IESO 2011
PRACTICAL TEST
“Oceanography”
Temperature and Depth Measurements
- Instruction sheet -

During this practical test you will measure the temperature of water at different depths at a sampling site. With the data collected, you will construct a thermal profile and conduct an investigation based on the data.
You will use thermometers fastened at fixed distances along a line called “mooring rope” ending with a weight. The upper end will be fixed to the boat. This system is called “mooring system”. During scientific measurements, it is generally fixed to a floating buoy.
The thermometers are actually micro-data-loggers that measure and record temperature data at desired time intervals. This operation is called a “mission”. The data loggers and the computers have already been configured for this mission.

Materials

- Temperature micro-data-loggers (thermochron iButton, Dallas-Maxim model DS1921G)
- Data-logger/PC cabling system (named LinkUSB)
- Computer with drivers and software already installed (named OneWireViewer)

Procedure

- **PAY SPECIAL ATTENTION TO SAFETY INSTRUCTIONS**
- **Preparation phase.** Using the hardware and software provided, you have to program all the data loggers in order to start your “mission” with the following characteristics:
  Measurement rate: 1 min.
  Format of temperature data: °C.
  Alarm: off
- **Start** the “mission” of each data logger.
- **Preparation of the mooring line**. Put the data loggers inside the chambers. Tightly close the chamber with a suitable o-ring using the given keys. Then fix the thermochrons at the following depths: sea floor, +10m above sea floor (asf), +20m asf, +30m asf.
- **Measurement**. Put the mooring line in the water following the instructions from the staff of the boat. Pay special attention to them!
- **Leave the mooring line** in the water for at least 10 minutes.
- Carefully raise the mooring line. Collect all the data from the loggers following the instructions provided by the student staff. For each data logger you have to choose (among all the collected values) a single value of temperature that, in your opinion, is representative of the temperature of the water at that depth where the thermometer was placed.
- **Go to the worksheet and answer the questions.**

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NAME_____ _____ country _____

- Worksheet –

Question 1

Record the data in the following table:

Depth (meter below sea level)	**Temperature (°C)**
0 m (sea level)	
- m	
- m	
- m (sea floor)	

5 points

Question 2

Draw a graph using the data you collected. Place the temperature on the horizontal axis (Scale the axis from -5°C to +30°C). Place the depth on the vertical axis. Be sure to place the sea surface at the top and the sea floor at the bottom of the axis.

5 points

Question 3

According to the data collected, this water mass is characterized by: (Choose only ONE of the following answers)

a) no thermal stratification
b) strong thermal stratification
c) weak thermal stratification
d) I would need more data to say something definitively.

5 points

Question 4

In your opinion, which of the following statements is most likely the main cause of the present condition of the water column; This should reflect your answer to question 3. (Choose only ONE of the following answers)

1. absence/presence of differences in density as a consequence of differences in temperature and/or salinity.
2. differences in the concentration of dissolved oxygen.
3. differences in the phytoplankton concentration.
4. Wave action
5. Non-natural causes such as the transit of boats and ships.

5 points

Question 5

Which of the following events, in your opinion, COULD CERTAINLY NOT affect the present

situation of stratification. (Choose ONE of the following answers)

a) inflow of water with a different salinity
b) inflow of water with a different temperature
c) a very strong wind
d) inflow of water with similar salinity and temperature
e) release of phosphorous from the sediment 5 points

Question 6

Which of the following best explains the importance of the stratification of a water mass? (Choose ONE of the following answers)

a) Because stratification affects the erosional processes carried on by the water mass
b) Because stratification and the temperature of the water affect only the primary production. (warm water means more productivity)
c) Because stratification could affect anoxic conditions at the bottom.

5 points

Question 7

Using the graph that you prepared for question 2, draw a thermal profile of this water mass during a hypothetical winter when the sea surface had frozen.

8 points

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