

Baikal Neutrino Telescope as an underwater laboratory for long-term environmental studies

Nikolay Budnev

Irkutsk State University
K. Marks 1, Irkutsk, 664003, Russia
tel/fax +7-3952-33-44-52, E-mail: nbudnev@api.isu.ru

The first underwater neutrino telescope NT200 has been operated in Lake Baikal since 1998. Beside numerous results in the field of astroparticle physics which were got with this array, a number unique interdisciplinary knowledge about hydrophysical and biogeochemical processes in the Lake were got in the framework Baikal Neutrino Project. To get environment data hundreds commercial and homemade hydrophysical, optical, acoustic and other type instruments distributed on tens moorings are used. All underwater equipment are deployed from ice cover. The ice is very cheap and convenient stable platform for operation with scientific instruments including mooring deployment, probe of water column and sediment cores taking. The data of long term monitoring, as well data were got during ice expedition since 1981 year contain unique information different dynamic processes in Lake Baikal about. For example this data were used for new model formulation of vertical water mixing in top layer of the Lake. Advective deep-water intrusions of cold surface water were regularly observed in the temperature time series from the near-bottom thermistors of the moorings. These advective intrusions are caused by coastal downwelling and subsequent thermobaric instability along the steep lake shores. The observations indicate that the largest deep-water intrusions generally take place during winter around the turn of the year. They can be much larger than the previously estimated typical values of 10 km³, filling a significant fraction of the deepest 100 m of the lake volume, and they seem to originate from the steep Northern shore of the South Basin. A luminescence of Baikal water was disclosed and its main properties were studied. It was proposed to use this phenomena as a nature tracer to study hydrophysical and hydrobiological processes. As well, many other new results about Baikal ecosystem were got in co-operation with DESY-Zeuthen (Germany), EAWAG (Switzerland), LIN SO RAN, IEC SO RAN, INR RAN JIRN (Dubna) and other institutes. We are open for new scientific contacts in the interdisciplinary studies of the Lake Baikal ecosystem.