Quarterly Report
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Contract Title: Infrared Algorithm Development for Ocean Observations with EOS/MODIS
Contract Number: NAS5-31361

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MODIS INFRARED ALGORITHM DEVELOPMENT

A. NEAR TERM OBJECTIVES

A.1 Continue interaction with the MODIS Instrument Team through meetings and electronic communications.

A.2 Develop and complete a portable calibration approach for satellite borne infrared radiometers using the AVHRR radiometer as a test bed.

A.3 Continue algorithmetric development efforts based on experimental match-up databases and radiative transfer model.

A.4 Expand our capabilities to do radiative transfer modeling and in situ match-up database analysis by adding appropriate computing and graphics facilities.

A.5 Develop a global in situ drifting buoy validation database.

A.6 Evaluate the statistics of match-up on this database.

A.7 Evaluate different approaches for global SST data assimilation and initiate work on statistically based objective analysis approaches.

A.8 Provide minimal investigator and staff support for the above.

B. OVERVIEW OF CURRENT PROGRESS

Participated in e-mail discussions concerning MODIS instrument radiometric calibration, in orbit calibration, potential changes in instrument specifications vis-a-vis rescoping of EOS, data productions, and other team related interactions. We reviewed the document RMODIS-N and the ATSR Calibration ReportS which compares the proposed MODIS-N performance to ATSR test results. Insofar as possible this document puts the MODIS specifications and ATSR specifications/measurements onto a common footing and compares the relative performance of the two instruments. From my perspective,

this report shows the need for a high quality, on-board, black body calibration reference, given that stray radiance and other corrections, which might contribute to nonlinear sensor behavior, can be significantly reduced in the instrument design and construction. A high quality black body reference is key to meeting the science goals for the instrument. The report suggests that a single black body reference would permit attaining needed accuracy for atmospheric corrections. The report is mute, however, on just how one diagnoses non-linear behavior when the radiometer is in-orbit. The proposed method of changing the operating temperature of the radiometer will not work because the entire instrument thermal level is elevated and emmissivity variations of the black body will not be apparent due to internal temperature equilibrium.

In the last quarterly report we noted the submission of a paper which developed a non linear correction approach for AVHRR calibrations. This paper is now in its third revision review cycle with the Editors of JGR. On the positive side, the review cycle has made the paper much easier to read. On the negative side, it has held up publication of the results by at least six months. Our trial tests with the East Coast fixed buoy match-up database suggests that this approach works quite well. Ian BartonUs group has also implemented the approach for their operational process system and report that it seems to work well. We are trying to expedite publication of the effort and hope for such during the next half year.

We have continued exercising the East Coast fixed buoy match-up database in an algorithm development sense. R. Evans, in his report, has noted the status of these efforts and it will not be discussed here. Suffice it to say, current results suggest that AVHRR retrievals can be processed with notably lower rms errors than obtained in on-line operational environments.

Extensive discussions have gone on with various computer vendors this quarter concerning availability of new hardware which has through-put characteristics commensurate with algorithm development needs. During the next quarter we expect several field test installations from Digital Equipment Corporation using their new RAlphaS processor. Visits have been made to Silicon Graphics for non-disclosure views of their machines (R. Evans). Jointly we will have to make a decision during the next 12 months concerning augmentation of our computing resources and need actual performance numbers on the different platforms in order to make quantitative cost trade-offs. More straightforwardly, we have continue revamping our computer area so that all work stations are now centrally located in a climate and power conditioned environment. We have also installed, using University and NOAA support, alternate back-up, high-speed network access. All scientists, science staff, post-docs, etc., now have at least minimal workstation support for their computing.

A number of the staff are participating in the joint development of a global drifting buoy match-up database for sea surface temperature. This work is joint with the Pathfinder efforts and MODIS. Trial extractions for a one-month period have been accepted and preliminary match-up statistics derived. It is expected that a working operational implementation of this database and test statistics for it will be available in the next quarter.

A. Mariano has continued his efforts to implement the needed analysis correlation for basin scale objective analysis of satellite SST fields. The objective correlation and parameter analyses have been tested using Nimbus-7 CZCS data in the North Atlantic and NOAA AVHRR retrievals in the tropical Pacific. We expect this procedure to be completely usable by the end of the next quarter. Trial results indicate that approximately 95% of the estimated parameters are now correct.

B.2 INVESTIGATOR SUPPORT - George Halliwell (analyses efforts)

C. FUTURE ACTIVITIES

C.1 Algorithms
C.1.1 Continue to develop and test East Coast algorithms on global retrievals.
C.1.2 Evaluation of objective global data correlation analysis.
C.1.3 Evaluation of global data assimilation.

C.2 Complete evaluation of FDDI; pursue acquisition.

C.3 Investigator support - continue current efforts.

D. PROBLEMS - No new problems to report.