspects. The older the time, the more the errors are.

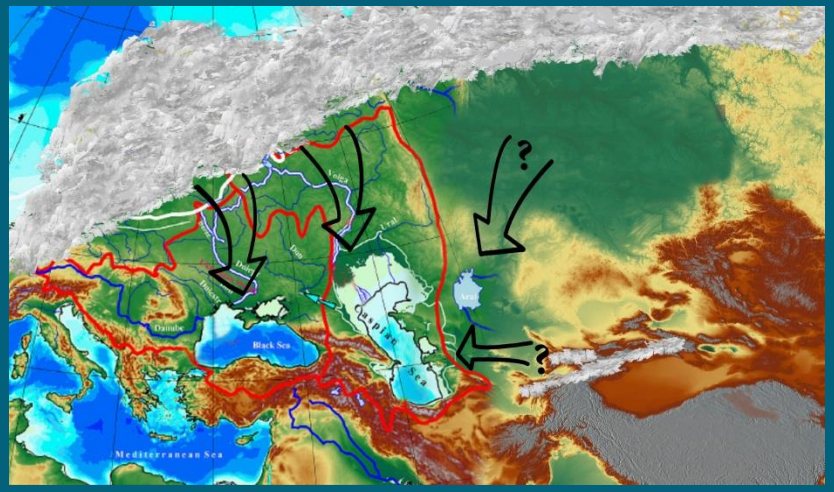
Method of dating and altimetry is the main source of contradiction among authors.

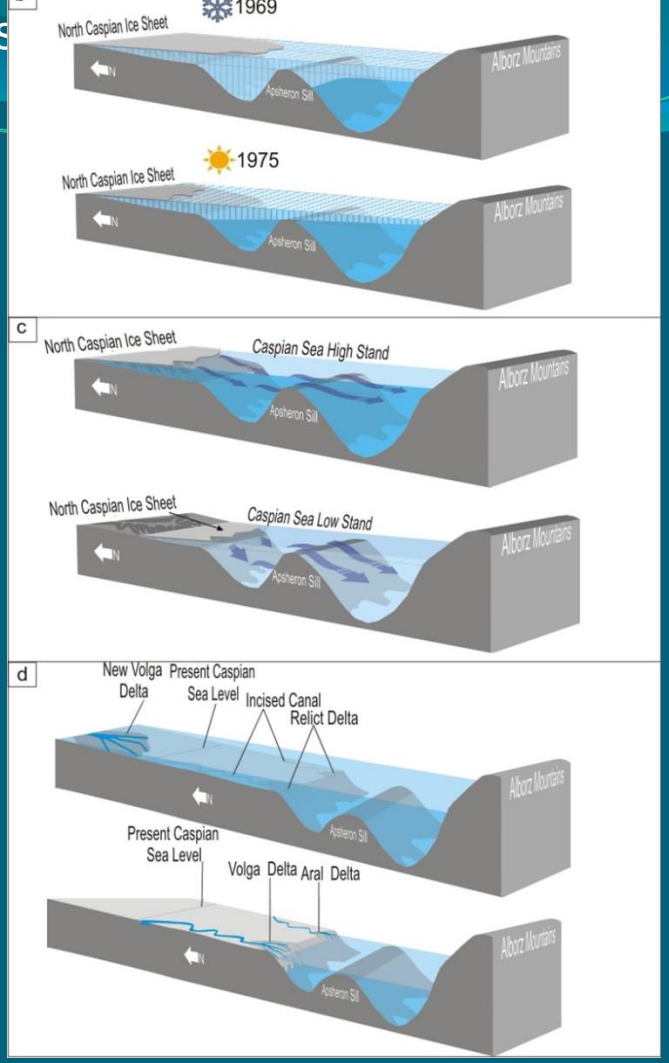
The most concerned periods are the Last Glacial Maximum, Deglacial and early Interglacial.

The source of extra water were the catchment, but which part had crucial input.

