

had already laid his powerful hand upon them; namely, M. Gauss, a mathematician not inferior to any of the great men who completed the theory of gravitation. And institutions had been established for extending the collection of the facts pertaining to it, on a scale which elevates Magnetism into a companionship with Astronomy. M. Hansteen's *Magnetismus der Erde* was published in 1819. His conclusions respecting the position of the four magnetic "poles" excited so much interest in his own country, that the Norwegian *Storting*, or parliament, by a unanimous vote, provided funds for a magnetic expedition which he was to conduct along the north of Europe and Asia; and this they did at the very time when they refused to make a grant to the king for building a palace at Christiania. The expedition was made in 1828-30, and verified Hansteen's anticipations as to the existence of a region of magnetic convergence in Siberia, which he considered as indicating a "pole" to the north of that country. M. Erman also travelled round the earth at the same time, making magnetic observations.

About the same time another magnetical phenomenon attracted attention. Besides the general motion of the magnetic poles, and the diurnal movements of the needle, it was found that small and irregular disturbances take place in its position, which M. de Humboldt termed *magnetic storms*. And that which excited a strong interest on this subject was the discovery that these magnetic storms, seen only by philosophers who watch the needle with microscopic exactness, rage simultaneously over large tracts of the surface of our globe. This was detected about 1825 by a comparison of the observations of M. Arago at Paris with simultaneous observations of M. Kupffer at Kasan in Russia, distant more than 47 degrees of longitude.

At the instance of M. de Humboldt, the Imperial Academy of Russia adopted with zeal the prosecution of this inquiry, and formed a chain of magnetic stations across the whole of the Russian empire. Magnetic observations were established at Petersburg and at Kasan, and corresponding observations were made at Moscow, at Nicolaieff in the Crimea, and Barnaoul and Nertchinsk in Siberia, at Sitka in Russian America, and even at Pekin. To these magnetic stations the Russian government afterwards added, Catharineburg in Russia Proper, Helsingfors in Finland, Teflis in Georgia. A comparison of the results obtained at four of these stations made by MM. de Humboldt and Dove, in the year 1830, showed that the magnetic disturbances were simultaneous, and were for the most parallel in their progress.