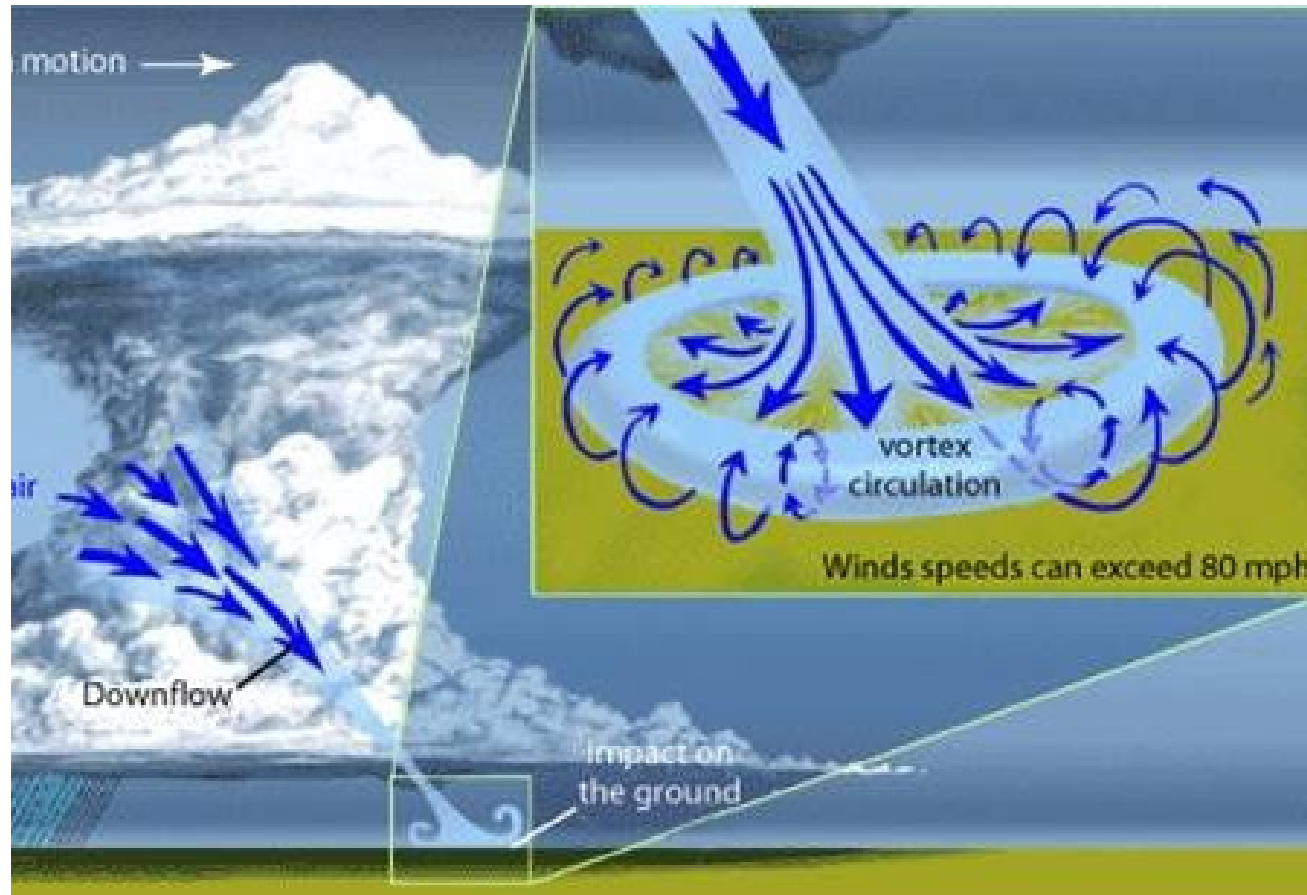




Santa Barbara Microburst

3 Sep 2017



What is a Microburst?

- A microburst is a localized column of sinking air (downdraft) within a thunderstorm
- Usually less than or equal to 2.5 miles in diameter
- Last 2-5 minutes
- Microbursts can cause extensive damage at the surface



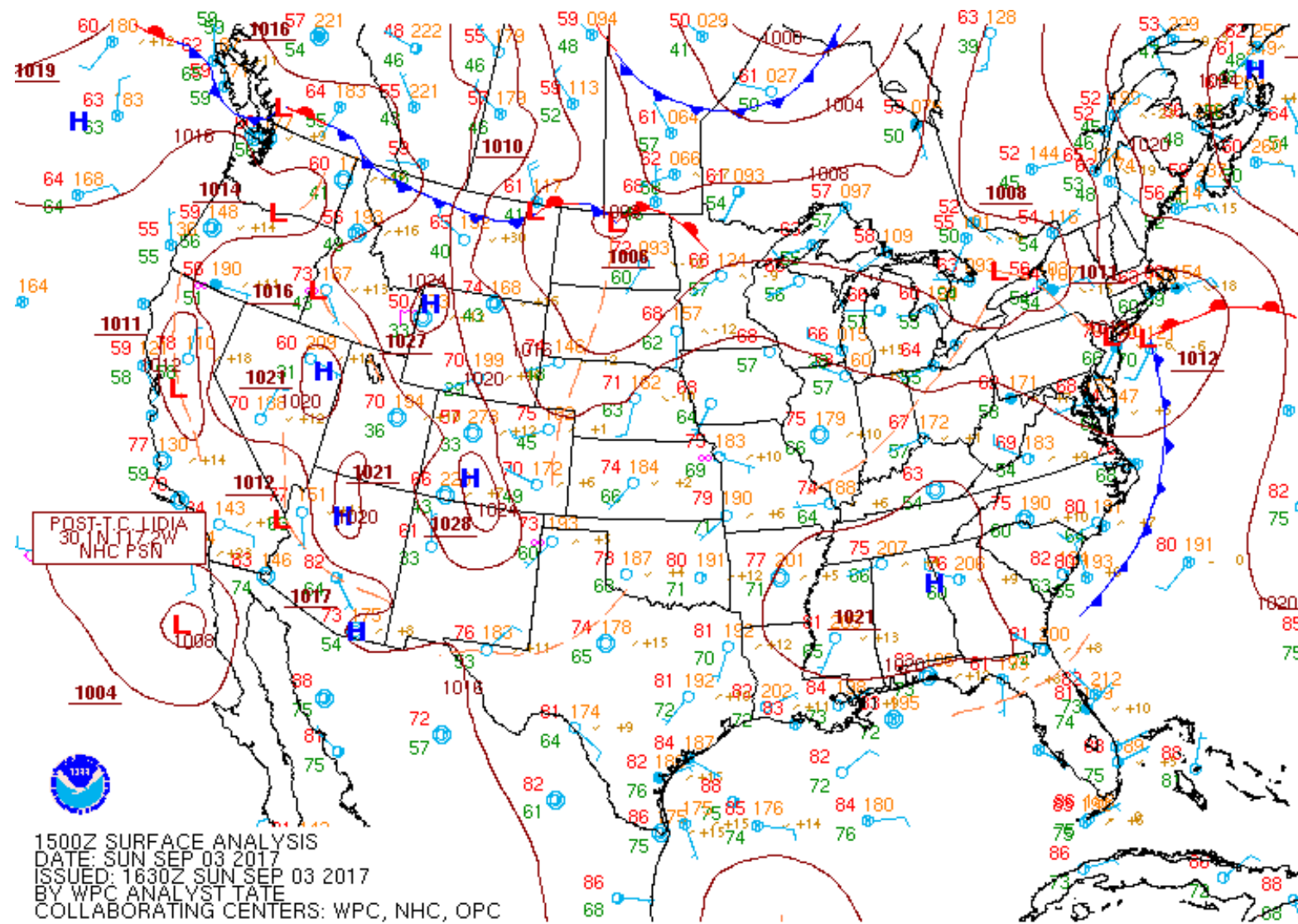
What causes a Microburst?

