

# Weather and Application Instruments

Robert E. Wolf

Extension Specialist Application Technology  
Bio and Agricultural Engineering

Robert G. Bellinger

Extension Associate/Associate Professor  
Soils and Plant Sciences



Biological and Agricultural Engineering



# The importance of application time weather monitoring?

To avoid spraying in conditions that may result in drift!!!

- ✓ Spotty pest control
- ✓ Wasted chemicals
- ✓ Off-target damage
- ✓ More high value specialty crops
- ✓ Urban sprawl and.....
- ✓ Less tolerant neighbors
- ✓ Litigious Society
- ✓ Result-higher costs-\$\$\$



# Documentation - Recordkeeping:

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- ✓ All certified applicators are required to maintain records of federally restricted use pesticide (RUP) applications.




# Pesticide Recordkeeping Requirements:

## ✓ Optional information ??????

- Target pest(s)
- Size/density of pest
- Adjuvants
- Application method
  - Aerial, ground, chemigation, incorporation
- Special equipment details
  - Boom/nozzle, airplane, helicopter, banding
  - Droplet size, pressure
- Reentry time/date
- Environmental conditions - Actual
  - Wind speed, direction, temperature, humidity, time

How many entries?



# Pesticide Recordkeeping Survey

Pesticide Education Program - Carol Ramsay and Carrie Foss  
Washington State University

- ✓ At-Program Recordkeeping Survey - Jan.-March 2002
- ✓ number of attendees = 2,191
- ✓ sample size = 826
- ✓ sample is 38% of attendees
  
- ✓ Post-Program Recordkeeping Survey - August 2002
- ✓ surveys mailed = 490
- ✓ sample size = 155
- ✓ response rate is 32% of mailed surveys

# How do you measure wind speed?

	At Program	Post Program
do not measure	4%	5%
anemometer	5%	4%
local radio or tv station	6%	8%
weather web site	6%	4%
observe flag movement on flag pole	7%	13%
local weather station	10%	11%
wind meter	16%	15%
best estimate	40%	34%

# What measure do you use for wind speed?



## ✓ Use words: calm, gusty, variable

- At Program 38%
- Post Program 33%

## ✓ In miles per hour (or feet per second)

- At Program 62%
- Post Program 67%



# How do you measure wind direction?

	At Program	Post Program
do not measure	4%	3%
compass	5%	3%
local radio or tv station	4%	6%
local weather station	6%	10%
dust and best estimate	9%	12%
flag or flagging tape	13%	14%
best estimate	44%	36%



# What measure do you use for wind direction?

## ✓ general direction (S, SSW, ESE, W)

- At Program 94%
- Post Program 97%

## ✓ compass reading (172°)

- At Program 6%
- Post Program 3%

# How do you measure temperature?



	At Program	Post Program
do not measure	2%	2%
other	3%	5%
internet weather web site	5%	5%
best estimate	19%	8%
local weather station	18%	26%
thermometer/anemometer	53%	54%

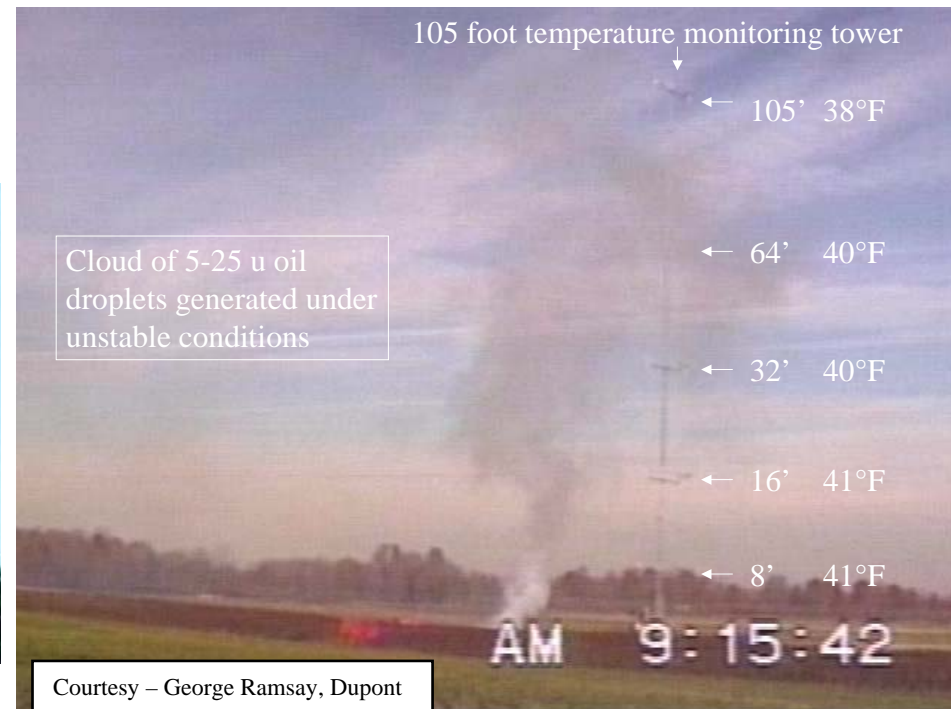
# Record keeping:



