

APPENDIX I

REFERENCES USED TO DEVELOP THE TRAMAN

Chapter 1

Meteorology Today, 4th ed., C. Donald Ahrens, West Publishing, St. Paul, MN, 1991.

Chapter 2

Naval Oceanographic Data Distribution System (NODDS), Products Manual, FLENUMOCEAN INSTRUCTION 3147.1, Commanding Officer, Fleet Numerical Oceanography Center, Monterey, CA, 1983.

Meteorology Today, 4th ed., C. Donald Ahrens, West Publishing, St. Paul, MN, 1991.

The Use of the Skew T, Log P Diagram in Analysis and Forecasting, Naval Air Instruction 50-1P-5, Naval Oceanography Command, Stennis Space Center, MS, 1990.

Chapter 3

Meteorology Today, 4th ed., C. Donald Ahrens, West Publishing, St. Paul, MN, 1991.

Centrally Produced Guidance and Analysis Products, Vol. 1, AFOS, National Weather Service Forecasting Handbook No. 1, U.S. Department of Commerce, Washington, D.C., 1993.

The Prediction of Maritime Cyclones, Naval Air Instruction 50-1P-545, Naval Oceanography Command, Stennis Space Center, MS, 1968.

Chapter 4

The Prediction of Snow Vs. Rain, Forecasting Guide No. 2, U.S. Department of Commerce, Washington, D.C., 1957.

The Use of the Skew T, Log P Diagram in Analysis and Forecasting, Naval Air Instruction 50-1P-5, Naval Oceanography Command, Stennis Space Center, MS, 1990.

A Workbook on Tropical Cloud Systems Observed in Satellite Imagery, Vol. 1, NAVEDTRA 40970, Naval Oceanography Command, Stennis Space Center, MS, 1993.

Satellite Imagery Interpretation in Synoptic and Mesoscale Meteorology, NAVEDTRA 40950, Naval Oceanography Command, Stennis Space Center, MS, 1993.

Chapter 5

Meteorology Today, 4th ed., C. Donald Ahrens, West Publishing, St. Paul MN, 1991.

Airman's Information Manual, Department of Transportation/Federal Aviation Administration, Washington D.C., 1994.

Doppler Radar Meteorological Observations, (Part D), Federal Meteorological Handbook No. 11, Washington D.C., 1992.

Terminal Aerodrome Forecast (TAF) Code, NAVOCEANCOM Instruction 3143.1E, Naval Oceanography Command, Stennis Space Center, MS, 1993.

Chapter 6

Joint Surf Manual, COMNAVSURFPAC/COMNAVSURFLANT Instruction 3840.1B, with change 1, 1987.

Sea and Swell Forecasting, NAVEDTRA 40560, Naval Oceanography Command, Stennis Space Center, MS, 1984.

Surf Forecasting, NAVEDTRA 40570, Naval Oceanography Command, Bay St. Louis, MS, 1987.

Chapter 7

Operator's Manual, Tactical Environmental Support System (TESS (3)) and Shipboard Meteorological and Oceanography Observing System (SMOOS), Vols. I, II, IIA, IIB, III, and IV, NAVEXCEN VJO 14203-0302428A, Vallejo, CA, 1993.

Tactical Environmental Support System, TESS 2.1, User's Guide, Naval Oceanographic Office, Stennis Space Center, MS, 1989.

Chapter 8

Environmental Effects on Weapon Systems and Naval Warfare (U), RP-1, Commander, Naval Oceanography Command, Stennis Space Center, MS, 1993.

Operator's Manual, Tactical Environmental Support system (TESS (3)) and Shipboard Meteorological and Oceanographic Observing System (SMOOS), Vols. I, II, IIA, IIB, III, and IV, NAVEXCEN VJO 14203-0302428A, Vallejo, CA, 1993.

Tactical Environmental Support System, TESS 2.1, User's Guide, Naval Oceanographic Office, Stennis Space Center, MS, 1989.