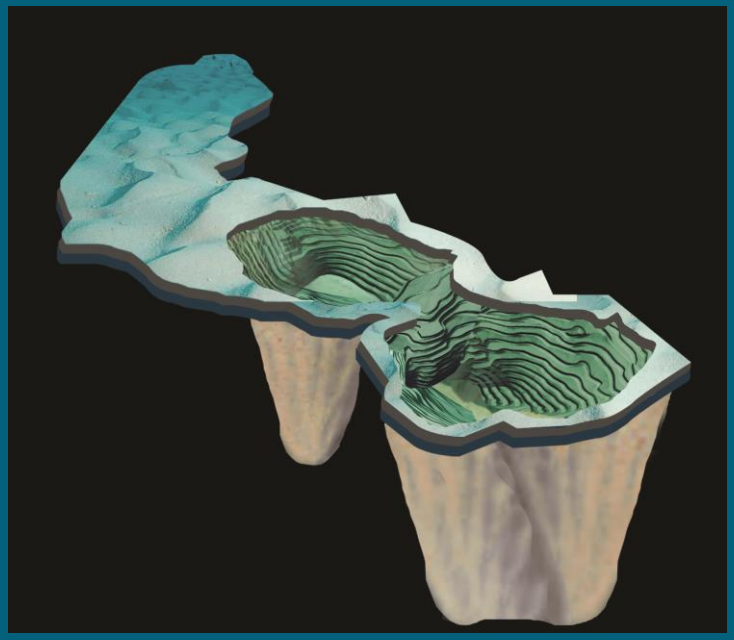
What was the mixing condition during extreme events in the two sub-basins? It determines the reservoir effect for carbon dating .

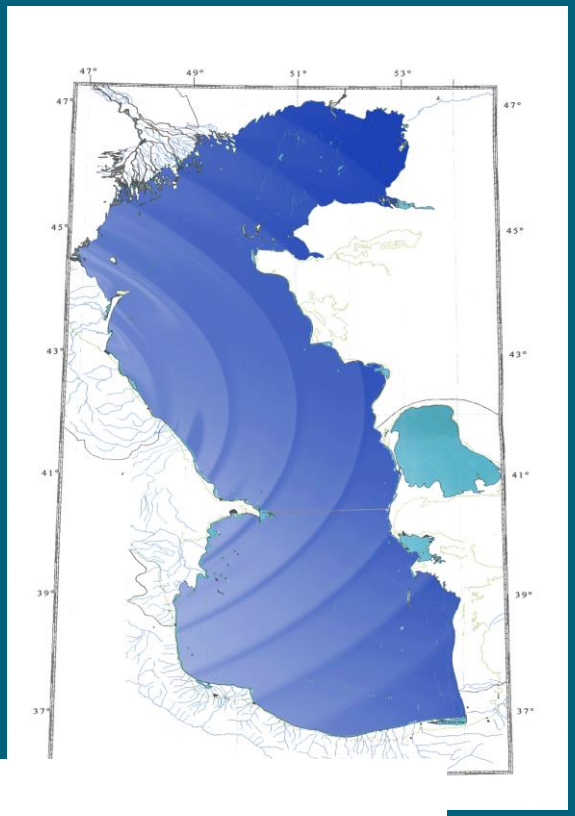
Proposed sources of water into the Cas during extreme condition