- ✓ Why am I keeping all of this information?
  - Refresh your memory
  - Safety
  - Better performance
  - Demonstrate care and concern
  - Stay ahead of the competition
  - Defend yourself!

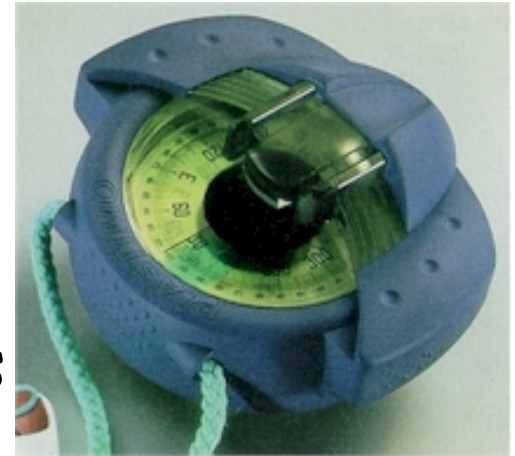
# Weather factors of concern:

- ✓ air movement (direction and velocity)
  - Topography, etc.
- ✓ temperature and humidity
- ✓ air stability/inversions



# Wind direction:

- ✓ Wind direction is very important
  - Know the location of sensitive areas - consider safe buffer zones.
  - Do not spray at any wind speed if it is blowing towards sensitive areas - all nozzles can drift.
  - Spray when breeze is gentle, steady, and blowing away from sensitive areas.
  - "Dead calm" conditions are never recommended.



# Compasses:





# Compasses:



Name	Features	Cost*
Brunton 7DNL	Analog, magnified display	\$ 9.95
Brunton 10BLNL	Weather eye compass	\$ 10.95
Brunton 15TDCL	Elite compass with sighting mechanism	\$ 49.50
Brunton SM	Sightmaster compass	\$ 70.00
Corsa X441	Digital handheld compass	\$ 36.95
Brunton SUM	Surveymaster direct sighting compas	\$169.00
Plastimo Iris 50	Double reading scales, maginified sight	\$ 89.00
Brunton MNS	Multinavigator GPS with true-magnetic built in	\$329.95
Compac - iPAC	With Navman is a multifunctional GPS	\$700.00

