



What Is An Inversion?

**National Weather Service
Little Rock, Arkansas**



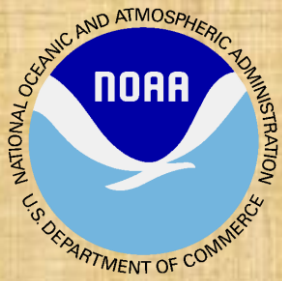
Temperature Inversion (The What)



From the National Weather Service Glossary:

A temperature inversion is a layer in the atmosphere in which air temperature increases with height. An inversion is present in the lower part of a cap.

The cap is a layer of relatively warm air aloft (above the inversion). Air parcels rising into this layer become cooler than the surrounding environment, which inhibits their ability to ascend.



Temperature Inversion (The What)



Inversions are stable air masses where the cooler air is near the earth's surface and warmer air is on top



Cooler air

Warmer air

NO INVERSION

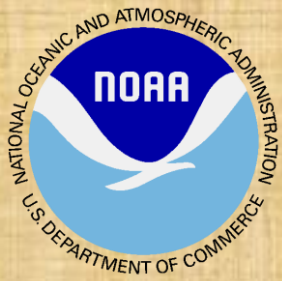


Warmer air

Cooler air

INVERSION

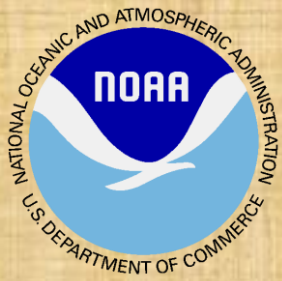
Note: Graphic is from the University of Missouri.



Temperature Inversion (The Why)



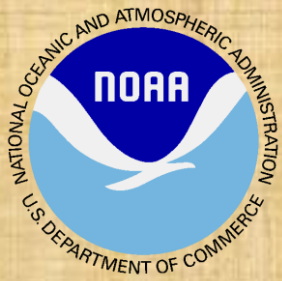
Air near the ground cools more quickly than air aloft. This is most likely when the sky is clear and the wind is light/calm. Cooling will occur the most readily in low places (such as valleys sheltered from the wind).



Temperature Inversion (The When)



This often happens in the late afternoon/early evening (before sunset) and lingers into the next morning (after sunrise) for a few hours.



Temperature Inversion (The Problem)



Since warm air rises, air under the inversion cannot escape because it is cooler than farther aloft. Smoke and pollution get trapped.



Temperature Inversion (The Problem)



Inversions are stable air masses where the cooler air is near the earth's surface and warmer air is on top

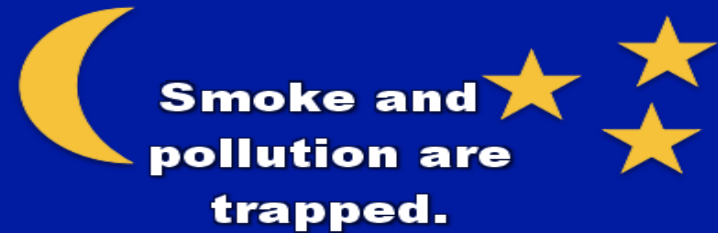


Cooler air

Smoke and pollution get up and out.

Warmer air

NO INVERSION



Smoke and pollution are trapped.

Warmer air

Cooler air

INVERSION

Note: Edited graphic from the University of Missouri.



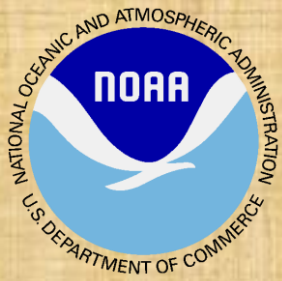
Temperature Inversion (The Signs)



- 1) Clear skies (no clouds)
- 2) Calm (wind < 3 mph)
- 3) Closer to sunrise or sunset
- 4) Dew present
- 5) Horizontal smoke patterns
- 6) Ground fog in low-lying area



Note: Graphic is from the University of Missouri.



