



Inter-comparison among Trends of Zonal-mean Temperature and Precipitation Basing on Multi-reanalysis and Analysis sources

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Abstract The trends of zonal-mean temperature and precipitation are estimated using multi-reanalysis and grid-analysis datasets for assessment of the validation of several reanalysis datasets in such kinds of studies. The analysis datasets used are from CRU, University of Delaware (UDel) and NOAA PREC, while four reanalysis datasets involved are NCEP/NCAR, NCEP II, ERA40 and JRA25. The results show some common features in their trend estimation, i.e., the warming is intensifying towards the North Pole, and the warming in Northern Hemisphere (NH) is stronger than that in Southern Hemisphere (SH) over the past 50 years. A cooling appeared at about 45°S and a sharp warming is found in Antarctic Peninsula for 1958-2001. The warming reached its extreme warming at about 65°N for the period. The reanalysis datasets show similar distributions in temperature trends, but different from them, especially near the Poles. The uncertainties appeared mainly in high latitudes for reanalysis' estimates. The ERA-40 exhibits a close trend estimate in trend in Arctic region with the analysis ones and so does the NCEP/NCAR in Antarctica, different from JRA 25 which present a cooling over the Antarctic continent. Besides, we also made estimation on zonal mean precipitation trend using reanalysis and analysis datasets and found bigger uncertainties among different sources.

