

## Policies and Operational Guidelines

*Established Fall 1996 The Department of Geography and Meteorology, Valparaiso University*

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This manual follows the plan originally outlined by Professor Greg Tripoli of the University of Wisconsin-Madison. It also incorporates policies instituted during the [Verification of the Origins of Rotation in Tornadoes Experiment](#) as outlined in the [VORTEX-95 Operations Plan](#) (published by the [National Severe Storms Laboratory](#), 1995)

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## Introduction

The outbreak of severe weather is the most direct method by which the extreme forces of nature affect the world around us. These outbreaks pose threats to property and life, but they also provide opportunities to study these forces first hand. It is because of our meteorological interest and the learning possibilities presented by these phenomena that the Valparaiso University Storm Intercept Team (VUSIT) has been organized. VUSIT is intended to provide meteorology students with a unique opportunity to further their education and to better interact with each other and with faculty members. However, all participants must be aware that storm interception activities are dangerous and possibly life-threatening endeavors. The purpose of this manual is to outline the guidelines and policies that will be instituted during storm intercept operations; all parties interested in participating are strongly encouraged to study this work. Any questions about the

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policies listed herein should be directed to members of the Storm Intercept Team contact list (see [Appendix A](#)).

## Organization

The Valparaiso University Storm Intercept Team is organized and administered by the [Department of Geography and Meteorology](#). A Meteorology Faculty Advisor and the members of the VUSIT Operations Committee are specifically charged with monitoring weather conditions and organizing any operations that may be conducted. They may be assisted by additional volunteers.

Participation in VUSIT is restricted to students pursuing a major in Meteorology or Broadcast Meteorology, and to Department faculty. Members can participate either in the field as a chaser or at the Weather Center as a forecasting/nowcasting team member. Field participants will be selected by the following criteria:

- Faculty and VUSIT members will be given priority over non-VUSIT members.
- All field participants must have served at least one shift on the Nowcasting team.
- Participants providing transportation will be given priority over members without transportation.
- If necessary, participants will be ranked by seniority.

Enrollment or credit in Meteorology 490: Severe Storms Nowcasting is strongly recommended for field participation. Also, while it is intended that every precaution will be taken to avoid dangerous situations, it is not possible to foresee all occurrences. All field participants will therefore be required to sign an affidavit releasing the organizers and the University from any liability.

Finally, all participants are encouraged to read the following articles on responsible storm chasing:

- "[Storm Chasing with Safety, Courtesy, and Responsibility](#)" by Chuck Doswell.
- "[Irresponsible Media Storm Chase Practices](#)" by Roger Edwards and Chuck Doswell.
- "[Storm Chase Ethics](#)" by Alan Moller.
- "[Storm Chasing's Rights and Wrongs](#)" by Gene Rhoden.

*NOTE: In the event that a participant behaves recklessly in the field, that person will not be reassigned in future chases.*

## Goals

The goals pursued by VUSIT are:

- to observe and appreciate the spectacle of convective weather in real-time;
- to reinforce and build upon material presented in coursework concerning severe convective weather; and
- to serve/assist in storm spotting and verification activities.

With this in mind, the primary criteria for mobilization will be the likelihood of tornadic and non-tornadic supercells within a 300 mile "Chase Zone" surrounding

Valparaiso. Other severe weather situations will be evaluated on a case by case basis, with the expected amount of convective organization being a major factor in decision making.

## **Storm Chasing Opportunities at Valparaiso University**

Official VUSIT operations will be limited to the academic year, with the authority of commencing activities restricted to the Meteorology Faculty Advisor and/or the VUSIT Operations Committee. A Departmental Storm Chase Field Study (Meteorology 385) is regularly offered for credit at the end of spring semester; these activities may include VUSIT members, but are solely organized by the faculty member in charge. Private storm chases may also be held at any time, but those taking part should not expect support from nowcasters or use of Departmental equipment.

