

Mars Electromagnetic Sounding Experiment (MARSES): Comparative and calibration studies on the example spatial and temporal variations subsurface geoelectrical sections of the saltwater interface on Sicily (Donnalucata Beach) and Shelter Island.

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The MARSES is the sounding instrument program on the base new portable geophysical instrumentation developed of searching for water, water-ice or permafrost layers existing in some depth under the visible surface of Mars. The first task is to measure the soil properties of the subsurface of Mars, which include porosity, electrical resistance of the liquid phase, thermal conductivity, temperature dependence and so on. A main task of the MARSES experiment is to examine changes in subsurface properties of local areas regolith on the martian subsurface, and to relate them to optical images and other remote sensing data in order to understand the nature of different terrain forms and structure of cryolitozone of Mars.

On the basis of results of several expedition programs in the earth's conditions the optimum configuration of devices and techniques of measurement which allows to receive spatial geoelectrical structure subsurface horizons near martian landers or rover study area in the future martian missions is revealed.

During cooperation within the frames of space research missions devoted to Mars exploration, which soil slice conditions are close to Earth's arid and semiarid lands, was developed compact, light and reliable instrument for subsurface sounding and mapping for Earth's applications, and more specifically it relates to a method to map, track, and monitoring: groundwater, groundwater channels, groundwater structures, subsurface pollution plumes, maps interconnected fracture or porous zones, map leaks in earthen dams, map leaks in drain fields, monitor changes in subsurface water flow, monitoring changes in ion concentration in groundwater, monitor in situ leaching solution, monitor movement of heap leaching solutions, monitor changes in subsurface redox or reaction fronts, monitor underground chemical reactions, monitoring subterranean bioreactions, or other subsurface water and related geological structure.

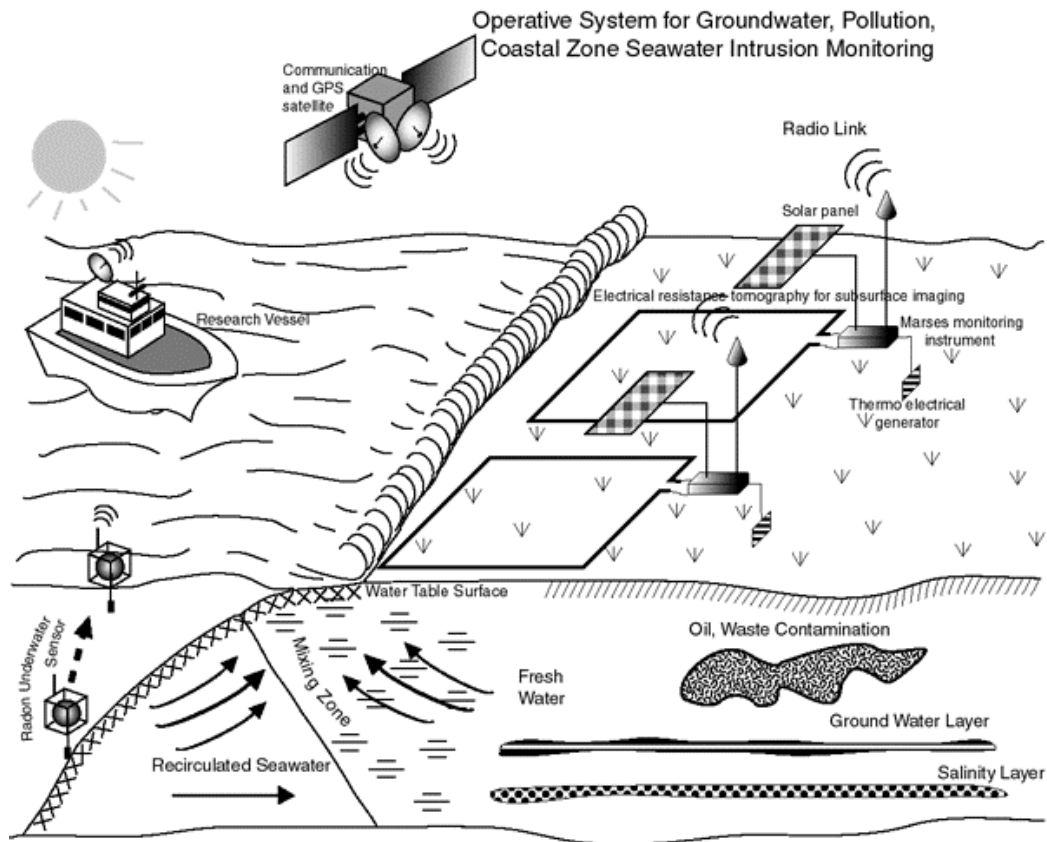


Figure 1. The subsurface monitoring system organization structure.

First observations of the dynamic parameters (spatial and temporal variations and changes of the salt/water interface in the process of the inland extent and movement of saltwater interface up to sounding depth in order to 100 m) have been obtained on the base new generation non-invasive instrument for subsurface sounding and new methodology . This is comparative and calibration studies is very important for future experiment on the surface of Mars and also for many application on the Earth .

Operative geophysical survey of the saltwater and freshwater interaction is an urgent task for operative monitoring subsurface system in drylands area in variuos regions of the world for long-term monitoring nature subsurface ecosystem.

Building of geographical slice using different instruments allows to obtain correct parameters for MARSES TEM in order to employ it in frozen soils sounding on the surface of Mars and for many applications for long-term monitoring and subsurface studies in the Earth's conditions.

References:

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