

A Comparison of the Western Pacific Subtropical High Indices Described by Four Reanalysis Datasets

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1. The importance of western Pacific subtropical high

The western Pacific subtropical high (WPSH) is one of the most important circulation systems affecting the weather and climate over East Asia.

- On the intraseasonal timescales, it controls the northward processes of the summer rain belts over East Asia.
- Its interannual variation influences the occurrence of flood or drought in East Asia.
- Its intradecadal change provides a climatological background of more rainfall than normal over Yangtze River valley of China since 1990s.

2. Four representative WPSH indices are investigated and compared based on NCEP/NCAR (NCEPI), NCEP/DOE (NCEPII), ERA-40 (ERA) and JRA-25 (JRA) reanalysis datasets, respectively.

The four indices includes the WPSH area (defined by the "area" of WPSH surrounded by the 588-dagpm contours over western Pacific), the intensity (the "volume" of WPSH over 588-dagpm), the latitudinal axis position (the latitude position of zonal wind shear line ($u=0$ and $\partial u/\partial y > 0$) at 500-mb level surrounded by the 588-dagpm contour) and the west boundary (the minimal longitude degree of the 588-dagpm contour).

3. Climatological features of JJA WPSH

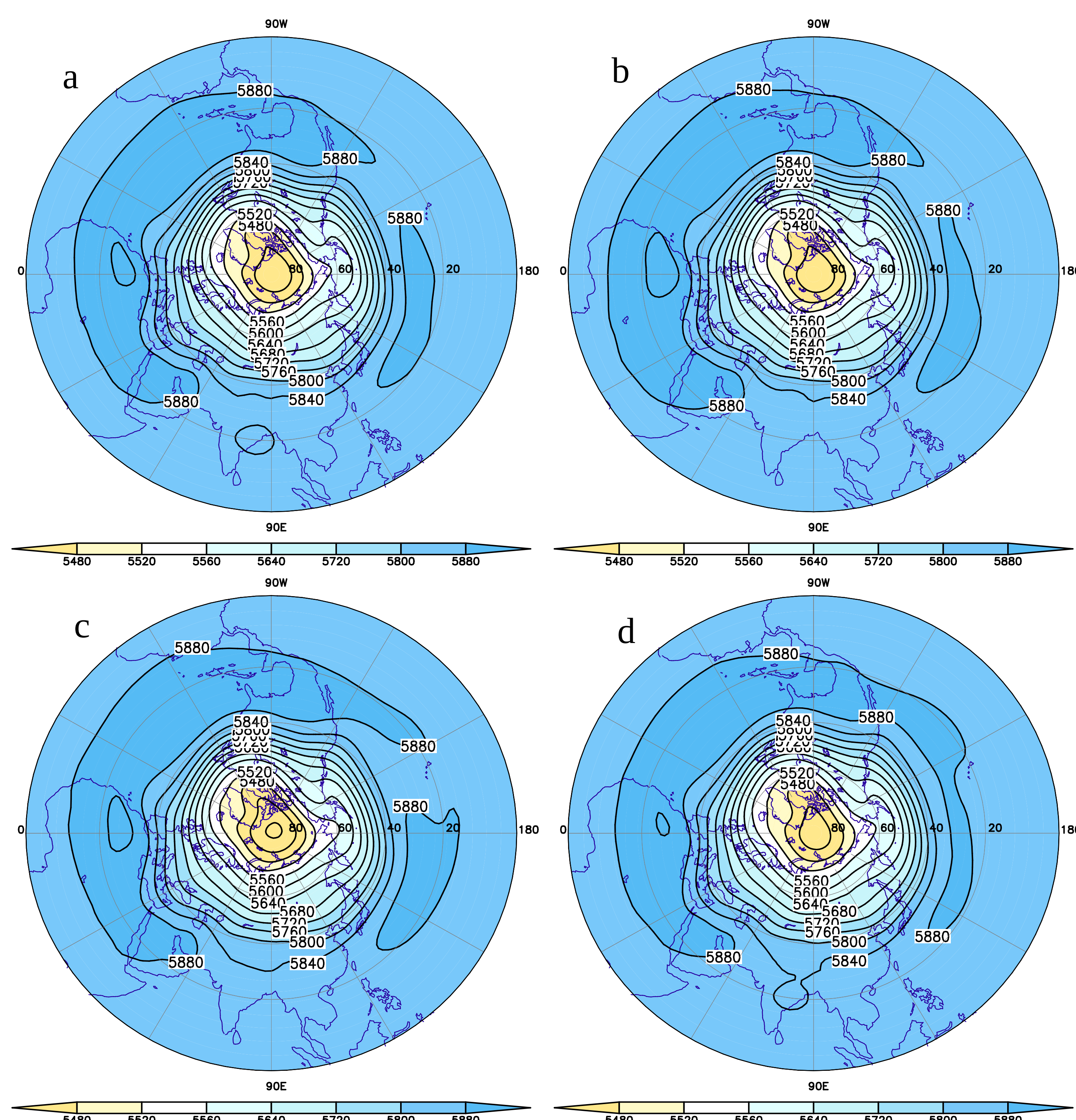


Fig.1 The geopotential height at 500-mb level for Northern Hemisphere summer averaged from 1971 to 2000 (a. NCEPI; b. NCEPII; c. ERA; d. JRA)