### **Teams**

#### Field Teams

Vehicles for field teams may occasionally be provided by the University, but field participants will be expected to volunteer additional transportation, especially in promising situations (every attempt will be made to prevent damage to vehicles, such as by hail or damaging winds). Each field intercept team will typically consist of 3-5 people, including at least one experienced chaser or observer. Each member of the team will have at least one specific responsibility

- **Driver.** Usually the person who owns or is responsible for the vehicle. The Driver will be expected to obey the rules of the road, and will be responsible for any moving violations. During severe weather, the Driver is to keep his/her eyes on the road at all times, in order to avoid accidents. The Driver should be equipped with proper medical, liability, collision, and especially comprehensive insurance.
- **Navigator.** The person who will plot courses aimed at reaching the target area defined by conversations with the Weather Center personnel, the Field Coordinator (if applicable) and the Team Leader(s), and by visual observations and other data. A package of chasing supplies will be gathered for each vehicle, including local maps and other supplies for use by the Navigator.
- **Communicator.** The person who is responsible for computer data analysis and for periodically contacting the Weather Center for the latest information and advice on where to proceed (for multiple teams, this specific role will probably be performed by the Field Coordinator). Also keeps contact with other chase vehicles via CB or amateur radio (if licensed) and monitors the police scanner and weather radio.
- **Record Keeper.** The person who will keep a detailed log of all that transpires during the chase, including all observations of the general weather while driving to the site, comments made by the team members concerning the behavior of the weather and speculation as to why events are evolving the way they are. It is advantageous to bring a cassette recorder on which to record observations for later entry into a written log.

- **Photographer.** The person(s) responsible for collecting photographic and/or video records of events as they unfold. This may actually be every member of the team.
- **Team Leader.** The person responsible for making final decisions for a specific field team (Team Leaders should not be driving unless it is unavoidable). The Team Leader should have some previous experience in intercepting or spotting severe storms, and should consider and respect the input of other team members. When multiple teams are deployed, Team Leaders will work with a Field Coordinator, and will be expected to defer to the decisions made by the FC *unless a Team Leader believes that a decision is too dangerous. Likewise, if another team member objects to a decision as too dangerous, the Team Leader should defer to that member and decide on another course of action.*
- **Field Coordinator.** When two or more field teams are dispatched, one Team Leader will be designated as the Field Coordinator (FC) and will oversee the activities of the teams. The FC should be an experienced storm chaser and should preferably be a Faculty member, if available. The FC will be expected to consider and respect the input of other team members and the nowcasting team to decide how to conduct the chase. However, once the FC makes a decision, that decision is expected to be obeyed unless another team member objects to the decision as too dangerous.

#### Forecasting/Nowcasting Teams

A forecasting team will meet on the morning of the chase to produce an initial forecast, and if operations are commenced a nowcasting team will then be formed and remain at the Weather Center. Its task will be to guide the field team(s) to the severe weather from a safe direction. These teams will need to focus on the following specialties:

- **Map Analysis.** Plot and analyze the hourly SAs/METARs and/or make a current McIDAS analysis of the local situation.
- **Thermodynamic and Wind Analysis.** Plot and analyze temperature and humidity profiles and wind hodographs. Also keep track of evolving wind profiler data, surface temperature, humidity, and wind conditions, estimating how thunderstorm potential is, in fact, evolving with time.
- **Satellite.** Keep abreast of the current trends as revealed by satellite, using McIDAS and making hard copies of output (if possible) for use in chase logs.
- **Radar.** Keep the radar screen updated and save, videotape or trace the screen for the base log.
- **[SPC Products](#).** Monitor and study Convective Outlooks and Mesoscale Discussions in order to identify factors and processes that may have been overlooked. These bulletins can be used for comparisons with the forecasting/nowcasting team's own analyses and opinions, but should not be used as substitutes; *these bulletins are ultimately the interpretations of another group of meteorologists, and may not be precise.* Severe Weather Watches and Watch Status Reports should likewise be monitored once severe convection begins to occur or is imminent.
- **[Internet Resources](#).** World Wide Web pages, Gopher servers, and other sources of weather data should be consulted if possible to supplement the

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resources available at the Weather Center. Examples include [Storm Track Online](#) and also at [Unisys](#).

The duties of individual forecasting/nowcasting team members can each be classified in at least one of the following ways:

- Assistant. Person(s) responsible for gathering the information listed above and for assisting the Forecasters or Nowcasters in using the data.
- Forecaster/Nowcaster. Person(s) responsible for integrating all of the above activities into morning forecasts and/or subsequent nowcasts for use by the field teams. A Chief Nowcaster may be designated if two or more Nowcasters are on duty.
- Discussion Leader. Person responsible for leading the morning discussion. The DL will also act as Chief Forecaster for the morning severe weather forecast.
- Communicator. Person(s) responsible for actively advising the field teams over the telephone or (during a multi-day chase) for preparing e-mail outlooks for later use.