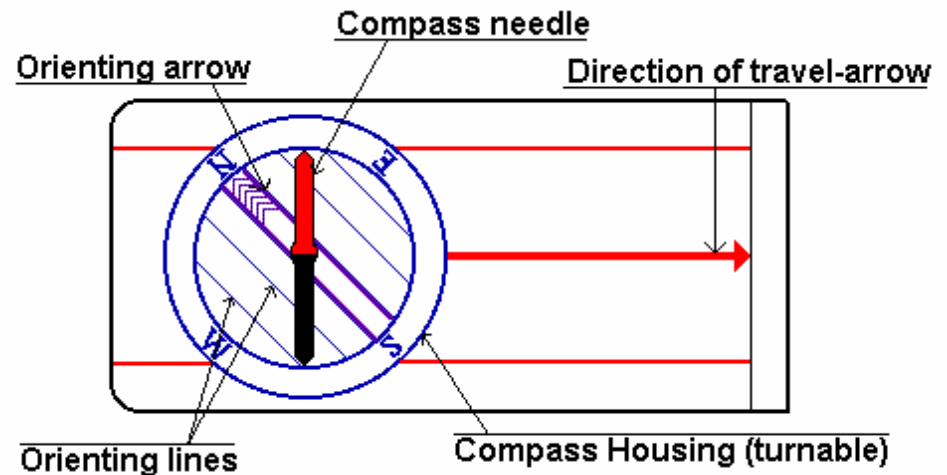
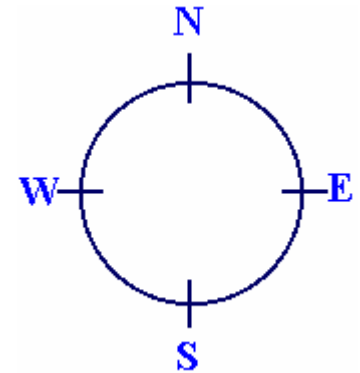
\*Prices from web



# Determining wind direction:

## ✓ Compass

- Provide magnetic description
- Direction blowing from
- Into your face!



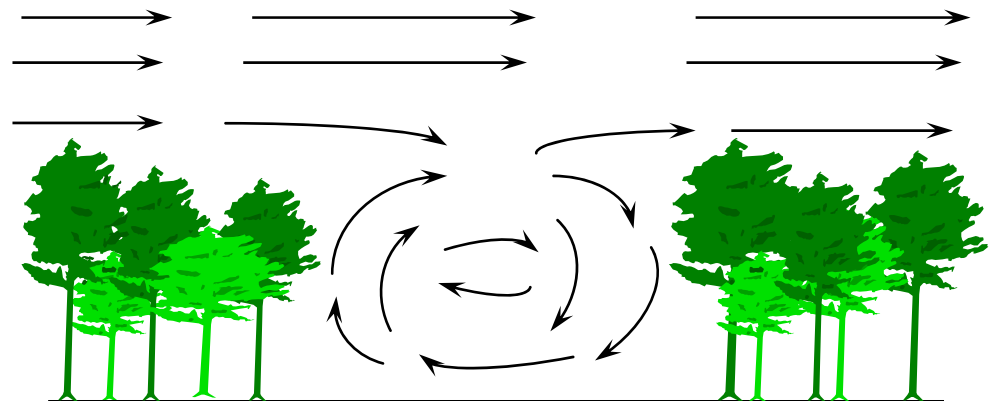
# Determining wind direction:

- ✓ Point compass into the wind direction and read in degrees.



# What affects wind direction:

- ✓ Wind currents can drastically affect spray droplet deposition
- ✓ Structures drastically affect wind currents
  - Wind breaks
  - Tree lines and orchards
  - Houses and barns
  - Hills and valleys



# Determining wind speeds:

- ✓ Handheld devices
  - Mechanical - floating ball, wind vane
  - Electronic - spinning turbines
- ✓ In-the-field stations
- ✓ On-the-go stations





