The Definition of Location of Maritime Objects and their Names[7]

Naftali Kadmon
(Professor, The Hebrew University of Jerusalem, Israel)

In previous papers submitted by the present author to past symposia on the Naming of Seas he dealt specifically with the names themselves – with their definition as linguistic items and with their toponymic classification. The present paper deals with the question of defining the location of geographical items, among them maritime ones, by various means and measures. Also, it will show some difficulties met in the process of defining location.

An anthroponym, i.e. a name of a person, relates to a "moveable" object; its bearer can change his or her location at any moment. By way of contrast, a toponym refers in general to a fixed, immoveable, object. In order to be assigned its place in space, e.g. in mapping or in a GIS (geographic information system) it must be given a spatial address.

The three scales of measurement – nominal, ordinal and quantitative

When man first began not only to relate to particular geographical objects in his environment but to convey their location to others of his species, he must have used verbal descriptions of the properties of any object in question, as well as physically pointing out its direction in relation to the speaker. An indication of distance must have come at a later stage, probably at first in terms of time and later in terms of metric distance. However, before an object can be named it must be identified. In the case of living things, which as mentioned above are mobile rather than fixed to a particular location, this usually involves describing the properties of the subject. Identifying immovable objects, and especially different objects belonging to a single category of items, must involve a definition of location S otherwise there would be no possibility of distinguishing between them. This is particularly true of topographic features which make up categories or feature classes: mountains, rivers, lakes, islands, populated places and many others. Below we shall briefly investigate how the location of geographical items S which are the objects of toponymy S can be defined.

All measuring activities, in the widest sense, can be conducted on three main "scales". The first is the nominal scale: here, each item is distinguished from all others in the set by its nature, and therefore it can be named (hence the term *nominal*, from Latin *nomen*, name) S but not graded. Examples are soil types, human occupations or professions (disregarding income or social status!) or countries. The second is the ordinal scale (from Latin *ordo*, order), in which items of a set can be arranged or graded in a clearly-defined progression or order, e.g. by size, intensity, value etc. S but not measured quantitatively.

[7] Based in part on chapter 3 of the author's book "Toponymy – the Lore, Laws and Language of Geographical Names", Vantage Press, New York 2001.

Military ranks, university degrees or the contestants in a beauty contest are examples of items arranged on an ordinal scale, as are roads graded by arteriality or rivers by their stream order.

Finally there is the quantitative scale, on which objects can be measured in a "metric" way, i.e. with a measuring tape, thermometer, weighing scales, monetary system or other measuring device; examples are income, intelligence quotient (I.Q.), distance, angle, etc. Strictly speaking, quantitative scales can be divided into two types. Interval scales have fixed units but no intrinsically fixed origin; angles, which can be measured from any direction, are an example, as is temperature which, at least in the Centigrade and Fahrenheit scales, has different zero points. On the other hand ratio scales are those which have a "naturally" fixed zero or point of origin, three examples being length, weight and azimuth (angle of direction, always measured clockwise from North).

In this text we shall refer to both interval scales and ratio scales under the combined heading of quantitative scales.

Defining location on different measuring scales

Coming now “down to earth” and to our reference body: a place on Earth S or, for that matter, on a celestial body such as the moon or a planet S can be defined in a number of ways. Coordinates such as geographical latitude and longitude, or plane topographic coordinates such as the UTM grid (see below), constitute a quantitative definition. A named or numbered grid square such as B-5 in a town plan forms an ordinal definition, because only an orderly progression of finite-size map squares is provided as reference frame for the geographical objects, not exact measurements of arbitrary precision. Last S but earliest in historical development S is the verbal description of location, i.e. by a name. Each method has its advantages and disadvantages. As shall be demonstrated, coordinates are precise to a point (and define an error square, the size of which depends on the smallest unit used in the coordinates); an ordinal grid rectangle is more comprehensive and is better understood by many readers, but includes on the average many dozens or even hundreds of names. Finally, names are still the world's primary reference system: according to Orth, approximately 1 billion names are being used by roughly 6 billion people populating the Earth.[8]

Names as locators

What, then, are the advantages of designating a geographical feature by its name? Primarily, a name is more easily remembered by most people than a set of numbers. Secondly, in many cases some mental connotation can be attributed to the name. Thirdly, a name can indicate not only a small object such as a spring or a cave, but also a larger area such as a city or even an entire continent or an ocean. Fourthly and chiefly, a name can often supply an appreciable amount of information about the location referred to, such as the type of place it is, and in many cases about its cultural, political and historical