## **Field Equipment**

The following equipment should be carried with each chase team:

- 35mm camera with telephoto lens if possible. A tripod is very useful if you have time to set up, but this is often not the case. It is useful to have one along anyway. Carry at least 200 (or higher) speed and preferable slide film, which has higher resolution. One should carry at least enough film for 50 pictures. A view of a tornado can be a once-in-a-lifetime experience. Don't blow it away by not having enough film and never be conservative taking pictures of any tornado. Always take several duplicates (perhaps some at slightly different f-stops) of the "big event."
- Video Camera. Carry at least 2 hours of tape and an extra charged battery if possible.
- Detailed navigational aids (i.e., maps, compass).
- List of phone numbers, especially those of the Weather Center and emergency contacts.
- Spare tire, jack and board to put jack on for muddy roads. You may be caught in the middle of nowhere.
- Cassette recorder for verbal log and notebook for written logs.
- Thermometer, psychrometer, and hand-held anemometer, if possible.
- Communications equipment, including scanner, ham radio and CB radio. The scanner is useful for picking up local emergency government and police activity with regard to storms.
- Weather radio.
- First aid kit and flashlight.
- Personal gear (rain jacket, change of clothes medication, driver's license, water bottles, cash, etc.)
- Supplemental checklists ("Communications", "Intercept Safety Rules", etc.)

## Levels of Readiness

### Level 1 (Code Yellow)

The Faculty Advisor and the Operations Committee will be monitoring weather outlooks and model data in order to anticipate possible severe weather outbreaks at least a day in advance. If conditions appear favorable, a *Code Yellow* will be declared. The likely timing of a *Code Yellow* is one day before a possible chase, and will probably be declared following the issuance of a favorable Day 2 Convective Outlook. However, the actual timing may vary, and a *Code Yellow* may be declared the morning of the chase, or several days beforehand.

Regardless of the timing, once a *Code Yellow* is declared, the Operations Committee will begin attempts to notify VUSIT members via telephone, phone mail, and e-mail. If time permits, the Committee will also post Activation Messages before each Meteorology class in regards to the possible storm chase. While a good faith effort will be put forth by the Operations Committee, *it is ultimately the responsibility of the individual VUSIT members to check their e-mail and phone mail accounts often enough to receive Activation Messages and any subsequent Status Reports. It is through good communications that a well organized storm chase can be conducted.*

On the morning of the possible chase, the Faculty Advisor and/or all available Operations Committee members, as well as volunteers (all VUSIT members are urged to assist!) will meet at the Weather Center by 7:30 AM. A Discussion Leader and forecasting/discussion team will be designated, and an assessment of the likelihood of severe weather within the Chase Zone will be conducted. The discussion team will be expected to prepare a composite diagram, soundings, hodographs, and McIDAS displays. The DL will make a recommendation whether the status is "GO", "NO GO", or "STAND BY" for chasing. A Status Report will then be sent to the other members, with a brief discussion of the weather situation. If the status is "STAND BY", a time will be designated for a final decision to be made. If the day is determined to be a "GO", then the DL will make a recommendation for the likely time chase teams should plan to leave and where they will be most likely be sent. The group will then move to a *Level 2 (Code Red)* response.

### Level 2 (Code Red)

If a *Code Red* is declared, it has been deemed that conditions are favorable for severe weather in the Chase Zone. The DL will lead a weather discussion starting at 10:00 AM unless otherwise rescheduled. Field team(s) and the nowcasting team will then be formed (if fewer than five interested persons commit, the chase may have to be scrapped). The situation will be monitored closely by the nowcasting team. When and if the time(s) seem appropriate, the field team(s) will be dispatched to strategic locations agreed upon by the group.

### Level 3 (Code Blue)

Here, the field team(s) will be deploying and the nowcasting team will remain at the Weather Center for field support to monitor the situation. The teams will call in to the Weather Center as required to be updated or to call in observations to the base station. Normally, these calls are made within 5 minutes of the quarter hour (i.e., 00-05, 15-20, 30-35, and 45-50 minutes after the hour).

The nowcasting team will "steer" the field team(s) to the expected location(s) of the most interesting convection. It is desirable that the teams attempt approach and interception about 90-120 degrees to the right of storm movement. Hence for storms moving toward the northeast, one would try to come in from the south-southeast to south- southwest; for storms moving toward the southeast, approach form the southwest to west. This is recommended for three reasons. First, interesting weather tends to be obscured by the rain and hail curtain if one is to the left or rear of the storm. Second, if a field team gets caught to the rear of the storm, they will have to outrun and "punch" through the rain/hail shaft and possibly tornadoes to get to the viewing area. This activity should be avoided since core punching is not only undesirable, but can be very dangerous. Third, tornadoes tend to move with the storm. Field teams want to chase the tornado and not vise versa. A map of the target area(s) will be erected for Weather Center personnel to keep track of the location and destination of each field team.

