CARL FRIEDRICH GAUß UND RUSSLAND. SEIN BRIEFWECHSEL MIT IN RUSSLAND WIRKENDEN WISSENSCHAFTLERN. Karin Reich and Elena Roussanova. Unter Mitwirkung und mit einem Beitrag von Werner Lehfeldt. 2012. illustrated. Berlin/Boston: de Gruyter (Abhandlungen der Akademie der Wissenschaften zu Göttingen. Neue Folge, Bd. 16). xxxii + 905p, illustrated, hard/soft cover. ISBN 978-3-11-025306-1, ISSN 0930-4304. €149.95, US$210.00. DOI: 10.1515/9783110253726

The work of the German mathematician Carl Friedrich Gauss (1777–1845) inspired the publication of numerous books and articles in different languages. His contribution to the elaboration of the theory of terrestrial magnetism in 1838 (G[auss] 1839) and in promoting respective investigations all over the world is remarkable (see Garland 1979). To what extent Gauss stimulated the launching of the Antarctic expeditions of James Clark Ross (1800–1862) and Jules Sébastien César Dumont D´Urville (1790–1842) is not very clear as it was Alexander von Humboldt (1769–1859), and not Gauss, who in April 1836 applied in this matter to the Royal Society of London. But from the correspondence between Gauss and Humboldt it follows that Gauss was also connected with this letter the formulation of which almost ruined the friendship of the two scholars (Biermann 1963). The expeditions of Ross and d´Urville, which had the goals of establishing precisely the magnetic south of the Earth, improved greatly knowledge of the climate and ice conditions in the southern polar areas and, as a result, brought to public attention discussion about the presence of a continent in the region of the South Pole. These facts are sufficient to include Gauss in the list of famous contributors to Antarctic exploration, although he himself never participated in a single expedition.

The evaluation of the importance of Russian researchers and of the geophysical observation stations located in the Russian empire to Gauss´s 'General theory of terrestrial magnetism', is the topic of this book by K. Reich and E. Roussanova. To answer this question, the authors performed thorough studies in different Russian, German and Estonian archives in order to find letters of different scholars to Gauss, and from Gauss, deposited there. Until then, the role of Russia in the investigations of Gauss had not attracted the particular attention of historians of physics. The results of the search were amazing: correspondence comprising 127 letters of 17 scholars of the Russian empire to Gauss was discovered. The analysis of the letters and Gauss´s theory of geomagnetism proved that the theory was mostly based on the observations conducted in the territory of the Russian empire (page 89). The introduction to the book is so striking that in future biographies of Gauss, it would be impossible to avoid the chapter 'Gauss and Russia' (page 16).

Why did the Russian empire become such an important centre of the study of geomagnetism? A crucial role in that was performed by the influential naturalist Alexander von Humboldt. He had already become interested in geomagnetism before his expedition to South America (1799–1804) and continued his research in Paris (from 1807). In 1816, in collaboration with Dominique François Jean Arago (1786–1853), he started daily observations of the variations in terrestrial magnetism. In 1823 and 1824, Adolph Theodor Kupffer (1799–1865) and Ivan M. Simonov (1794–1855), working at Kazan University, visited Paris. Simonov had performed geomagnetic observations during the Russian Antarctic (South Pole) expedition (1819–1821). Humboldt had convinced them to apply his method and start geomagnetic observations in the Russian empire. Simonov started observations in Kazan in 1828 and Kupffer, who had been proposed a job at the St Petersburg Academy of Sciences, started geomagnetic observations in 1830. Gauss corresponded with both scientists.

Humboldt also performed a very important role in setting up the network of geophysical observation stations in the Russian empire. In 1829, at the invitation of the Russian Emperor Nicholas I and the Minister of Financial Affairs, Georg von Cancrin (1774–1845), Humboldt visited the Urals. In his speech performed at the St Petersburg Academy of Sciences on 16 November 1829, he emphasised the importance of the network of observation stations in order to conduct simultaneous observations. He considered particularly important the continuation of observations in the regions where the geophysicists Christopher Hansteen (1784–1873) from Norway and Georg Adolf Erman (1806–1877) from Germany were carrying out observations in this year (Knobloch and others 2009: 266–285). Thanks to the support of Cancrin, Humboldt´s idea was realised in 1834 by Kupffer, whose role in coordinating and systematising the geomagnetic and meteorological observations in the Russian empire cannot be underestimated.