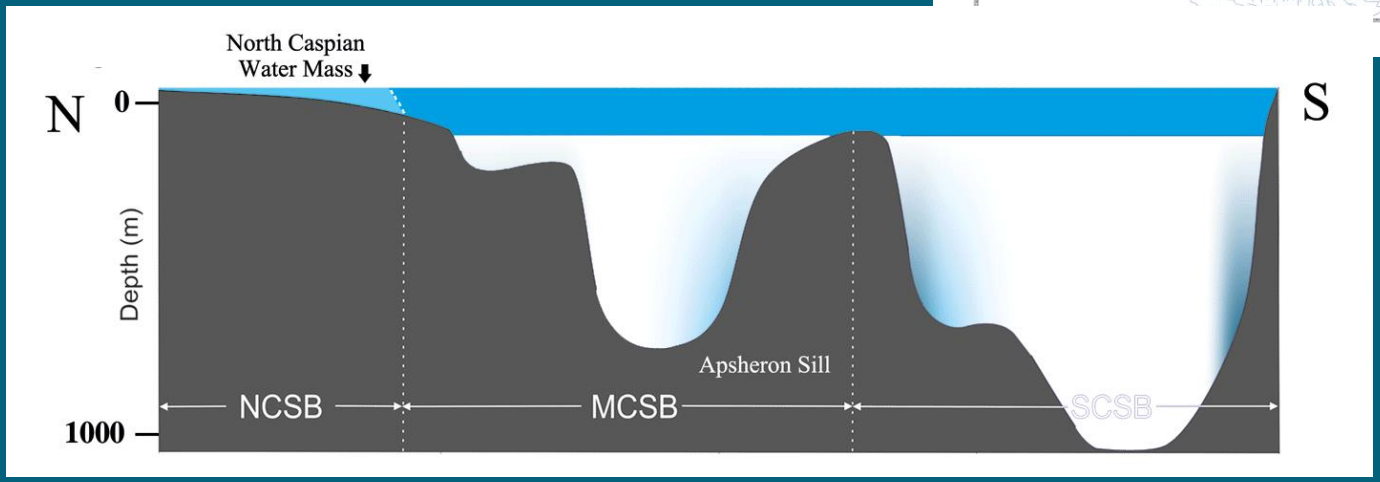




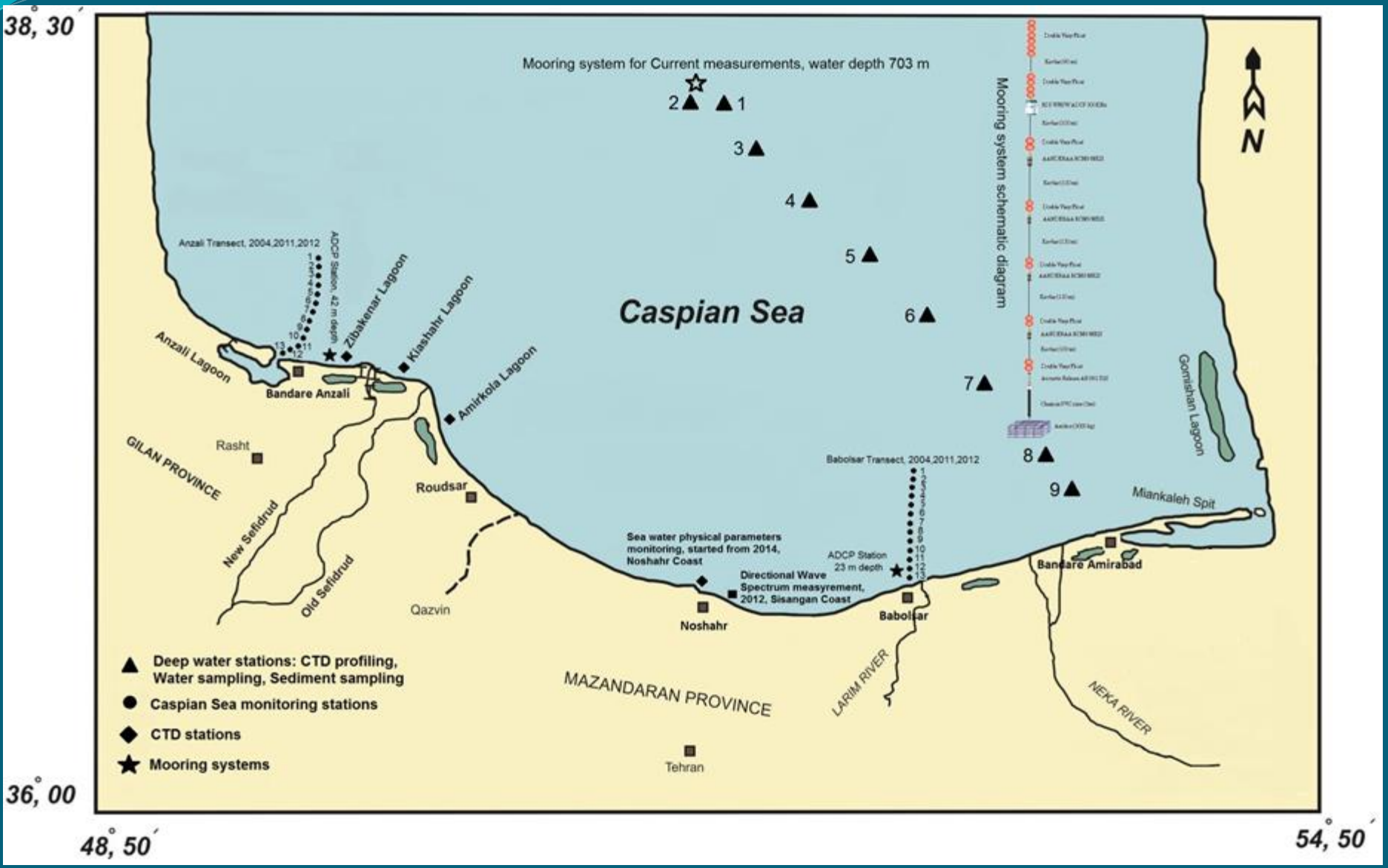
2- Deep water motion: wave or current, possible forcing? INIOAS's experience in the south Caspian deep basin



