Ⅳ-179　NUMERICAL LAND INFORMATIONS IN GEOGRAPHICAL FIELD AND ITS APPLICATION

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1. Introduction

In response to the recent increasing needs for comprehensive and systematic land information from a standpoint of land development planning and implementation, Japanese Government has started the pojects of collecting and producing various digital data concerning the land and human activities in a systematic way since 1974. The aim of these projects is to store in the cmputer the numerical data of various kind of natural and social materials including in the map and also to store in form of magnetic tapes so as to process by computer for retrieval and regional analysis. These data can be effectively used for analysis of multiply purpose in form of grid system by combining the economical information collected in National Land Agency and the poputation information collected by Statistical Bureau. Our Inst. in the way of same grid system is now carrying out the surveying of residential land as important item among the big projects of surveying the pattern of land use in Tokyo Metropolitan Area using personal computer. The paper deals with the problems on numerical land informations in geographical field of Japanese Government and several examples.

2. Process of Practical Works

The following shows us the flow chart of practical works in processing the geographical numerical informations.
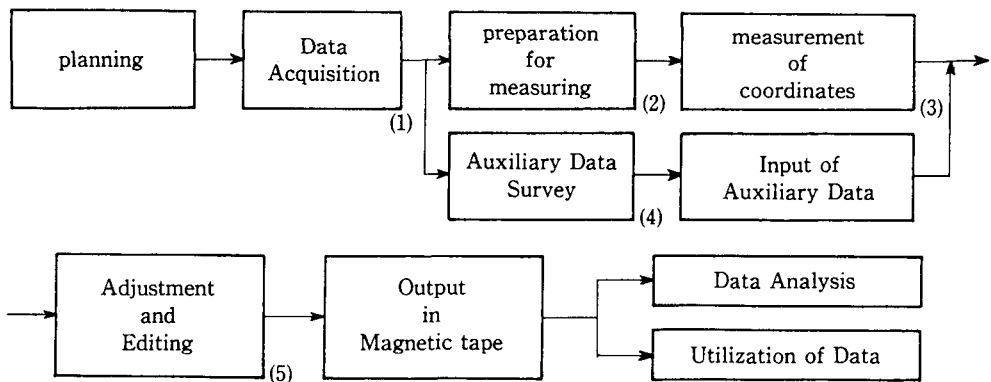
(1) The data acquisition is to collect necessary informations for numerical process mainly from the source of topographical map and aerial photos.
(2) The preparation works for measuring are to decide the signs and marks and coloring on the tracing film placed on the original map.
(3) This process is to measure coordinates in same category.
(4) The auxiliary information concerning to the land coordinates, for example:river code number, supervisor name of river in connection to the river survey.
(5) This process is to do rearrangement of coordinates and their auxiliary data for easier usage.

2. Digital Land Information

(1) State of Organization of Digital Land Information

Various types of digital land information,such as natural condition, the existing land use and areas of legislative control, etc. are being organized in mesh or geocoordinate form and stored in magnetic tapes. As of March 1982, digital information amounted to approximately 160 classes of files, 1,600 data categories and 400 spools of magnetic tape.

(2) Mesh Data

Digital land information may be considered as information that digitalizes in a standardized form, basic data concerning the national land available in the form of map information and statistical information. In this process, it is necessary to digitalize and symbolize not only the basic information itself but also its location. In digital land information, in order to pinpoint the location, a common regional grid cell is adopted. This is a method whereby the area is divided into meshes of a net by using a standard latitude and longitude. It is also called the longitude and latitude method.

The rdgional mesh divided by longitudinal and latitudinal lines can cover the whole world in a continuous fashion. Also, the mesh lines can easily be drawn by anyone on the basis of the longitudinal and latitudinal lines printed on maps.

There are three standard reginal meshes, 1) the first regional division is diveided by latitudinal lines of 1° apart and longitudinal lines at 40' intervals, 2) the second regional division is formed by dividing by 8 length and breadth of the first regional division, 3) similarly, the third regional division is formed by dividing by 10 length and breadth of the second regional division. The size of the first regional division isabout 80x80km for the central area of Japan, that of the second regional division is about 10x10km and the third regional division is about 1x1km. In general, the third regional division is called the standard rdgional mesh or the tertiary mesh.

(3) Data Formats for Digital Land Information

In digital land information, mesh data which categorize the grid cells, coordinate data which record its location, etc. is digitalized in various forms.

(a) Mesh data

The mesh can be regarded as an area, organized for data collection and is the basic form for the collection of digital land information. The grid cell of the Tertiary mesh is used as a basic unit and it can be combined and made into twice its size or Sub-divided into 1/4,1/10 or 1/100 of its size.

(b) Coordinate data

Coordinate data is used to represent information in point form as well as linear form.

(d) Aggregated data

In digital land information, besides mesh data and coordinate data from the viewpoints of effectively utilizing the information, aggregated data have been collected and totalled to represent information covering cities, wards, townships and villages or water catchment areas.

3. Practical Application

(1) The first step is the summation of the numerical data.

(2) The picture data are extracted in process of data output, such as the bird's-eye view and figures of the public facilities. these are drawn by X-Y plotter easily. The bird's-eye view and land use figures are extracted in any scale by inkjet-plotter and the film-writer can extract the same figures on t-e original printing film.