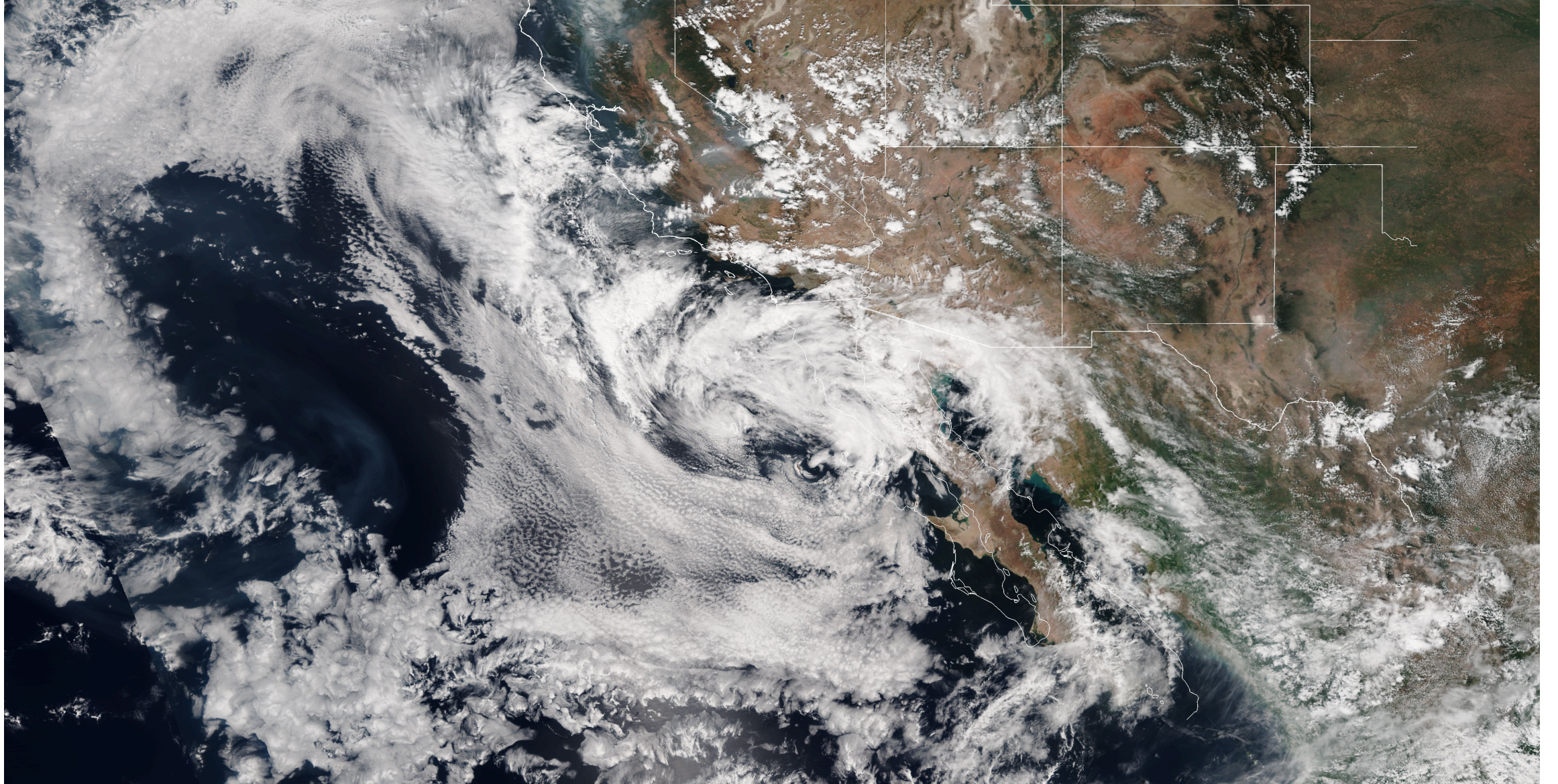
- It all starts with the development of a thunderstorm
- Water droplets/hailstones are being suspended within the updraft.
- Sometimes an updraft is so strong it suspends large amounts of these droplets and hailstones in the upper portions of the thunderstorm.
- Eventually the updraft weakens. Once this occurs, it is no longer capable of holding the large core of rain/hail up in the thunderstorm.
- As a result, the core plummets to the ground.
- As it hits the ground it spreads out in all directions.
- The location in which the microburst first hits the ground experiences the highest winds and greatest damage.



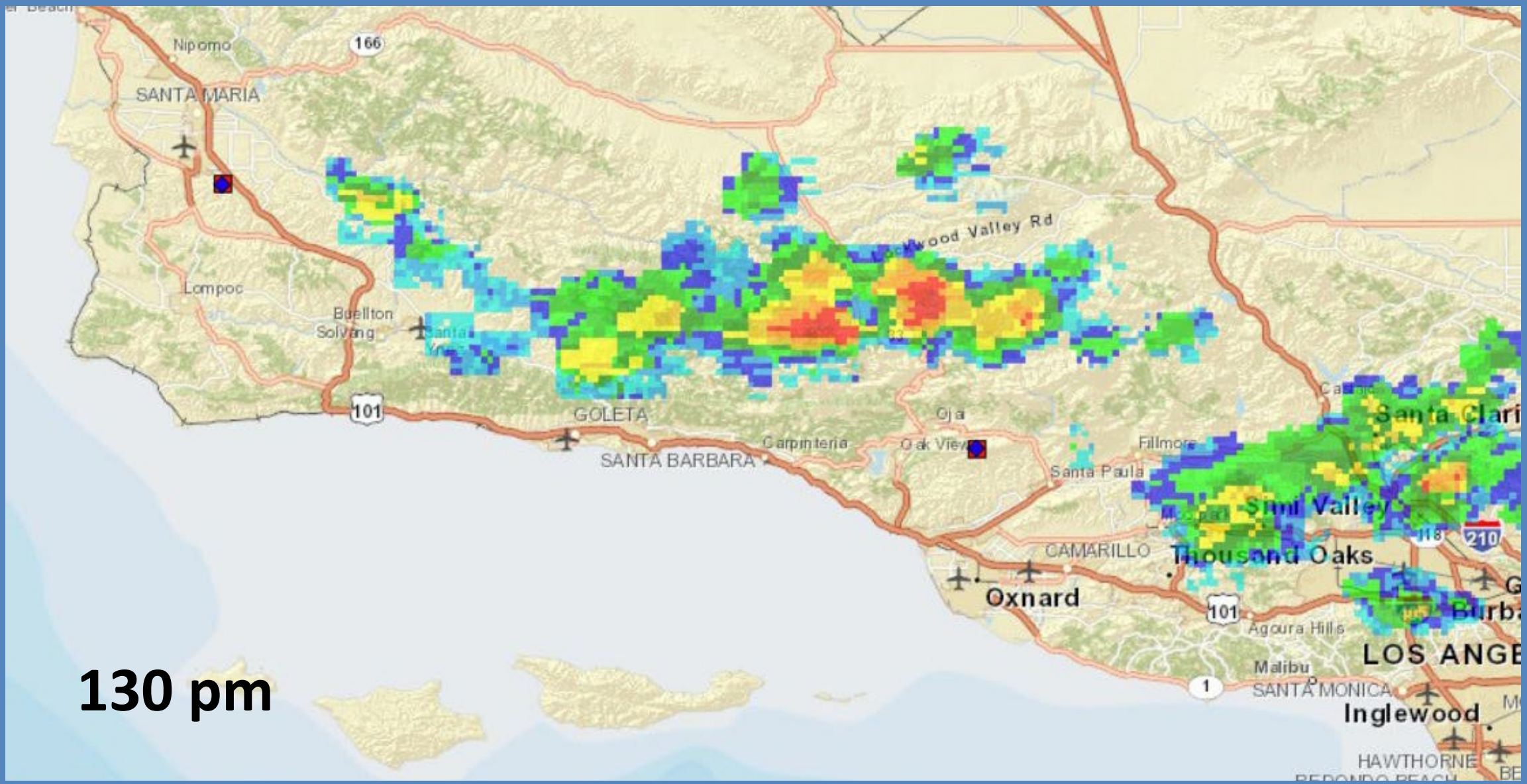
Microburst Damage

- Wind speeds in microbursts can reach up to 80 mph, or even higher
- Equivalent to an EF-1 tornado!
- Winds this high can cause major damage
 - Homes
 - Other structures
 - Level trees
 - Down power lines