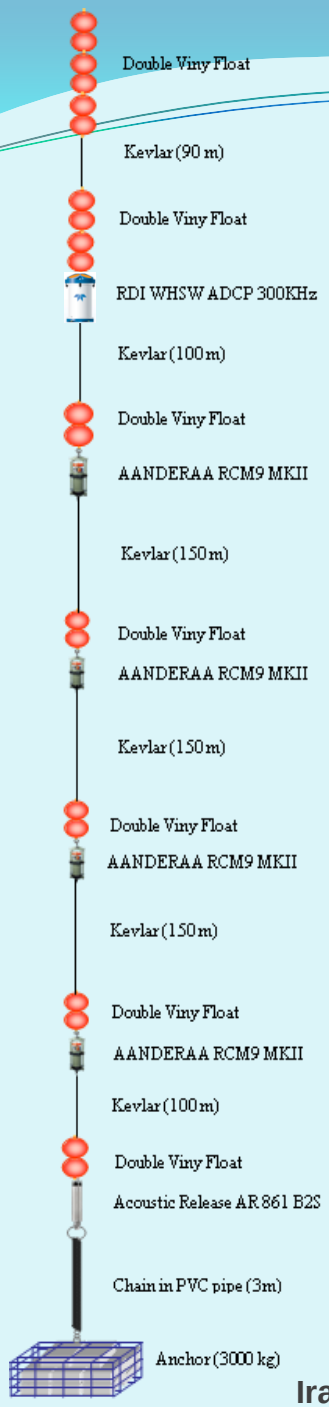


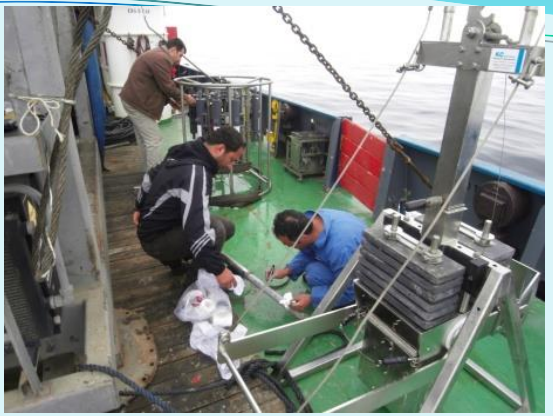


INIOAS has conducted several deep expeditions in the south Caspian sub-basin, but most prominent is deployment of mooring system in depth of 740 m.



