

**NAS8-37127: South Pacific Convergence Zone and Global Scale Circulations  
(July 1987 - July 1991, with no cost extension)**

**NAG8-836: Observational and Modeling Studies of Heat, Moisture, Precipitation,  
and Global-Scale Circulation Patterns (July 1990 - July 1993)**

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**A. Significant Accomplishments (August 1990 - May 1991)**

Since the last review, which was held in August 1990, our research group has continued to move forward on a number of research topics. These include, but are not restricted to: (1) observational and modeling studies of relationships between tropical heat sources and subtropical jet streams; (2) the intraseasonal (30-60 day) oscillation near the equator; and (3) precipitation over the tropical oceans. Essentially, we have completed all tasks originally proposed under our NASA contract, NAS8-37127, which terminates in July 1991. Also, we initiated some of the tasks outlined in our present grant, NAG8-836. A list of our most significant accomplishments in the last year is now given.

1. Dr. James W. Hurrell completed his Ph.D. degree in August 1990 and is now employed as a research scientist at NCAR in Boulder, CO.
2. Mr. Ken-Chung Ko, a graduate research assistant on the project, completed his M.S. degree in August 1990 and is continuing on to work toward his Ph.D.
3. Mr. Robb Velasco, an undergraduate research assistant on the project, completed his B.S. Honors degree in May 1991 and will be pursuing an M.S. degree in the environmental area in Civil Engineering at Purdue.
4. Mr. Perry Ramsey, a Ph.D. student on the project, presented a paper at the Fifth Conference on Satellite Meteorology and Oceanography at London, England in September 1990.
5. Dr. Dayton Vincent attended the annual seminar series at ECMWF in Reading, England in September 1990. The title of the series was "Circulation Features of the Tropics and Interactions with Extratropical Latitudes: Observations and Modeling".
6. Dr. Dayton Vincent presented a paper at the Seventh Symposium on Meteorological Observations and Instrumentation in New Orleans in January 1991.
7. Dr. Dayton Vincent presented a paper at the 19<sup>th</sup> Conference on Hurricanes and Tropical Meteorology in Miami in May 1991.

8. We received our new IBM PS/2 55SX computing system with a laser printer. It is being used to capacity by our project and, through its graphics capability, has greatly enhanced our research efforts.

**B. Focus on Current Research**

Presently, we are preparing for a busy summer of research activity. Dr. Vincent is working on two papers he will present at the IUGG meetings in Vienna, Austria in August 1991. One paper titled, "Mean monthly precipitation rates over tropical oceans", by Vincent, Velasco and North, will be given at the IAMAP Workshop on Precipitation Measurements, while the second paper, "The relationship between tropical heating and subtropical wind maxima", by Drs. Hurrell and Vincent, will be given at the IAMAP Symposium on Large-Scale Atmospheric Flow and Variability. Dr. Vincent is also working on a preprint paper, "Relationship between the intraseasonal oscillation and subtropical wind maxima over the South Pacific Ocean", by Dr. Hurrell and himself, which will be presented at the Fifth Conference on Climate Variations in Denver, CO in October 1991. Finally, Drs. Hurrell and Vincent are presently working on a revised version of their manuscript, "A GCM study on the maintenance of short-term subtropical wind maxima in the summer hemisphere during SOP-1, FGGE", which has been accepted for publication in the Quarterly Journal of the Royal Meteorological Society, subject to minor revisions.

**C. Plans for Next Year**

1. Prepare a final report for our contract, "South Pacific Convergence Zone and Global-Scale Circulations" (NAS8-37127), which terminates on 19 July 1991.
2. Travel to Vienna, Austria in August 1991 to present two papers and Chair a session at the IUGG IAMAP meetings.
3. Travel to Denver, CO in October 1991 to present a paper at the Fifth Conference on Climate Variations.
4. Prepare a manuscript to submit for publication on Mr. Ken-Chung Ko's research.
5. Prepare a manuscript to submit for publication on the paper being given by Dr. Vincent at Denver (item C-3).
6. Continue to make progress on the Ph.D. research of Messrs. Ramsey and Bourassa.
7. Prepare an Abstract to submit and, presumably, a paper to present, at the Third Symposium on Global Change Studies to be held in Atlanta, GA in January 1992.
8. Begin working with a new M.S. student on the project, Mr. Dave Sliwinski, who will join us in August 1991.

**D. Publications (August 1990 - May 1991)**

**1. Refereed**

Vincent, D.G., T. Sperling, A. Fink, S. Zube and P. Speth, 1991: Intraseasonal oscillation on convective activity in the tropical Southern Hemisphere: May 1984 - April 1986. Journal of Climate, 4, 40-53.

In addition, three other papers by our research group have been accepted for publication subject to revision, one to the Quarterly Journal of the Royal Meteorological Society (Hurrell and Vincent) and two to the Journal of Climate (Hurrell and Vincent; Vincent, North, Velasco and Ramsey).

**2. Preprint papers**

Hurrell, J.W. and D.G. Vincent, 1991: Observational and modeling study of the maintenance of short-term subtropical wind maxima in the Southern Hemisphere during SOP-1, FGGE. 19<sup>th</sup> Conference on Hurricanes and Tropical Meteorology, May 6-10, 1991, Miami, FL, 6 pp.

North, K.H. and D.G. Vincent, 1991: Precipitation rates in the tropics: June 1984 - May 1987. Seventh Symposium on Meteorological Observations and Instrumentation, January 14-18, 1991, New Orleans, LA, American Meteorological Society, Boston, MA, 189-194.

Ramsey, P.G., 1990: Diagnosis of tropical convection using the International Satellite Cloud Climatology Project (ISCCP) C1 data set. Fifth Conference on Satellite Meteorology and Oceanography, September 3-7, 1990, London, England, 2 pp.

**3. Theses**

Hurrell, J.W., 1990: Maintenance of short-term subtropical wind maxima in the Southern Hemisphere: Observational and modeling study. Ph.D. thesis, Department of Earth and Atmospheric Sciences, Purdue University, West Lafayette, IN, 47907, 161 pp.

Ko, K.-C., 1990: Baroclinic (shear) and barotropic (mean) kinetic energy study of Southern Hemisphere subtropical wind maxima. M.S. thesis, Department of Earth and Atmospheric Sciences, Purdue University, West Lafayette, IN, 47907, 54 pp.

Velasco, R., 1991: A diagnosis of moisture parameters in the tropics, including two estimates of precipitation rates. B.S. Honors thesis, Department of Earth and Atmospheric Sciences, Purdue University, West Lafayette, IN, 47907, 77 pp.

