PRESENTER: But in the springtime air over Tornado Alley, there's a regional anomaly that intensifies this basic atmospheric process. The result is that here particularly powerful storms can develop. There's a stable layer of dry air that acts as a barrier between the warm air down below and the cooler air higher up. So, the warm air is trapped. And what's more, the ground keeps on heating it as the day goes on. The thermals get more and more powerful until by late afternoon they finally punch through the barrier layer at colossal speed. These rapid updrafts of less dense lower pressure air are so strong that they generate huge thunderstorms. It's from these thunderstorms that in certain conditions tornadoes can emerge. I'm going to investigate how this happens--

JOSH WURMAN: Not as bad as north of us.

PRESENTER: --with the help of atmospheric scientist Josh Wurman.

JOSH WURMAN: I don't know what to make of these stringy little features.

PRESENTER: The first step in our quest for a tornado is locating a promising storm. After a couple of days on the road, we managed to intercept one moving north through Colorado. What's happening behind me is the storm is building. And in the middle of that storm over there there's an updraft with low pressure at the center of it and all the air around the outside has higher pressure. And that high pressure is pushing air into the center and up into the storm, and that's what's building the storm. The atmosphere tries to even out the extreme differences in temperature that have been generated, so the air movements at the core of the storm become exceptionally powerful. Hail is one characteristic product of this atmospheric violence. The hail formed when an updraft cooled rapidly so that water condensed out of the air and turned immediately to ice. This is what was carried from the south, and it was pushed up into the storm and it gave the storm its energy. And now it's falling back down on me. Wow. Even though this is chaotic and messy, what this is is a demonstration that the atmosphere is an unstable place. That is, there are all these differences in temperatures and pressures. And this is what happens when the atmosphere moves around to even everything out and make it all the same. It's not looking very peaceful at the moment, but that's what it's trying to get back to. When tornadoes do form, they are often preceded by hail but this time there's no twister. So, we're back on the road, still trying to see a storm spawn a tornado. After a week of tracking promising storms without success, Josh's specialist radar detects one which shows a revealing swirl of clouds. We have to move fast. Tornadoes form and vanish very quickly.

JOSH WURMAN: Going out ahead, this big dark area is the core, so we're basically going to penetrate through the core and see what's interesting.

PRESENTER: Tornadoes form when powerful rotating cylinders of air within the storm get caught by an updraft and are knocked on their side.

JOSH WURMAN: Right now, we're kind of right in the center of the coiled part of it.

PRESENTER: When that column of rotating air touches the ground, a tornado is born. At the tornado's core is an area of intense low pressure, which draws high pressure air towards it. The dust and debris picked up by the tornado reveal the swirling pattern of winds. So, this is it. The high pressure is swirling inwards and up that funnel, and it's enormous. I had no idea it would look that big. It's just amazing. Here it's almost calm. But over there, those winds are going at hundreds of miles an hour pushing stuff right up into the heart of the storm. I just-- I can't stop looking at it. It's incredible. Just 15 minutes after it first touched down, the tornado dissipates. There's still so much that we don't understand about storms. We don't understand when they're going to produce hail, when they're going to produce rain, when they're going to produce tornadoes. But what we do understand is that a storm like this is just a manifestation of something that's happening around us all the time. Our planet's atmosphere is a mosaic of warmer and cooler air masses constantly in motion. The air is rising, falling, and swirling around as it seeks to balance out its differences in temperature and pressure and return to equilibrium. During April and May, the effect of the Earth's tilt is to enhance those differences by increasing surface temperatures, which in turn heat the air. So, all over the northern hemisphere, spring is the season for volatile storms. Tornadoes are only one consequence.