740 m Depth Mooring System Schematic Diagram

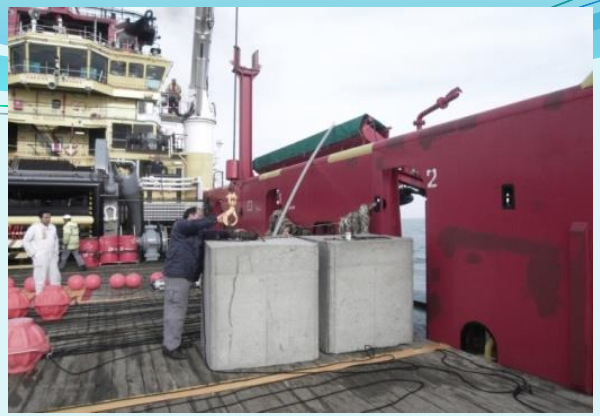




2 m Sediment Core

Box Core Sediment Sample

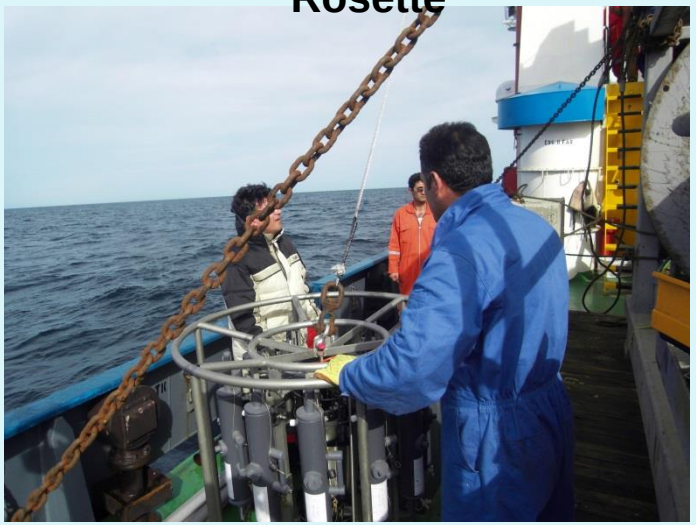
Mooring Deployment



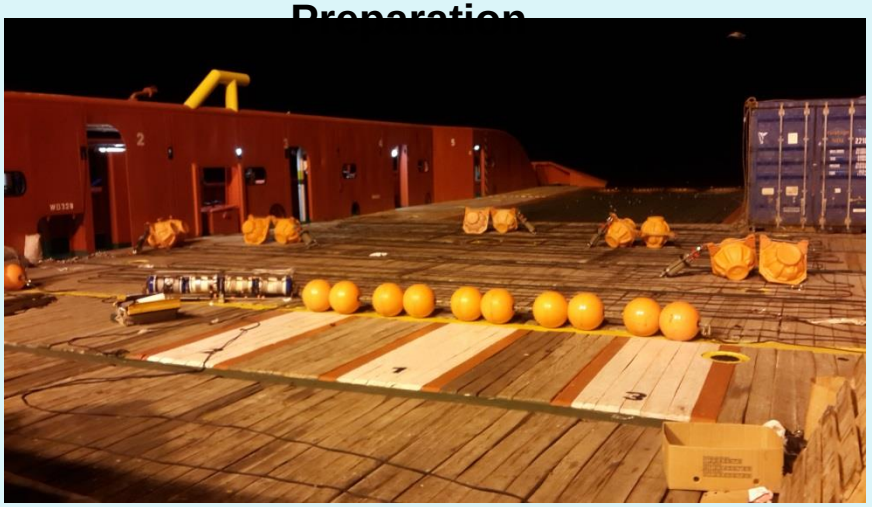
Automatic Weather Station Installed on Platform

