NATIONAL WEATHER SERVICE
PRODUCT/SERVICE DESCRIPTION DOCUMENT (PDD)
TYPE: Official Product
DATE: February 03, 2003

OPERATIONAL DAY 5 TROPICAL CYCLONE FORECAST

Part 1 - Mission Connection

1. **Product/Service Description:**
   The approval of this PDD authorizes the public dissemination of an operational Day 5 tropical cyclone forecast. Two products will require modification if Day 5 forecasts are approved: the Tropical Cyclone Forecast/Advisory Product (TCM) and the Tropical Cyclone Discussion (TCD) to add: (i) a 96- and 120-hour forecast position, and (ii) a 96- and 120-hour forecast intensity.

   The National Hurricane Center (NHC) and the Central Pacific Hurricane Center (CPHC), hereafter referred to as the tropical cyclone centers, issue these products routinely at 0300, 0900, 1500, and 2100 Coordinated Universal Time (UTC) for all tropical cyclones within their area of responsibility. If approved, forecast guidance from these tropical cyclone centers will extend from 72 to 120 hours.

2. **Purpose/Intented Use:**
   Extending tropical cyclone guidance to Day 5 enhances the NWS mission to protect life and property and enables customers to make better informed decisions. Two years of customer feedback was obtained from a diverse range of users. The overall message from our customers is they need and desire tropical cyclone forecast guidance out to Day 5.

   Tropical cyclone forecast guidance beyond three days is required to support existing and planned Weather Forecast Offices (WFO) and National Centers for Environmental Prediction (NCEP) products. Extending tropical cyclone forecast guidance to Day 5 supports the NWS Strategic Plan to "extend the time periods and improve the accuracy and formats of weather, water, and climate products."

3. **Audience:**

   - WFOs and the National Centers
   - Federal, state, and local governments and agencies
   - Federal, state, and local emergency managers
   - The general public
   - The marine community
   - Private sector meteorologists, who will acquire, repackage, and retransmit the data
   - Media
   - International meteorological community

4. **Presentation Format:**
The TCM and TCD are text (alphanumeric) products. Minor modifications to the TCM and TCD will be required to include 96- and 120- hour tropical cyclone forecasts. The 96- and 120-hour tropical cyclone forecasts will contain the following elements:

(i) The forecast location of the center of the tropical cyclone by its latitude and longitude,
(ii) The forecast intensity with maximum sustained wind speed and maximum gusts to the nearest 5 knots. A suggested format is below with the final format decided at the NOAA Hurricane Conference, January 2003.

Product examples - Bolded sections denote changes

TCM
ZCZC MIATCMAT3 ALL
TTAA00 KNHC DDHHMM
HURRICANE ZENIA FORECAST/ADVISORY NUMBER 15
NATIONAL WEATHER SERVICE MIAMI FL
0300Z MON SEP 13 2002

A HURRICANE WARNING IS IN EFFECT FOR THE CENTRAL BAHAMAS ... INCLUDING CAT ISLAND ... EXUMAS ISLANDS ... LONG ISLAND ... RUM CAY ... AND SAN ALVADOR ISLAND.

A HURRICANE WATCH IS IN EFFECT FOR THE NORTHWEST BAHAMAS ... INCLUDING THE ABACO ISLANDS ... ANDROS ISLAND ... BERRY ISLANDS ... BIMINI ... ELEUTHERA ... GRAND BAHAMA AND NEW PROVIDENCE ISLAND.

A TROPICAL STORM WARNING IS IN EFFECT FOR THE TURKS AND CAICOS ISLANDS AND THE SOUTHEASTERN BAHAMAS.

A HURRICANE WATCH MAY BE ISSUED FOR A PORTION OF THE FLORIDA EAST COAST AT 5 AM ON MONDAY.

INTERESTS IN THE SOUTHEAST U.S. SHOULD MONITOR THE PROGRESS OF THIS HURRICANE.

