# TABLE OF CONTENTS

1. Abstract .................................................................................. 1
2. Introduction .............................................................................. 2
3. Narrative .................................................................................. 4
   Long-term goals for the CBI project ........................................ 4
   Immediate goals for this project ............................................. 5
4. Findings ................................................................................... 6
5. Conclusion & Procedure .......................................................... 6
4. Procedure ............................................................................... 11
5. Main module ........................................................................... 14
6. Module-1 ............................................................................... 16
7. Module-2 ............................................................................... 20
8. Module-3 ............................................................................... 23
9. Module-4 ............................................................................... 26
10. Results and Conclusions ....................................................... 28
11. Bibliography .......................................................................... 29

**Appendixes:**

1. Appendix A: Stations list ......................................................... 30
2. Appendix B: Introduction to Fourier Analysis ......................... 32
3. Appendix C: Listing of programs: Korn shell script ............... 35
4. Appendix D: Listing of program: Splus functions .................. 54
5. Appendix E: Listing of program: PERL programs .................. 56
6. Appendix F: Samples of graphs output ................................... 58
Figures:

1. Figure 1: System's data flow diagram .................. 13
2. Figure 2: Main module data flow diagram ............... 15
3. Figure 3: Module-1 data flow diagram .................. 19
4. Figure 4: Module-2 data flow diagram .................. 22
5. Figure 5: Module-3 data flow diagram .................. 25
6. Figure 6: Module-4 data flow diagram .................. 27
ABSTRACT

This project report covers the design and implementation of a data analysis interface program for the Conrad Blucher Institute for Surveying and Science (CBI). The program has improved on the existing methods used to analyze data collected by Texas Coastal Ocean Observation Network (TCOON) by allowing a user to easily:

1. Invoke a C program "tcesm" to extract data from an Ingres database.
2. Pass the data to various existing FORTRAN programs "fftlnge" and "specld" to provide statistical analysis.
3. Present the results graphically using several S-plus functions.
4. Save the input and output variables and files.
5. Print the spectrum and the data when needed.

This system has proven to be efficient, user friendly, and fast. It has became the foundation for future development.
INTRODUCTION

The Conrad Blucher Institute for Surveying and Science (CBI) collects data from tide gages located at 43 stations along the Texas coast. Water levels are collected at all stations, while wind speed and direction, barometric pressure, and air and water temperatures are measured at a subset of the 43 stations. These data have been collected since 1990.

Previously, analysis required the following steps to be followed by a researcher:

1. Use the "tcesm" program for data retrieval.
2. Use "fftlnth" and "specld" programs for the data analysis.
3. Use the S-plus language for graphical displays.

This project has concentrated on integrating the functions of the different programs into a single system, running the analysis and modeling on one variable from one station, and developing a platform for future enhancement. The ability to perform comparative studies between stations or between different sensors has been left for later programs.

The interface program is beneficial to the researchers and the other users for the following reasons:

1. Before the current implementation described herein, it took a researcher weeks to understand the UNIX and analysis tools needed
to perform the analysis. The time spent on learning inconsistent individual program interfaces could have been spent on research. This interface program has reduced this time, since it is a menu driven tool that hides the idiosyncracies of each program.

2. An average person is not able to run the FFT analysis using the existing programs because of the lack of understanding of UNIX, the analysis tools, and the analysis techniques themselves. The interface program has reduced the skill level needed on the user's part to enable wider and more frequent use of the FFT analysis by researchers, programmers, and other staff members at CBI.

3. The interface program provides the core for future programs that will enhance the analysis further, including the comparative analysis of different variables from the same station, the same variable at different stations, and different variables measured at different stations.