ANNUAL REPORT ON GEOTRACES ACTIVITIES IN RUSSIA
JUNE 2013 – JUNE 2014

Meetings

- In 2013 – early 2014 Russian scientists participated in 14 conference, where they have done more than 350 presentations. Among the conferences there were the three ones relevant to GEOTRACES.
- Shirshov Institute of Oceanology in Moscow (18-21 November, 2013) has held the 20-th International Scientific School - Conference on Marine Geology under the leadership of academician Alexander Lisitzin, where about 500 scientists from different institutes took part. The GEOTRACES related topics were the following: Biogeochemical processes in seas and oceans; Nano- and microparticles in the marine sedimentation processes; Geochemical processes in the deep-sea hydrothermal systems, Marine geology of the Arctic Ocean; Anthropogenic influence on the trace substances' sedimentation processes.
- Russian Lithology Conference «Sedimentation basins and post-sedimentation processes over the geological history" was held in the Institute of Oil and Gas geology RAS, Novosibirsk (28–31 October, 2013). About 200 scientists participated, many presentations was aimed to search geochemical, mineralogical and biomolecular indicators of paleoenvironmental sedimentation and ore deposits.
- Russian Conference "Geochemistry of Lithogenesis" was held in Syktyvkar, March 17-19, 2014 by the Geology Institute of the Ural branch of RAS. There were about 60 participants. Among the themes of presentations related to GEOTRACES I may mention presentations on the methodical geochemical issues as well as mineralogical and geochemical indicators of the sedimentary phases.

Cruises

- During 2013 the five expeditions were held: Multidisciplinary investigations in the White Sea on *R/V Ecolog* (17-27 August 2013), in the Caspian Sea on *R/V Capitan Shurekov* (21 August -10 September 2013), in the Kara Sea on *R/V Professor Shtokman* (3-23 September 2013), in the NE Pacific on *R/V Akademic Lavrent'ev* (area close to the Piip Volcano). In addition Russian scientist dr. Sergey Pisarev (Shirshov Institute of Oceanology) participated in the international cruise of the ice boat "TARA TSG"(France) in the Kara and Laptev Seas.
- In December 2013 the ship time proposals have been submitted for cruises in 2014. Until now we have not a response.

New funding

- We have information about supporting of the 5 initiative projects from the Russian Foundation on Basic Research (RFBR), but forthcoming funding (grants) is not sufficient for the Arctic expedition. A special proposal for this was submitted to a new Russian Scientific Foundation.

New results

- A new indicator of the fresh and saline water mixing for areas of strong river run-off influence was offered by Prof. Peter Makkaveev and dr. Yury Nalbandov (Shirshov Institute of Oceanology, Moscow): it is the Alkalinity/Salinity ratio. When the river waters mix with sea water the Alk/Cl ratio increases. These results from the fact that in river water the Alk/Cl ratio is much higher than that in the sea water. Value of the Alk/Cl ratio > 0.06 – 0.08 points to the presence of the river water. In areas under the strong river run-

off influence, value of Alk/Cl ratio may reach up to 5 - 7 and even more. Based on the hydrochemical data base for the Ob River estuary (Obskaja Guba) an evolution of the Alk/Cl ratio over 37 years (1976 - 2013) was studied (figure 2, unpublished data). A river water - sea water contact zone' location was found to have not only a seasonal change but interannual ones also, that depends on variation in the river-runoff volume.