Chapter 9

Fleet Oceanographic and Acoustic Reference Manual, RP 33, Naval Oceanographic Office, Stennis Space Center, MS, 1989.

Navy Oceanographic Data Distribution System Products Manual, FLENUMOCEANCEN Instruction 3147.1, Fleet Numerical Oceanography Center, Monterey, CA, 1993.

Navy Oceanographic Data Distribution System Users Manual, Fleet Numerical Oceanography Center, Monterey, CA, 1993.

Chapter 10

Composite Warfare Oceanographic Support Modules (CWOSM) (Part 1), Training Manual TM 04-92, Naval Oceanographic Office, Stennis Space Center, MS, 1992.

Fleet Oceanographic and Acoustic Reference Manual, RP 33, Stennis Space Center, MS, 1989.

Meteorology Today, 4th ed., C. Donald Ahrens, West Publishing, St. Paul MN, 1991.

Navy Oceanographic Data Distribution System (NODDS), Version 3.1, User's Manual, Commanding Officer, Fleet Numerical Oceanography Center, Monterey, CA, 1993.

Optimum Path Aircraft Routing System, User's Manual, FLENUMOCEANCENINST 3710.1B, Fleet Numerical Oceanography Center, Monterey, CA, 1990.

Procedures Governing Flight Weather Briefings and Preparing DD Form 175-1 and U.S. Navy Flight Forecast Folder, NAVOCEANCOM Instruction 3140.14C, Stennis Space Center, MS, 1993.

Operator's Manual, Tactical Environmental Support System (TESS (3)) and Shipboard Meteorological and Oceanographic Observing System (SMOOS), NAVEXCEN VJO 14203-0302428A, Vallejo, CA, 1993.

Terminal Aerodrome Forecast (TAF) Code, NAVOCEANCOM Instruction 3143.1E, Commander, Naval Oceanography Command, Stennis Space Center, MS, 1993.

U.S. Navy Oceanographic & Meteorological Support System Manual, NAVOCEANCOMINST 3140.1J, Commander, Naval Oceanography Command, Stennis Space Center, MS, 1991.

Chapter 11

Composite Warfare Oceanographic Support Modules (CWOSM) (PART 1)
Training Manual, TM 04-92, Stennis Space Center, MS, 1992.

Chapter 12

Doppler Meteorological Radar, WSR-88D, Technical Manual, NAV-EM400-
AF-OPI-010/WSR88D, 1992.

Doppler Radar Meteorological Observations (Part B), Federal Meteorological
Handbook No. 11, Washington, D.C., 1990.

Doppler Radar Meteorological Observations (Part D), Federal Meteorological
Handbook No. 11, Washington, D.C., 1992.

Weather Radar Observations (Part B), Federal Meteorological Handbook No.
7, Washington, D.C., 1981.

Chapter 13

Atmospheric Climatic Publications, Officer in Charge, Naval Oceanographic
Command Detachment, Asheville, NC, 1993.

Composite Warfare Oceanographic Support Modules (CWOSM) (PART 1),
Naval Oceanographic Office, Stennis Space Center, MS, 1992.

Environmental Effects on Weapon Systems and Naval Warfare (U), RP-1,
Commander, Naval Oceanography Command, Stennis Space Center, MS,
1993.

Geophysics Fleet Mission Program Library (GFMPPL) Summary, Naval
Oceanographic Office, Stennis Space Center, MS, 1992.

Guide to Standard Weather Summaries and Climatic Services, Naval
Oceanography Command Detachment, Asheville, NC, 1986.

Joint Surf Manual, COMNAVSURFPAC/COMNAVSURFLANT Instruction
3840.1B, with change 1, 1987.

*Warnings and Conditions of Readiness Concerning Hazardous or Destructive
Weather Phenomena*, OPNAV Instruction 3140.24E, Department of the
Navy, Chief of Naval Operations, Washington, D.C., 1993,

Chapter 14

Special Incident Reporting (OPREP-3 and UNIT SITREP) Procedures,
NAVOCEANCOM Instruction 3100.2D, Naval Oceanography Command,
Stennis Space Center, MS, 1989.