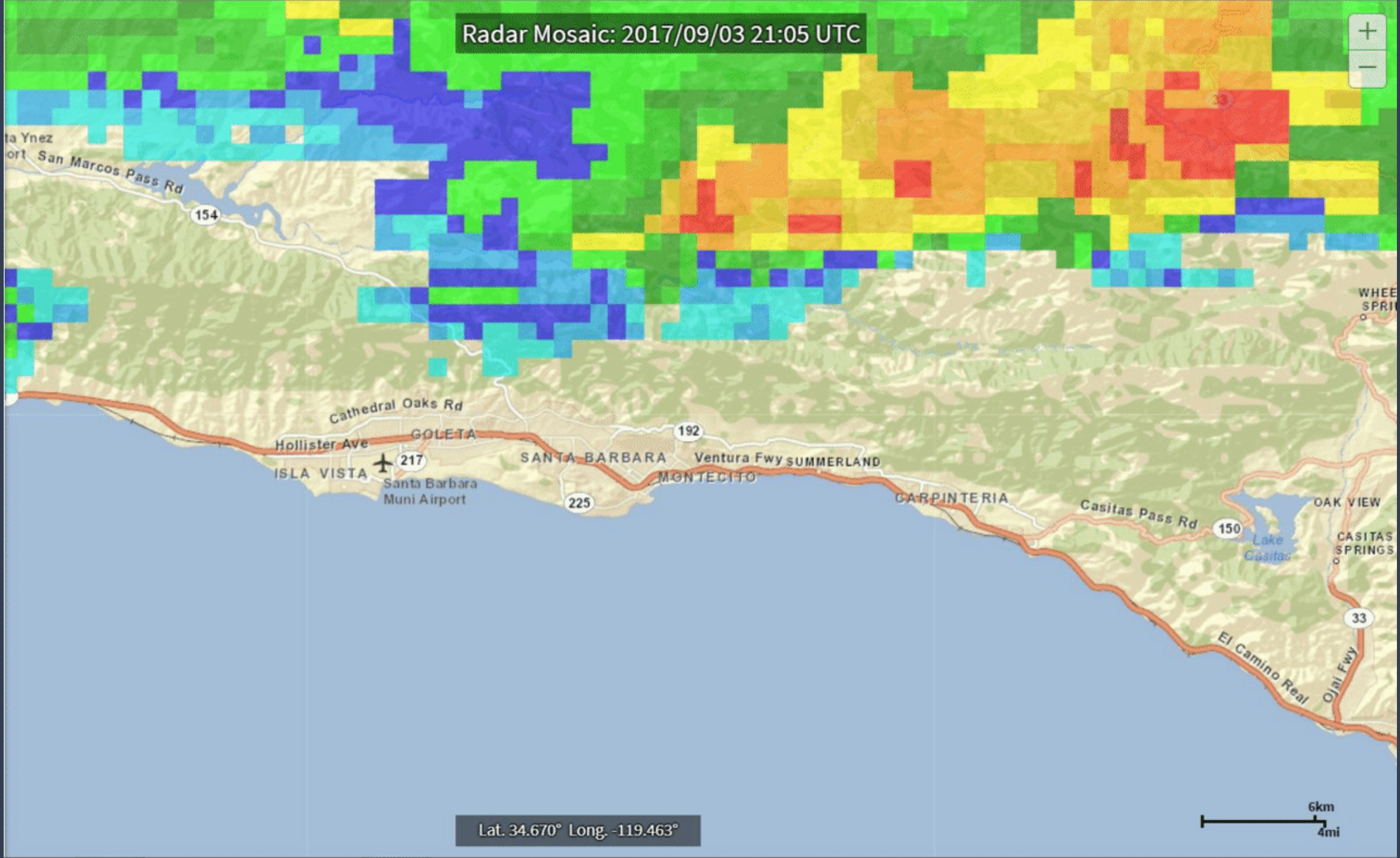






130 pm

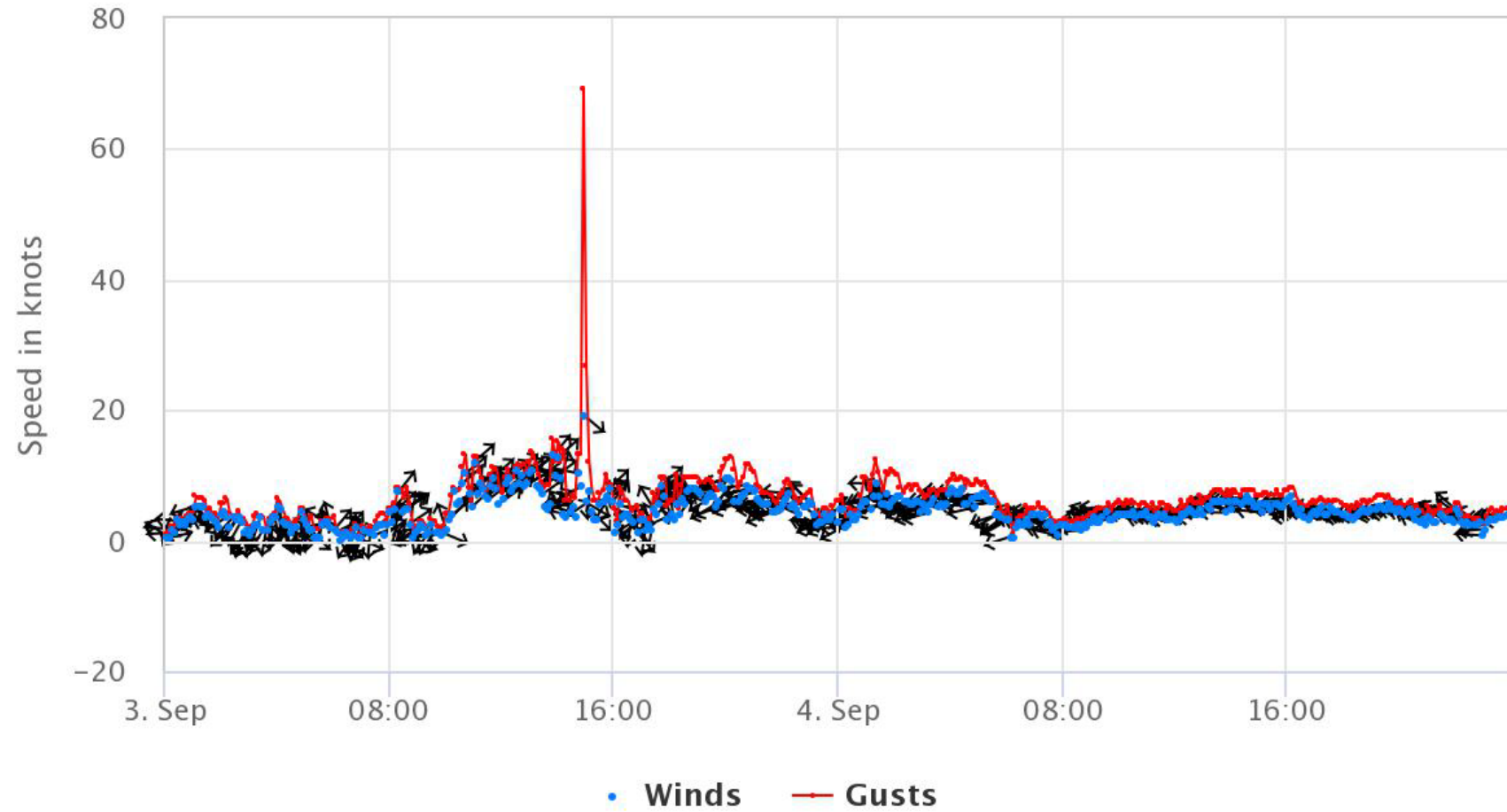
Radar Mosaic: 2017/09/03 21:05 UTC



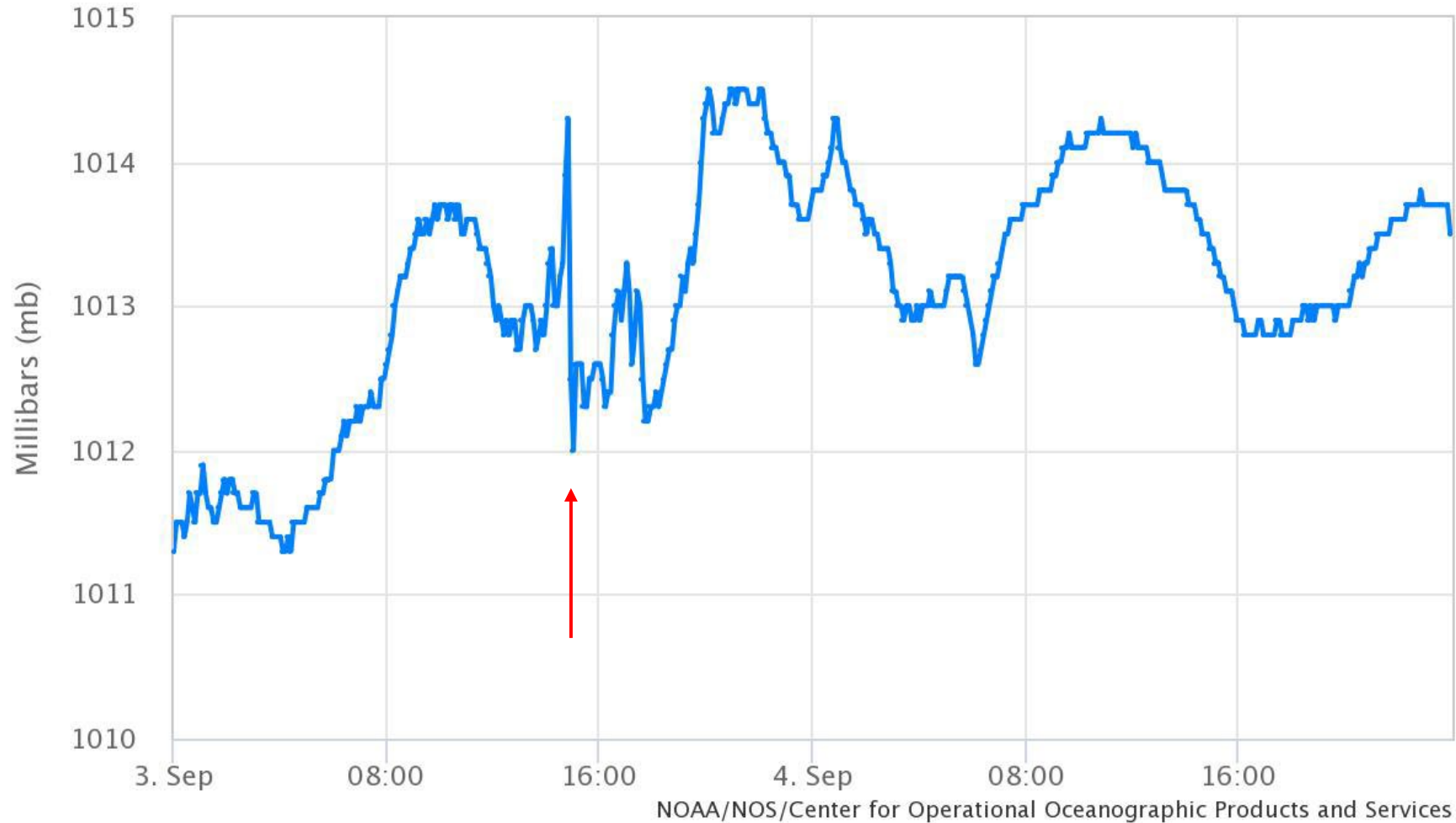