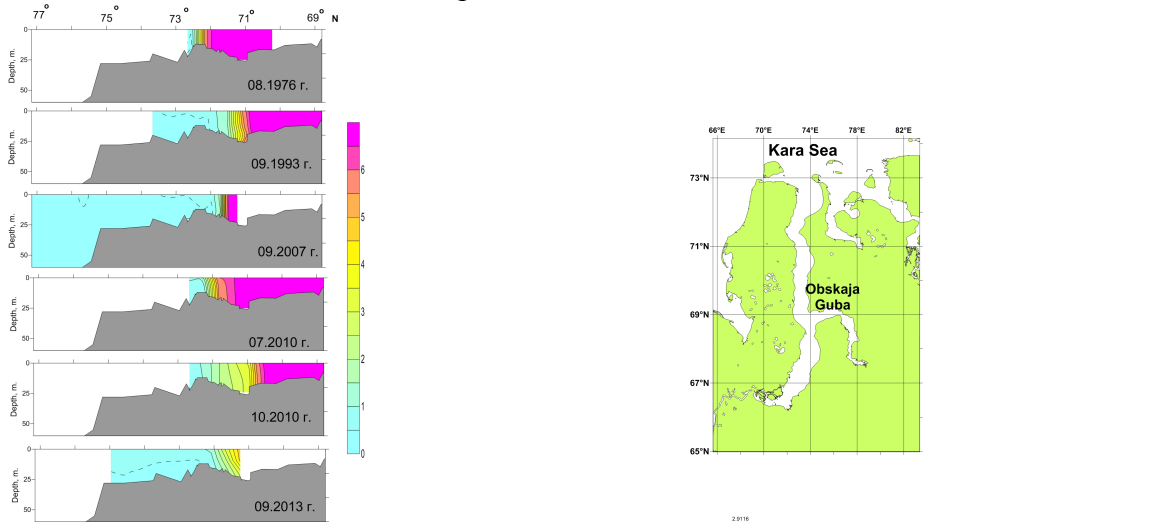

Figure 2. *Evolution of the Alk/Cl ratio in the Ob River estuary (Obskaja Guba)-the Kara Sea longitudinal transect over 37 years (unpublished data of Makkaveev and Nalbandov, IORAS).*

- Distribution of total dissolved molybdenum, tungsten, vanadium, and uranium in the surface water of the Atlantic Ocean was studied by dr. Maria Rimskaya-Korsakova and prof. Alexander Dubinin (figure 3) (Rimskaya-Korsakova, Dubinin, et al., 2013).

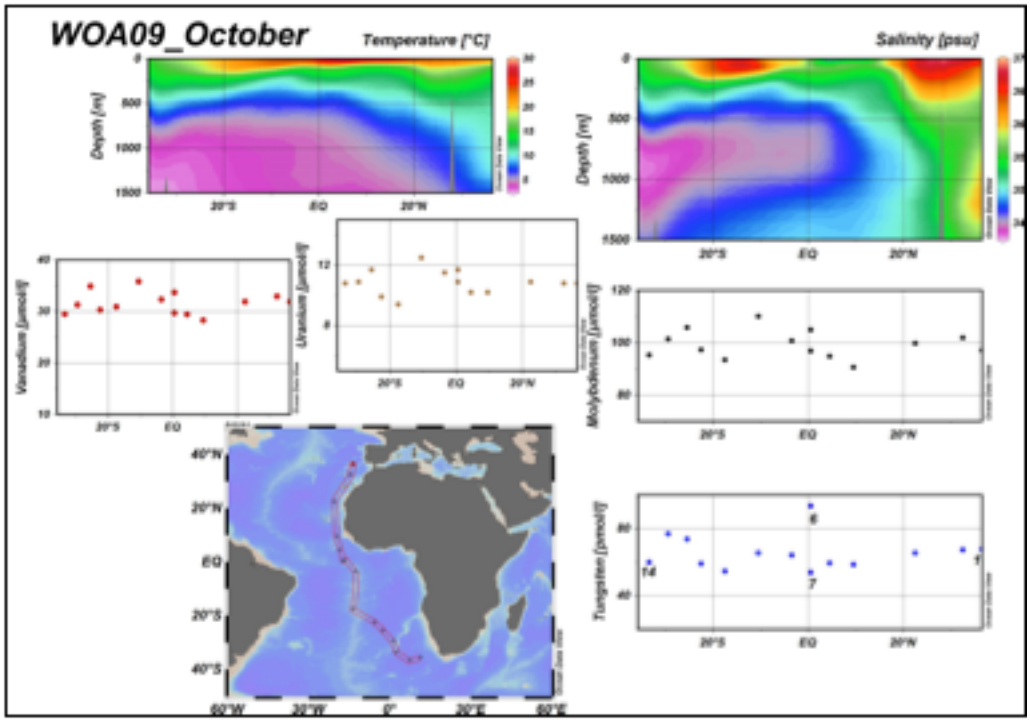

Figure 3. *Distribution of total dissolved molybdenum, tungsten, vanadium, and uranium in the surface water of the Atlantic Ocean*

- For the first time the abundance of algae Pseudo-nitzschia seriata that are enriched in Chlorophyll-a was detected in the near-bottom water (depth of 295–424 m) in the Caspian

Sea. The low boundary of phytoplankton prevalence is the depth of 500 m. In the open Caspian Sea the Chlorophyll-a maximum was found to be deepen to the low boundary of a seasonal thermocline (from 20 to 60 m, figure 4). From this it follows that the primary production' estimation based on satellite data may be incorrect in this basin as soon as the light scanners cover only surface water layer that doesn't exceed a few meters.

