

U.S. DEPARTMENT OF COMMERCE/ National Oceanic and Atmospheric Administration

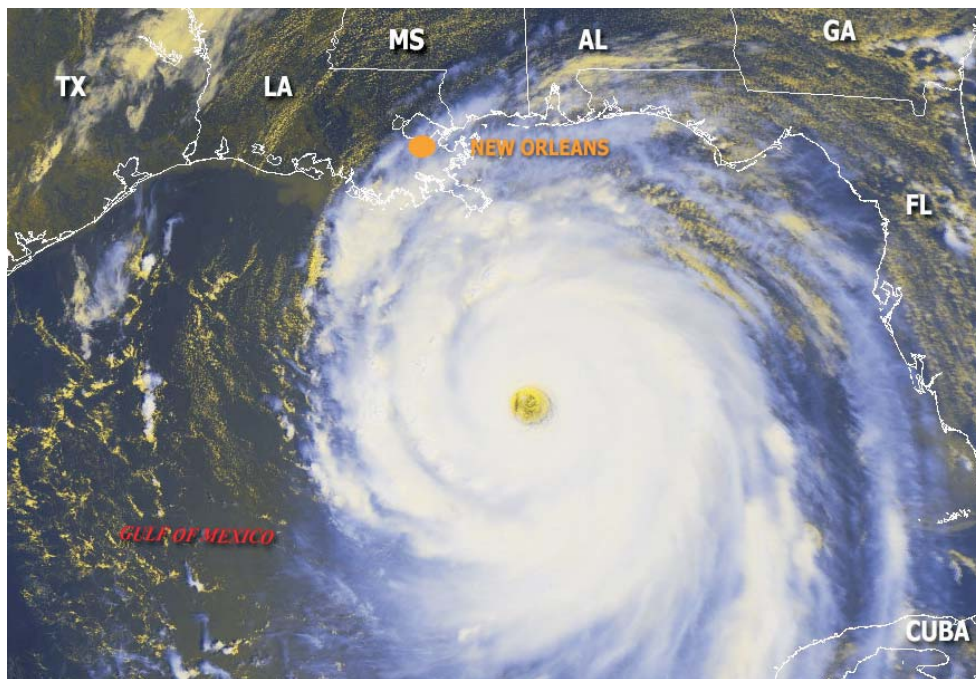
OFCM



OFFICE OF THE FEDERAL COORDINATOR FOR
METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH

National Hurricane Operations Plan

FCM-P12-2006



Hurricane Katrina - 28 August 2005 - NOAA 17

Washington, DC
May 2006

THE FEDERAL COMMITTEE FOR
METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH (FCMSSR)

VADM CONRAD C. LAUTENBACHER, JR., USN (RET.) Chairman, Department of Commerce	MR. RANDOLPH LYON Office of Management and Budget
DR. SHARON HAYS (Acting) Office of Science and Technology Policy	MS. VICTORIA COX Department of Transportation
DR. RAYMOND MOTHAS Department of Agriculture	MR. DAVID MAURSTAD (Acting) Federal Emergency Management Agency Department of Homeland Security
BRIG GEN DAVID L. JOHNSON, USAF (RET.) Department of Commerce	DR. MARY L. CLEAVE National Aeronautics and Space Administration
MR. ALAN SHAFFER Department of Defense	DR. MARGARET S. LEINEN National Science Foundation
DR. JERRY ELWOOD Department of Energy	MR. PAUL MISENCIK National Transportation Safety Board
DR. MAUREEN MCCARTHY Science and Technology Directorate Department of Homeland Security	MR. JAMES WIGGINS U.S. Nuclear Regulatory Commission
DR. MICHAEL SOUKUP Department of the Interior	DR. LAWRENCE REITER Environmental Protection Agency
MR. RALPH BRAIBANTI Department of State	MR. SAMUEL P. WILLIAMSON Federal Coordinator

MR. JAMES B. HARRISON, Executive Secretary
Office of the Federal Coordinator for
Meteorological Services and Supporting Research

THE INTERDEPARTMENTAL COMMITTEE FOR
METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH (ICMSSR)

