Regional model of the geomagnetic field changes in and around Japan.

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In G.S.I., continuous geomagnetic observation and repeat survey (the first class magnetic survey) were conduced from early 1950's. From these data, reference values of intensity and direction of the magnetic field in and around Japan Island was estimated, and these information were published in every 10 years (1980, 1990 and 2000).

To extract more accurate information about the magnetic field distribution and annual change from the observed data, we started to consider the construction of the geomagnetic spatial-temporal model for the area of Japan Island and, partially, surrounding seas.

Inside the Japan area, there are many geomagnetic stations continuously observing the geomagnetic field. For example, our institute has 2 observatories and 13 magnetic stations which observe the geomagnetic 3 components and total force, or only total force, continuously. So that, we configured the goal of our study to establish the scheme to construct the regional 3 components magnetic models using only the continuously observed magnetic data set which consists of X, Y, Z and F time series. For this purpose, we tried to combine the technique of NOC and SCH (Spherical Cap Harmonic) analysis. This is because, to use the total force data, it might be the very easy way to apply the potential analysis method.

To estimate the expressivity and clarify some problems come up with practical use of NOC + SCHA method, we treated the IGRF synthesize time series (period 1990-2001 and time spacing is 0.25 year) as the input data. The magnetic stations that we assumed were 34 points (in 16 points, 4 components (X, Y, Z and F), and in 18 points, only total force data were given). The locations of each station are identical with that of the actual geomagnetic stations. Using NOC + SCHA (colatitudes of half angle of the spherical cap is 45 degree and maximum degree of Gauss coefficients is 4), we can explain the input data with accuracy of 2-3 percent of input data and this accuracy will be suitable for our purpose.

Now, we are trying to construct the monthly 3 component model using continuously observed geomagnetic data in the period of 1998 to 2002. In our presentation, we will discuss about the expressivity and accuracy of our model.