[8] Donald J. Orth, *Organization and function of a national geographical names standardization programme*. United Nations, New York, 1987.

background. And therein lie the roots of a problem of mainly cultural-historical or, in many cases political, character. Whereas coordinates in a given framework are unambiguous, names are not: a given well-defined location may be addressed by various names by different cultures or political systems, sometimes leading to friction and rivalry. Cases are, of course, too numerous to list, and a few examples may serve the purpose: the German names of towns and villages in German Lebensraum in French, Polish or Czech soil between the two world wars; Greek and Turkish names in Cyprus after 1974, maritime names such as the Persian Gulf vs. the Arabian Gulf: Nihon Kai (Sea of Japan) as against Tong Hae (East Sea), Yam Kinneret (Hebrew) vs. Buḥayrat Tabarīya (Arabic) for the Sea of Galilee in Israel. Here we encounter the first difficulty in assigning a name to a topographic item: which name or names, perhaps from among a selection of allonyms (alternative names), should be given to it?

Are there any drawbacks to designating a place only with the aid of its name, besides the lack of "geometric" precision? Yes, there are three. Firstly, one name often refers to several geographical features. Let us take the name Bethlehem. In the Holy Land alone there are two Bethlehems: one South of Jerusalem, also called Bethlehem-Judah in the Bible (Judges 19, 2), and one in Galilee (Joshua 19, 15). But we find cities and towns carrying the name Bethlehem (or its derivatives, i.e. its conversions and exonyms) in many other countries. In the US alone there are dozens of populated places named Bethlehem. So the place name itself does not supply a complete definition of the location, and we may have to add the name of the country and perhaps even of the district. Secondly, a specific geographical feature may have more than one name. A Dutchman may refer to his country's capital as Den Haag; a foreigner will look up the place in his atlas and find The Hague or s'Gravenhage, and will be unaware that he has indeed hit upon the correct place. Thirdly, in this age of computers and information technology a quantitative definition of location is indispensable for digital geographical processing, especially in a GIS (geographic information system), including maps, statistics and indexes such as gazetteers.

Incidentally, the first disadvantage mentioned above in connection with names as locators applies also to the ordinal definition of location by map squares: a single square may include more than one appearance of a specific toponym. This is certainly true of names such as Olifantsfontein or Nooitgedacht in South Africa, which appear dozens and perhaps hundreds of times in the country at large, and (in the case of Nooitgedacht) over a dozen in a single 1:50,000-scale map sheet.

The geographical graticule vs. topographic grids

It is thus clear that for a precise and unambiguous definition of location of a given toponym a quantitative method is mandatory, but, in cases of homonyms (different places with identical names), perhaps not enough. Such a framework is supplied by the various coordinate systems, with which we shall briefly deal now. No proper national gazetteer of geographical names is complete without reference to the coordinates of each name. Since these coordinates are, in most cases, taken from maps, air photos or directly from GPS (global positioning systems), we shall below deal with the principles involved.

Geographical coordinates seem to be the most ancient quantitative method of defining location, at least in western literature. The earliest list of geographical names complete with quantitative locators is Ptolemy's *Geographia* of the 2nd cent. AD, which records some

8100 places by their names and with their geographical coordinates. The net of circular lines of latitude on the globe, also called parallels (because their planes are parallel to each other and to that of the equator), and of lines of longitude or meridians (which are half "great circles" extending from pole to pole), is called the geographical *graticule*. Latitude of a place on the globe (and one should never forget that all toponyms refer to places on a *spheroidal* body) is measured north or south from the equator (lat. 0E) as angles, in degrees, minutes and seconds, and varies between 90EN at the North Pole and 90ES at the South Pole. Longitude is similarly measured as an angle east or west from the prime meridian of Greenwich, England (longitude 0E) and varies between 180EW and 180EE (which coincide, and form the basis of the International Date Line). These measurements thus constitute a precise quantitative system, and its degree of precision is limited only by the smallest unit used (degrees, minutes or seconds and their fractions).