# Handheld windmeters:



Kestrel® 1000  
Pocket Wind Meter



Kestrel® 3000  
Pocket Weather Meter

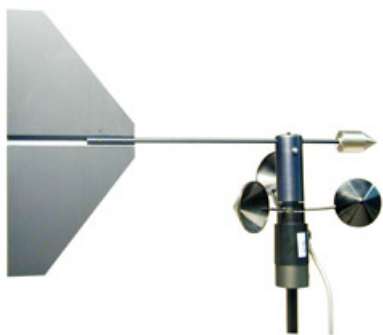


# Handheld wind meters:

Name	Features	Cost*
Dwyer	Floating Ball	\$15.00
Wind Wizard	Mechanical Vane	\$42.00
Turbo Meter	Wind Speed - knots, ft/min, meters/sec, mph	\$150.00
Kestrel 1000	Maximum, average, current wind speed in knots, feet/min, meters/sec, mph	\$70.00
Kestrel 2000	Maximum, average, current wind speed, temp, wind chill- knots, feet/min, meters/sec, mph	\$90.00
Kestrel 3000	All wind speed features plus temp, wind chill, dew point, heat index, relative humidity	\$135.00
Kestrel 4000	Measures EVERY environmental condition. Chart mode allows to graph 250 measurements.	\$265.00
Kestrel 4000+	Add an computer interface bundle	\$85.00
Calibration Kit	Kestrel 3000 and 4000 units (Impeller replacements for all Kestrels)	\$45.00 \$15.00
Skymate Series	SM-18, Sm-19, SM-28	\$80-170

\*Prices from web

# Weather stations with anemometers:



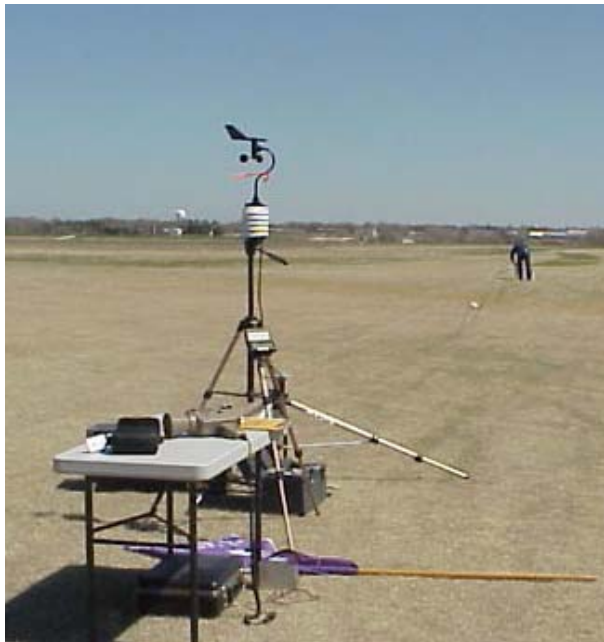
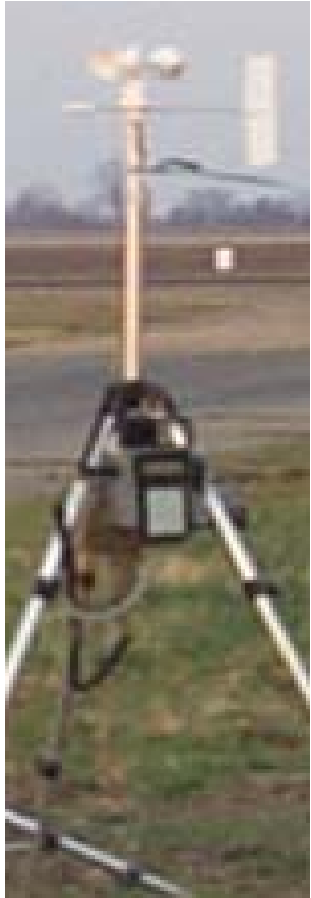


# Weather stations:

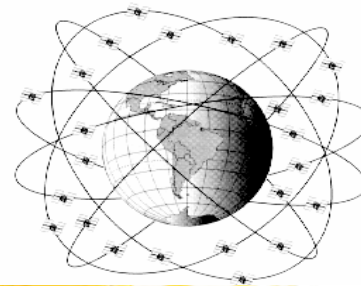
Name	Features	Cost*
Davis Vantage Pro	Console, anemometer, temp, humidity, cable	\$ 495.00
Davis Vantage Pro	Same plus solar powered, wireless (400 ft. Range)	\$ 595.00
Davis Vantage Pro+	Additional sensors (UV, solar radiation, ....) cabled	\$ 895.00
Davis Vantage Pro+	Same plus solar powered, wireless (400 ft. Range)	\$ 995.00
Davis Weather Monitor II	Anemometer for wind speed, direction, temp, humidity, wind chill, cable	\$ 255.95
Oregon Scientific	(WM-918) Basic station with anemometer (free software and communication cable	\$ 199.95
Oregon Scientific	Weather Monitor Data Recorder	\$ 99.95
Spectrum Tech.	Watchdog Model 525 (software extra)	\$ 795.00
Spectrum Tech.	Watchdog Model 900ET (software extra)	\$1495.00
Spectrum Tech.	Specware software and cable	\$ 130.00
Texas Instruments	TI 1-Wire Sensor	\$ 629.95

