Claims

1. A monitoring module comprising a first line of sensors adapted to determine a profile of a bore within the ground or a structure along a length of the first line of sensors, wherein the first line of sensors comprises a plurality of inertial measurement units (IMUs) disposed along a flexible substrate, each IMU is electrically connected to a processing unit, the processing unit comprises: (a) a power source; and (b) a transmitter is adapted for transmitting the data obtained from the IMU to a control box.

2. The module according to any preceding claim, further comprising a second line of sensors connected in parallel to the first line of sensors.

3. The module according to claim 2, wherein the second line of sensors comprises at least one sensor selected from the group comprising of: a water pressure sensor, a pore water pressure sensor, a pH sensor, a sound level detector, a gas sensor, a salinity sensor, and a temperature sensor.

4. The module according to any one of the preceding claims, wherein the first line of sensors comprises 16 or less equally spaced apart inertial measurement units.

5. The module according to any one of the preceding claims, wherein each inertial measurement unit is 0.5 metres apart.

6. The module according to any one of the preceding claims, wherein the length of the strip is 8 metres or less.

7. The module according to any one of the preceding claims, wherein the inertial measurement units in each line of sensors are connected in series.

8. The module according to any one of the preceding claims, wherein the first and second lines of sensors are each housed in a housing.

9. A monitoring device comprising two or more of the monitoring modules according to any one of claims 1 to 8.

10. The device according to claim 9, wherein each module is connected to each other in series.

11. The device according to any one of claims 9 or 10, further comprises a control box electrically connected to the two or more monitoring modules, wherein the control box comprises a GPS module.

12. The device according to claim 11, wherein the control box further comprises a power source, the power source is a fuel cell or a solar cell.

13. The device according to any one of claims 9 to 12, further comprising a ground line of sensors electrically connected to the control box, disposed on a surface of a ground or structure to be monitored.

14. The device according to claim 13, wherein the ground line of sensors comprising at least one sensor selected from the group comprising of: a water pressure sensor, a pore water pressure sensor, a pH sensor, a sound level detector, a gas sensor, a salinity sensor, and a temperature sensor.

15. A monitoring system comprising:
    (a) at least one monitoring module according to any one of claims 1 to 8, or at least one device according to any one of claims 9 to 14; and
    (b) a central unit,
    wherein the central unit comprises a communications module for receiving and transmitting data from the at least one monitoring module or from the at least one device.

16. The monitoring system according to claim 15 comprising an aggregator device, wherein the aggregator device serves as an intermediary between the at least one monitoring module or at least one device and the central unit.

17. A method for monitoring, the method comprising:
    (a) obtaining data from at least one monitoring module according to any one of claims 1 to 8, or at least one device according to any one of claims 9 to 14; and
    (b) determining a position of each inertial measurement unit relative to each other to determine the profile of the first line of sensors.

18. The method according to claim 17, wherein obtaining the data is based on a time schedule, triggered by an event, or upon a user’s request.