Lat. 34.670° Long. -119.463°



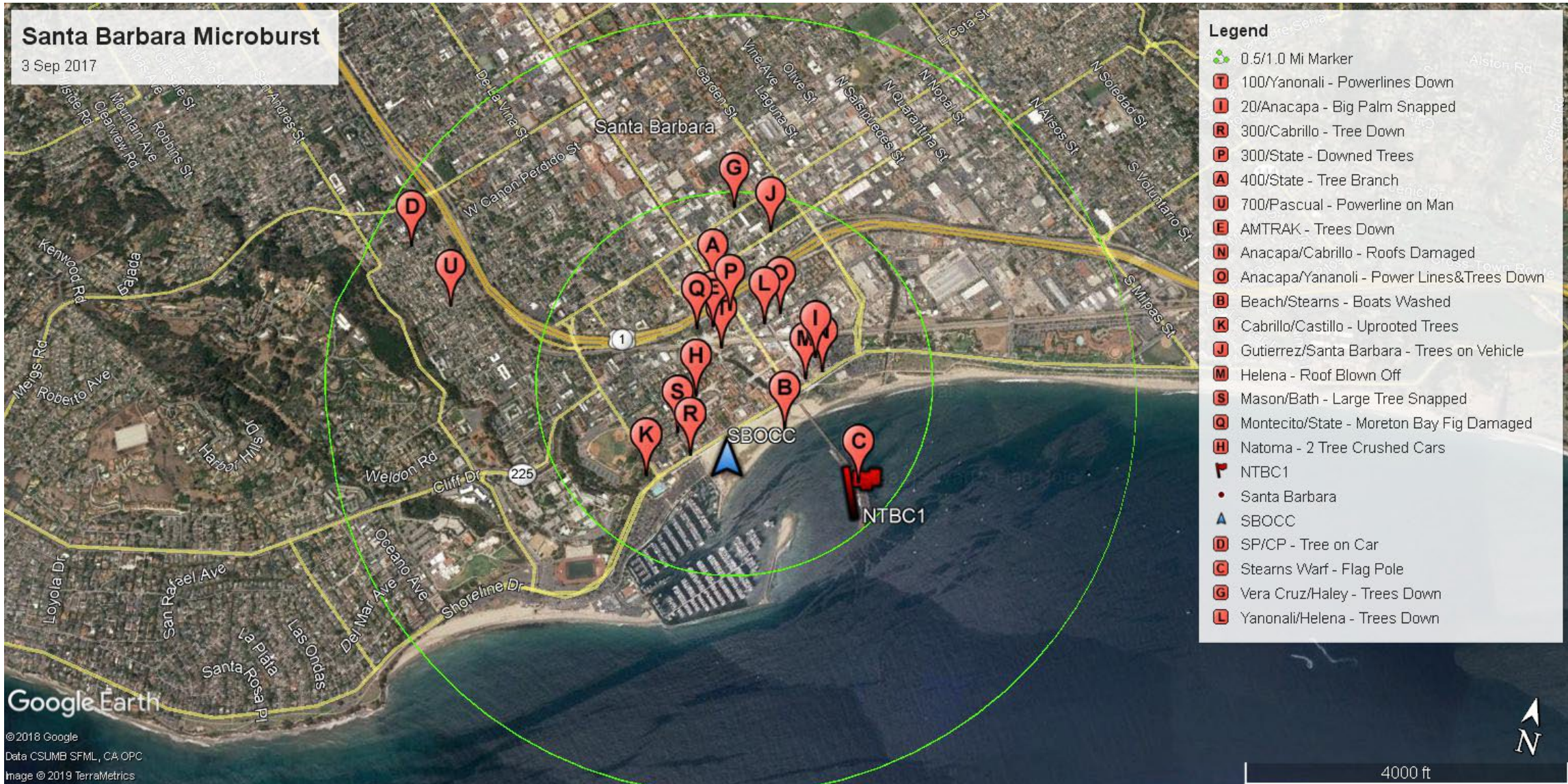
NOAA/NOS/CO-OPS
Winds at 9411340, Santa Barbara CA
From 2017/09/03 00:00 LST/LDT to 2017/09/04 23:59 LST/LDT