In order to satisfy readers with a proper background in cartography or geodesy it should be mentioned that referring to the Earth as a sphere is only a first approximation. To be precise, the Earth is an irregular body; just go out and look at the nearest mountain and you will see the truth of this statement. But, as a base for more precise calculations of location, as well as for topographic mapping and for specific uses such as computing satellite and missile trajectories, a geometrical shape has to be assumed. On this theoretical surface the mountains, valleys and depressions of the "real Earth" can then be superimposed. The first approximation thus is the sphere with constant radius R (for our purposes a value of R=6371 km is sufficient). A better approximation is a so-called oblate ellipsoid of rotation, which can be visualised as a sphere slightly flattened at the two poles: the equatorial radius is roughly 6378 km while the polar radius is only some 22 km less or some 6356 km, the flattening ratio thus being approximately 1/300. Therefore, meridians are not half-circles but near-circular half-ellipses. A further refinement is the so-called geoid used mainly in computing precise altitudes. The surface of this shape is, at all points, perpendicular to the direction of gravity, and can be visualized by imagining the oceans extending below the continents. So we should speak of the Earth not as a spherical but as a spheroidal body. However, being toponymists and not geodesists we shall continue to use the approximation of the spherical Earth!

In spite of what has been said above concerning the sphericity of the Earth, it is often convenient to deal with only a limited portion of the Earth's surface and regard this at large scale (and therefore in detail) not as curved but as a flat surface, a plane. This is what every conventional topographic map enables one to do. The method of transferring places from the spheroidal surface of the Earth to the plane map sheet is called a cartographic projection. Since the representations of the lines of the graticule in a plane map are curved (except in the so-called normal cylindrical projections), and therefore inconvenient for measuring coordinate values from them, it is common practice to superimpose a plane rectangular net of squares on the map, of the well-known type called Cartesian coordinates, and this is called a topographic or local grid, or, if it covers a national territory, a national grid, the coordinates then being called national coordinates. Most countries have such a national grid, adapted to the particular needs of the country involved. But some grids were designed specifically for international use over wider regions. One example is the grid based on the Gauss-Krüger projection; another, now widely accepted and used around the world, is the UTM system. Such rectangular coordinates are useful for describing the location of names (which in a map does not necessarily coincide with the location of the

respective geographical objects), mainly in land areas. In extended sea areas, especially in small-scale maps, where less precision is required, definition by geographical latitude and longitude is often more convenient.

Placing a maritime name

It was said above that a name can define a very large area such as a continent or an ocean. Also it was said that a geographical object must be defined before it can be named. And herein may lie a further problem. In order to correctly describe an object such as a sea e.g. in a map, its outlines must be digitized, i.e. converted into a polygon, a closed "string" of point coordinates. The name can then be inserted at any convenient point within the polygon, for example at the center of gravity of the area. Since the outline of the maritime item, at least in a small-scale map, is usually an objective line, there should not be any difficulty in performing this operation. But what about a contested sea area? Besides its different territorial waters which are governed by endonyms, it might include secondary areas such as EEZs (extended economic zones) – which may not be recognized by all countries bordering the maritime item under review[9]. It might also have other "closed" areas. Economical rivalry is perhaps the chief agent for dissention, political rivalry following in second place, this often being connected to security considerations. In most cases of sea areas bordered by more than one national authority, different endonyms are often used by the respective countries. When those are applied not only to a country's own territorial waters but to the entire maritime object, strictly speaking they then form exonyms in the languages of the other countries. There remains the case of the open or high seas which do not come under the jurisdiction of any one national authority. Here, any toponym can be applied. Relevant examples would be the Black Sea or the Baltic Sea (where no toponymic tension seems to exist), or the Persian/Arabian Gulf and the East Sea/Sea of Japan, where it does. In such cases, selecting the location of the appropriate name depends on the definition of the outline or polygon selected. And this, again, depends on the scale of the respective map, and will probably change with map scale.

Finally, the present author always points to the example of the three Scandinavian countries which, by consent, decided on the single name form "Skagerrak" for this northern maritime item, with its single geographical definition, to replace the three different former name forms. One can only hope that other countries involved in a similar situation but at present still resisting a common solution, would follow suit!

Author's e-mail address:
msnkadmo@mscc.huji.ac.il

[9] See also N. Kadmon, "Endonym or exonym – is there a missing term in maritime names?" Ninth United Nations Conference on the Standardization of Geographical Names, E/CONF.98/6. New York, August 2007