4. Annual cycles

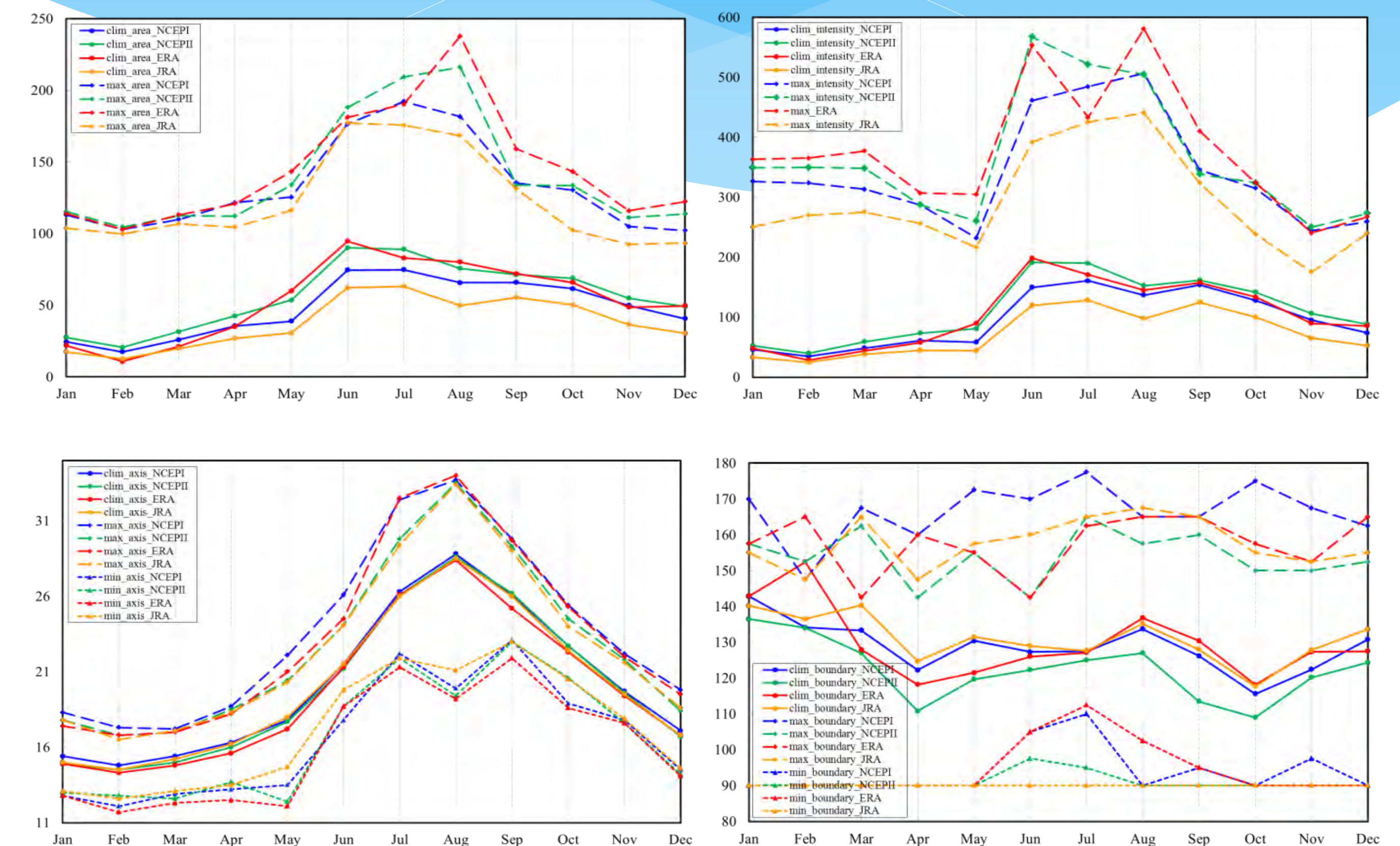


Fig.2 The annual cycles of the WPSH indices and their maximum/minimum (blue lines: NCEPI; red lines: NCEPII; green lines: ERA; orange lines: JRA)