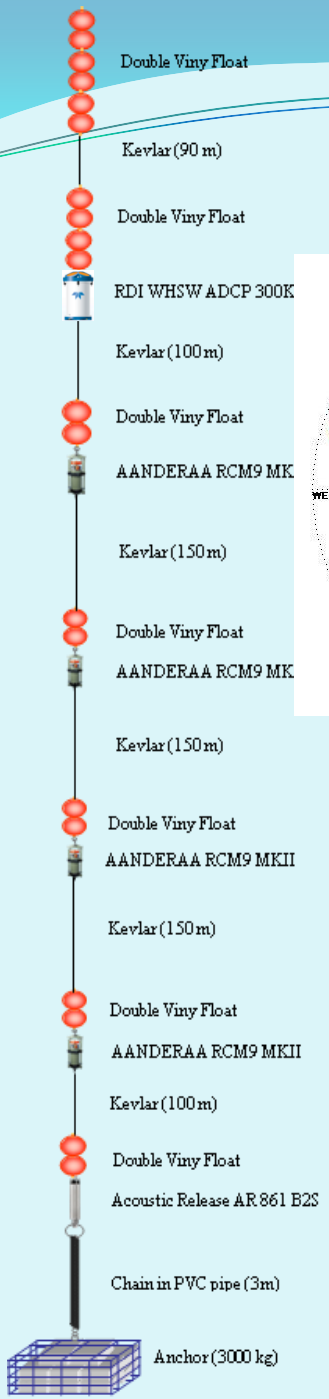
ADCP after Retrievement

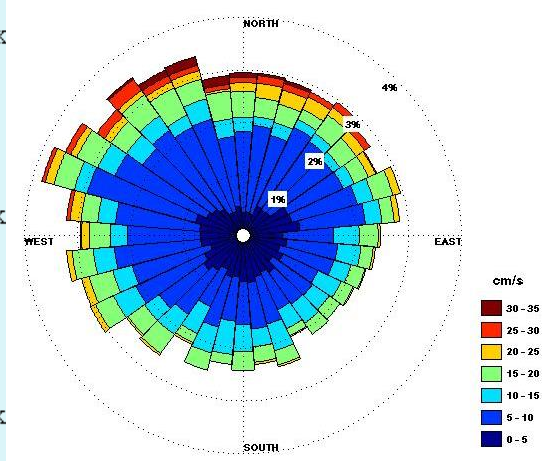
Water Sampling by Rosette

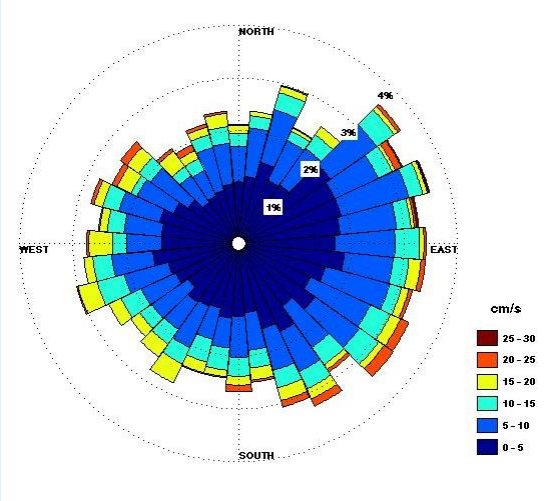


Mooring System Preparation




Double Viny Float
Kevlar (90 m)
Double Viny Float
RDI WHSW ADCP 300K
Kevlar (100 m)
Double Viny Float
AANDERAA RCM9 MK
Kevlar (150 m)
Double Viny Float
AANDERAA RCM9 MK
Kevlar (150 m)
Double Viny Float
AANDERAA RCM9 MKII
Kevlar (150 m)
Double Viny Float
AANDERAA RCM9 MKII
Kevlar (100 m)
Double Viny Float
Acoustic Release AR 861 B2S
Chain in PVC pipe (3m)
Anchor (3000 kg)


NORTH
EAST
SOUTH
WEST
1%
2%
3%
4%
cm/s
30 - 35
25 - 30
20 - 25
15 - 20
10 - 15
5 - 10
0 - 5


NORTH
EAST
SOUTH
WEST
1%
2%
3%
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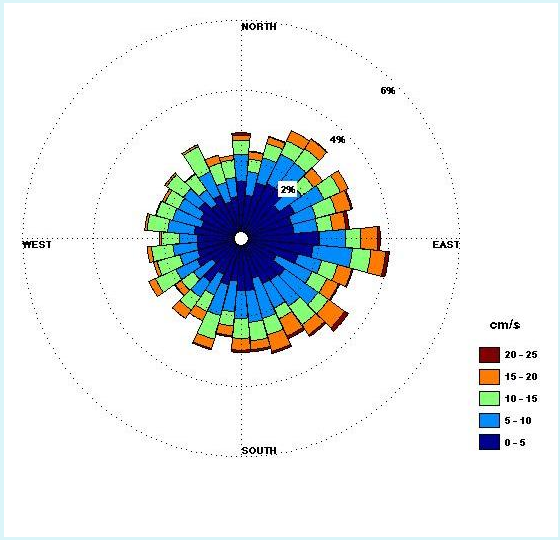
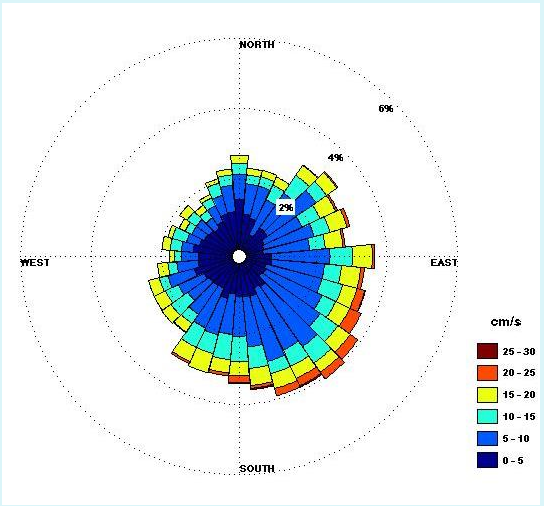
cm/s
25 - 30
20 - 25
15 - 20
10 - 15
5 - 10
0 - 5


