

the long duration of Magellan's circumnavigation (from August, 1519, to September, 1522), and the long sojourn of a numerous crew under the southern sky, obliterated the remembrance of all earlier observations, and spread the name of the *Magellanic Clouds* among all the sea-faring nations of the Mediterranean.

We have thus shown by a single example how the extension of the geographical horizon southward opened a new field to contemplative astronomy. There were four objects to which the attention of pilots was especially directed in the new hemisphere, viz., the search for a southern polar star, the form of the Southern Cross, which assumes a vertical position when it passes through the meridian of the place of observation, the Coal-sacks, and the circling clouds of light. We learn from the treatise on the art of navigation (*Arte de Navegar*, lib. v., cap. 11), by Pedro de Medina, which has been translated into many languages, and first appeared in 1545, that the meridian altitudes of the "Cruzero" were used as early as the first half of the sixteenth century for the determinations of latitude. *Measurement* soon succeeded the merely contemplative observation. The first work on the position of stars contiguous to the antarctic pole was based on the distances of known stars of the Rudolphine Tables, as calculated by Tycho Brahe. This work, as I have already observed,* was composed by Petrus Theodori of Embden, and Friedrich Houtman of Holland, who navigated the Indian Seas about the year 1594. The results of their measurements were speedily embodied in the Star-Catalogues and celestial globes of Blaeuw (1601), of Bayer (1603), and of Paul Merula (1605). Such were the materials for the foundation of the topography of the southern heavens before Halley (1677), and before the meritorious astronomical researches of the Jesuits Jean de Fontaney, Richaud, and Noel. The intimate connection between the history of astronomy and that of geography thus indicates those memorable epochs in which (scarcely two hundred and fifty years ago) men first acquired the knowledge necessary for the completion of the *cosmical image* of the firmament and of the configuration of continents.

The *Magellanic Clouds*, the larger of which covers a celestial space of forty-two, and the smaller a space of ten square degrees, certainly produce, at first sight, the same

the Milky Way throughout the arch of heaven within the breadth of that space."]

* *Cosmos*, vol. ii., p. 287; vol. iii., p. 112, 138.