

Analyzing the early 19 century's geomagnetic declination in Japan from Tadataka Inoh's Santou-Houi-Ki.

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Santou-Houi-Ki national treasure of Japan recorded by cartographer Tadataka Inoh in 1800-1816, is 67 volumes ledger consist of approximately 200,000 magnetic compass land survey azimuth data accuracy of 0 degree 05 min, from eastern coast of Hokkaido to Yakushima Isl in western Japan. We continue the work of analysis that stopped after only analysis in 1917, which done about the survey data at known position of the retirement home of Inoh at Fukagawa in Edo (Tokyo) in 1802-1803.

(1)It is able to change Japan as one of the most concentrated area of accurate geomagnetic declination data in the world, in early 19th century, from insufficient area of data, and supply new data to northeast Asia by analysis of Santou-Houi-Ki.

The total number of analyzed points exceeded 178, and the outline isogonic line in Japan archipelago and the distribution of the declination in every15 minutes in western Japan coast in those days, begun to appear.

(2)Compare the isogonic Atlas by Gauss and Weber (hereinafter Gauss Atlas) consisted of observed data in 1828-1830, with the analysis from Santou-Houi-Ki, the foundational structure of isogonic lines in Japan archipelago is roughly similar. But we recognize the contradiction to reverse with secular variation in Northern Kyushuu area and Tsushima Island. There are no observed data in Japan in the table supplemented with Gauss isogonic Atlas. The recorded observational data in Gauss Atlas in East Asia were inland area from Pekin to Eastern Siberia, Ohotsk, Kamchatka etc. From the analysis of Santou-Houi-Ki, we recognize the magnetic declination supposed as the local geomagnetic anomaly in southern coast of eastern Hokkaido. The isogonic line of declination in surrounding area of Japan in Gauss Weber's Atlas had drawn by calculated estimates, on a matrix of 5 degree in latitude and 10 degree in longitude, one cell of this matrix is 500km long. Therefore the analysis of Santou-Houi-Ki becomes very important. Today it is very important to verify with the isogonic map of Andrew Jackson et al Gufm1 by NOAA (1800-1815).

(3)Procedure and advantage of interdisciplinary and simultaneous analysis of Santou-Houi-Ki across geomagnetism, cartography, and local history. 1.It increase precise evidence to verify the azimuth and the name or short description of the reference point or the target points recorded in Santou-Houi-Ki, with not only the survey diary by Inoh or Inoh map or the survey map of today, add historical local map, historical local source material, the old survey map by former Japan imperial army. 2. Use the recreation software of scenery or digital map of GSI Japan to grasp the outline of particular latitude and longitude of the reference point and target points and real azimuth. 3. Calculate the average of remainder as the declination, to deduct the magnetic azimuth recorded in Santou-houi-Ki from the real azimuth. 4. The important point is to calculate backward the precise position of the reference point should be adjusted to the position, where all of the declination values from the magnetic survey azimuth to different targets at the reference point are approximately equal to each other, to use the consecutive formula of Excel for speed up and keep accuracy. 5. Use GPS transmitter at the reference point to investigate longitude and latitude, and recalculate the position under 0 second in latitude and longitude, minute accuracy declination, more detail and accurate than traditional study. 6.It is able to find areas or points of local geomagnetic anomaly, or to restore the precise position of survey reference point by Tadataka Ino, accuracy of less than second in latitude and longitude, or the objective point of survey in accuracy second where the valuable in local history, including disappeared constructions or big tree etc.

Keywords: declination, Inoh, SantouHouiKI, Reference point, interdisciplinary