NORTH
EAST
SOUTH
WEST
2%
4%
6%
cm/s
20 - 25
15 - 20
10 - 15
5 - 10
0 - 5


NORTH
EAST
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2%
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6%
cm/s
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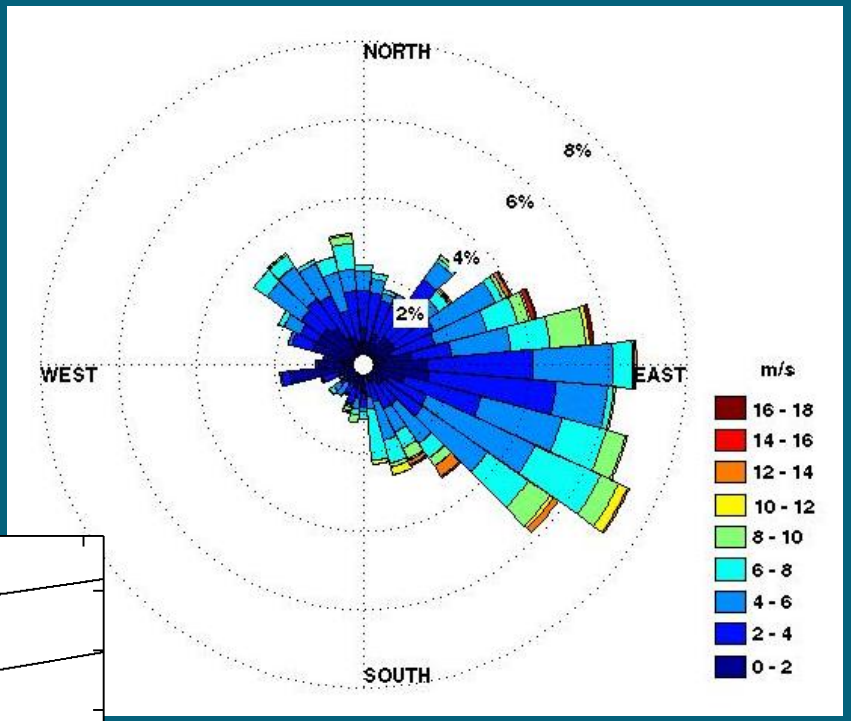
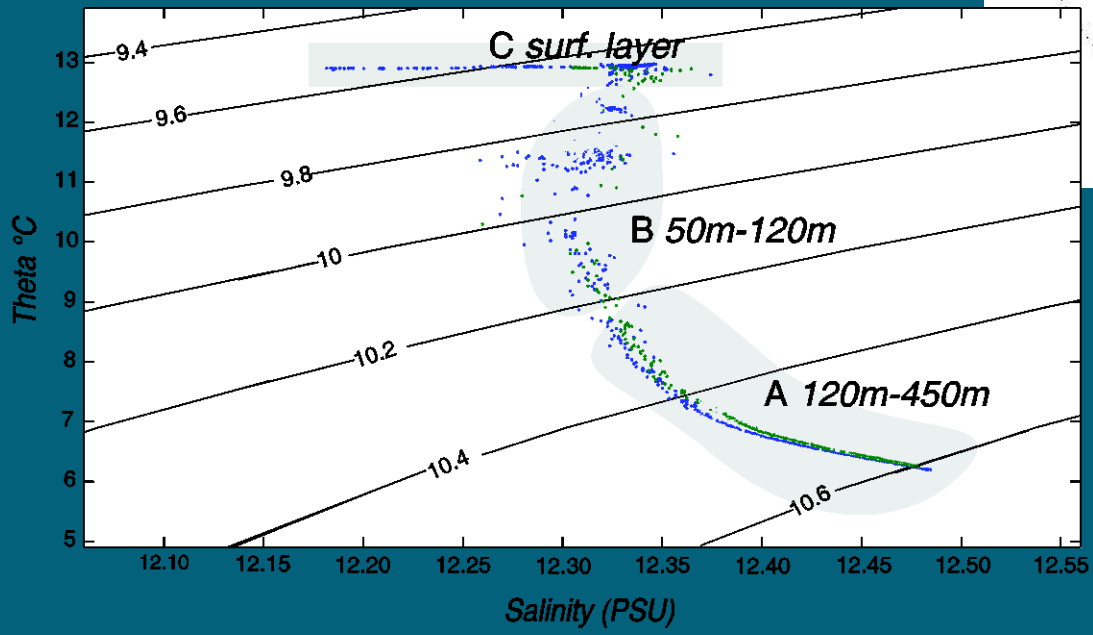
20 - 25
15 - 20
10 - 15
5 - 10
0 - 5

