2018年7月豪雨時の週間アンサンブル予報データによる簡易感度解析
Simple sensitivity analysis using weekly ensemble forecasts during the heavy rain event in July 2017

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It has been pointed out that the heavy rain event that struck a wide area of Japan in the beginning of July 2018 was mainly ascribed to the development of the Okhotsk High and the North Pacific High on a synoptic scale, although meso-scale physics was also important, and that a stationary Rossby wave train that is referred to as the Silk Road pattern appeared over the Eurasian Continent and contributed to strengthening the North Pacific High. The author attempted to identify which area was responsible for the forecast around Japan during the event using a simple sensitivity analysis technique. The method used here was the ensemble singular-vector sensitivity analysis proposed by Enomoto et al. (2015), based on ensemble forecast data. This technique assumes that initial perturbations growing optimally in a verification domain at a given forecast time can be expressed in a linear combination of the ensemble initial perturbations. They can identify a particular set of coefficients that maximizes a "norm" of forecast perturbations within the verification domain, by solving an eigenvalue problem under the constraint that the norm of the initial perturbations equals unity. The norm was here defined in terms of dry total energy. For 72-hour forecasts around Japan from the end of June to the beginning of July, sensitivity of their initial conditions was large south of Japan, around Mongol and East Siberia. These signals was able to be traced back to areas west of the Ural Mountains four or five days before the forecast time, and the sensitivity around Caspian Sea was especially large. This is consistent with the Silk Road pattern. The sensitivity signal was able to be tracked back to West Europe, but was no longer clear over the Atlantic Ocean.

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