Local Area and Area of Responsibility (AOR) Forecaster's Handbooks,
NAVOCEANCOM Instruction 3140.2D, Naval Oceanography Command,
Stennis Space Center, MS, 1992.

NATOPS General Flight and Operating Instructions, OPNAV Instruction 3710.7P, Washington D.C., 1992.

Naval Meteorology and Oceanography Command Training and Certification Program, NAVMETOCCOM Instruction 1500.2H, Naval Meteorology and Oceanography Command, Stennis Space Center, MS, 1994.

Oceanographic Post-Deployment Reports, NAVOCEANCOM Instruction 3140.23A, Naval Oceanography Command, Stennis Space Center, MS, 1990.

INDEX

A

- Administration, *see* Command administrative functions
- Advection stratum, 1-2
- Aircraft icing, 5-28 to 5-34
 - forecasting, 5-30 to 5-34
 - intensities, 5-29
 - operational aspects, 5-29 to 5-30
 - process of formation, 5-28 to 5-29
 - tactical decisions aids, 7-20 to 7-21
 - thunderstorm hazard, 5-2
 - use of Skew T Log P Diagram, 5-31 to 5-34
- Airmass cloudiness and weather, 4-6 to 4-8
- Airmass thunderstorms, 5-8
- Altimeter setting, 10-4 to 10-6. *See also*
 - Thunderstorm altimetry
 - errors, 10-4 to 10-6
 - forecasting, 10-6
- Ambient noise, 9-11 to 9-13
 - effects on mine warfare, 13-6
- Amphibious warfare, 13-7 to 13-9. *See also* Surf forecasting
- Angular spreading, 6-4, 6-10 to 6-11
- ARPGEN program, 10-3 to 10-4

B

- Bathythermograph collective product, 8-9 to 8-10
- Bathythermograph observation records, 14-1
- Bioluminescence, 9-13 to 9-14
 - effects on mine warfare, 13-6
- Blocking highs, 2-5 to 2-6
 - formation, 2-9
 - intensity, 2-8
- Bottom bounce, 9-2 to 9-3
- Briefing, METOC, 9-18 to 9-20, 10-11 to 10-12, 13-1 to 13-9. *See also* Tactical decision aids
 - amphibious warfare, 13-7 to 13-9
 - climatology, 10-11 to 10-12, 13-2
 - conditions of readiness, 13-1 to 13-2

- Briefing, METOC—Continued
 - evasion/sortie 13-3
 - mine warfare, 9-18 to 9-20, 13-4 to 13-7
 - storm surge 13-3
 - tropical cyclone disaster planning, 13-1 to 13-2

C

- Cirrus clouds, 4-19 to 4-21
 - forecasting, 4-20 to 4-21
 - indications from RAOB data, 4-19
 - observation and formation, 4-19 to 4-20
 - relation to jet stream, 4-21
 - relation to tropopause, 4-20
- Climatology, 10-11 to 10-12. *See also* Tropical cyclones
 - climatological studies, 10-12
 - publications and summaries, 10-11 to 10-12
- Cloud analysis and forecasting, 4-3 to 4-21
 - airmass cloudiness, 4-6 to 4-8
 - ceiling height, 4-10 to 4-12
 - cirrus clouds, 4-19 to 4-21
 - dewpoint, 4-14
 - frontal and orographic, 4-4 to 4-6
 - frost point, 4-14
 - icing, 5-31
 - nephanalysis, 4-9
 - precipitation, 4-19
 - stratus clouds, 5-23 to 5-24, 5-27 to 5-28
 - turbulence, 5-38
 - use of RAOB data, 4-13 to 4-19, 5-27 to 5-28
- Command administrative functions, 14-1 to 14-8
 - bathythermograph observation records transmittal, 14-1
 - local area forecaster handbooks, 14-6
 - meteorological records transmittal, 14-1
 - meteorological station and description reports, 14-5
 - post-deployment reports, 14-7 to 14-8
 - publication review, 14-7