\*Prices from web

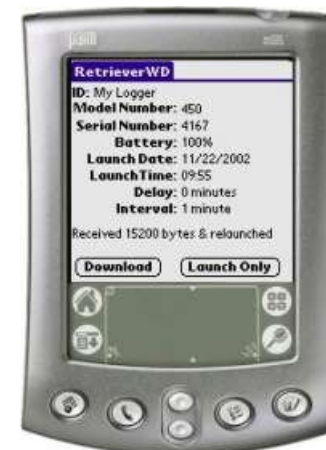
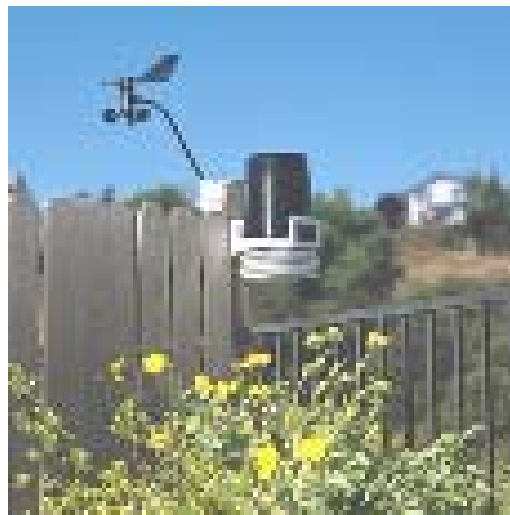
# Weather station in use:



# Enabling technology:



- ✓ GPS (Global Positioning System)
- ✓ Increased computing power in smaller packages
- ✓ Ability to transfer data to computers



# On board weather instrumentation:

- ✓ Aventech Research Inc.
  - Aircraft Integrated Meteorological Measurement System -AIMMS
    - AIMMS-10
    - AIMMS-20
      - ✓ Air flow probe
      - ✓ 2 - measurement modules
      - ✓ CPU (20 second updates)
- ✓ Wind speed and direction transmitted on-board
  - Used and logged
  - PDA software available for real time display of meteorological conditions.

<http://www.aventech.com>







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## PRODUCT SEARCH

## PRODUCT LINE:

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- Specware Software
- Degree Day Recorders
- Data Shuttle
- Nutrient Management
- Chlorophyll Meters
- Plant Health/IPM
- Light Measurement
- Rain Measurement
- pH and EC Meters
- Soil Moisture
- Soil Compaction
- Weather Instruments

## WatchDog Weather Stations



### WatchDog Model 900ET Weather Station

This powerful weather station measures, calculates and logs evapotranspiration (ET), solar radiation, wind speed/direction, wind chill, dew point, temperature, RH and rainfall. Three (3) available external sensor channels for leaf wetness, soil moisture or other sensors.



### WatchDog Model 700 Weather Station

Includes wind speed/direction, temperature, RH and rainfall. Has four (4) available external sensor

# Web sites of interest:



[www.aventech.com](http://www.aventech.com)

[www.ambientweather.com](http://www.ambientweather.com)

[www.specmeters.com](http://www.specmeters.com)

[www.davisnet.com/weather/index.asp](http://www.davisnet.com/weather/index.asp)

[www.gemplers.com](http://www.gemplers.com)

[www.onlinemarine.com](http://www.onlinemarine.com)

[www.westmarine.com](http://www.westmarine.com)

[www.chesapeakeotechnology.com/html/retrieverWD.htm](http://www.chesapeakeotechnology.com/html/retrieverWD.htm)

[www.scientificsales.com/constat.htm](http://www.scientificsales.com/constat.htm)



For more information contact:

[rewolf@ksu.edu](mailto:rewolf@ksu.edu)

[www.bae.ksu.edu/faculty/wolf](http://www.bae.ksu.edu/faculty/wolf)