HURRICANE CENTER LOCATED NEAR 23.6N 69.3W AT 13/0300Z
POSITION ACCURATE WITHIN 10 NM

PRESENT MOVEMENT TOWARD THE WEST OR 280 DEGREES AT 12 KT

ESTIMATED MINIMUM CENTRAL PRESSURE 931 MB
EYE DIAMETER 30 NM
MAX SUSTAINED WINDS 125 KT WITH GUSTS TO 150 KT
64 KT 90NE 50SE 50SW 070NW
50 KT 125NE 100SE 90SW 100NW
34 KT 250NE 180SE 150SW 200NW
12 FT SEAS..300NE 200SE 175SW 300NW

ALL QUADRANT RADII IN NAUTICAL MILES

REPEAT...CENTER LOCATED NEAR 23.6N 69.3W AT 13/0300Z AT 13/0000Z
CENTER WAS LOCATED NEAR 23.5N 68.7W

FORECAST VALID 13/1200Z 24.1N 71.3W
MAX WIND 130 KT...GUSTS 160 KT
64 KT... 90NE 50SE 50SW 70NW
50 KT...125NE 100SE 90SW 100NW
34 KT...250NE 180SE 150SW 200NW

FORECAST VALID 14/0000Z 24.8N 73.8W
MAX WIND 135 KT...GUSTS 165 KT
64 KT... 90NE 50SE 50SW 70NW
50 KT...125NE 100SE 90SW 100NW
34 KT...250NE 180SE 150SW 200NW

FORECAST VALID 14/1200Z 25.9N 76.3W
MAX WIND 135 KT...GUSTS 165 KT
64 KT... 90NE 50SE 50SW 70NW
50 KT...125NE 100SE 90SW 100NW
34 KT...250NE 180SE 150SW 200NW

FORECAST VALID 15/0000Z 27.2N 78.3W
MAX WIND 130 KT...GUSTS 160 KT
50 KT...125NE 100SE 100SW 100NW
34 KT...200NE 150SE 150SW 150NW

FORECAST VALID 16/0000Z 30.5N 81.0W
MAX WIND 125 KT...GUSTS 145 KT
50 KT...125NE 100SE 100SW 100NW
34 KT...200NE 150SE 150SW 150NW

EXTENDED OUTLOOK. NOTE...ERRORS FOR TRACK HAVE AVERAGED NEAR 300 NM ON DAY 4 AND 350 NM ON DAY 5...AND FOR INTENSITY NEAR 20 KT EACH DAY.

OUTLOOK VALID 17/0000Z 34.0N 78.0W
MAX WIND 90 KT...GUSTS 120 KT.

OUTLOOK VALID 18/0000Z 38.0N 83.0W...INLAND
TROPICAL DEPRESSION

NEXT ADVISORY AT 13/0900Z

(NAME)

TCD

ZCZC MIATCDAT3 ALL
TTAA00 KNHC DDHHMM
HURRICANE ZENIA DISCUSSION NUMBER 15
NATIONAL WEATHER SERVICE MIAMI FL
11 PM EDT TUE SEP 13 2002

IT APPEARS ZENIA HAS PEAKED BASED ON THE PLETHORA OF DROPSONDE AND FLIGHT-LEVEL WIND DATA COLLECTED BY BOTH AIR FORCE RESERVE AND NOAA RECONNAISSANCE AIRCRAFT THIS EVENING. THE STRONGEST WINDS OBSERVED WERE 196 KT AT 848 MB AND 183 KT AT 933 MB FROM DROPSONDES...AND 141 KT OBSERVED AT THE 700 MB FLIGHT-LEVEL. ALL OF THIS EQUATES TO APPROXIMATELY 125 KT AT THE SURFACE...WHICH IS SUPPORTED BY STEP-FREQUENCY MICROWAVE DATA OF 125 KT OBTAINED FROM A NOAA RESEARCH PLANE. THE PRESSURE HAS ALSO RISEN FROM 938 MB TO 942 MB DURING THE PAST 5 HOURS...FURTHER INDICATING THAT ZENIA HAS LIKELY PEAKED. HAVING SAID THAT...ZENIA IS STILL A VERY FORMIDABLE CATEGORY 4 HURRICANE. THE UPPER-LEVEL OUTFLOW HAS BECOME ELONGATED NORTHWEST-SOUTHEAST...BUT THERE ARE NO SIGNS OF ANY SIGNIFICANT SHEAR OR DRY AIR ENTRAINMENT. ALSO...THE WIND RADII WERE INCREASED SLIGHTLY BASED ON SURFACE ANALYSES PROVIDED BY THE AOML/HURRICANE RESEARCH DIVISION.

. . . TEXT CONTINUES . . .

