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GEOMAGNETIC RESEARCH FOR SOLVING PROBLEMS OF INDUSTRIAL ECOLOGY IN WATER AREAS WITH A HIGH TECHNOGENIC BURDEN

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To solve the problems of industrial ecology, a method of geomagnetic measurements and data interpretation was developed, which made it possible to significantly increase the reliability of the results obtained in conditions of high technogenic burden and limited size of the water area of the existing port. Russian-made measuring equipment and software were used. Based on the quantitative interpretation of the transformant of the anomalous magnetic field, the spatial characteristics of anomalous sources of technogenic origin have been determined. The results of the quantitative interpretation of magnetic anomalies are certified by side-scan sonar and diving work. Studies were carried out on the topic of state tasks of TOI FEB RAS 121021700342-9.

Keywords: Golden Horn Bay, Peter the Great Bay, geomagnetic research, sunken ships, seaport, technogenic interference.

References

1. Issledovanie stepeni zagryazneniya donnyh otlozhenij v buhte Zolotoj rog (YAponskoe more) / A.S. Zubcova [i dr.]. Sovremennoe obshchestvo: global'nye i regional'nye processy: materialy IV mezhdunarod. nauch. konf. Sankt-Peterburg. 14–15 marta 2019 goda. SPb.: Lulu Press, 2019. P. 52-55.

2. Ermolickaya M.3. Issledovanie sostoyaniya donnyh otlozhenij buhty Zolotoj Rog. / M. Z. Ermolickaya. Ekologiya i bezopasnost' zhiznedeyatel'nosti. 2013. No. 1. P. 86-91.

3. Kalitina E. G. Vliyanie organicheskogo zagryazneniya na strukturu i sostoyanie mikrobnyh soobshchestv poverhnostnyh vod buhty Zolotoj Rog: diss ... kand. biol. nauk: 03.00.16. / E. G. Kalitina. Vladivostok, 2006. 181 p.

4. Ermolickaya M. Z. Gidrohimicheskoe issledovanie buhty Zolotoj Rog za 2008-2009 gg. / M. Z. Ermolickaya, O. A. Kochetkova. Vestnik MGU. Seriya: Teoriya i praktika zashchity morya. 2010. Vyp. 41. P. 17-21.

5. Vliyanie zatonuvshih sudov na ekologicheskuyu bezopasnost' pribrezhnyh akvatorij i beregovyh zon Rossii / N. A. Val'dman [i dr.]. Trudy Krylovskogo gosudarstvennogo nauchnogo centra. 2019. No. 4(390). P. 231-244.

6. Krone R. Wrecks as artificial lobster habitats in the German Bight / R. Krone, A. Schröder. Helgoland Marine Research. 2011. Vol. 65. P. 11-16. DOI: 10.1007/s10152-010-0195-2.

7. Vliyanie iskusstvennyh rifovyh konstrukcij na vosstanovlenie antropogenno-izmenennyh akvatorij / L. E. Slobodskova [i dr.]. Aktual'nye problemy osvoeniya biologicheskih resursov Mirovogo okeana: materialy VII Mezhdunarod. nauch.-tekhn. konf. Vladivostok, 2022. P. 203-208.

8. Belan T. A. Usloviya sushchestvovaniya i osobennosti raspredeleniya makrozoobentosa morskoj akvatorii porta Vladivostok (zaliv Petra Velikogo, YAponskoe more) / T. A. Belan, L. S. Belan, A. V. Berezov. Ekologicheskie aspekty osvoeniya neftegazovyh mestorozhdenij: sb. statej REA № 1. Vladivostok: Dalnauka, 2009. P. 116-128.

9. Yandeks.Karty [Elektronnyj resurs] - URL: https://yandex.ru/maps/11409/primorsky-krai/geo/bukhta_zolotoy_rog/2523721457/?-from=tabbar&l=sat&ll=131.897482%2C43.100035&source=serp_nav-ig&z=13 (data obrashcheniya 15.01.2023).

10. Geomagnetic survey for solving ecology problems on aquatory seaport with high level of electromagnetic noise (Golden Horn bay, Peter the Great gulf, sea of Japan) / Bessonova E.A. [et. al.]. IOP Conference. Series: Earth and Environmental Science. 2021. Vol. 666. No. 6. – 062149. - DOI: 10.1088/1755-1315/666/6/062149

11. Environmental magneto-gradiometric marine survey in a highly anthropic noisy area (2009) / D. Embriaco [et. al.]. Annals of Geophysics. No. 52(5). P. 459-467.

12. High resolution marine magnetic survey of shallow water littoral area / E. Weiss [et. al.]. Sensors. 2007. Vol.7(9). P. 1697-1712. DOI: 10.3390/s7091697.

13. Gosudarstvennaya geologicheskaya karta Rossijskoj Federacii masshtaba 1:200 000. Seriya Sihote-Alinskaya. Listy K-52-XII, XVIII. Ob"yasnitel'naya zapiska. SPb, 2002.

14. ZHukovskaya A. V. Rezul'taty aerogeofizicheskih rabot masshtaba 1:25000 na uchastke Murav'evskom. (Otchet Aerogeofizicheskoj partii za 1987-89 g.g.). TFGI, inv. № 12048.

15. Prikaz Ministerstva transporta RF ot 2 iyulya 2013 g. N 229 «Ob utverzhdenii Obyazatel'nyh postanovlenij v morskom portu Vladivostok» (s izmeneniyami i dopolneniyami) [Elektronnyj resurs]: Portal GARANT. RU. - URL: https://base.garant.ru/70420734/?ysclid=lddwh5a6nm839932665 (data obrashcheniya 13.01.2023)

16. Gershanok L.A. Maloglubinnaya magnitorazvedka v usloviyah promyshlennyh pomekh / L. A. Gershanok. Vestnik Permskogo Universiteta. Geologiya. 2013. Vyp 1(18). P. 34-49.

17. Kochetov M. V. Optimizaciya metodiki differencial'noj gidromagnitnoj s"emki / M. V. Kochetov, V. A. ZHuravlev. Vestnik Voronezhskogo gosudarstvennogo universiteta. Seriya Geologiya. 2018. No. 2. P. 127–131.

18. Geomagnetic models and software [Elektronnyj resurs] / U.S. National Geophysical Data Center (NGDC). 2012. - URL: http://www.ngdc.noaa.gov/seg/geomag/models.shtml (data obrashcheniya 22.05.2017)

19. Devis Dzh. S. Statisticheskij analiz dannyh v geologii: V 2 kn. / Dzh. S. Devik; per. s angl. V. A. Golubevoj; pod red. D. A. Rodionova. Kn. 2. M.: Nedra, 1990. 427 p.

20. Bloh YU. I. Interpretaciya gravitacionnyh i magnitnyh anomalij: ucheb. posobie [Elektronnyj resurs]. M., 2009. URL: http://sigma3d.com/content/view/24/2/ (data obrashcheniya 15.01.2023).

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