1. Warming in Land

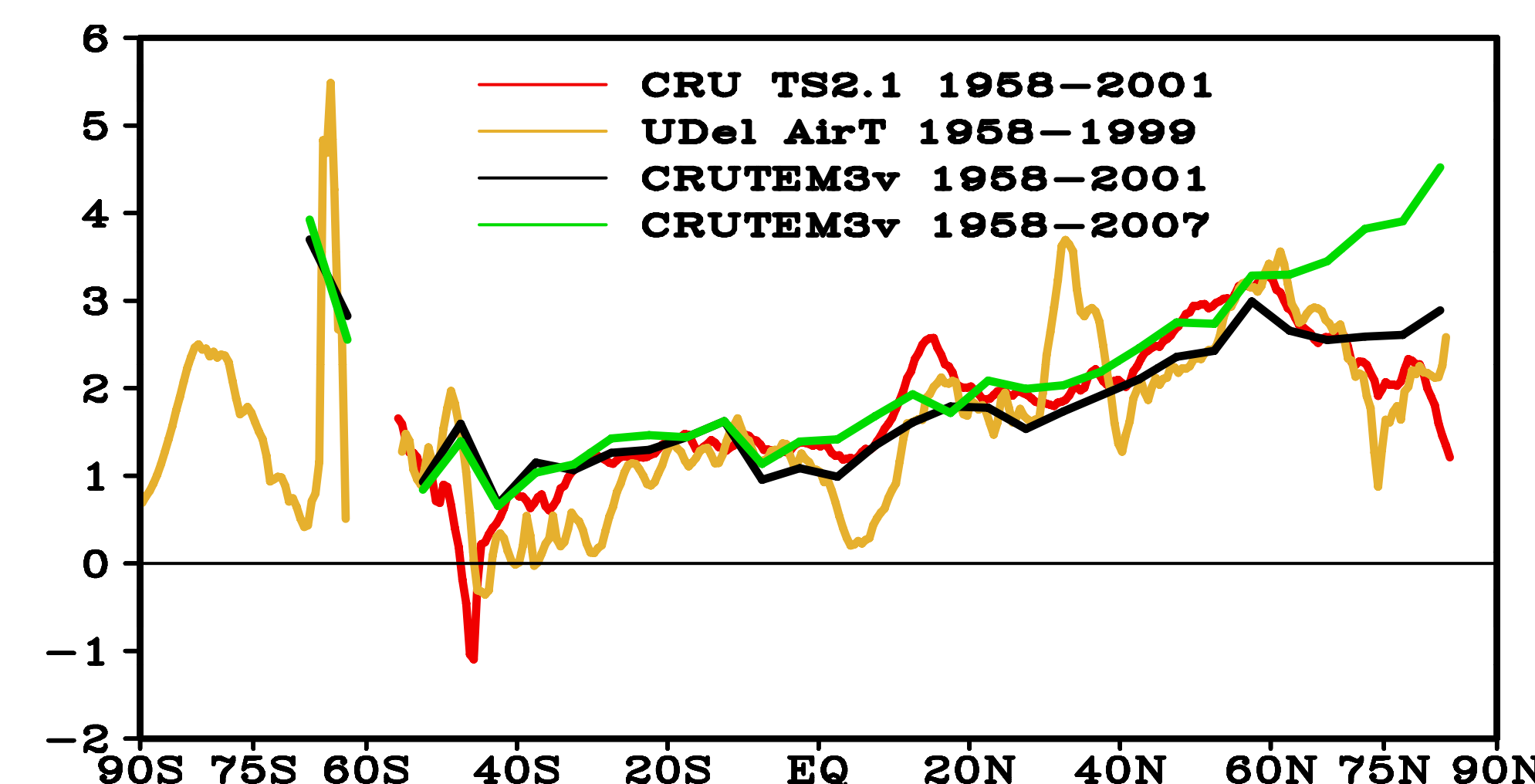


Fig.1 Linear trends of zonal mean annual temperatures for 1958-2001; unit: deg./100a

2. Trend in annual temperature for 1958-2001

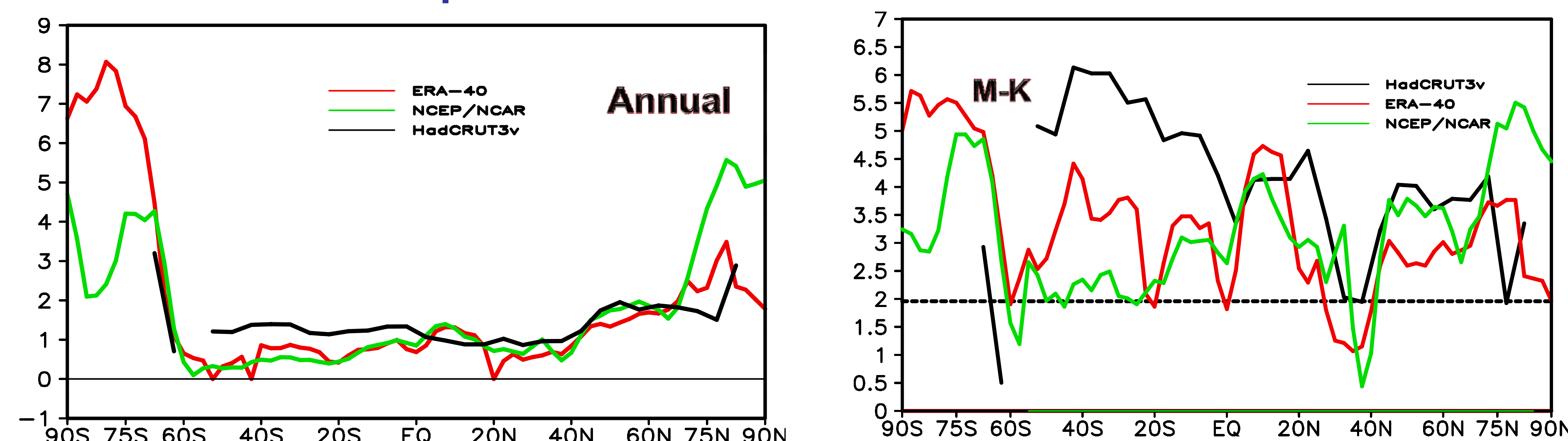


Fig.2 Linear trends in annual temperature reanalysis for 1958-2001; Left: trend (deg./100a); Right: M-K test, the dash line denotes a significance at 0.05

A Comparison among the Zonal-mean Trends from Multi – Reanalysis and Analysis Resources

