

**UNITED NATIONS**

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**Group of Experts on  
Geographical Names**

**WORKING PAPER**

***Fourteenth Session  
Geneva, 17-26 May 1989***

No. 5

15 April 1989

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Agenda item 6

**INCORPORATING A DIGITAL TOPONYMIC DATA BASE IN A GEOGRAPHICAL  
INFORMATION SYSTEM (GIS) -**

**FIRST RESULTS OF COMPUTERIZED PLACEMENT OF "CURVED" NAMES IN MAPS**

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United Nations  
Group of Experts on Geographical Names  
14th Session, Genève, May 1989

INCORPORATING A DIGITAL TOPONYMIC DATA BASE IN A GEOGRAPHICAL  
INFORMATION SYSTEM (GIS) —  
FIRST RESULTS OF COMPUTERIZED PLACEMENT OF "CURVED" NAMES IN MAPS

The following is a brief account of first results of employing a digital toponymic data base (DTDB) in the computer-assisted production of maps.

Computer-generated gazetteers of geographical names serve numerous user communities. The majority of these make use of the names stored in the data base as a single-dimensional array, i.e. in linear mode. A prime example is the hard-copy gazetteer printed as system output by the computer printer or automated typesetting equipment. The cartographer, on the other hand, is not only one of the most frequent users of toponymic data, but uses these data in a two-dimensional environment, the map, where the placement of localities and other geographical items is analogous with their location on the three-dimensional spheroid. Every geographical name is linked to at least one such item. The two-dimensional cartographic array of names in the map, which, in reality, represents two degrees of freedom in three-dimensional space, can therefore be regarded as being analogous to this space.

In the past, names placement in maps was always a manual operation. Even when copy for the names, such as strip film, was produced by semi-automated or automated means, placement itself was performed by hand. One of the main reasons was the programming effort needed and the computer memory required for automating the process.

The first breakdown of the barrier of automation in names placement was the handling of horizontal straight-lined names. These are mostly names of populated places, such as cities, towns and villages. Since these can - and, of course, always should - be accompanied by the coordinates designating the location to which the name is assigned, it is easy to link the digital toponymic data base via suitable software to a plotter. In small-scale maps, where e.g. circular point symbols are used to represent populated places, a spatial separator in the form of a pair of adjustable parameters (dx,dy) can then be used to define the position of all (horizontal) names relative to the point symbol. In cases of name overlap the placement had to be adjusted manually, and later e.g. by moving the name up or down or to either side of the symbol through locally changing the values of (dx,dy). When interactive editing became available, it became possible to perform this operation on the screen.

The second stage was the handling of oblique but still straight-lined names. While for horizontal names only one pair of coordinates is required, usually those of the left-lower point of the first character, slanting or off-horizontal names must have their direction defined by two points, both on the (slanting) base line, the first again usually being the left-lower point. This action normally requires the use of a digitiser.

#### Computer-Assisted Placement of Curved and Winding Names

The problem remained of effectively automating the placement of irregular place names, and in particular the curved or winding names of rivers and other linear hydrographic features such as wadis.

The Survey of Israel has recently experimented successfully with a computerised solution of this task. In setting up its new Geographic Information System (GIS), Arc/Info software was acquired and is being used inter alia in map design and production. Since the toponymic data file of Israel - described e.g. in UNGEGN document E/CONF.79/L.65 (Montreal 1987) - is incorporated in the GIS, names called from the DTDB can readily be projected onto the editing screen of the "Sun" work station to the

spot designated by the coordinate pair. This is a completely automated step, the name appearing horizontally. But even before the name is called onto the screen, the relevant linear map items such as rivers and streams, contour lines, streets in town plans, etc., are called to the screen from the topographic data base. The name in question is now "caught" as a linear feature, and is then interactively "bent" along the respective linear geographic item. This can be done in either of two ways. A given part of the curved linear item (such as a river) can be specified by its menu address and a pair of coordinates on the line; a separator distance is also specified, and the name in question is then strung out automatically, parallel to this stretch of the geographical feature and at a given distance from it. Alternatively, a curved line can be traced on the screen with the aid of the cursor (at the Survey of Israel a "mouse" is employed for this as well as for most locating operations), and the name strung along it. Finally the name is fixated in the chosen position. Since this is a ROM (read-only memory) operation as regards the data base, the latter is not affected.

As yet the method has been tried in raster mode output only; vector hard-copy may give improved graphic quality to what may be regarded as an advanced-technology use of a toponymic data base.

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