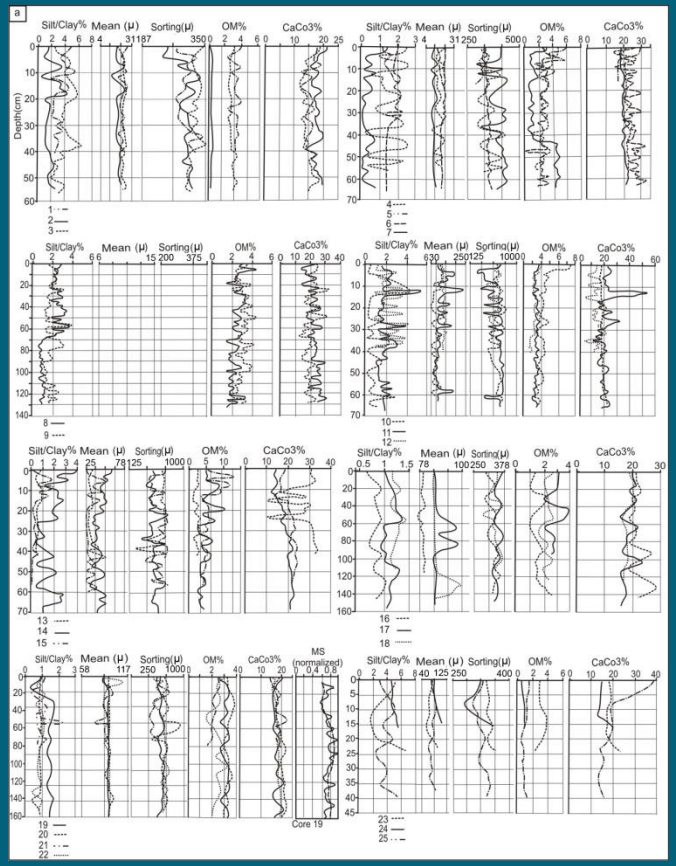
Metrological Measurements

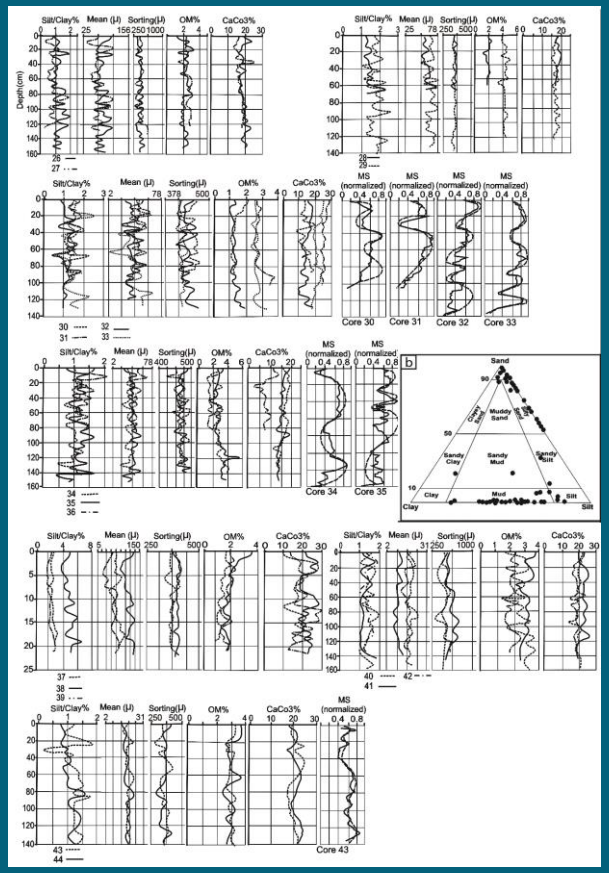
Automatic Weather Station
CDT (Ocean Seven Multi Parameter Probe)





Deep coring: magnetic susceptibility of authigenic and detrital minerals, ventilation and oxygenation during highstand and lowstand



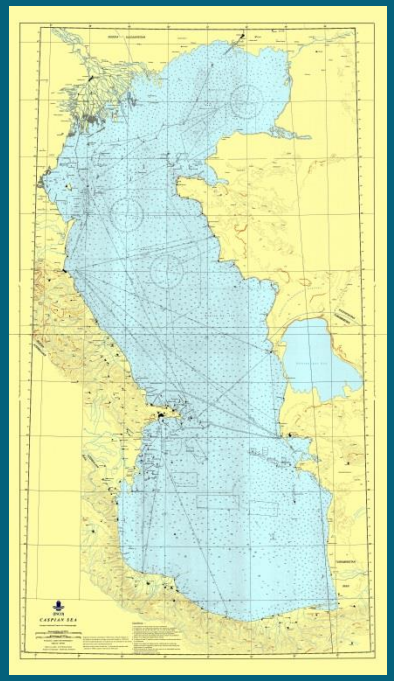


Fe_3S_4
Anoxic,
Low ventilated
Deep water,
Highstand

Fe_3O_4
High oxygenated,
High ventilated
Deep water,
Lowstand

3- Bottom hydrography: is it the source of errors?

The last basin wide survey has been done by the Soviet Navy in 1960s, new maps are just reproduction! Our experience represents that in depth mainly bellow 100 m one might encounter great differences between the map and current topography.



Deep Caspian Sea sub-basins bearing main water volume and area

Have significant role in mixing, circulation, evaporation, geochemical

and ecological condition of the Sea. The past investigation that have

Enough duration to be climatic, however unanswered questions couldn't

be uncovered by existing data. They need:

Intercultural efforts,

New measurements

And mainly time and money!