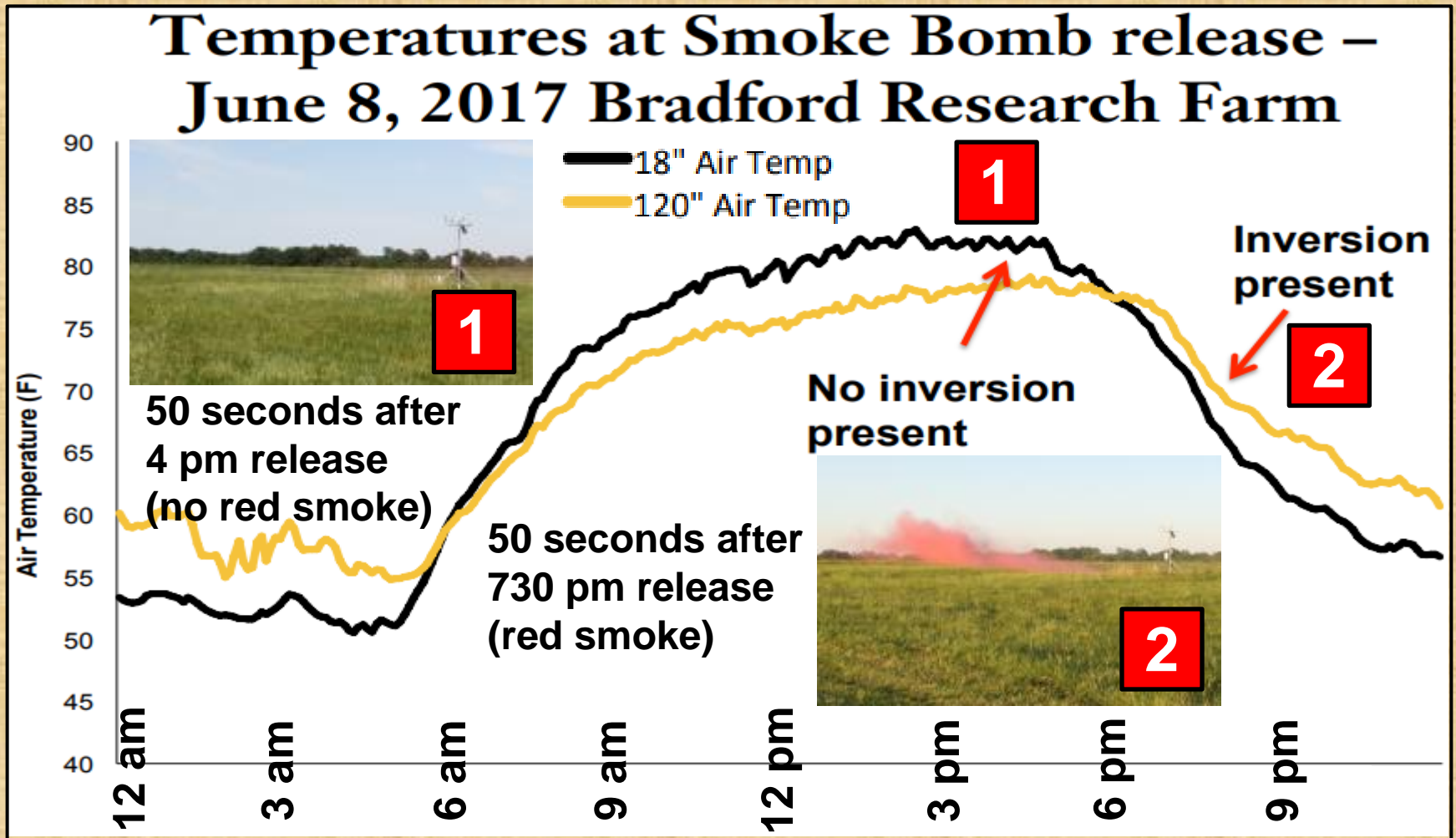
Temperature Inversion (The Demonstration)



The University of Missouri conducted an experiment with smoke bombs at a research farm in June, 2017. At 400 pm CDT, red smoke dispersed within a minute, indicating no inversion. A minute after a 730 pm CDT release, an inversion had set up and red smoke hovered along the ground.



Temperature Inversion (The Demonstration)



Note: Research and graphic from the University of Missouri.