3. Trends of annual temperature for 1979-2001

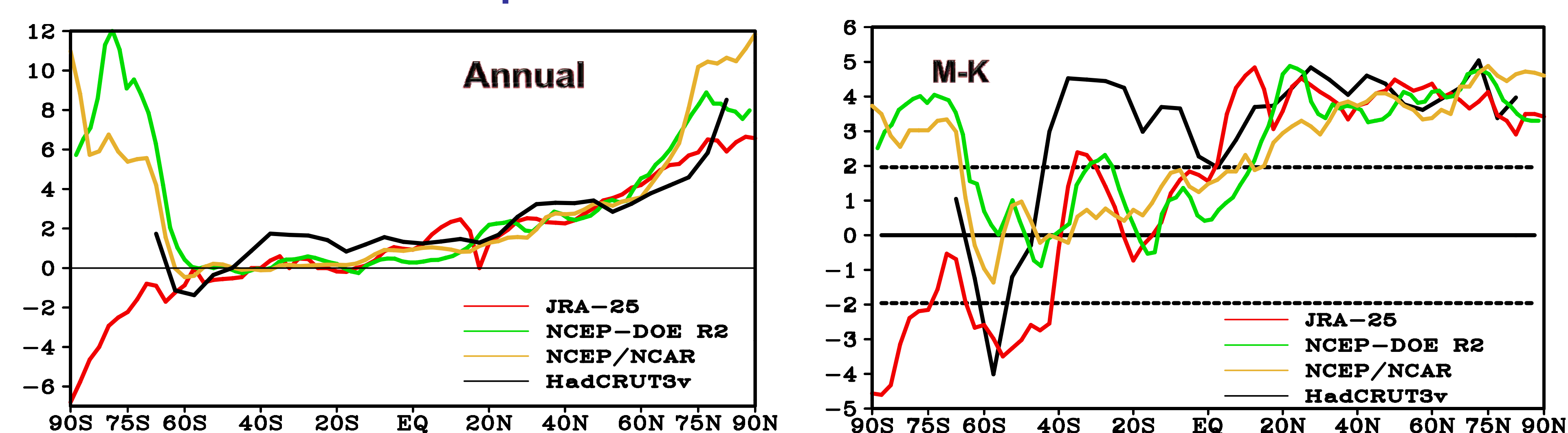


Fig.3 Linear trends in reanalysis annual temperature for 1979-2001; Left: trend (deg./100a); Right: M-K test, the dash line denotes a statistic significance at 0.05