5. Interannual variations

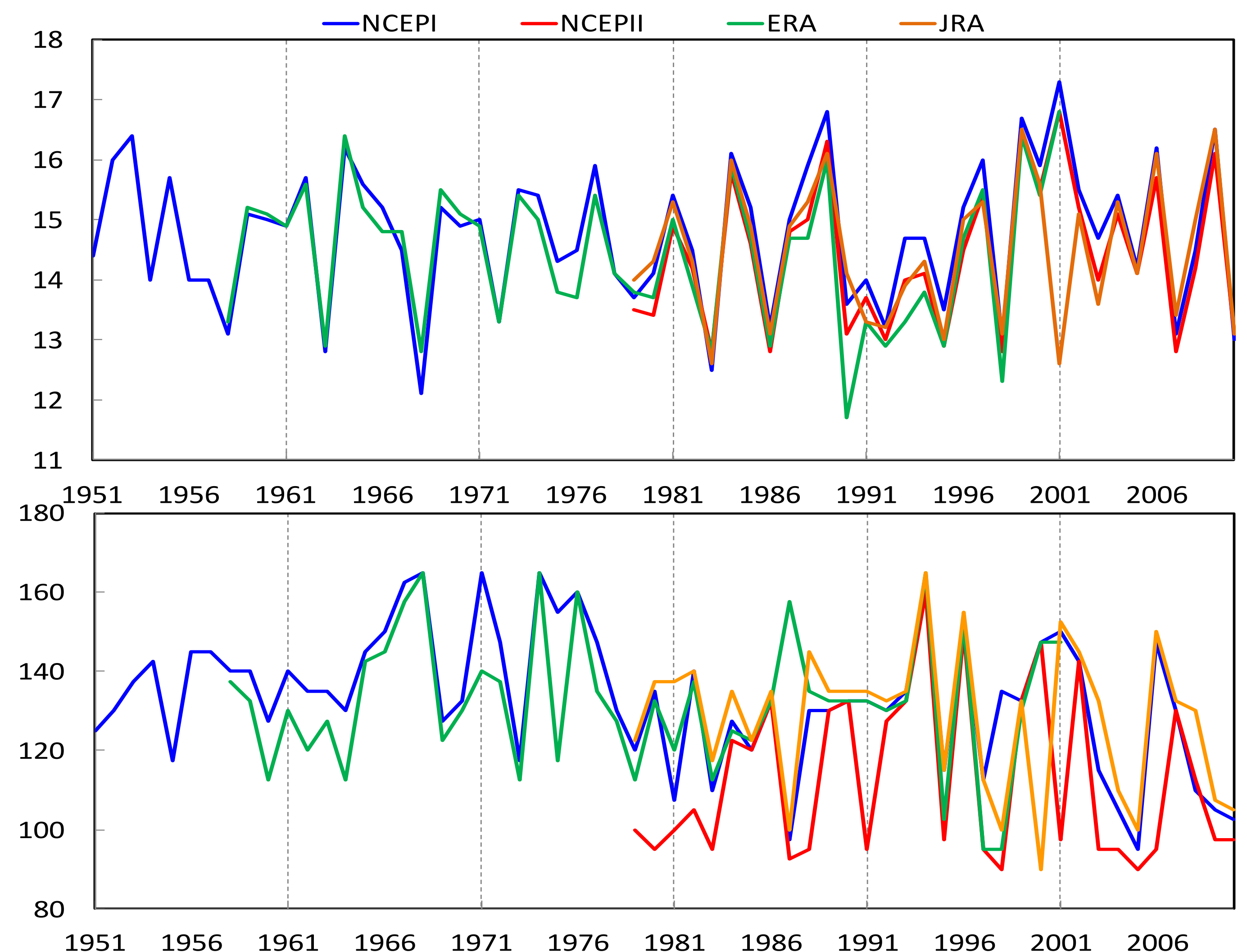


Fig.3 Interannual time series of the latitudinal axis position of WPSH in Feb. (top) and of the western boundary of WPSH in Sep. (blue lines: NCEPI; red lines: NCEPII; green lines: ERA; orange lines: JRA)

6. Summary

- a. As the most primary feature, the annual cycles are represented in all the datasets. The climatological WPSH area in JJA is the least in JRA and the greatest in NCEPII (Fig. 1). The climatic mean latitudinal axis position of the high is more southward in ERA and the west boundary is more westward in NCEPII (Fig. 2).
- b. All the datasets show significant interannual variations of the high. Compared to the WPSH indices in ERA and NCEPII, the variability in JRA and NCEPI are relatively less than others.
- c. The time series of the area and intensity in four datasets show similar multi-time scales variability, which means all the datasets can describe the strength of the high well. But the latitudinal axis positions and the west boundary locations differ quite a lot in some months in different datasets, especially in JRA (Fig. 3).

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