

Evolution of the Relationship between Maps and Geographical Thinking from Ancient to Modern China

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Abstract. It's over 5000 years' evolution of maps in China from ancient time to modern society, and their changes and development appeared closely interrelated with China's history. For instance, the maps was in embryo form and mainly existed in Chinese mythology and tales in the far ancient period, and in the form of primitive maps made through divination plus simple measuring in the Xia, Shang & Zhou dynasties, while was mainly used in military affairs and water conservancy project in the Warring States period. Till the Qin & Han dynasties, multiple modes of mapping were realized on the basis of unified characters, measuring system and surveying-mapping projects. Chinese ancient cartographic theories and mapping instruments were developed in the periods of the Three Kingdoms, the Northern-Southern, Sui-Tang dynasties, and colorful national topographic maps as well as landscape painting maps were produced. It was in the Song & Yuan dynasties when the maps in China reached the pre-modern level, i.e., the theory & technology of Gage-row-square, based on which plenty of maps were made. The near-modern cartographic theories and technologies appeared in the Ming & Qing Dynasties, when the precision mapping technologies in the western world reached to China, and were integrated with the latter ones, and national maps, regional maps, even global maps were prevalent in that time. In the Republican period, topographic mapping, aerial survey aroused evidently, and lots of map publishing companies and agencies came into the world. The cartographic theories and technologies developed greatly since the founding of P. R. China, from the traditional ones to the modern ones, especially after the year 2000, has been to the era of digital, informational, automatic, and intelligent mapping.

Maps and Geography aroused, co-existed and co-developed since the beginning of human beings' history, i.e. maps help people learning natural environment, while the geographic theory & concepts have direct guidance to the map-makers on recognizing and grasping the knowledge of territory, domain, layout and geographic pattern. In a word, their history shows a spiral track of mutual impacting, illumination and promotion.

To my knowledge, the relationship between maps and geographic thinking lies in the two points of views, i.e., the geographic concept one, and the geographic methodology & tools one. As for the first one, the depth of recognition of geographic objects affects the map make results, e.g., on ancient Chinese world maps, the continent of Asia was extremely large, while the American continent was very small, and was displayed as a part of north-eastern Asia; the second example is that on the ancient Chinese maps, North was on the up-side, while on the western maps, North or South was on the up-side. These two examples explain how different recognition on geographic objects laid effect on the maps made by those who held different geographic concept. One the other hand, the achievement of surveying-mapping has positive impact on the improvement of geographic concept, such as the unified view of the whole globe, the unification of time & space, etc. Furthermore, the relationship of geography and map can be expressed as that of prototype and model, and may be describe in three dimensions (axis) as degree of accuracy, degree of generalization, and degree of innovation.

As for the second point of view, i.e. the relationship of geographic thinking and map-use tools, we should say, the method of map-using in the far ancient and ancient time was only the graph-image thinking, and was improved to the mixture of graph- image thinking with mathematic model in the near modern periods, while in the nowadays, multiple methods are used in geographic thinking, such as knowledge reasoning, simulation & virtual reality, Geo-Info-TUPU, comprehensive integration, except the two ones mentioned above.

Keywords. Maps, Geographic thinking, Relationship, Evolution, China