



AD-A217 322

REPORT DOCUMENTATION PAGE

Form Approved  
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE January 1990	3. REPORT TYPE AND DATES COVERED presentation/paper
4. TITLE AND SUBTITLE REVIEW OF NATURAL AND MAN-MADE RADIO NOISE PROGRESS 1986-1989	5. FUNDING NUMBERS PE: 0601153N WU: DN307 513 PN: MP82	
6. AUTHOR(S) D. B. Sailors	8. PERFORMING ORGANIZATION REPORT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Ocean Systems Center San Diego, CA 92152-5000	10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Office of Naval Research 800 N. Quincy Street Arlington, VA 22217	11. SUPPLEMENTARY NOTES	
12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.	12b. DISTRIBUTION CODE	

DTIC  
ELECTE  
JAN 30 1990  
S E D

13. ABSTRACT (Maximum 200 words)

The progress in natural and man-made noise investigations from 1986 to 1989 is reviewed. Most but not all natural noise investigations have been made at frequencies below the HF band. Herman et al. (Radio Sci., 21 25-46, 1986) describe the measurement and statistical analysis of wideband MF atmospheric radio noise. Results presented include the temporal structure of atmospheric noise, the distribution and time variation of the measured average noise power, and comparisons with predictions by the CCIR. The impact on bandwidth and system performance is presented by Giordano et al. (Radio Sci., 21, 203-222, 1986). Stanford University (Fraser-Smith, A.C., NATO AGARD Conference Proc. 420, 4A, 1987) is operating a global network of eight computer-controlled receiving systems for the measurement of electromagnetic noise in the 10-32, 000 Hz frequency band. The digital data are being used primarily for statistical studies of the global distribution of ELF/VLF noise. Field and Warber (NATO AGARD Conference Proc. 420, 3, 1987) addressed the role of horizontal lightning strokes in producing transverse-electric (TE) LF atmospheric noise. Turtle et al. (Radio Sci., 24, 325-339, 1989) presented measurements of both TE and TM LF atmospheric noise aboard a free-floating balloon at altitudes up to 20 km. La Belle (J. Atmos. Terr. Phys., 51, 197-211, 1989) reported radio noise of auroral origin from 1968-1988.

Although much of the man-made radio noise efforts have been concerned about spectrum occupancy at HF, Hagn (NATO AGARD Conference Proc. 420, 5, 1987) discussed what the scientific community knew and did not know about man-made radio noise. Measurement of man-made radio noise was also discussed. An experiment to measure spectral occupancy at HF has been undertaken by Gott (NATO AGARD Conference Proc. 420, 7, 1987) since the sunspot maximum of 1982. The aim was to provide data which may be used to advise HF operators on typical occupancy they may encounter. Hagn et al. (IEEE Trans. Broadcasting, 34, 1988) reported measurements of spectrum occupancy and signal levels made at four locations in the United States and at two locations in Europe. The paper presented some initial results comparing spectrum-occupancy and signal-level data between CONUS and Europe.

*Keywords: spectrum. (KR)*

Published in *National Radio Science*, January 1990.

14. SUBJECT TERMS atmosphere noise radio communications		15. NUMBER OF PAGES	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED		16. PRICE CODE	
18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT UNLIMITED	

REVIEW OF NATURAL AND MAN-MADE RADIO NOISE  
 PROGRESS 1986-1989  
 David B. Sailors  
 Ocean and Atmospheric Sciences Division  
 Naval Ocean Systems Center  
 San Diego, Ca 92152-5000

The progress in natural and man-made noise investigations from 1986 to 1989 is reviewed. Most but not all natural noise investigations have been made at frequencies below the HF band. Herman et al. (Radio Sci., 21, 25-46, 1986) describe the measurement and statistical analysis of wideband MF atmospheric radio noise. Results presented include the temporal structure of atmospheric noise, the distribution and time variation of the measured average noise power, and comparisons with predictions by the CCIR. The impact on bandwidth and system performance is presented by Giordano et al. (Radio Sci., 21, 203-222, 1986). Stanford University (Fraser-Smith, A.C., NATO AGARD Conference Proc. 420, 4A, 1987) is operating a global network of eight computer-controlled receiving systems for the measurement of electromagnetic noise in the 10-32,000 Hz frequency band. The digital data are being used primarily for statistical studies of the global distribution of ELF/VLF noise. Field and Warber (NATO AGARD Conference Proc. 420, 3, 1987) addressed the role of horizontal lightning strokes in producing transverse-electric (TE) LF atmospheric noise. Turtle et al. (Radio Sci., 24, 325-339, 1989) presented measurements of both TE and TM LF atmospheric noise aboard a free-floating balloon at altitudes up to 20 km. La Belle (J. Atmos. Terr. Phys., 51, 197-211, 1989) reported radio noise of auroral origin from 1968-1988.

Although much of the man-made radio noise efforts have been concerned about spectrum occupancy at HF, Hagn (NATO AGARD Conference Proc. 420, 5, 1987) discussed what the scientific community knew and did not know about man-made radio noise. Measurement of man-made radio noise was also discussed. An experiment to measure spectral occupancy at HF has been undertaken by Gott (NATO AGARD Conference Proc. 420, 7, 1987) since the sunspot maximum of 1982. The aim was to provide data which may be used to advise HF operators on typical occupancy they may encounter. Hagn et al. (IEEE Trans. Broadcasting, 34, 1988) reported measurements of spectrum occupancy and signal levels made at four locations in the United States and at two locations in Europe. The paper presented some initial results comparing spectrum-occupancy and signal-level data between CONUS and Europe.



Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By <u>NO SC</u>	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
<u>A-1</u>	<u>21</u>