4. Trend of seasonal temperature for 1980-2007

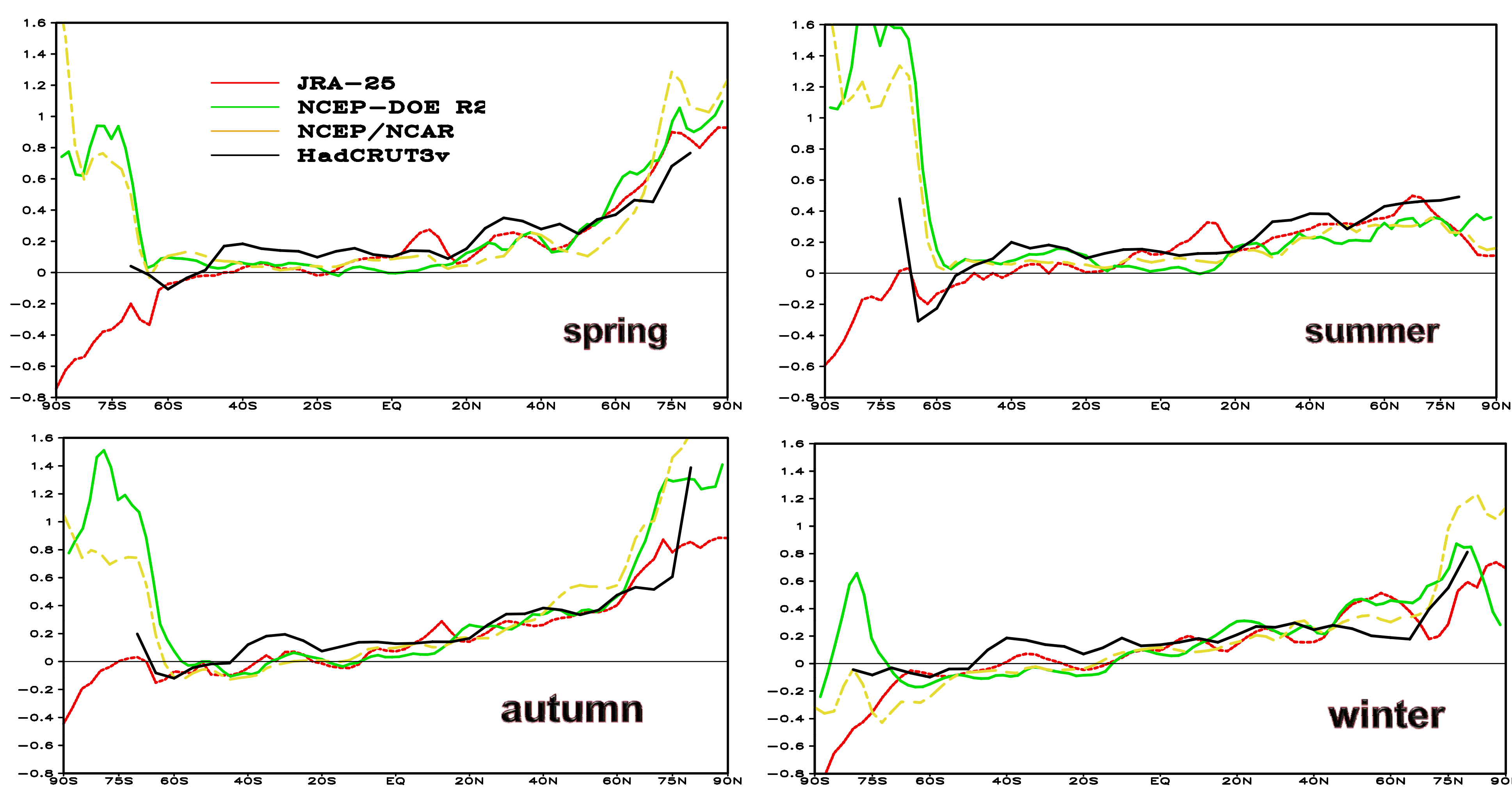


Fig.4 Linear trends in reanalysis seasonal temperature for 1980-2007; unit: deg./100a

5. Trends of annual precipitations or rates for 1979-2010

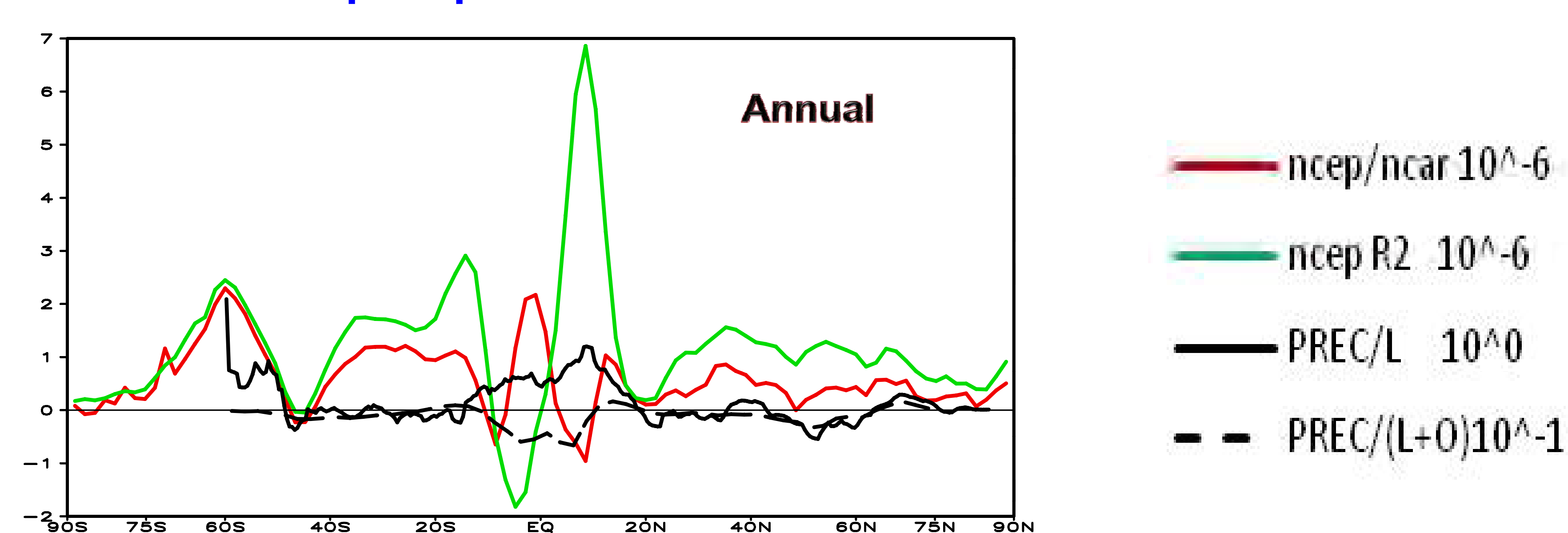


Fig.5 Linear trends (/10a) for reanalysis and analysis annual precipitations or rates for 1979-2010

