National Team Field Investigation (NTFI):

Please direct all your queries and enquiries relating to this activity to:
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NTFI is similar to ITFI; however, instead of 6-8 multi-national members, only four members of a national team conduct field investigations.

The characteristics of NTFI (and ITFI)

NTFI is a mini-study pertaining to a concrete earth system phenomenon in a field site that combines limited and short field and laboratory studies. The art of NTFI is the ability to formulate **a focused research question,** in terms of time and scope - A research question that can be answered through a mini-study of a few hours of field studies and a few hours of laboratory research.

The selection of the phenomenon studied should be based on the following criteria:

(a) The phenomenon represents earth system interactions.
(b) The research question has an environmental component.
(c) Data collection includes the use of up to date field instruments and up to date lab measurements.
(d) A long-term data set may be provided to students following a one-time measurement at the field site.
(e) NTFI is not a duplication of in depth academic studies (Ph.D. and M.Sc.). The evaluation panel will disqualify works with a scope of more than 1-2 research days of data collection and analysis.

NTFI should be based on modern lab analytical tools, but not too complicated or too expensive. Preferable methods include analyses that the students can carry out by themselves using field instruments such as multi-parameter water quality meters or kits, and field spectrophotometers. Use of more complicated lab instruments is also possible, but only if students can operate the instruments by themselves or with minimal help from technicians. If the instruments are too complicated for the students to operate, they themselves should prepare the samples for the tests.

The table below presents eight suggestions of generic NTFI projects. To meet the above criteria, mentors must closely collaborate with geoscientists from universities both in the design and implementation stages.

Table 1: Examples of NTFI projects

1. An example of a lake environment NTFI project:	
Subject:	Lake water depth profiles
Possible objective:	To identify changes in the physical-thermal-chemical conditions in the water column in space and time
Possible research question:	What are the relationships between biological processes and physical-thermal development of the lake water column?
The filed tools	Multi-parameter water quality meters or field spectrophotometer (to measure temperature, pH, conductivity, oxygen, nitrates, chlorides, phosphates)
The lab tools	Spectrophotometer, Centrifuge for chlorophyll, Microscopes
2. An example of a soil NTFI project:	
Subject:	Soil salinization

Possible objective:	Understanding the mechanism soil salinisation in a specific basin, providing a forecast of future soil salinization based on the current situation and past measurements
Possible research questions:	What are the factors that influence soil salinization? What is the rate of soil salinization?
Filed tools	Conductivity sensor, Soil sampling hand drill
Lab tools	Kiln, Scales, Sieves
3. An example of an economic geology NTFI project	
Subject:	Prospect of rare metals
Possible objective:	Understanding the principles of economic geology and quantitative evaluation of metals discovered. Performing economic, environmental and ethical analyses.
Possible research questions:	What is the economic prospect of the rare metals found in this area? What is the economic viability of metal production compared to the environmental impact of the production process?
Lab tools	SEM + EDS or XRF (if available at institute)
4. An example of an aquifer and springs NTFI project	
Subject:	Hydrological modelling of an aquifer and the groundwater composition
Possible objective:	Understanding the interrelationships between rocks and water in the area studied
Possible research questions:	What influences the composition of spring water in a particular area? Do all sources represent one aquifer or is there an aquitard source too?
Filed tools	Multiparameter water quality meter . Temp, pH, carbonates, chlorides, or field spectrophotometer
Lab tools	Optional titration for bicarbonate and chloride, ICP (if available at institute)
5. An example of a seasonal pond (or wetland) environment NTFI project	
Subject:	Pond sediments as heavy metal pollution recorders
Possible objective:	Interrelationships between the earth system and its environmental application
Possible research questions:	To what extent do pond sediments constitute a tool for monitoring heavy metal pollution?
Filed tools	Sediment core sampler, Tools for digging and depth measurement (for dry sediment)
Lab tools	Optical granulometry (if available), Instrument for measuring organic carbon, XRF (if available)
6. An example of a global warming NTFI project	
Subject:	The use of Recent benthonic foraminifera as a model system for the rising ocean water temperature
Possible objective:	To identify foraminiferal species that manage to survive in the hot spots of power plant turbines cooling wastewater. To find the temperature range in which each species manages to grow its shell.
Possible research questions:	What is the influence of hot water on the skeletal growth of benthonic foraminifera?
Filed tools	Sampling equipment, Thermometers, Rose Bengal
Lab tools	Binocular microscopes (preferably with camera)
7. An example of a geosphere NTFI project	
Subject:	The development of the crystalline basement of a specific area.
Possible objective:	Reconstruction of a sequence of geological processes and events.
Possible research questions:	What were the conditions of formation of the various rock bodies? In what tectonic environments did the processes take place? What are the relationships between the geological development and human life today in this area?
Filed tools	Brunton compass
Lab tools	Preparation of thin sections, Polarizing microscopes
8. An example of a wetland with strong human intervention NTFI project	
Subject:	The ability of a wetland to act as a nutrient sink.
Possible objective:	To understand the balance of nutrients in a wetland with strong human interference.

Possible research questions:	Is the wetland acting as a sink or source of nutrients? What influences the nutrient balance? How does the occurrence of this wetland affect the environment downstream?
Filed tools	Multiparameter water quality meters, Field spectrophotometer
Lab tools	

How to prepare for and conduct an NTFI

The **first stage** of preparation is to formulate a research question together with a local researcher, who can provide field-measuring equipment and access to his/her lab equipment. The research question must lead to a small-scale, mini study suitable for high school students.

Second stage – preparation towards the study: A half to one-day session to introduce students to the research question, location, theoretical background of the research, stages of the study, schedule and the scientific background of the field-measuring equipments.

Third stage – the field study: A half to one day fieldwork to study the field phenomenon, to conduct field measurements and to collect samples for lab measurements. The students must carry out the study by themselves.

Fourth stage – the lab study: A half to one day lab work that will include an introduction to the lab measuring tool/s and its/their scientific principles and lab measurements. The students must be actively involved with the sample preparation and operation of the lab equipment.

Fifth stage – getting the lab data and answering the research question: It is important that students, and only students, are involved in this stage, with no help from mentors or researcher.

Sixth stage – preparing the presentation: again, students themselves must carry out this stage. Mentors may provide the students with the evaluations criteria (= rubric) for the presentation, but should not be involved in the preparation stage.

The evaluation

The field investigations will be presented for Jury evaluation during the IESO. The evaluation will be based on the regular rubric of the NTFI and the following components:

1. Originality: The evaluation panel will disqualify an NTFI, which is a duplication of in-depth academic studies (Ph.D. and M.Sc.).

2. Scope: The evaluation panel will disqualify an NTFI, which is based on more than 3 research days of data collection and analysis and reasonable research equipment similar to the examples above.

3. Independence: The evaluation panel will disqualify an NTFI that does not show clear evidence that the students collected the samples in the field and tested them in the laboratory.

4. Logical sequence: The conclusions should be based on the data that were collected by the students. They could relay and present data that was not collected by them, but only if it is about the same analysis. For example, if they measured some geochemical characteristics in a specific location on a specific date, they could use the same geochemical characteristics that were measured for different locations and at different times.

How many students from each country can participate in the online NTFI?

Students can conduct their studies in teams of 1-4 students. Up to two teams from each nation can participate in the NTFI.

The presentation

Students will have 15-20 minutes for the presentation. The presentations may be live on Zoom, or pre-recorded totally or partially, depending on the countries and students' ability to have good Zoom access.
The team can obtain gold, silver or bronze medals based on Evaluation Board criteria.

Consultation:
Mentors who need guidance or advice are invited to contact Nir
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