MR. SAMUEL P. WILLIAMSON, Chairman Federal Coordinator	MR. JAMES H. WILLIAMS Federal Aviation Administration Department of Transportation
MR. THOMAS PUTERBAUGH Department of Agriculture	DR. JONATHAN M. BERKSON United States Coast Guard Department of Homeland Security
MR. JOHN E. JONES, JR. Department of Commerce	MR. JEFFREY MACLURE Department of State
RADM FRED BYUS, USN United States Navy Department of Defense	DR. S. T. RAO Environmental Protection Agency
COL JOHN D. MURPHY, USAF (Acting) United States Air Force Department of Defense	MR. JOHN GAMBEL Federal Emergency Management Agency Department of Homeland Security
MR. RICKEY PETTY Department of Energy	DR. RAMESH KAKAR National Aeronautics and Space Administration
MR. CHRISTOPHER DOYLE Science and Technology Directorate Department of Homeland Security	DR. JARVIS MOYERS National Science Foundation
MR. JOHN VIMONT Department of the Interior	MR. DONALD E. EICK National Transportation Safety Board
MS. REGINA MCELROY Federal Highway Administration Department of Transportation	MS. LETA A. BROWN U.S. Nuclear Regulatory Commission
	MS. ANDREA PETRO Office of Management and Budget

MR. JAMES B. HARRISON, Executive Secretary
Office of the Federal Coordinator for
Meteorological Services and Supporting Research

**FEDERAL COORDINATOR
FOR
METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH**

8455 Colesville Road, Suite 1500
Silver Spring, Maryland 20910
301-427-2002
www.ofcm.gov

NATIONAL HURRICANE OPERATIONS PLAN

FCM-P12-2006

Washington, D.C.
May 2006

CHANGE AND REVIEW LOG

Use this page to record changes and notices of reviews.

Change Number	Page Numbers	Date Posted	Initial
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Changes are indicated by a vertical line in the margin next to the change or by shading and strikeouts.

Review Date	Comments	Initial

FOREWORD

The Interdepartmental Hurricane Conference (IHC) is sponsored annually by the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) to provide a forum for the responsible Federal agencies, together with representatives from the user communities like emergency management, to review the Nation's hurricane forecast and warning program and to make recommendations on how to improve the program in the future. The major objective is to plan and prepare for the upcoming hurricane season. The 60th IHC was held in Mobile, Alabama, March 20-24, 2006, and the new procedures, procedural changes, and agreements reached at the conference were incorporated into this publication—the 44th edition of the *National Hurricane Operations Plan* (NHOP).

At the 60th IHC, the Working Group for Hurricane and Winter Storms Operations and Research (WG/HWSOR) addressed 19 action items. Of the 19, 9 will be closed through incorporation into the 2006 NHOP as approved recommendations and/or changes; 5 of the items were informational in nature. Detailed descriptions of the action items are available on the OFCM web site at http://www.ofcm.gov/homepage/text/spc_proj/ihc.html.

This edition includes a number of minor revisions and changes to Chapter 3, *General Operations and Procedures of the National Weather Service Hurricane Centers*, and Chapter 5, *Aircraft Reconnaissance*, to include a requirement in Chapter 5 for high density three-dimensional Doppler radar data. Additionally, Chapter 4, *National Weather Service Products for the Department of Defense*, Chapter 6, *Satellite Reconnaissance*, and Appendix A, *Local National Weather Service (NWS) Office Products* contain some important updates.

The 2005 Atlantic tropical cyclone season was one of historic proportions—the most active season on record. Twenty-seven tropical storms developed, breaking the old record of 21 set in 1933. Of these 27 tropical storms, 15 became hurricanes, breaking the record of 12 set in 1969, and 7 became major hurricanes. The record-breaking season also recorded two firsts. For the first time, four Category 5 hurricanes were observed in the Atlantic basin in a single season, and four major hurricanes made landfall in the U.S. In all, there were seven U.S. landfalls, including Hurricanes Cindy, Dennis, Katrina, Rita, and Wilma, and Tropical Storms Arlene and Tammy. As of March 2006, the death toll for Hurricane Katrina alone was over 1600, making it the deadliest U.S. hurricane since the Palm Beach-Lake Okeechobee hurricane of 1928. Total property damage in the U.S. is estimated to be near \$104 billion—the costliest U.S. hurricane season on record. The estimated damage from Katrina alone was \$75 billion, making it the costliest single hurricane in U.S. history to date. The bottom line, however, is that the civilian and military organizations that make up our multiagency tropical cyclone forecast and warning system performed superbly during this historic and extremely challenging season—a tribute to their professionalism and dedicated efforts.

