I was watching the news Wednesday afternoon and saw a story about the horrible pollution that is being experienced in Chinese cities. The extreme reduction in visibility made my jaw drop. Obviously there are several factors that have created this problem, with the leader being the addition of manmade pollutants, but meteorology most likely has a place in this as well.

<https://www.yahoo.com/news/china-says-smog-blanketing-cities-may-finally-soon-074225557.html?ref=gs>

I am attaching a sounding of the atmosphere taken from the weather balloon we launch twice a day. The red line is temperature, the green line dewpoint. In what we call a standard atmosphere the temperature decreases with height. Occasionally the temperature will increase with height. When it does we call this a temperature inversion. What I’d say are the two most common ways these form are radiation inversions and subsidence inversions. Radiational often happen on cold clear nights: the air at the surface has its heat escape out toward space, causing that layer to be colder than the air above it, hence temperature increases with height (but only for a short distance). Subsidence inversions occur when a large area of high pressure settles over a region. The following is a definition I found on Encyclopedia Britannica:

A subsidence inversion develops when a widespread layer of air descends. The layer is compressed and heated by the resulting increase in [atmospheric pressure](https://www.britannica.com/science/atmospheric-pressure), and as a result the [lapse rate](https://www.britannica.com/science/lapse-rate) of temperature is reduced. If the [air mass](https://www.britannica.com/science/air-mass) sinks low enough, the air at higher altitudes becomes warmer than at lower altitudes, producing a temperature inversion. Subsidence inversions are common over the northern continents in winter and over the subtropical oceans; these regions generally have subsiding air because they are located under large high-pressure centers.

The top of the inversion acts essentially as an atmospheric wall – the air above and below do not mix. With pollutants this causes the smoke to spread out under the trapped layer of air. When the inversion lasts for multiple days this means the pollution will continually worsen. I’m no expert in Chinese weather, but I’m guessing that the cities with the worst pollution are sitting under a subsidence inversion caused by high pressure across the region, like if you continued to pour dye into bath water but not change the water for days. The best way to clear out the smog is for a strong cold front to push through. But alas this situation will certainly happen again, and again.