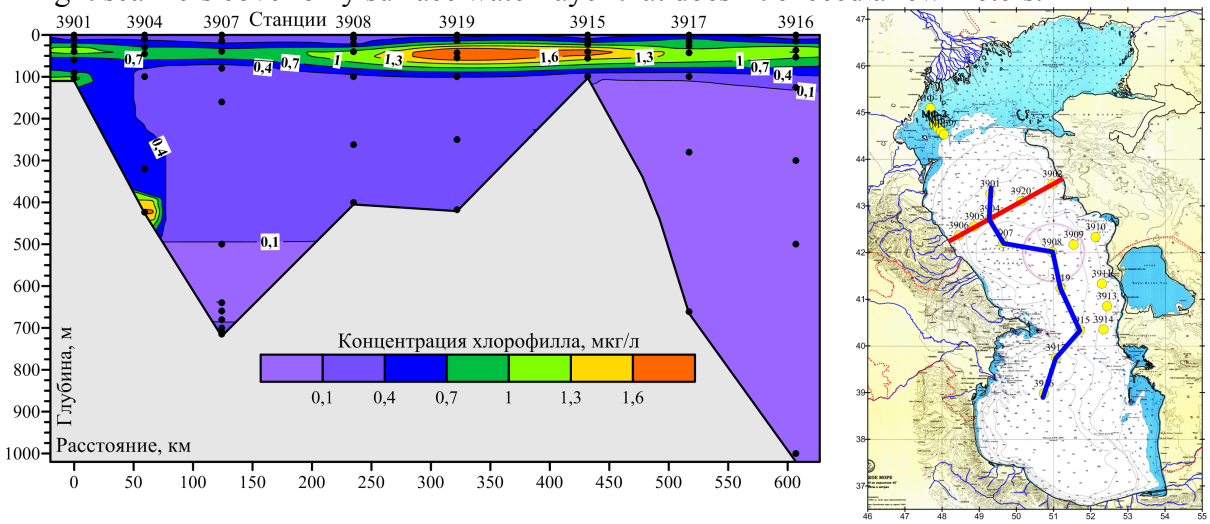

Figure 4. *Chlorophyll-a distribution along the longitudinal transect (blue color) in the Caspian Sea in May-June 2013, cruise 39 of R/V «Rift». Unpublished data of dr. Marina Kravchishina, Shirshov Institute of Oceanology, Moscow. Abscissa axis is the transect length, km; axis of ordinates is sea depth, m; Chlorophyll-a concentrations, µg/l, are shown in different colours.*

- Examination of the distribution pattern of total dissolved Fe and Mn at the deep-sea hydrothermal vent field 9o50'N, East Pacific Rise (fig. 5) let us to suppose that the TDFe/TDMn ratio might be a tracer of the hydrothermal fluids and ocean water mixing' processes (Demina et al., 2013), along with earlier well documented tracers such as temperature, pH and H2S concentration (Sarradin et al., 1999; German et al., 2010).

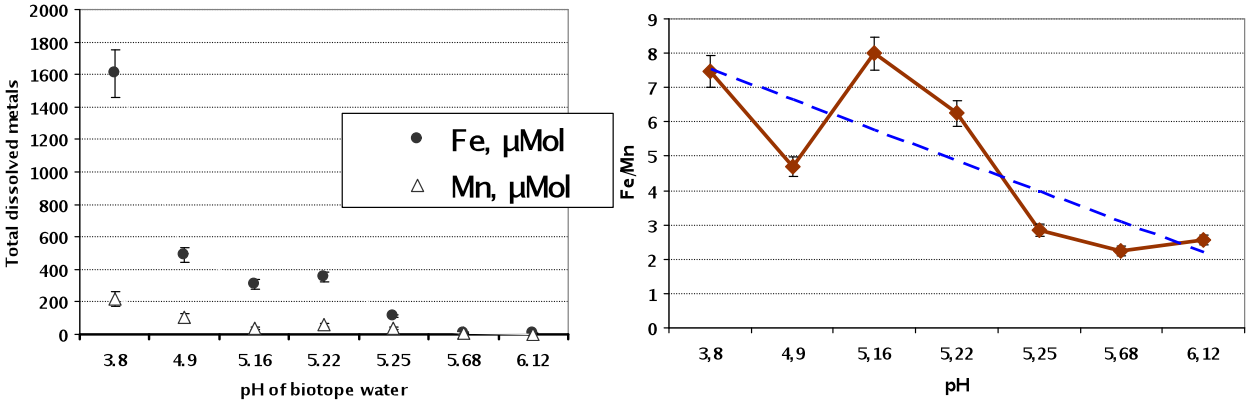

Figure 5. *Concentrations of TDFe and TDMn (a) and the TDFe/TDMn ratio versus pH in the biotope water of the Mussel Bed site (the 9°50'N hydrothermal vent field, the East Pacific Rise) (Demina et al., 2013).*

New publications

Monographies

- The White Sea System. Volume III. Dispersed sedimentary hydrosphere material, microbial processes and pollution. Moscow. Moscow. Scientific World. 2013. 667Moscow. Scientific World. 2013. 667 pp.
- Demina L.L., Galkin S.V. Trace metal biogeochemistry in the deep-sea hydrothermal ecosystems of the ocean. Moscow: GEOS.2013. 272 pp.
- Nemirovskaya I.A. Oil in the Ocean (Pollution and Natural Flows). Moscow. Scientific World. 2013. 428 pp.