NOAA/NOS/CO-OPS
Barometric Pressure at 9411340, Santa Barbara CA
From 2017/09/03 00:00 LST/LDT to 2017/09/04 23:59 LST/LDT



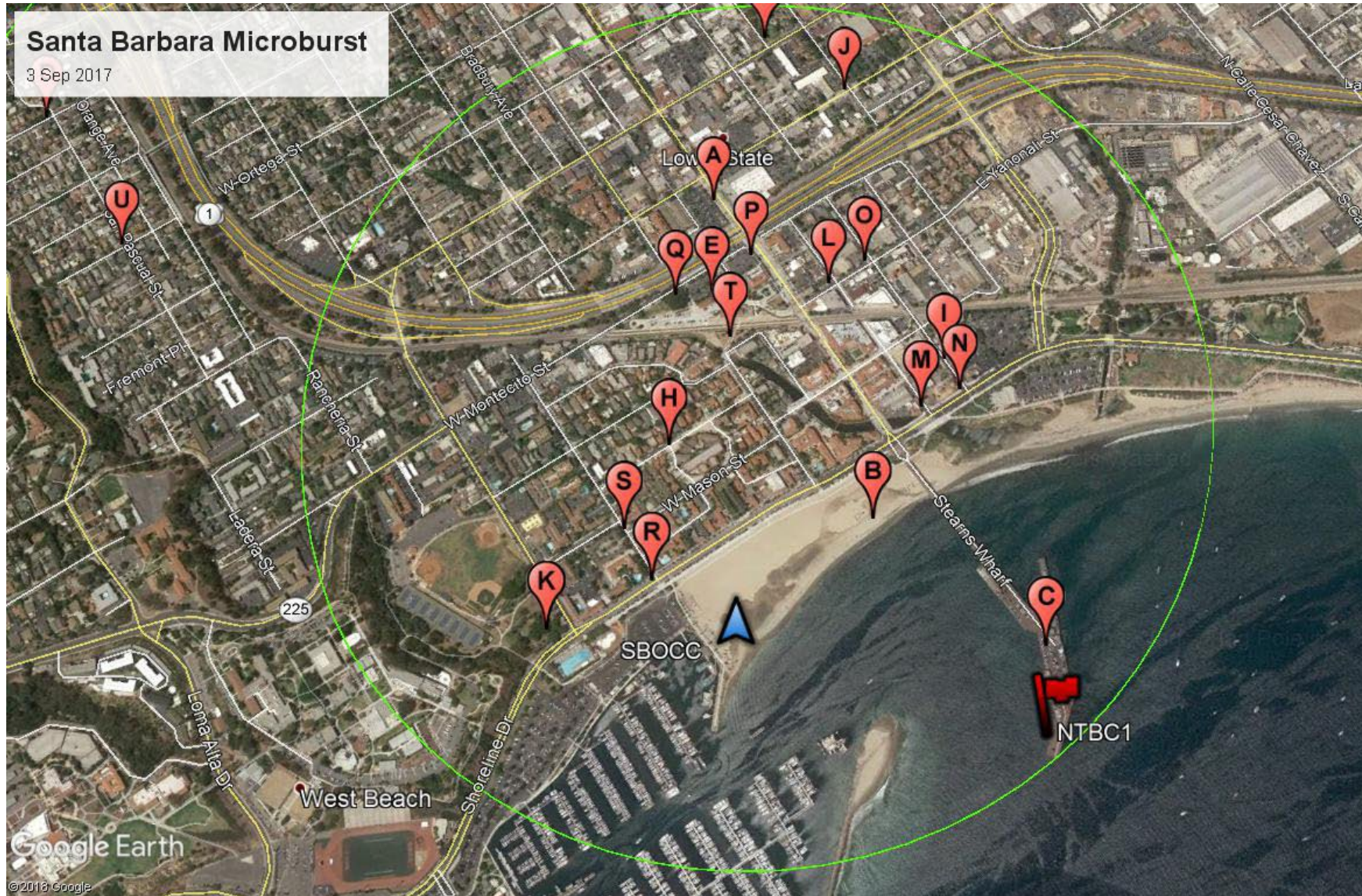
SBA Microburst reflected in pressure trace



Damage reports clustered close together – typical of microbursts

Santa Barbara Microburst

3 Sep 2017



- ### Legend
- 0.5/1.0 Mi Marker
 - T 100/Yanonali - Powerlines Down
 - I 20/Anacapa - Big Palm Snapped
 - R 300/Cabrillo - Tree Down
 - P 300/State - Downed Trees
 - A 400/State - Tree Branch
 - U 700/Pascual - Powerline on Man
 - E AMTRAK - Trees Down
 - N Anacapa/Cabrillo - Roofs Damaged
 - O Anacapa/Yanonali - Power Lines&Trees Down
 - Beach
 - B Beach/Stearns - Boats Washed
 - K Cabrillo/Castillo - Uprooted Trees
 - J Gutierrez/Santa Barbara - Trees on Vehicle
 - M Helena - Roof Blown Off
 - S Mason/Bath - Large Tree Snapped
 - Q Montecito/State - Moreton Bay Fig Damaged
 - H Natoma - 2 Tree Crushed Cars
 - NTBC1
 - Reported Wind Gust Direction
 - ▲ SBOCC
 - D SP/CP - Tree on Car
 - C Stearns Warf - Flag Pole
 - G Vera Cruz/Haley - Trees Down
 - L Yanonali/Helena - Trees Down