Samuel P. Williamson
Federal Coordinator for Meteorological
Services and Supporting Research

NATIONAL HURRICANE OPERATIONS PLAN

TABLE OF CONTENTS

		Page
CHANGE AND REVIEW LOG		ii
FOREWORD		iii
TABLE OF CONTENTS		v
CHAPTER 1	INTRODUCTION	1-1
	1.1. General.....	1-1
	1.2. Scope	1-1
CHAPTER 2	RESPONSIBILITIES OF COOPERATING FEDERAL AGENCIES	2-1
	2.1. General	2-1
	2.2. DOC Responsibilities.....	2-1
	2.3. DOD Responsibilities.....	2-4
	2.4. DOT/DHS Responsibilities.....	2-5
	2.5. Annual Liaison with Other Nations	2-5
	2.6. Air Traffic Control/Flight Operations Coordination.....	2-6
CHAPTER 3	GENERAL OPERATIONS AND PROCEDURES OF THE NATIONAL WEATHER SERVICE HURRICANE CENTERS	3-1
	3.1. General	3-1
	3.2. Products.....	3-1
	3.3. Designation of Tropical and Subtropical Cyclones.....	3-4
	3.4. Transfer of Warning Responsibility	3-6
	3.5. Alternate Warning Responsibilities	3-7
	3.6. Abbreviated Communications Headings.....	3-12
	3.7. Hurricane Liaison Team (HLT)	3-13
CHAPTER 4	NATIONAL WEATHER SERVICE PRODUCTS FOR THE DEPARTMENT OF DEFENSE	4-1
	4.1. General	4-1
	4.2. Observations.....	4-1
	4.3. Tropical Cyclone Forecast/Advisories	4-1
CHAPTER 5	AIRCRAFT RECONNAISSANCE	5-1
	5.1. General	5-1
	5.2. Responsibilities	5-1
	5.3. Control of Aircraft.....	5-3
	5.4. Reconnaissance Requirements	5-3
	5.5. Reconnaissance Planning and Flight Notification	5-6
	5.6. Reconnaissance Effectiveness Criteria.....	5-19

5.7.	Aerial Reconnaissance Weather Encoding, Reporting, and Coordination	5-20
5.8.	Operational Flight Patterns.....	5-23
5.9.	Aircraft Reconnaissance Communications	5-25
CHAPTER 6	SATELLITE SURVEILLANCE OF TROPICAL AND SUBTROPICAL CYCLONES	6-1
6.1.	Satellites	6-1
6.2.	National Weather Service (NWS) Support	6-5
6.3.	NESDIS Satellite Analysis Branch (SAB).....	6-5
6.4.	Air Force Support and the Defense Meteorological Satellite Program (DMSP)	6-6
6.5.	Satellites and Satellite Data Availability for the Current Hurricane Season	6-8
6.6.	Current Intensity and Tropical Classification Number	6-12
CHAPTER 7	SURFACE RADAR REPORTING.....	7-1
7.1.	General	7-1
7.2.	The WSR-88D.....	7-1
7.3.	Procedures	7-1
CHAPTER 8	NATIONAL DATA BUOY CAPABILITIES AND REQUIREMENTS.....	8-1
8.1.	General	8-1
8.2.	Requests for Drifting Buoy Deployment	8-2
8.3.	Communications.....	8-2
CHAPTER 9	MARINE WEATHER BROADCASTS	9-1
9.1.	General	9-1
9.2.	Global Maritime Distress and Safety System (GMDSS)	9-1
9.3.	Coastal Maritime Safety Broadcasts	9-2
9.4.	High Seas Broadcasts.....	9-2
9.5.	Additional Information.....	9-3
CHAPTER 10	PUBLICITY	10-1
10.1.	News Media Releases.....	10-1
10.2.	Distribution.....	10-1