Command administrative functions—Continued
 special incident reports, 14-5 to 14-6
Command training functions, 14-6 to 14-9
 inspection of afloat units, 14-8 to 14-9
 instrument ground school, 14-6
 training and certification program, 14-8
Condensation processes, 4-1
 dissipation processes, 4-3
Conditions of readiness (COR), 13-1 to 13-2
Convergence, 1-1 to 1-7, 1-10 to 1-11, 4-2 to 4-3
 effects on weather, 1-7
 features aloft, 1-3 to 1-6
 mass convergence, 1-2
 surface pressure systems, 1-3
 vorticity, 1-10 to 1-11
 wind shear, 1-1 to 1-2
Convergence zone, 9-1 to 9-2
Critical eccentricity, 2-7
Currents, 6-15, 6-17 to 6-18
 coastal and tidal, 6-17 to 6-18
 eddies, 6-17
 effects on amphibious warfare, 13-8 to 13-9
 effects on mine warfare, 13-4 to 13-5
 Ekman spiral 6-18
 wind-driven, 6-17 to 6-18
Cutoff low, 2-8 to 2-9
 formation, 2-9
 intensity, 2-8

D

Direct path, 9-6
Ditch headings, 10-8, 10-10
Divergence, 1-1 to 1-7, 1-10 to 1-11, 4-2 to 4-3
 effects on weather, 1-7
 features aloft, 1-3 to 1-6
 mass divergence, 1-2
 surface pressure systems, 1-3
 vorticity, 1-10 to 1-11
 wind shear, 1-1 to 1-2
Doppler radar, 12-3 to 12-15
 alert areas and thresholds, 12-12 to 12-13
 anomalous propagation, 12-7

Doppler radar—Continued
 archiving data, 12-14 to 12-15
 bright band, 12-12
 cloud layer detection, 12-10 to 12-11
 data access, 12-13
 doppler shift, 12-4
 ground clutter, 12-6 to 12-7
 history, 12-3 to 12-4
 interpretation of velocity patterns, 12-8 to 12-12
 large scale weather systems, 12-11 to 12-12
 mesocyclone signature detection, 12-9 to 12-10
 Principle User Processor, 12-4, 12-12 to 12-15
 range-folded data, 12-5 to 12-6
 side lobes, 12-7
 solar effects, 12-7 to 12-8
 user function operations, 12-13 to 12-14
 velocity aliased data, 12-4 to 12-5
 wind shear detection, 12-10

E

Eddies, 6-17
 acoustic effects, 9-15
Ekman spiral, 6-18
Electromagnetic coverage display, 7-10 to 7-12
Electromagnetic path loss, 7-4 to 7-6
Electronic countermeasures, 7-1 to 7-2
Electronic support measures, 7-6 to 7-8
Electro-optical systems, 10-6 to 10-7
 environmental effects, 10-6 to 10-7
 FLIR program, 7-18 to 7-20
 LRP program, 7-16

F

Fetch limited sea, 6-6
Fog and stratus, 5-18 to 5-28
 dissipation, 5-26 to 5-28
 effect of air mass stability, 5-18 to 5-19
 forecasting, 5-19 to 5-28
 formation, 5-19 to 5-25
 types, 5-19, 5-21 to 5-25
 use of Skew T Log P Diagram, 5-25 to 5-28

Frontogenesis, 3-20

Frontolysis, 3-20

Fronts, 3-17 to 3-20, 4-2 to 4-5, 4-9 to 4-12

forecasting clouds and weather, 4-9 to 4-12

forecasting intensity, 3-20

forecasting movement, 3-17 to 3-20

frontal lifting, 4-2

frontogenesis, 3-20

frontolysis, 3-20

G

Geophysics Fleet Mission Program Library (GFMPPL), 7-1 to 7-21, 8-1 to 8-9, 9-20, 10-3 to 10-4, 13-3. *See also* Tactical decision aids