Google Earth

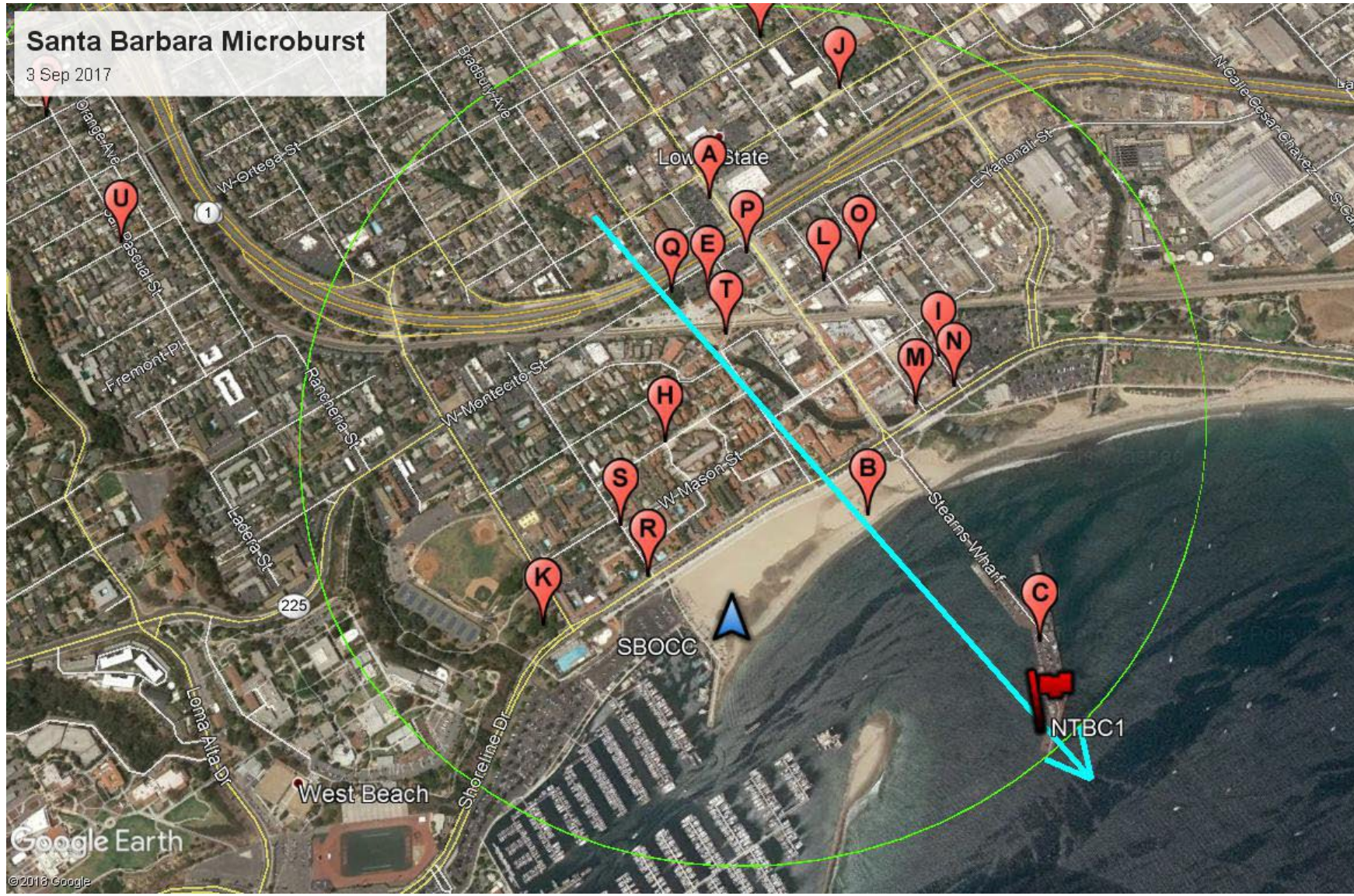
© 2018 Google



2000 ft

Santa Barbara Microburst

3 Sep 2017

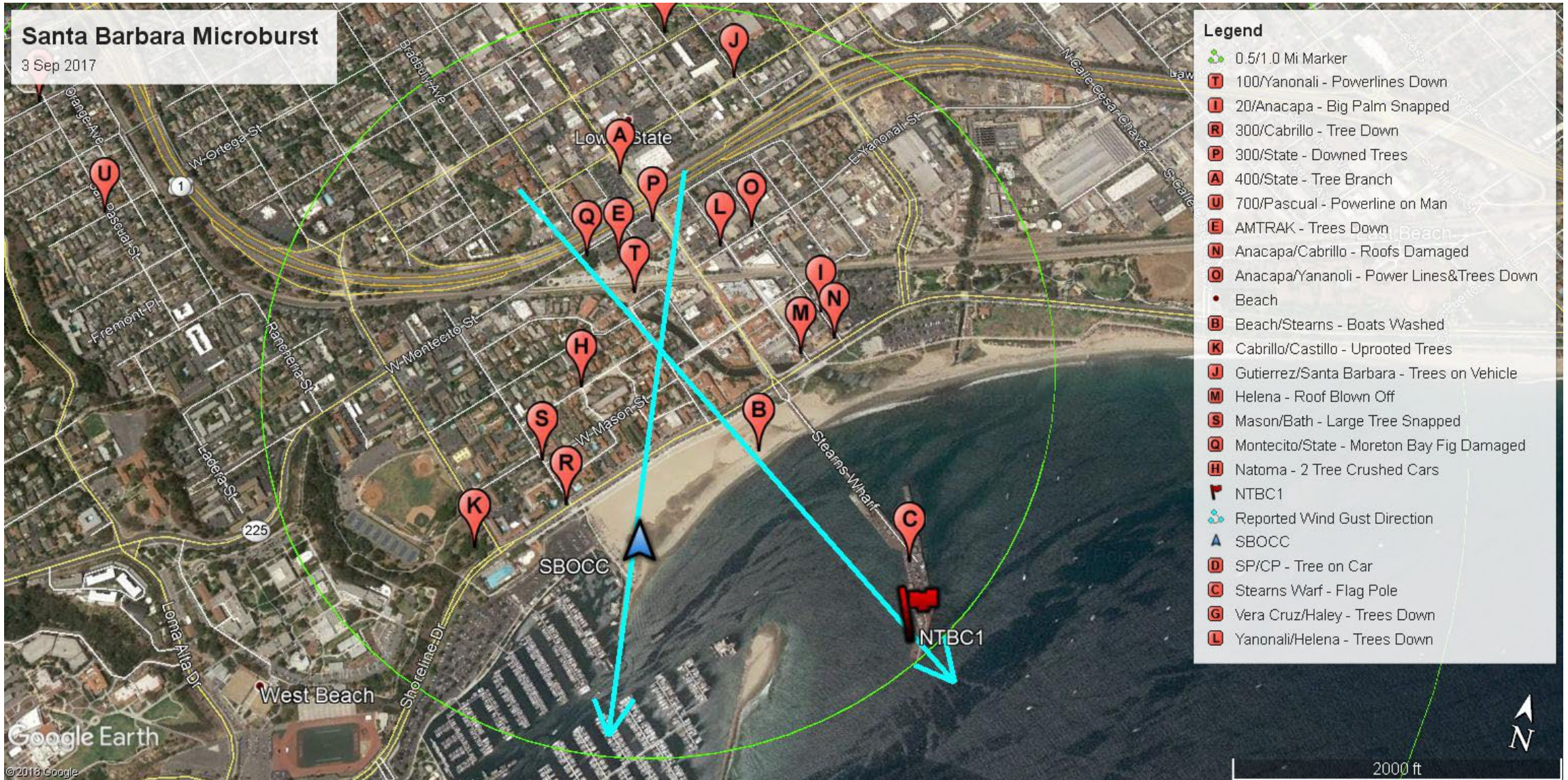


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Google Earth

© 2018 Google

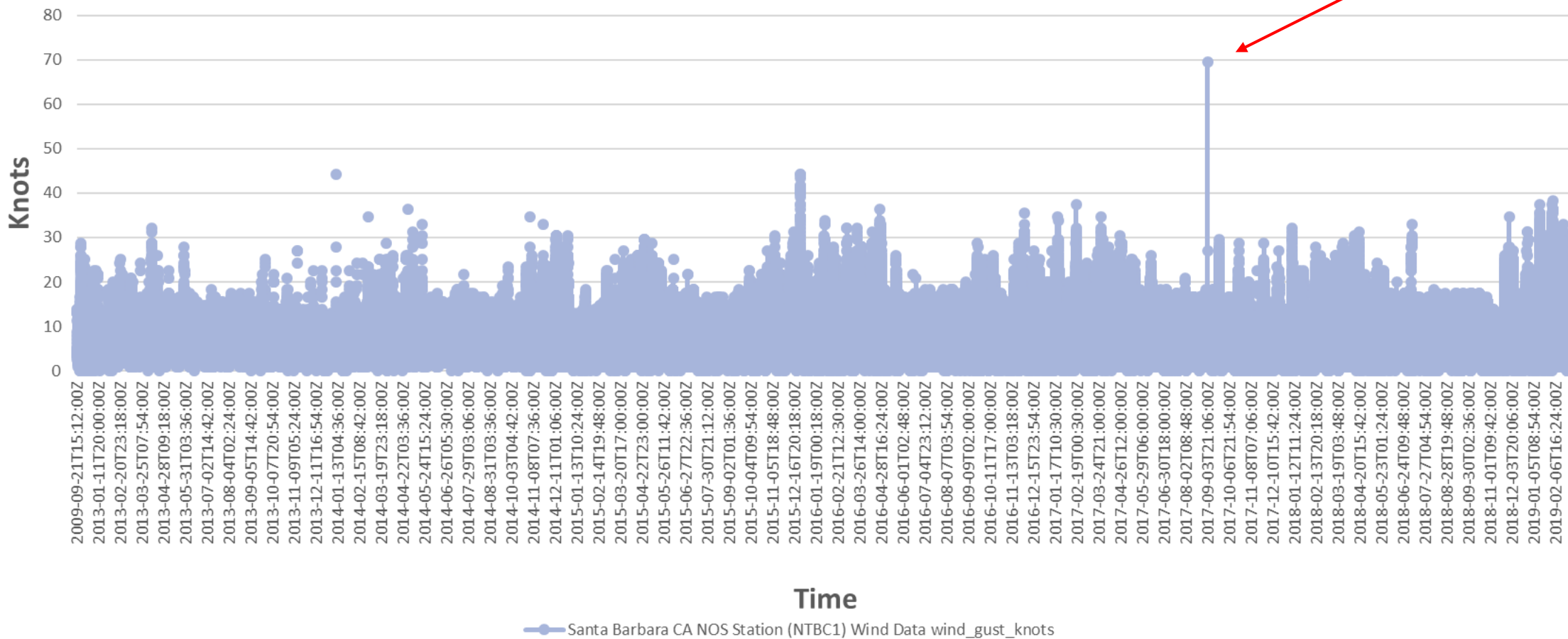
2000 ft



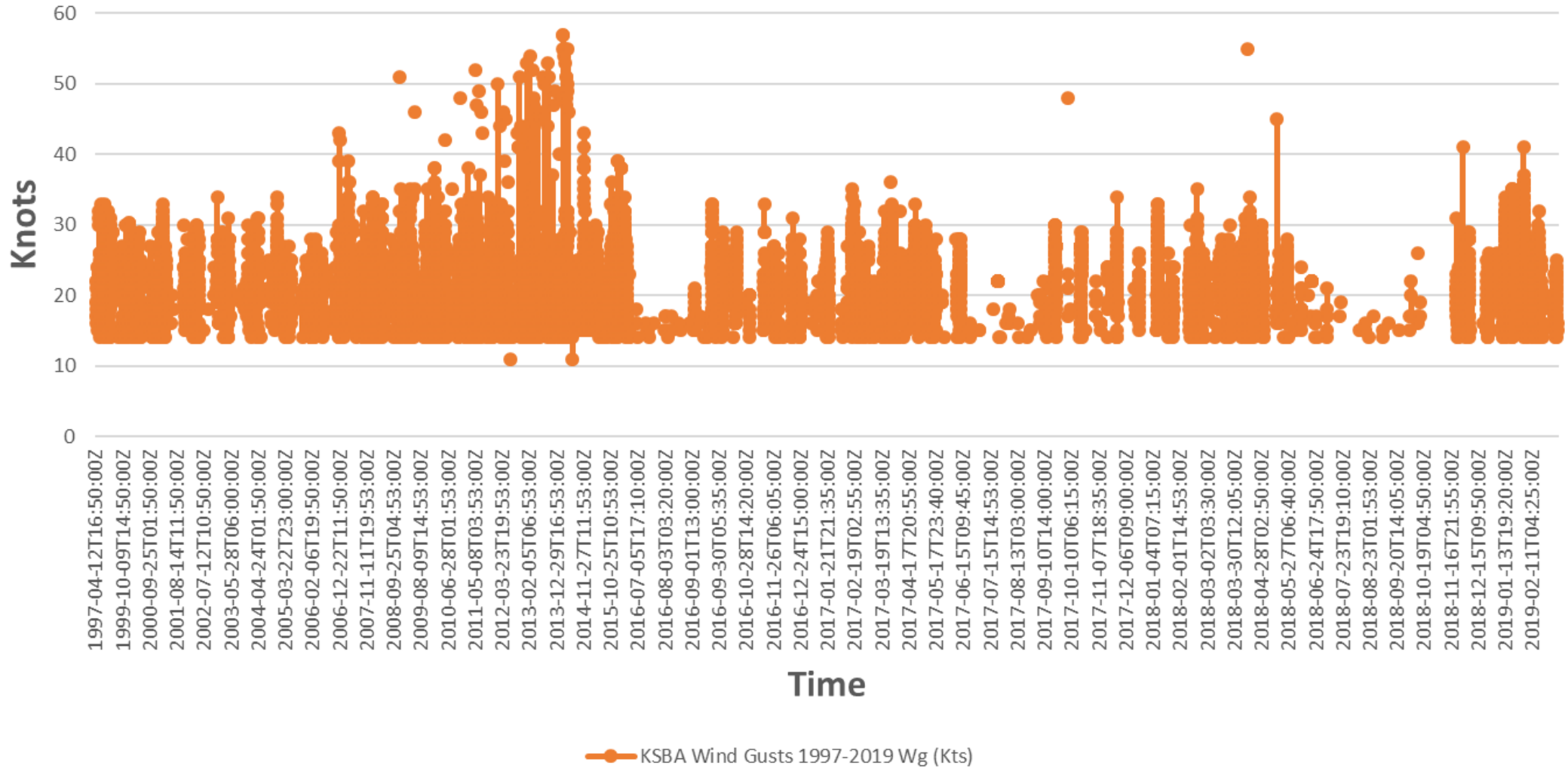
Intersection of wind barbs indicative of where microburst initiated

Santa Barbara CA NOS Station (NTBC1) Wind Data 2009-2019

SBA Microburst



Santa Barbara Airport Wind Gusts 1997-2019 Wg (Kts)



Raw, un-quality controlled, SBA airport data show nothing close to what occurred 9/3/17 or prior