Selected articles

- Lisitzin A.P., Vasil'chuk Yu.K., Shevchenko V.P., Budantseva N.A., Krasnova E.D., Pantyulin A.N., Filippov A.S., Chizhova Ju.N. Oxygen isotope composition of water snow–ice cover of isolated lakes at various stages of separation from the White Sea // Doklady Earth Sciences. 2013. V. 449. No. 2. P. 406–412. http://link.springer.com/article/10.1134/S1028334X1304003X.
- Lisitzin A.P., Kravchishina M.D., Kopelevich O.V., Burenkov V.I., Shevchenko V.P., Vazyulya S.V., Klyuvitkin A.A., Novigatskii A.A., Politova N.V., Filippov A.S., Sheberstov S.V. Spatial and temporal variability in suspended particulate matter concentration within the active layer of the White Sea // Doklady Earth Sciences. 2013. V. 453. No. 2. P. 1228–1233. http://link.springer.com/article/10.1134/S1028334X13120052.
- Demina L.L., Shapovalov S.M. First Russian Conference on the International Geotracers Program // Oceanology. 2014. V. 54, No. 1, pp. 113–115.
- Astakhov A.S., Ivanov M. V. , and B. Ya. Li Hydrochemical and Atmochemical Mercury Dispersion Zones over Hydrothermal Vents of the Submarine Piip Volcano in the Bering Sea // Oceanology, 2011, 51, 5, 26–835.
- Demina L.L. Comparison of trace metal bioaccumulation potential in the three different ocean's zones. Goldscmidt2013. Conference Abstracts. 2013. p. 971.
- Demina L.L., Lisitzin A.P. Role of Global Biological Filters in Geochemical Migration of Trace Elements in the Ocean: a comparative estimation // Doklady Earth Sciences, 2013, Vol. 449, Part 2, pp. 469–473.
- Demina L.L., N. G. Holm, S. V. Galkin, A. Yu. Lein. Some features of the trace metal biogeochemistry in the deep-sea hydrothermal vent fields (Menez Gwen, Rainbow, Broken Spur at the MAR and 9o50'N at the EPR): a synthesis// Journal of Marine Systems. 2013. V.126. P. 94 -105.
- Kravchishina, M.D., Burenkov, V.I., Kopelevich, O.V., Sheberstov, S.V., Vazyulya, S.V., Lisitzin, A.P. New data on the spatial and temporal variability of the chlorophyll a concentration in the White Sea // Doklady Earth Sciences. 2013. Vol. 448. No. 1. pp. 120-125. http://elibrary.ru/item.asp?id=18448204.
- Kravchishina M.D., Novigatskii A.N., Politova N.V., Zernova V.V., Mosharov S.A., Dara O.M., Klyuvitkin A.A. Studying the Biogenic and Abiogenic Parts of Suspended Particulate Matter in the Volga Delta during Spring Flood of May 2008 // Water Resources, 2013, Vol. 40, No. 2, pp. 143–156. http://elibrary.ru/item.asp?id=18797161. http://link.springer.com/article/10.1134%2FS0097807813010053.
- Pokrovsky O.S., Shirokova L.S., Viers J., Gordeev V.V., Shevchenko V.P., Chupakov A.V., Vorobieva T.Y., Candaudap F., Causserand C., Lanzanova A., Zouiten C. Fate of colloids during estuarine mixing in the Arctic // Ocean Science. 2014. V. 10. No. 1. P. 107–125. doi:10.5194/os-10-107-2014. http://www.ocean-sci.net/10/107/2014/os-10-107-2014.html.

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- Rimskaya-Korsakova M., Berezhnaya E., Dissolved Mo, W, and V in Atlantic surface water. Goldschmidt 2013 Conference abstracts. P.2063. DOI:10.1180/minmag.2013.077.5.18.
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- Shevchenko V.P., Pokrovsky O.S., Starodymova D.P., Vasyukova E.V., Lisitzin A.P., Drovnina S.I., Zamber N.S., Makhnovich N.M., Savvichev A.S., Sonke J. // Doklady Earth Sciences. 2013. V. 450. Part 1. P. 514-520. http://link.springer.com/article/10.1134/S1028334X13050073.
- Stohl A., Klimont Z., Eckhardt S., Kupiainen K., Shevchenko V.P., Kopeikin V.M., Novigatsky A.N. Black carbon in the Arctic: the underestimated role of gas flaring and residential combustion emissions // Atmospheric Chemistry and Physics. 2013. V. 13. P. 8833–8855, doi:10.5194/acp-13-8833-2013. http://www.atmos-chem-phys.net/13/8833/2013/acp-13-8833-2013.html.

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