ARPGEN program, 10-3 to 10-4

meteorological products, 7-1 to 7-21

mine warfare products, 9-20

oceanographic products, 8-1 to 8-9

surge program, 13-3

tropical cyclone applications, 13-3

Geostrophic wind, 3-17 to 3-20, 11-9

H

Hail, *see* Thunderstorms

Half-channel, 9-6 to 9-7

High seas warnings, 10-2

I

Isopycnic level, 1-2 to 1-3

J

Jet stream, 2-3, 2-7, 3-7, 4-9, 4-21, 5-34, 5-36, 5-38

clear air turbulence, 5-34, 5-38

effect on movement of surface lows, 3-7

effect on upper air systems, 2-3, 2-7

relation to cirrus clouds, 4-21

turbulence, 5-36

L

Lightning, *see* Thunderstorms

Local area forecaster handbooks, 13-1, 14-6

Long waves, 2-3, 4-32

relative to tropical cyclones, 11-3 to 11-4, 11-7

M

MAD operational effectiveness (MOE) charts, 8-10

Maritime cyclones, 3-7

Mine warfare, 9-18 to 9-20, 13-4 to 13-7

briefing of environmental effects, 9-18 to 9-19, 13-4 to 13-7

mine hunting sonar systems, 9-19

support systems and products, 9-19 to 9-20

Modified surf index, 6-15, 13-8

N

NAVSAR program, 8-2 to 8-5

NODDS products, 2-10, 3-12, 7-1, 8-1. *See also*

Operational oceanography

oceanographic products, 9-1 to 9-10

ditch headings product, 10-8, 10-10

Nephanalysis, 4-9

O

Ocean fronts, 9-15 to 9-18

acoustic effects, 9-17 to 9-18

determining position, 9-16, 9-18

eddies, 9-15

Ocean waves, *See* Sea surface forecasting

Operational oceanography, 9-1 to 9-20. *See also*

Tactical decision aids, *and* Sea surface forecasting

ambient noise, 9-11 to 9-13

bioluminescence, 9-13 to 9-14

bottom bounce, 9-2 to 9-3

bottom bounce products, 9-3

convergence zone, 9-1 to 9-2

Operational oceanography-Continued

- convergence zone products, 9-2
- direct path, 9-6
- direct path product, 9-6
- half-channel, 9-6 to 9-7
- half-channel conditions product, 9-7
- ocean fronts and eddies, 9-15 to 9-18
- shallow sound channel axis, 9-9
- shallow sound channel axis products, 9-9 to 9-10
- sonic layer depth, 9-4
- sonic layer depth product, 9-5
- sound channel axis, 9-8
- sound channel axis depth product, 9-8
- sound fixing and ranging channel, 9-8
- surface duct, 9-5 to 9-6
- surface duct cutoff frequency product, 9-6
- underwater visibility, 9-14
- upwelling, 9-15 to 9-16

OPTASK METOC, 13-9, 14-7

P

Precipitation processes, 4-1 to 4-12, 4-19, 4-21 to 4-30

- airmass precipitation, 4-6 to 4-8
- dissipation processes, 4-3
- frontal and orographic, 4-1 to 4-2, 4-4 to 4-6, 4-9 to 4-12
- snow versus rain, 4-21 to 4-30
- vertical motion, 4-8
- vertical stretching, 4-2 to 4-3
- vorticity, 4-8

R

Radar, weather, 5-2, 5-10, 11-3, 12-1 to 12-15. *See also* Doppler radar

- anomalous propagation, 12-7
- attenuation, 12-3
- doppler radar, 12-3 to 12-15
- effects of wavelength and frequency, 12-1 to 12-2
- ground clutter, 12-6 to 12-7

Radar, weather-Continued

- nondoppler radar, 12-1 to 12-3
- pulse length and pulse repetition frequency, 12-3
- radar beam characteristics, 12-2 to 12-3
- sidelobes, 12-7
- signal strength and echo definition, 12-3
- solar effects, 12-7 to 12-8
- thunderstorm detection, 5-2, 5-10
- tropical cyclone detection, 11-3

