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Progress in developing a statistical tropical cyclone rainfall forecast model for the Taiwan area

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Progress of our work in developing a generalized statistical tropical cyclone (TC) rainfall forecast model for the Taiwan area based on the simple climatology and persistence (CLIPER) model is reported in this paper. CLIPER has been used in the National Center for Disaster Reduction for rainfall estimation and downstream applications such as calculations of flood and debris flow potential during TC periods. Verification results on CLIPER indicate that its skill (as revealed by the equitable threat score) highly depends on direction of TC tracks, size of TCs and height of rain stations. Therefore, in developing the statistical model that is based on multiple regressions, additional predictors include the structure parameters of a TC such as size and intensity, and possibly other factors derived from synoptic environment.

A regression model is setup to first verify the relative weighting of climatology and persistence currently in use in CLIPER. For preliminary test, the regression is performed for the 22 traditional rain stations individually (Fig. 1). A typical result is that the weighting for climatology (α) increases in the first few hours of forecasts and then stabilizes afterward to a value about 0.7-0.8 (Fig. 2). Comparatively, the coefficient for persistence (β) usually starts from a higher value but its importance decreases gradually, in consistence with our previous combination of climatology and persistence in CLIPER. The residual term γ is usually small compared with the other two terms. If the regression results for each station are examined more closely, it can be found that stations located in different regions possess different characteristics. It is generally recognized from these regression results that different combination of climatology and persistence may be necessary for different forecast times, and different regions in Taiwan. Future work includes addition of TC structure parameters, topography parameters, environmental parameters and possibly remote-sensing data to the regression model.

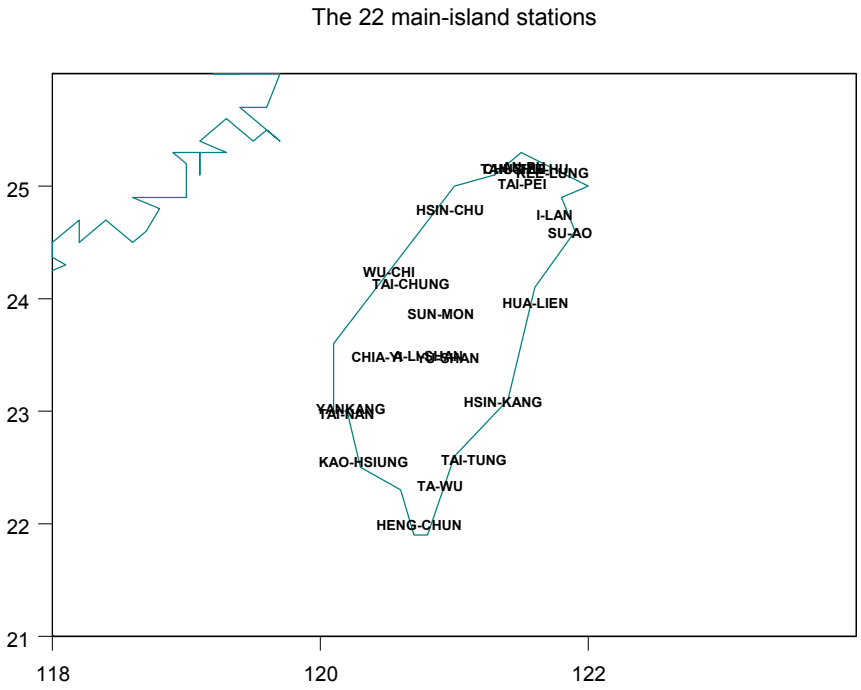

Fig. 1 Rain stations for which regression model is established.

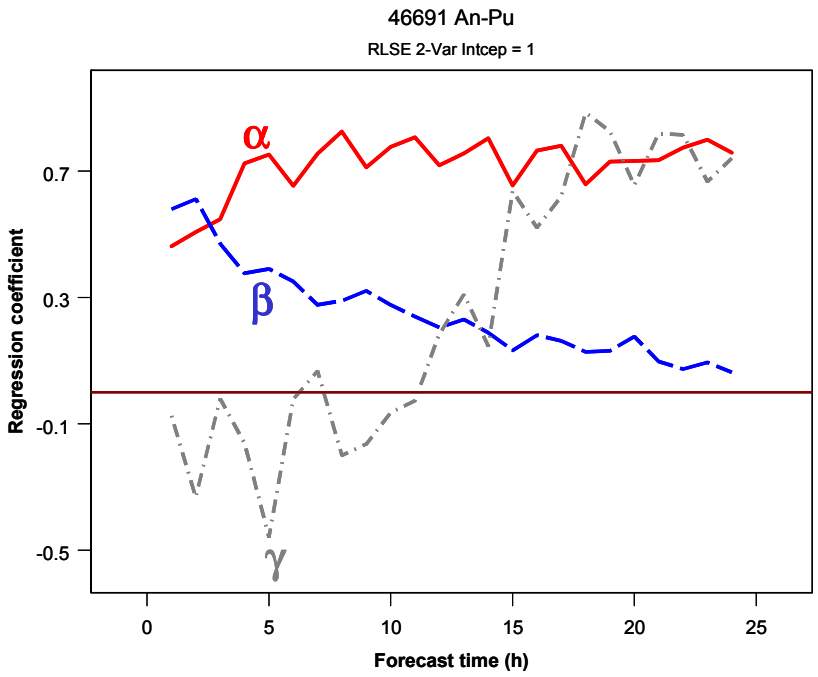

Fig. 2 Time series of the α, β and γ regression coefficients for station An-Pu.