6. Trends of seasonal precipitations or rates for 1980-2010

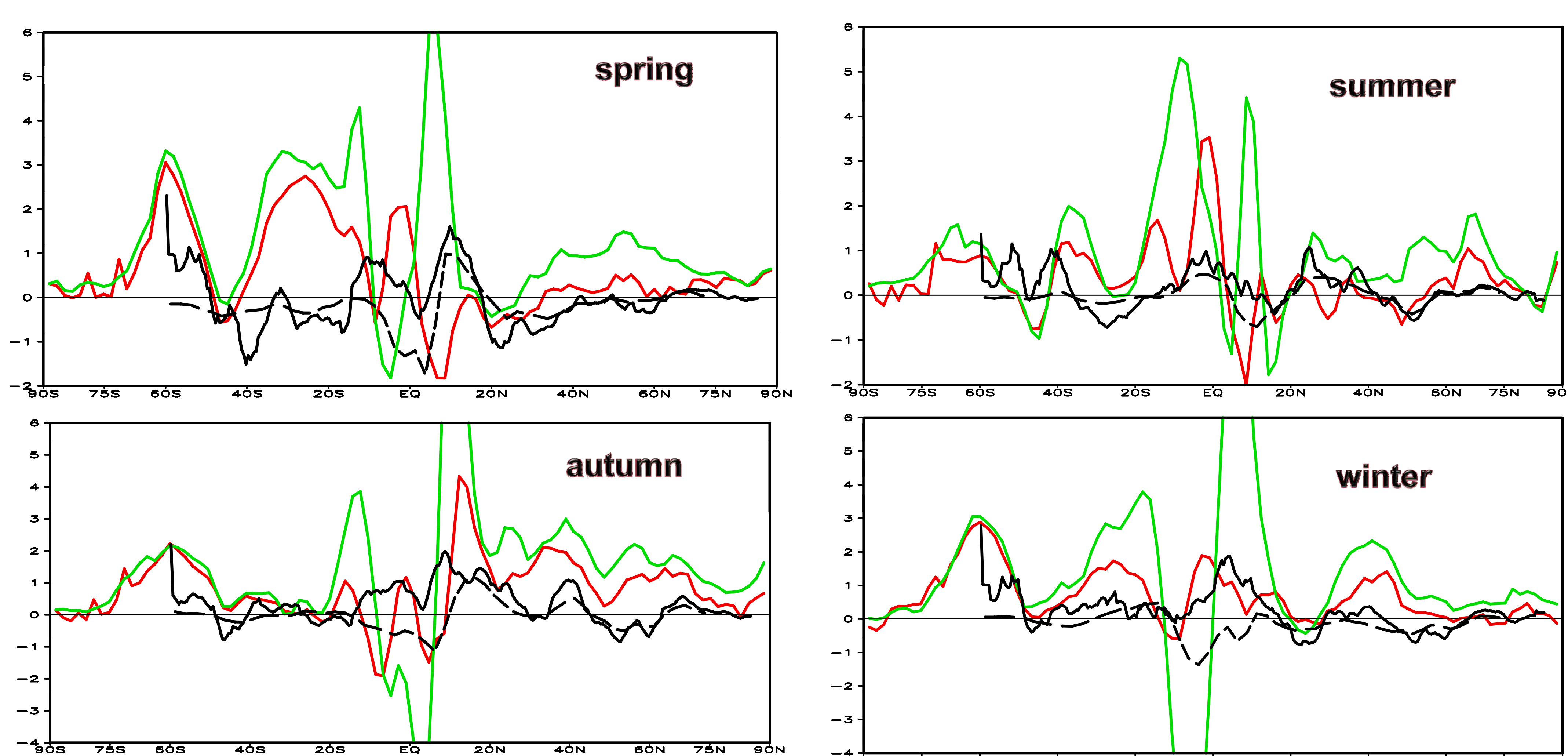


Fig.6 Linear trends (/10a) for seasonal reanalysis and analysis precipitations or rates for 1980-2010