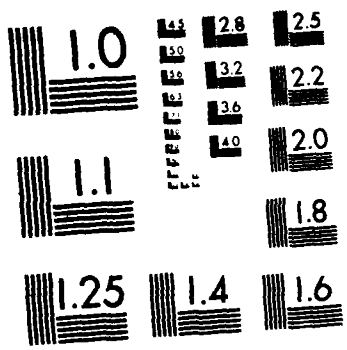
AD-A191 954 HF MUF (MAXIMUM USABLE FREQUENCIES) MODEL UNCERTAINTY 1/1
ASSESSMENT(U) NAVAL OCEAN SYSTEMS CENTER SAN DIEGO CA
T N ROY ET AL. JAN 87
UNCLASSIFIED F/G 20/14 NL


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0

UNCLASSI

SECURITY CLAS

AD-A191 954

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION: UNCLASSIFIED	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT: Approved for public release; distribution is unlimited.
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S)	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION: Naval Ocean Systems Center; 6b. OFFICE SYMBOL (if applicable)	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State and ZIP Code): San Diego, CA 92152-5000	7b. ADDRESS (City, State and ZIP Code)
8a. NAME OF FUNDING/SPONSORING ORGANIZATION: Space & Naval Warfare Systems Command; 8b. OFFICE SYMBOL (if applicable): SPAWAR	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State and ZIP Code): Washington, DC 20363-5100	10. SOURCE OF FUNDING NUMBERS

PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	AGENCY ACCESSION NO.
RDDA	MP57	NSA	DN288591

11. TITLE (include Security Classification)

HF MUF Model Uncertainty Assessment

12. PERSONAL AUTHOR(S)

T.N. Roy

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
Presentation	FROM ______ TO ______	January 1987	

16. SUPPLEMENTARY NOTATION

DTIC ELECTE MAR 1 4 1988

17. COSATI CODES

FIELD	GROUP	SUB-GROUP

18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

To assess the accuracy of MUF model prediction, a statistical analysis of observed oblique sounder median maximum observed frequencies (MOF) and predicted maximum usable frequencies (MUF) was conducted. A data base consisting of 13,054 hours of oblique sounder MOFs measured on 70 paths were compared against the predicted MUF values from MINIMUF-3.5, MINIMUF 85 and an unrelated MUF model, the HF Broadcast WARC Model (HFBC 84). The data was screened into subsets to determine the effect of particular paths, path length and orientation, season, month, latitude, sunspot number, diurnal trends, geographic region and sounder type. The accuracy of all three models was very close, with the MINIMUF-3 model having the lowest rms error of 4.44 MHs. MINIMUF 85 was next with an rms error of 4.58 MHs and HFBC 84 was last with an error of 4.67 MHs. Correlation was good for all three models. Coefficients were .824, .819, and .827 for MINIMUF-3.5, MINIMUF 85 and HFBC 84, respectively.

The primary difference between MINIMUF-3.5 and MINIMUF 85 appeared when detailed analysis of the accuracies was conducted. When the variation in error was noted as a function of season, sunspot number, or range, for instance, there was less variation in the accuracy of MINIMUF 85. In some cases, MINIMUF-3.5 would exhibit high error, and in other cases it would exhibit low error.

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT: ☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION: UNCLASSIFIED
22a. NAME OF RESPONSIBLE INDIVIDUAL: T.N. Roy	22b. TELEPHONE (include Area Code): 619-225-6822; 22c. OFFICE SYMBOL: Code 542

DD FORM 1473, 84 JAN

83 APR EDITION MAY BE USED UNTIL EXHAUSTED
ALL OTHER EDITIONS ARE OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

HF MUF MODEL UNCERTAINTY ASSESSMENT

T.N. Roy and D.B. Sailors
Ocean and Atmospheric Sciences Division
Naval Ocean Systems Center
San Diego, CA 92152-5000

To assess the accuracy of MUF model prediction, a statistical analysis of observed oblique sounder median maximum observed frequencies (MOF) and predicted maximum usable frequencies (MUF) was conducted. A data base consisting of 13,054 hours of oblique sounder MOFs measured on 70 paths were compared against the predicted MUF values from MINIMUF-3.5, MINIMUF 85 and an unrelated MUF model, the HF Broadcast WARC Model (HFBC 84). The data was screened into subsets to determine the effect of particular paths, path length and orientation, season, month, latitude, sunspot number, diurnal trends, geographic region and sounder type. The accuracy of all three models was very close, with the MINIMUF-3.5 model having the lowest rms error of 4.44 MHz. MINIMUF 85 was next with an rms error of 4.58 MHz and HFBC 84 was last with an error of 4.67 MHz. Correlation was good for all three models. Coefficients were .824, .819 and .827 for MINIMUF-3.5, MINIMUF 85 and HFBC 84, respectively.

The primary difference between MINIMUF-3.5 and MINIMUF 85 appeared when detailed analysis of the accuracies was conducted. When the variation in error was noted as a function of season, sunspot number, or range, for instance, there was less variation in the accuracy of MINIMUF 85. In some cases, MINIMUF-3.5 would exhibit high error, and in other cases it would exhibit low error.

When the accuracy of the models was investigated as a function of mid-path local time a large diurnal error was found in all three models. In the case of the MINIMUF models, linear regression showed that the bias could be removed and the rms error be reduced. It also showed that the error is common to both MINIMUF models. Further investigation for path lengths less 4000 km, also showed that linear regression could reduce the rms error and remove the bias. This implies that the error in the models could be attributed to the f_oF2 portion of the model. A method for improving this portion of the model is suggested.

END
DATE
FILMED
5-88
DTIC