#### Post-Intercept

After intercept operations conclude (the storms having moved on, the sun having set, etc.), the field team(s) will be called in and the nowcasting team will be relieved. Depending on how far the field team(s) travels and whether they stop somewhere for dinner, they may take an additional 2-4 hours (or more) to arrive back at Valparaiso. Hence one should realize that it may be near or after midnight until everyone will get back. Those participating should be aware of this before leaving and bring enough money for meals, telephone calls, and so on. A Post-Chase briefing summarizing the event will be prepared at a designated later time.

### **Ownership of Photos and Videos**

The [pictures](#) and videos taken can become valuable and even publishable materials. It must be recognized that the rights to the pictures taken during chases are the property of the member whose equipment was used to produce them unless the chase was sponsored by the University. Under these circumstances, they may become the property of the University. If some photographs are of sufficient quality, we may want to copyright the pictures (or video) and publish them somewhere recognizing the photographer and the participating teams. The nowcasting teams will have no opportunity to snap a picture but will be at least as responsible for the fruits of these expeditions as the field teams themselves! The owner of the camera must make available negatives for reproduction to anyone in the group wishing a copy of a photograph taken on these chases.

### **Appendix A: Storm Intercept Team Contact List**

(2010-11 academic year)

Director

[Jacki Ritzman](#)

Deputy Director

[Chris Shuma](#)

Secretary

[Katie Ertell](#)

Treasurer

[Jacob Cobb](#)

Meteorology Faculty Advisor

Professor of Geography and Meteorology

Bart J. Wolf

[Bart.Wolf@valpo.edu](mailto:Bart.Wolf@valpo.edu)

## **Appendix B: Intercept Safety Rules**

- Traffic hazards
  1. Wear your seat belt!
  2. Do not speed.
  3. Drive only as fast as conditions allow.
  4. Drivers watch the road, not the storm.
  5. Front-seat passenger assists driver. Do not assume the driver is going to stop. Don't let the driver nod off.
  6. Watch for unmarked RR crossings.
  7. Don't swerve suddenly to avoid small animals.
  8. Avoid section roads as much as possible. They may dead end and become extremely slick or impassable when wet.
  9. Watch out for debris in road or drooping power lines.
  10. Don't stray away from your vehicle.
  11. Don't run low on gas.
  12. The driver is responsible for all tickets.
  13. When driving through or near a town that has been hit by a tornado, remember the power may be out causing traffic disruptions and preventing you from refueling. Be alert for emergency vehicles.
  14. Do not drive into smoke or blowing dust that obscures your view. If heavy rain obscures your view, it would be wise to pull over if there is a paved shoulder to avoid being hit from behind.
  15. When backing up, have passengers assist you by watching for obstructions.
  16. Do not pass on the shoulder of the road, even when exiting. This is illegal in many states.
  17. Be extremely cautious when passing slow vehicles on two lane highways.
- Power lines
  1. Watch for power lines hanging down across the road (hard to see in poor light).
  2. Do not attempt to move "dead" power lines out of the way (because of automatic restart feature).
  3. Don't drive over live power lines.
  4. If live power lines are in contact with your vehicle, stay in the vehicle. Don't ground yourself by getting out.
  5. Use a long dry branch to remove a line from someone.
- Lightning hazards
  1. Pay attention to approaching areas of lightning.