FORECASTER (NAME)

FORECAST POSITIONS AND MAX WINDS

INITIAL	13/0300Z 23.6N 69.3W	125 KT
12HR VT	13/1200Z 24.1N 71.3W	130 KT
24HR VT	14/0000Z 24.8N 73.8W	135 KT
36HR VT	14/1200Z 25.9N 76.3W	135 KT
48HR VT	15/0000Z 27.2N 78.3W	130 KT
72HR VT	16/0000Z 30.5N 81.0W	125 KT
96HR VT	**17/0000Z 34.0N 78.0W**	**90 KT**
120HR VT	**18/0000Z 38.0N 83.0W**	**TROPICAL DEPRESSION...INLAND**

5. **Feedback Method:**
   Internal Feedback: Experimental Day 5 Tropical Cyclone Forecast and Track Skill Score
   The NHC initiated experimental Day 4 and Day 5 track forecasts for the Atlantic and eastern Pacific Oceans at the beginning of the 2001 hurricane season. The track forecasts remained in house. TPC compared the Day 4 and 5 track forecasts to the long-standing, benchmark hurricane track model (CLIPER). Average annual track errors for CLIPER and the experimental forecasts are provided below:

Day 4 Atlantic Basin Day 5						
	CLIPER	Exp.	Cases	CLIPER	Exp.	Cases
2001	545nm	235nm	69	737nm	315nm	48
2002	571	281	76	760	340	64
2/yr avg.	559	259	145	750	329	112

Day 4 East Pacific Basin Day 5						
	CLIPER	Exp.	Cases	CLIPER	Exp.	Cases
2001	261nm	193nm	51	291nm	194nm	33
2002	358	171	37	420	192	18
2/yr avg.	302	184	88	337	194	51

Based on this two year test period, verification scores demonstrate TPC provides significant improvement and thus skill over the benchmark CLIPER model. Additionally, this skill level satisfies the needs of 63% of our customers when queried on useful track error. CPHC conducted Day 4 and 5 forecasts. In 2001, there were only 4 weak, short-lived tropical cyclones and no cases of 96- or 120-hour forecasts. Based on partial data for the five tropical cyclones thus far in 2002, it is anticipated CPHC average error will be below Atlantic basin numbers and similar to the east Pacific values.

External Feedback 1: Customer Questionnaires

A questionnaire was administered to user groups in 2001 and 2002 on their needs for an operational Day 5 forecast. The overall message from these customers is a need and desire for tropical cyclone guidance out to Day 5 (80% said "useful" or "essential").

Ongoing user feedback will be solicited through many venues after operational implementation: NOAA Hurricane Conference (annual), Interdepartmental Hurricane Conference (annual), National Hurricane Conference (annual), NWS Marine Branch Program Teleconferences and Conferences with Region Marine Focal Points, future NWS Marine Branch Focus Group Projects, NWS-FEMA Partnership, Meteorological and Oceanographic Group U.S. Pacific Command Tropical Cyclone Conference (annual), and NWS-U.S. Coast Guard Partnership.

External Feedback 2: Public Information and Awareness Campaign

The Marine Branch will issue a Public Information Statement (PNS) before the distribution of the revised TCM and TCD products. The PNS will include a brief description and limitations of the Day 4 and 5 tropical cyclone forecast/advisory, with the Tropical Cyclone Program Manager as the point of contact for any questions.

Part 2 - Technical

1. **Format and Science Basis:**
   What are the technical limitations of this information? There is a concern users of the 5 day forecast will focus on the forecast track and not take into account the uncertainties associated with extended period hurricane forecasts. A continuing education program will address this issue as is currently done for days 2 and 3.

The tropical cyclone centers do not plan on issuing wind radii forecasts-but will supply a wind speed forecast to the nearest 5 knots and highest gusts at Days 4 and 5 because storm structure/intensity forecast skill lags behind track skill.

2. **Availability:**
   Tropical cyclone centers will issue the operational Day 5 guidance in the same manner as the three day product, now issued at 0300, 0900, 1500, and 2100 UTC for all tropical cyclones within their area of responsibility. All NWS/FOS/EMWIN circuits will continue to distribute the products.

3. **Additional Information:**
   We are always seeking to improve our services based on user feedback. Comments on the 5 Day forecasts or the TCM and TCD products may be addressed to:

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