RAOB, 4-13 to 4-20, 5-5 to 5-15, 5-25 to 5-28, 5-30 to 5-34, 5-38

- cirrus cloud forecasting, 4-19 to 4-20
- cloud analysis, 4-13 to 4-19
- fog and stratus forecasting, 5-25 to 5-28
- hail forecasting, 5-10 to 5-15
- icing, 5-30 to 5-34
- precipitation forecasting, 4-19
- thunderstorm forecasting, 5-5 to 5-10
- turbulence 5-38

Ridges, 1-5 to 1-6, 1-9 to 1-10, 2-2 to 2-5

- divergence and convergence 1-5 to 1-6
- effects of super gradient winds, 2-4 to 2-5
- forecasting intensity, 2-4 to 2-5
- forecasting movement, 2-2 to 2-3
- vorticity, 1-9 to 1-10

S

Satellite imagery, 2-2, 2-10, 3-1 to 3-2, 3-15 to 3-17, 4-6 to 4-8, 9-18, 11-3

- airmass cloud patterns, 4-6 to 4-8
- constructing upper level prognostic charts, 2-10
- determining ocean frontal position, 9-18
- formation of new pressure systems, 3-1 to 3-2
- tropical cyclone detection, 11-3

Sea surface currents, *see* currents

Sea surface forecasting, 6-1 to 6-19

- sea waves, 6-1
- sea wave forecasting, 6-5 to 6-9
- sine waves, 6-1
- surf forecasting, 6-11 to 6-17
- surface currents, 6-15, 6-17 to 6-18
- swell waves, 6-1

Sea surface forecasting-Continued

- swell wave forecasting, 6-9 to 6-11
- wave properties, 6-2 to 6-4
- wave spectrum, 6-4 to 6-5

Severe weather, 5-1 to 5-39, 10-1 to 10-2, 13-1 to

13-2. *See also* Thunderstorms

- conditions of readiness (COR), 13-1 to 13-2
- fog and stratus, 5-18 to 5-28
- icing, 5-28 to 5-33
- tornadoes, 5-15, 5-17 to 5-18
- turbulence, 5-34 to 5-39
- warnings, 10-1 to 10-2
- waterspouts, 5-18

Ship ice accretion, 7-12 to 7-13

Shoaling, 6-13

Significant wave height, 10-1

Snow, 4-21 to 4-30

- area of maximum snowfall, 4-27 to 4-30
- forecasting techniques and aids, 4-23 to 4-27
- snow versus rain forecast, 4-21 to 4-30

Sound speed profile, 8-5 to 8-9, 9-2 to 9-9, 9-17 to 9-18, 13-6

- bottom bounce, 9-3
- convergence zones, 9-2
- direct path, 9-6
- effects of ocean fronts, 9-17 to 9-18
- effects on mine warfare, 9-18, 13-6
- half-channel, 9-6 to 9-7
- NOTS program, 8-8
- PPL program, 8-7
- RAY program, 8-5 to 8-6
- sonic layer depth, 9-4
- sound channels, 9-8 to 9-9
- SSP program, 8-8 to 8-9
- surface ducts, 9-5 to 9-6

Special observations and forecasts, 10-1 to 10-12

- altimeter settings, 5-4 to 5-5, 10-4 to 10-6
- atmospheric refractivity, 10-3 to 10-4
- climatology, 10-11 to 10-12
- ditch headings, 10-8, 10-10
- electro-optics, 10-6 to 10-7
- extreme temperatures, 10-2
- freezing rain, 10-2

Special observations and forecasts-Continued

- gale warnings, 10-1
- high seas warnings, 10-2
- significant weather, 10-1
- small craft warnings, 10-1
- storm warnings, 10-1
- thunderstorm warnings, 10-2
- tropical cyclone warnings, 10-2, 11-10 to 11-11
- verification of forecasts, 10-11
- verification of warnings, 10-2
- WEAX/AVWX issuance, 10-7 to 10-9
- wind warnings, 10-1 to 10-2