2. Stay in vehicle if possible.
  3. Stay away from wire fences; they carry lightning currents to you.
  4. Do not lean on vehicle and act as path to ground.
  5. Avoid single trees and being the highest object.
  6. If your hair stands up or power lines start crackling, get in your vehicle or squat on the balls of your feet.
  7. Tripods can shock you due to ground currents.
  8. Take your colleagues to a CPR class. Often people can be revived by restarting either their breathing or both their breathing and heart.
- Miscellaneous hazards
    1. Snakes, particularly on shoulders of road.
    2. Chiggers, mosquitoes, bees.
    3. Dress for all weather contingencies.
  - As the mesocyclone approaches
    1. Park safely. Do not stop on a soft shoulder.
    2. Keep the engine running; the engine may not restart.
    3. Don't get caught in a town.
    4. Don't get trapped at a RR crossing by a passing train, or in a construction zone. U-turn and escape.
    5. Be aware if you are on a divided highway (e.g. interstates) that you cannot easily turn around on. Use frontage roads to the extent possible for intercept work.
    6. Always be cognizant of an escape route.
  - Flash flood hazards
    1. Do not drive into running water unless you are certain that you can get across.
    2. Stay alert for flooding, especially after dark (the worst time). Listen to the car radio for watches and warnings.
    3. Check for road and bridge closings.
    4. Watch for washed-out roads and bridges.
    5. If your vehicle gets stuck, get out and head for higher ground. Remember that most people who die in flash floods are in cars.
    6. Stay out overnight if necessary.
    7. Watch out for snakes flushed out of their habitat.
  - Storm hazards
    1. Don't crowd other vehicles. Act professionally at all times. Be a team player.
    2. Don't get disoriented.
    3. Have an escape route.
    4. Don't come into the mesocyclone from the wrong direction (through the core or a thick hook echo). Stop, if necessary, to let the mesocyclone cross the road ahead of you.
    5. Don't get under wall clouds.
    6. Watch out for tornadoes in the rain. Many end their lives in rain, or re-emerge from rain after being engulfed in it. Be alert for sparse large hail, spiralling rain curtains, rotating scud clouds, rotations in the cloud base, debris, the sound of a tornado or your ears popping; all indications that you have managed somehow to get yourself in the wrong spot.
    7. Don't get caught in the new mesocyclone core (look overhead), while watching a tornado in the occluded core.

8. Get out of the way of rapidly propagating gust fronts as the storm collapses.
9. Watch out for gustnadoes as you pass through the gust front.
10. Remember that heavy debris is thrown around the right sides and far ahead of violent tornadoes, so don't get too close.
11. Remember that tornadoes in your viewfinder look further away than they actually are.
12. Err on the side of caution. We don't need people almost in the tornado circulation. The last thing that we need are dead or injured "heroes" or loose cannons out there.
13. If a tornado overtakes you (this shouldn't happen), get out of your vehicle, lay down in a ditch, hang on to something and protect your head.
14. There will be no intercept work after dark. If it becomes too dark for you to adequately observe cloud features, abort the chase.
15. On restricted access, divided highways (interstates and turnpikes), bridges become storm shelters. Be very wary that traffic may come to a halt as people scramble for safety.

## Appendix C: Communications

In earlier storm chases, problems in communications occasionally cropped up and resulted in confusion amongst the participants and in several cases led to field teams becoming separated at inopportune times. As a result, the following guidelines will be instituted in operations conducted by VUSIT:

(Note: These guidelines are not intended to be rigorously enforced throughout the entirety of a storm chase. CB radio traffic between different field teams can be an effective way to relieve boredom during the several hours of driving time it may take to arrive in a target area. Instead, these guidelines are intended to be used as convection is occurring and interception is taking place, in order to better coordinate activities.)

- Radio traffic should be reduced and focussed on the chase itself. Try to watch your language and contain your ecstasy. Talk professionally. Lighthearted giddiness can reduce tension, but it can also make a bad impression.
- When contacting another field team, follow the following protocol: "FC, TOTO." or "FC, this is TOTO."
- When contacted by another field team, the proper response is: "TOTO, (this is) FC, go ahead." or "TOTO, (this is) FC, stand by."
- After a message or instruction is received by a field team, the field team should acknowledge in the following manner: "FC, (this is) TOTO, copy." or "FC, (this is) TOTO, please repeat." Also, a field team may repeat part or all of a message in its acknowledgment: e.g. "FC, (this is) TOTO, switching to Channel 3."
- If the FC sends out a message to two or more field teams, those teams should acknowledge in alphabetical order (e.g. CYCLONE responds, then HELICITY, then TOTO). NOTE: it is not necessary for the FC to wait for all teams to respond before sending the message; instead, the Field Coordinator should say "All teams, FC" and then send the message. It is, however, important for

all the teams to acknowledge the message after it is sent, so as to make sure that all the teams actually received it.

- When transmitting over the CB, make sure that the microphone is not continuously keyed. Otherwise, other teams will be prevented from cutting in during emergencies.
- A note on team designations: the team that the Field Coordinator is with should be called "FC". Other teams may choose their names, but they should preferably exclude words that may cause confusion during a chase (e.g. CUMULUS, TWISTER, HAIL, etc.)

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