

Background Information

The Hayman fire of 2002 ran 19 miles in six hours. It produced a convection column with pyrocumulus clouds, also referred to as a column. The column could be seen with satellite imaging. It extended from the active fire through Denver and into Wyoming. On the ground it was a mass of heat and smoke. The convection column caused spot fires a mile in front of the wall of flame. The convection column heated the fuels in front of the fire. A spark was all that was needed to ignite the trees in front of the wall of flame.

Pyrocumulus clouds form during a wildfire when the water vapor from the air and vegetation combustion rises with the assistance of the upward moving hot air currents from a wildfire. Once the vapor has risen high enough, it condenses to form a cloud.

The focus of this unit is the transfer of energy associated with fire. This project is best done after a reminder of the effects of heat on molecule movement (basic physical reactions). Water molecules provide the simplest example. Frozen water has restrictive movement (molecules have to be at absolute zero to lie motionless). As heat is applied to ice the molecules get excited, start to vibrate, and the ice melts. The molecules are swimming around; the ice becomes water. With the addition of more heat the water molecules start to move extremely fast, break their hydrogen bonds, and become a gas. These physical reactions occur as a result of a change in temperature – the addition of energy in the form of heat into the system.

The students will look at heat transfer in the forms of convection, conduction and radiation. These are the basics mechanisms through which fire spreads. Convection is one of the hardest mechanisms for wildland fire fighters to control. When homes are threatened by wildfire a new set of problems arise. We will also address what can be done to create defensible space around a structure while keeping in mind the science of heat transfer.