In 1833, an article about the intensity of the geomagnetic field of the earth and its absolute rate by Gauss was published (Gauss 1833). In the same year, in collaboration with his colleague the physicist Wilhelm Weber (1804–1891), Gauss invented the unifilar and bifilar magnetometers to measure the intensity of the magnetic field of the earth. In Göttingen, Gauss and Weber started respective observations in 1834. They founded a society, Göttinger Verein, with the purpose of collecting geomagnetic observation data from all over the world, independently of Humboldt. In 1833, Kupffer visited Gauss in Göttingen and demonstrated the instruments. He decided to start observations in Russia according to Gauss´s methods. Kupffer started observations in 1835 (page 386). Thus it is not surprising that the theory of geomagnetism by Gauss was greatly based on the observations conducted in Russia.

This book, *Gauss and Russia*, is like an encyclopedia. Those interested in the history of natural sciences in the Russian empire, can learn much about the scholars Gauss corresponded with (most distinguished among them are Kupffer, Wilhelm Struve (1793–1864), Nikolai Fuss (1755–1826), and Paul Fuss (1798—1855)), and about the Russian empire and scientific developments there in the 18th and 19th centuries. The biographies of the correspondents of Gauss, their academic pursuits and

relations with Gauss are described in detail. These form the greater part of the book of 900 pages. The contribution of Gauss to the progress of Russian science, in general, is analysed and all his investigations translated into Russian have been included. The illustrations, all in all 90, are instructive and appropriate. The authors have tried to uncover even the smallest details, beginning with the living dates and presentation of biographical facts (60 pages in all). As it was probably very complicated to find relevant information about some persons, the compiled database is very valuable. There are over 60 pages of references. Besides the biographical data, there is a name index, which considerably simplifies the use of the book. In conclusion, the publication by Reich and Roussanova is an excellent example of German meticulousness, as a result of which a perfect and necessary source is available for those interested in scholarly activities in the Russian empire.

Gauss´s impact on the study of geomagnetism cannot be overestimated as it led to the establishment of the magnetic south of the earth by Ross. Terrestrial magnetism was also one of the most important investigation problems of Carl Weyprecht (1838–1881), which he hoped to solve during the International Polar Year (IPY) in 1882–1883 (Tammiksaar and others 2010). The next IPY took place in the 20th century. The book *Gauss and Russia* by Reich and Roussanova is a very important link in better understanding the above mentioned events. (Erki Tammiksaar, Centre for Science Studies, Estonian University of Life Sciences, Baer House, Veski 4, 51005 Tartu, and Department of Geography, University of Tartu, Vanemuise 46, 51014 Tartu, Estonia (erki.tammiksaar@emu.ee)).

References

Biermann, K.-R. 1963. Aus der Vorgeschichte der Aufforderung Alexander von Humboldts von 1836 an den Präsidenten der Royal Society zur Errichtung geomagnetischer Stationen. (Dokumente zu den Beziehungen zwischen A. v. Humboldt und C. F. Gauß). *Wissenschaftliche Zeitschrift der Humboldt-Universität zu Berlin, Mathematisch-Naturwissenschaftliche Reihe* 12(2): 209–227. URL: http://www.uni-potsdam.de/u/romanistik/humboldt/hin/hin11/biermann.htm.

Garland, G.D. 1979. The contributions of Carl Friedrich Gauss to geomagnetism. *Historica Mathematica* 6: 5–29.

Gauss, C.F. 1833. Die Intensität der erdmagnetischen Kraft, zurückgeführt auf absolutes Maass. *Annalen der Physik und Chemie* 28(104): 241–273, 591–615.

G[auss, C.F.] 1839. Allgemeine Theorie des Erdmagnetismus. In: Gauss, C.F., and W. Weber (editors). *Resultate aus den Beobachtungen des magnetischen Vereins im Jahre 1838*. Leipzig: Weidmann: 1–57.

Knobloch, E., I. Schwarz, C. Suckow (editors). 2009. Alexander von Humboldt. Briefe aus Russland 1829. Berlin: Akademie Verlag (*Beiträge zur Alexander-von-Humboldt-Forschung* 30).

Tammiksaar, E., N.G. Sukhova, and C. Lüdecke. 2010. The International Polar Year 1882–1883. In: Barr, S., and C. Lüdecke (edotors). *The history of the International Polar Years (IPYs)*. Vol. 1). Heidelberg: Springer: 7–33.

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