4 Conclusion

We have developed an atmospheric part of the model, *i.e.*, an atmospheric general circulation model, which is named CCSR/NIES AGCM. The model reproduces the observed climatology rather well. The major problem in the model climatology are summarized to:

1. too dry subtropical lower troposphere and land surface in the summer season
2. too large short-wave radiative forcing in the subtropical oceanic regions
3. equatorward shift of southern hemispheric baroclinic zone
4. rather large cold bias in the stratosphere

The community use of the CCSR/NIES AGCM have been started in 1996 under the cooperative study program of CCSR, University of Tokyo and Global Environment Research Program of Environmental Agency of Japan. By using the model, we have started the studies concerning the climate change and climate variability in several aspects. The first is the assessment of the climate change by the anthropogenic effects. We have started experiments of equilibrium response for doubled CO_2 using the ocean mixed layer model version of the model. The initial effort for coupling the AGCM with CCSR ocean general circulation model (OGCM) has just completed and experiments of transient response for increasing CO_2 as well as long control experiment with this comprehensive coupled ocean-atmosphere model are in progress. The effect of non-CO_2 anthropogenic gases and aerosols will be incorporated in future study. Also, the uncertainty of the model assessment will be explored by sensitivity studies on physical processes, especially in clouds and surfaces processes. The second is the study on the climate variability in the interannual to inter-decadal time scales. By long-time integrations with observed SST, interannual atmospheric responses are examined comparing with the observed atmospheric data. We have already done the AMIP integrations with 10-year observed SST. The mechanism of the interannual variability of the climate system will be explored by sensitivity experiments by varying SST, land-surface conditions, and physical parameterization schemes. Also, coupling to simple ocean model is attempted in this context. The third is application of the model for data assimilation. The experimental assimilation of satellite data will be attempted in order to get the information on for-dimensional distribution of the variables which is important to the climate system, for example, clouds, aerosols, and the land-surface variables. The last is the basic study on the general circulation of the atmosphere. The goal of the study is the understanding of the mechanism which determines the atmospheric response and related feedback processes for given boundary conditions. For example,