

Relations between precipitation, Arctic Oscillation and solar magnetic activity

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Nowadays, various global climate changes are reported and many researchers investigate their trends: e.g., extreme heat waves, regional heavy rain events, great typhoons. The cause of these phenomena is supposed to be anthropogenic global warming, rapid increase in population and deforestation, but the clear causality is still unsolved. The area with less resilience against these extreme events will have extensive damages, developing country in particular, and hence it is necessary to evaluate the disaster and predict the damages in advance.

Recent studies show the possibility that solar activity: e.g., geomagnetic activity¹⁾ and oceanic tide²⁾ affect short-term and local-scale climate changes, so that wide-range approach is required. On the basis of these studies, we emphasize solar activity, which is well recognized as one of the possible natural factors on climate changes, and consider relation between Arctic Oscillation and solar magnetic activity. Thus, we studied the correlation of each index with local precipitation changes, which represents a major impact of climate change.

We obtained world precipitation station data from Global Historical Climatology Network (GHCN)³⁾, aa (amplitude antipodal) index, which is one of the major solar magnetic activity indices, from British Geological Survey (BGS)⁴⁾ and Arctic Oscillation Index, which shows change of Arctic atmosphere, from Climate Prediction Center (CPC)⁵⁾. With the correlation coefficient between these indices and precipitation, we discuss the precipitation change in terms of the world scale geographical distribution of the correlation coefficients.

1) K. Itoh, Japan Geoscience Union Meeting (2008), (2009)

2) C. D. Keeling et al., PNAS, vol.97, no8, 3814-3819 (2000)

3) <http://www.ncdc.noaa.gov/oa/climate/ghcn-monthly/index.php>

4) <http://www.geomag.bgs.ac.uk/welcome.html>

5) http://www.cpc.noaa.gov/products/precip/CWlink/daily_ao_index/ao.shtml

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