

Atypical Path of the Kuroshio Large Meander South of Japan occurred in September 2017

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The Kuroshio south of Japan takes the large-meander (LM) and non-large-meander (NLM) paths alternatively on interannual to decadal time scales. Except for the 1981-1984 LM path, past LM paths (in 1975-1980, 1986-1988, 1989-1990, and 2004-2005) were changed from the nearshore NLM paths, which passes through the channel north of Miyake-jima Island. To perform a comparison between the ongoing LM path begun in September 2017 and other LM paths, we examined tide gauge data (1961-2018), altimetric sea surface height data (1993-2018), bottom pressure data (2014-2017), and Quick Bulletin of Oceanographic conditions (1961-2018). The 2017 LM path was found to be changed from the offshore NLM path, which passes through the channel south of Hachijo-jima Island. In addition, the meandering trough of the 1981-1984 and 2017 LM paths were observed to be more shifted to the east and to be frequently located on the Izu-Ogasawara Ridge. The formation process and shape of these LM paths are atypical and different from those of the other LM paths. Therefore, it is suggested that there exist two types of the LM paths. Being similar to other LM paths, before the formation of the LM path, a mesoscale path disturbance, called a small meander, occurred in the region southeast of Kyushu, propagated eastward, and amplified the offshore displacement of the Kuroshio west of the Izu-Ogasawara Ridge. Approximately three months before the passage of the small meander off the eastern coast of Kyushu, a significant bottom pressure depression was observed. The baroclinic instability is commonly important for current path disturbances to develop to the large meanders of both types.

Keywords: Kuroshio large meander, Sea surface height, Bottom pressure