Stability indexes, 5-8 to 5-10

Subgradient winds, 1-6

Super gradient winds, 1-5 to 1-6, 2-4 to 2-5

Surf forecasting, 6-11 to 6-17, 13-7 to 13-9

- modified surf index, 6-15, 13-8
- objective techniques, 6-15 to 6-17

Surface systems, 1-3, 2-8 to 2-9, 3-1 to 3-21, 4-3 to 4-5

- application of satellite imagery, 3-1 to 3-2, 13-5 to 13-17
- divergence and convergence, 1-3
- forecasting formation, 2-8 to 2-9, 3-1 to 3-3
- forecasting intensity, 2-8, 3-8 to 3-15, 3-20 to 3-21
- forecasting movement, 3-3 to 3-8, 3-17 to 3-20
- forecasting principles, 3-6 to 3-8
- frontal clouds and weather, 4-3 to 4-5
- prognostic charts, 3-1 to 3-3, 3-12, 3-17 to 3-21

T

Tactical decision aids, meteorological, 7-1 to 7-21, 10-3 to 10-4

- aircraft icing (AIRICE), 7-20 to 7-21
- ARPGEN program, 10-3 to 10-4
- ballistic wind and densities corrections (BALWND), 7-16 to 7-17
- battle group vulnerability (BGV), 7-4
- D-values (DVAL), 7-2 to 7-3
- electromagnetic coverage diagram (COVER), 7-10 to 7-12

- Tactical decision aids, meteorological-Continued
 - electromagnetic path loss versus range (LOSS), 7-4 to 7-6
 - electronic countermeasures effectiveness (ECM), 7-1 to 7-2
 - electronic support measures (ESM), 7-6 to 7-8
 - forward-looking infrared (FLIR), 7-18 to 7-20
 - laser range prediction (LRP), 7-16
 - platform vulnerability (PV), 7-8 to 7-10
 - radiological fallout (RADFO), 7-17 to 7-18
 - ship ice accretion (SHIP ICE), 7-12 to 7-13
 - sound focus (SOCUS), 7-14 to 7-16
 - surface search radar range (SSR), 7-10
 - tropical cyclone applications, 13-3
 - tropical storm surge (SURGE), 13-3
- Tactical decision aids, oceanographic 8-1 to 8-10.
 - See also* Operational oceanography
 - naval search and rescue (NAVSAR), 8-2 to 8-5
 - near-surface ocean thermal structure (NOTS), 8-8
 - passive acoustic propagation loss (PPL), 8-7
 - raytrace (RAY), 8-5 to 8-7
 - sound speed profile generator module (SSP), 8-8 to 8-9
 - tidal prediction (TIDE), 8-1 to 8-2
- Tactical Environmental Support System (TESS), 7-1 to 7-21, 8-1 to 8-9, 9-20, 10-3 to 10-4, 13-3.
 - See also* Tactical decision aids
 - ARPGEN program, 10-3 to 10-4
 - meteorological products, 7-1 to 7-21
 - mine warfare products, 9-20
 - oceanographic products, 8-1 to 8-9
 - surge program, 13-3
 - tropical cyclone applications, 13-3
- Temperature, air, 4-21 to 4-32, 10-2
 - advection, 4-31
 - advisories, 10-2
 - cold wave, 4-32
 - evaporation and condensation, 4-31
 - heat wave, 4-32
 - insolation and radiation, 4-30 to 4-31
 - snow versus rain, 4-21 to 4-30
 - vertical heat transport, 4-31
- Thunderstorms, 5-1 to 5-15, 10-2, 12-9 to 12-12, 13-1 to 13-2
 - airmass, 5-8
 - conditions of readiness (COR), 13-1 to 13-2
 - entrainment, 5-2
 - flight hazards, 5-2 to 5-3
 - forecasting, 5-5 to 5-15
 - hail, 5-1 to 5-2, 5-11 to 5-15
 - icing, 5-2
 - lightning, 5-2
 - maximum gusts, 5-11
 - movement, 5-10
 - radar detection, 5-2, 5-10, 12-9 to 12-12
 - rain, 5-2
 - surface phenomena, 5-3 to 5-4
 - turbulence, 5-1
 - use of RAOB data, 5-5 to 5-15
 - warnings, 10-2
- Thunderstorm altimetry, 5-4 to 5-5
- Tides, 6-17 to 6-18
 - effects on amphibious warfare, 13-9
 - effects on mine warfare, 13-5
- Tide prediction, 8-1 to 8-2
- Tornadoes, 5-15, 5-17 to 5-18
 - conditions of readiness (COR), 13-1 to 13-2
 - forecasting, 5-17 to 5-18
 - radar detection, 12-9
 - types, 5-18
- Training, *see* Command training functions
- Tropical cyclone, 10-2, 11-1 to 11-11, 13-1 to 13-3
 - climatological summaries, 13-2
 - conditions of readiness, 13-1 to 13-2
 - detection, 11-3
 - disaster planning, 13-1 to 13-2
 - dynamics, 11-2
 - evasion/sortie briefings, 13-3
 - formation, 11-2 to 11-3
 - intensification, 11-3 to 11-4, 11-8
 - movement, 11-4 to 11-10
 - prediction by objective techniques, 11-8 to 11-10
 - recurvature, 11-6 to 11-8
 - software applications, 13-3
 - warnings, 10-2, 11-10