Past Severe/Damaging Thunderstorms in Santa Barbara

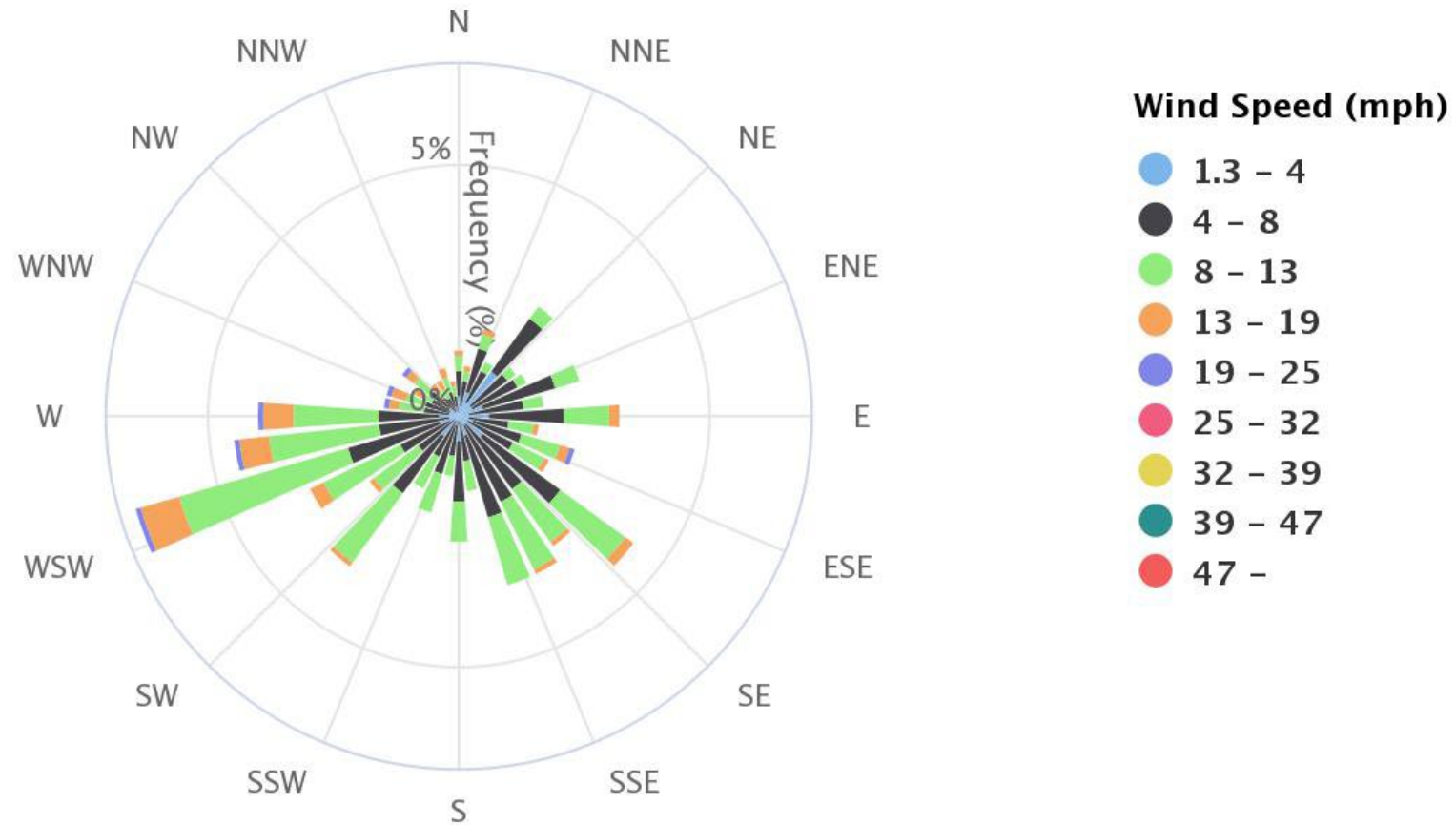
Date	Time	Event Type	Magnitude
9/3/17	1454 PDT	Thunderstorm	Measured Gust to 80 mph
1/21/10	1140 PST	Thunderstorm	Estimated Gust to 60 mph
11/28/96	Unspecific	Thunderstorm	Estimated Gust to 60 mph
2/18/93	0600 PST	Thunderstorm	Not specified

Average Thunderstorm Days Each Year = 2-3 Severe is NWS defined as wind gust \geq 58 mph

SANTA BARBARA MUNI AP (CA) Wind Rose

Nov. 1, 1948 - Mar. 12, 2019

Sub-Interval: Jan. 1 - Dec. 31, 0 - 23



Click and drag to zoom

Shows prevailing wind direction is WSW or SE and NW-N is more rare and not to be expected



NOAA Technical Memorandum NWS WR-225

CLIMATE OF SANTA BARBARA, CALIFORNIA

Elford (1962) estimated that a peak wind of 60 mph at Santa Barbara might be experienced "as often as once in 50 years" and that a peak wind of 80 mph might occur "once in 100 years." If and when such extreme winds are measured in Santa Barbara, they would most likely fit into the category of downslope winds.

Gary Ryan
Weather Service Office
Santa Maria, California

December 1994

XII. REFERENCES AND ACKNOWLEDGMENTS

AUTHORS:

Elford, C. Robert, 1962: *The Climate of Santa Barbara*. Original typed manuscript.

Elford, C. Robert, et al., 1965: *The Climate of Santa Barbara County*. University of California Agricultural Extension Service, Santa Barbara.

U.S. DEPARTMENT OF
COMMERCE

National Oceanic and
Atmospheric Administration

National Weather
Service

Forecastability

CAZ039-040130-

Santa Barbara County South Coast-

Including Santa Barbara, Montecito, and Carpinteria

357 AM PDT Sun Sep 3 2017

...HEAT ADVISORY IN EFFECT UNTIL 10 PM PDT MONDAY...

.TODAY...Partly cloudy with a slight chance of showers and thunderstorms in the morning, then mostly cloudy with a chance of showers and thunderstorms in the afternoon. Highs in the mid 80s

to lower 90s except the mid 70s to around 80 cooler beaches.

South winds around 15 mph in the afternoon. Chance of precipitation 30 percent.

Forecastability

CAZ039-032330-

Santa Barbara County South Coast-

Including Santa Barbara, Montecito, and Carpinteria

1155 AM PDT Sun Sep 3 2017

Update

...HEAT ADVISORY IN EFFECT UNTIL 10 PM PDT MONDAY...

.REST OF TODAY...Partly cloudy in the morning. A slight chance of showers and thunderstorms in the morning, then showers likely and **isolated thunderstorms in the afternoon.** Highs in the upper 80s to upper 90s to around 100 except the upper 70s to mid 80s cooler beaches. South winds around 15 mph in the afternoon. Chance of precipitation 60 percent.

.TONIGHT...Showers likely with a slight chance of thunderstorms in the evening, then a chance of showers with a slight chance of thunderstorms after midnight. Lows in the mid 60s to lower 70s. Chance of precipitation 60 percent.

Why No Warning

Special Weather Statement
National Weather Service OXNARD CA
238 PM PDT SUN SEP 3 2017

CAZ036-052-032230-
Santa Ynez Valley CA-Santa Barbara County Mountains CA-
238 PM PDT SUN SEP 3 2017

...SIGNIFICANT WEATHER ADVISORY FOR NORTH CENTRAL SANTA BARBARA
COUNTY UNTIL 330 PM PDT...

At 235 PM PDT, Doppler radar was tracking a line of strong
thunderstorms 10 to 20 miles north of Montecito, moving west at 20
mph.

Nickel size hail and wind gusts up to 50 mph will be possible with
this storm. Flash flooding is also possible with rainfall rates
possibly exceeding one half inch per hour.

Locations impacted include...

Figueroa Mountain...Big Pine Mountain...Lake Cachuma...
and Highway 154 over San Marcos Pass.



Why No Warning

Special Weather Statement
National Weather Service OXNARD CA
255 PM PDT SUN SEP 3 2017

CAZ036-039-040-052-032245-
Santa Ynez Valley CA-Santa Barbara County South Coast CA-
Ventura County Coast CA-Santa Barbara County Mountains CA-
255 PM PDT SUN SEP 3 2017

...SIGNIFICANT WEATHER ADVISORY FOR WESTERN VENTURA AND SOUTHEASTERN
SANTA BARBARA COUNTIES UNTIL 345 PM PDT...

At 254 PM PDT, Doppler radar was tracking a strong thunderstorm near
Isla Vista, or 11 miles northwest of Santa Barbara, moving west at 25
mph.

Locally heavy rain, frequent lightning, dime size hail and winds in
excess of 40 mph will be possible with this storm.

Locations impacted include...
Santa Barbara...Montecito...Carpinteria...Summerland...La Conchita...
Rincon Point...Isla Vista...Goleta...Old Man Mountain...
Mission Canyon...Hope Ranch...Santa Barbara Air[port...
and Highway 154 over San Marcos Pass.

Takeaways – Part 1

A severe microburst hit Santa Barbara (lower State Street area) and the beach/harbor area at 254 PM on 3 Sep 2017

Resulted in the strongest wind gust EVER measured/recorded in Santa Barbara, CA

Very localized – less than 2 miles across

No other thunderstorm event of this magnitude ever recorded in Santa Barbara, CA

Last time severe/damaging thunderstorm occurred and reported in area – 21 Jan 2010

Takeaways – Part 2

“A chance of thunderstorms” was in the forecast. No mention of severe or damaging potential. “Focus of activity would be in the mountains to the north”

NWS notification of some potential strong storms – 1 minute after the event occurred

NO WARNING EVER ISSUED