

CHAPTER 5 CONCLUSION AND RECOMMENDATION

5.1 Conclusion

Numerical weather prediction models as well as the atmosphere itself can be viewed as nonlinear dynamical systems in which the evolution depends sensitively on the initial conditions. Any small error in the initial condition will lead to forecast errors that grow with increasing forecast time. In order to obtain various patterns of cold surge over Southeast Asia, numerous simulations of the possible states of northeast monsoon over Southeast Asia under the influence of global warming have been generated from an initial observation and these scenarios are then used as input for a prediction model. Methods of ensemble forecasting have been developed to generate representative samples of the possible future states of the atmosphere. For an efficient ensemble forecasting, the initial perturbations to the control analysis should adequately sample the possible analysis errors. Ensemble forecasting technique entails running of a numerical weather prediction (NWP) model a number of times, with slightly perturbed initial conditions, to assess the forecast uncertainty due to errors in the initial conditions and possibly in model formulation. Several techniques have been used for generation of the initial perturbation of analysis fields at NWP centers around the world.

In this research, the breeding ensemble forecasting technique is used to generate initial perturbations for the preparation of ensemble forecasts of the northeast monsoon over Southeast Asia under the influence of A2 global warming scenario. This method is selected because it is computationally inexpensive and can be applied to the Single Level Primitive Equation (SILEPE) model to generate initial perturbations with less difficulty than other methods.

The SILEPE model is tested to determine capability of the model in cold surge simulations with 2 selected cases. The results show that SILEPE provide acceptable forecast up to 3-4 days.

Breeding ensemble forecasts are performed for 5 cases under A2 global warming scenario. The breeding perturbations (bred vectors) provide reasonable distribution of ensemble members that cover the control run and A2 during the first 48-hr forecast. After 48-hr the ensemble members seem to converge to the control run. This could be due to the over simplification of SILEPE which is a 2-D model and the damping nature of SILEPE.

Nevertheless, the ensemble forecasts with breeding method reveals that under A2 global warming scenario, the pattern of cold surge over Southeast Asia can be identified from a long wave trough at the 500 hPa geopotential height.

5.2 Recommendation

The model used in this research is a 2-D shallow water model without topography. More appropriate models such as a 3-D model with topography or a model with physical parameterizations should be applied in order to obtain better simulation of the cold surge.

In addition, to be able to extend the range of the winter monsoon simulation beyond 4 days a global model should be used. This will solve the problems associated with boundary conditions, especially in the north and south boundaries of the domain.