The floor level change along the 3 km SuperKEKB main ring tunnel has been surveyed using DNA03 and N3 periodically. The south arc section continues to sink with respect to the interaction point at an average speed of a few millimeters per year, resulting in a net sinkage of 35 mm. The floor level of the south arc section and around the interaction point have been monitored continuously with the BINP HLS system. The level is affected by the outside temperature, rainfall etc.

Reference sensor

18 HLS units (TL099 etc.) are installed along the red line in the Tsukuba Exp.

The both side of the IP sections are covered by radiation shields. Each section weighs about 60 tons. The floor levels during the radiation shield installation are shown. Two shields were installed per day. The sensors near the IP presented the largest variation of approximately 200 μm.

Effects of the construction is clearly seen. Relative level change measured by DNA03 is plotted against the distance from the IP. The effects of the construction is clearly seen.

The floor has been continuously monitored since the installation of the HLS units in August 2015. The levels are relative to the reference sensor (TL099) located at the left end. The floor near the IP started sinking with respect to the reference point (or the left end and right end started floating with respect to the IP) and reached the lowest level in winter. It started floating up again, as spring came. The seasonal change of the floor level is observed to be more than 1 mm over the approximately 8-months period. The floor level variation appears to follow seasonal changes of the outside air temperature. The daily variation following to the air temperature is seen, too.

Daily variation of the tilt of the tunnel floor is as small as 20 μm / 10 m, but it is noticeable when the daily variation of the ambient temperature is large or the time of the sunrise is long.

The floor is tilted because of the heavy rain.

Expansion joint TN-20. The bump of the floor concrete can be seen.

HLS #1–4 (offered by DESY) OUTPUTS, WHICH WERE PLACED IN THE ARC SECTION OF OHO AREA

Daily variation of the floor level is shown. The floor level of the south arc section shows a noticeable change compared to the reference point (IP). This is likely due to the seasonal change of the outside air temperature. The daily variation following to the air temperature is seen, too.

The floor level started sinking rapidly in early September 2015 and late August 2016, which seems to have some correlation with the precipitation. We had a localized torrential downpour in this area at that time and this likely changed the underground water level and the tunnel level.

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