APPENDIX A	LOCAL NATIONAL WEATHER SERVICE (NWS) OFFICE PRODUCTS	A-1
APPENDIX B	DEFINING POINTS FOR TROPICAL CYCLONE WATCHES/ WARNINGS	B-1
APPENDIX C	JOINT TYPHOON WARNING CENTER (JTWC) BULLETINS.....	C-1
APPENDIX D	FORMAT FOR NHOP/NWSOP FLIGHT INFORMATION FOR INTERNATIONAL AND DOMESTIC NOTAM ISSUANCE	D-1
APPENDIX E	SAFFIR-SIMPSON HURRICANE SCALE	E-1
APPENDIX F	OFFICIAL INTERAGENCY AGREEMENTS	F-1
APPENDIX G	RECCO, HDOB, MINOB, AND TEMP DROP CODES, TABLES, AND REGULATIONS.....	G-1
APPENDIX H	WSR-88D OPERATIONS PLAN FOR TROPICAL CYCLONE EVENTS	H-1
APPENDIX I	TELEPHONE AND TELETYPE LISTING.....	I-1
APPENDIX J	PHONETIC PRONUNCIATION LISTING.....	J-1
APPENDIX K	ACRONYMS/ABBREVIATIONS	K-1
APPENDIX L	GLOSSARY	L-1
APPENDIX M	DISTRIBUTION.....	M-1

LIST OF FIGURES

Figure	Page
1-1. Tropical cyclone forecast centers' areas of responsibility	1-2
2-1. Typhoon Longwang, September 29, 2005	2-3
3-1. HPC Public Advisory Product Format.....	3-3
3-2. Aviation Tropical Cyclone Advisory Format	3-4
4-1. Tropical cyclone forecast/advisory format	4-4
4-2. Tropical cyclone public advisory format	4-5
5-1. WC-130 Weather Reconnaissance Aircraft	5-2
5-2. G-IV Weather Surveillance Aircraft	5-2
5-3. NOAA P-3 Weather Surveillance Aircraft	5-3
5-4. Vortex data message worksheet.....	5-8
5-5. Supplementary vortex data message.....	5-9
5-6. Example Vortex Data Messages (VDM) and Supplementary Vortex Data Messages (SVDM) for the WC-130J	5-13
5-7. NHOP coordinated request for aircraft reconnaissance.....	5-14
5-8. Tropical cyclone plan of the day format	5-15
5-9. Mission evaluation form	5-21
5-10. Flight pattern ALPHA	5-23
5-11. Suggested patterns for investigative missions	5-24
5-12. Schematic of aircraft-to-satellite data link for NOAA P-3 aircraft.....	5-27
5-13. Schematic of aircraft-to-satellite data link for AFRC WC-130 aircraft	5-28
6-1. The GOES satellite system	6-3
6-2. Center fix data form and message format (satellite).....	6-7
8-1. Example Buoy and Float Deployment Pattern.....	8-3
A-1. Hurricane Local Statement Format.....	A-7
A-2. <i>Extreme Wind Warning using TOR Product Format</i>	A-9
A-3. Inland NPW Product Format	A-12
A-4. Post-Tropical Cyclone Report Format	A-15
B-1. Tropical Cyclone Break Points for the Northeast.....	B-3
B-2. Tropical Cyclone Break Points for the Southeast.....	B-4
B-3. Tropical Cyclone Break Points for the Gulf of Mexico.....	B-4
G-1. Reconnaissance code recording form	G-2
G-2. HDOB Description and Sample Messages	G-6
G-3. MinOb Description and Sample Message.....	G-8
G-4. Example TEMP DROP Message for Tropical Cyclones.....	G-15

LIST OF TABLES

Table	Page
3-1. Atlantic Tropical Cyclone Names.....	3-8
3-2. Eastern Pacific Tropical Cyclone Names	3-9
3-3. Central Pacific Tropical Cyclone Names.....	3-10
3-4. International Tropical Cyclone Names for the Western Pacific and South China Sea.....	3-11
5-1. Requirement for aircraft reconnaissance data.....	5-6
5-2. Vortex data message entry explanation	5-10
6-1. Communications headings for satellite tropical weather discussion summaries....	6-6
6-2. Satellite and satellite data availability for the current hurricane season.....	6-8
6-3. The empirical relationship between the C.I. number and the maximum wind speed and the relationship between the T-number and the minimum sea-level pressure	6-12
7-1. Participating radar stations.....	7-2
<i>A-1. HLS Product Table</i>	<i>A-3</i>
G-1. Reconnaissance code tables.....	G-3
G-2. Reconnaissance code regulations.....	G-5
G-3. HDOB Message Format.....	G-7
G-4. NOAA MinOb Message Format.....	G-9
G-5. TEMP DROP Code.....	G-10