Tropical forecasting, 11-1 to 11-11

local area forecasts, 11-1

Troughs, 1-5 to 1-6, 1-9 to 1-10, 2-2 to 2-5

effects of super gradient winds, 2-4 to 2-5

divergence and convergence, 1-5 to 1-6

forecasting intensity, 2-4 to 2-5

forecasting movement, 2-2 to 2-3

vorticity, 1-9 to 1-10

Turbulence, 5-1,5-34 to 5-39

characteristics, 5-34

classification and intensity, 5-36 to 5-37

clear air turbulence (CAT), 5-34 to 5-35, 5-38

convective cloud turbulence, 5-38

mountain waves, 5-35 to 5-36

surface turbulence, 5-38

thunderstorm turbulence, 5-1

U

Upper level systems, 1-3 to 1-6, 2-1 to 2-10, 3-2 to 3-3, 3-5 to 3-8, 3-10 to 3-15, 3-20, 4-4 to 4-5

analysis, 2-1

application of satellite imagery, 2-2, 2-10

critical eccentricity, 2-7

divergence and convergence, 1-3 to 1-6, 3-11 to 3-14

forecasting, 2-1 to 2-10

forecasting intensity, 2-4 to 2-5, 2-8

forecasting movement, 2-2 to 2-3, 2-5 to 2-8

formation, 2-8 to 2-9

influence on surface features, 3-5 to 3-8, 3-10 to 3-15,3-20

prognostic charts, 2-1 to 2-2, 2-9 to 2-10, 3-2 to 3-3

Upwelling, 9-15 to 9-16

V

Vertical motion, 1-3 to 1-4, 1-7,4-8

vertical velocity charts, 1-7

Vertical stretching, 4-2 to 4-3

Vorticity, 1-8 to 1-11, 3-10,4-8

absolute, 1-8 to 1-9

evaluation of, 1-9 to 1-10

effects on cyclogenesis, 3-10

precipitation, 4-8

relation to weather processes, 1-10 to 1-11

relative, 1-8 to 1-9

W

Waterspouts, 5-18

Warnings, *see* Special observations and forecasts

Weather elements, forecasting of, 4-1 to 4-32

WEAX/AVWX, 10-2, 10-7 to 10-9

frequency of issuance, 10-8

standard format, 10-8 to 10-9

verification, 10-2

Wind shear, 1-1 to 1-2, 12-10, 5-34 to 5-39. *See also*

Vorticity

directional, 1-1 to 1-2

radar detection, 12-10

turbulence, 5-34 to 5-39

velocity, 1-2

WSR-88D radar, *see* Doppler radar

