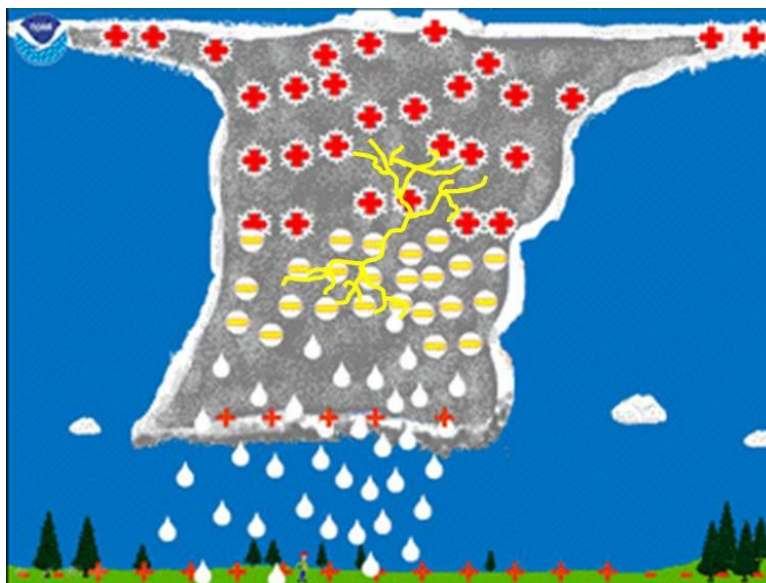


LIGHTNING 101

There are two main types of lightning, intra-cloud and cloud-to-ground. The ARL/SORD lightning detection system is capable of detecting both types. The following is a brief discussion of the different types of lightning.

Intra-cloud lightning

Intra-cloud or cloud-to-cloud lightning is an electrical discharge between oppositely charged areas within a thunderstorm or between nearby thunderstorms. When they occur, these flashes are displayed on the ARL/SORD Website Lightning pages (click hyperlink or paste into browser <http://www.sord.nv.doe.gov/Lighting.php?Location=Southwest&Ltime=30>) as colored circles without black outlines. In some cases, intra-cloud or cloud-to-cloud lightning occurs prior to cloud-to-ground lightning and can be interpreted as a precursor to cloud-to-ground flashes.



Cloud-to-ground (CG) lightning

Cloud-to-ground (CG) lightning, is an electrical discharge between opposite charges in the cloud and on the ground. When cloud-to-ground lightning occurs, the flashes are displayed on the ARL/SORD Website Lightning pages by colored circles with black outlines (click hyperlink or paste into browser <http://www.sord.nv.doe.gov/Lighting.php?Location=Southwest&Ltime=30>). CG lightning can occur between negative charges in the cloud and positive charges on the ground (a negative flash) or vice versa, between positive charges in the cloud and negative charges on the ground (a positive flash). A CG lightning flash consists of one or more *leaders* followed by one or more *return strokes*. The *leader* is the initial step in the lightning flash and establishes the conductive channel that the electrical discharge (lightning flash) will take. The *return stroke* is the large electrical discharge we see as the bright light. The return stroke occurs very quickly (about 200 million miles per hour) and the channel appears to light up all at once (this is because our eyes cannot perceive things moving at these speeds).

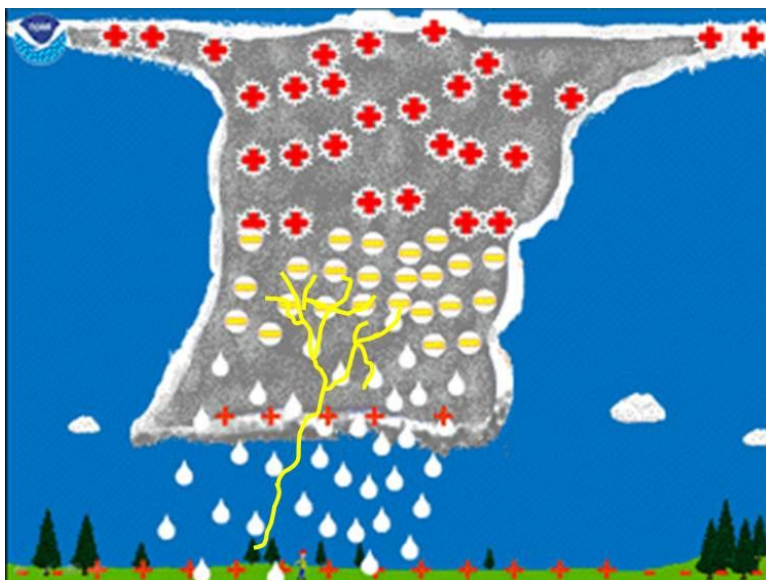
There are two types of CG lightning, negative flashes and positive flashes. The ARL/SORD lightning detection system is capable of detecting both types.

Information presented here was obtained from the following source:

Jenseni, John S. Jr., National Weather Service (NWS), National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce (DOC). [accessed 2015 May 25]. Understanding Lightning .
<http://www.lightningsafety.noaa.gov/science/scienceintro.shtml>

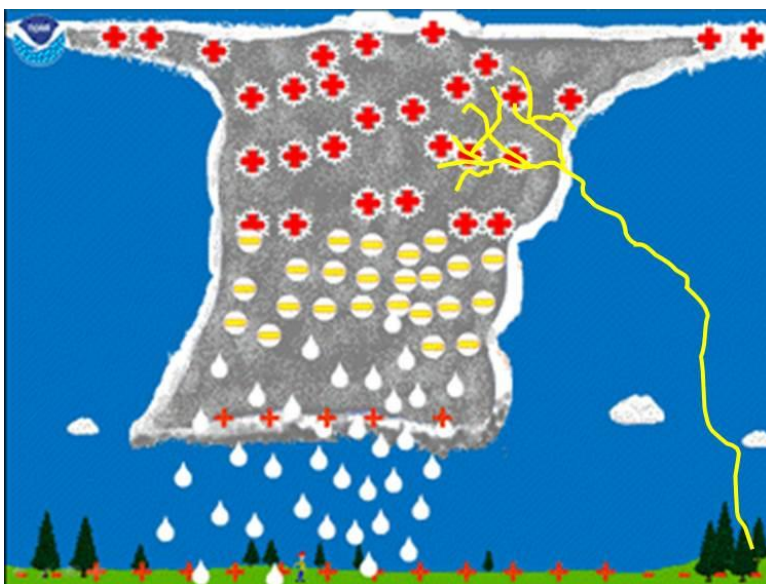
CG lightning – Negative Flash

A negative flash is the most common and occurs when the leaders originate from the negatively charged area of the thunderstorm.



CG lightning – Positive Flash

A positive flash occurs when the leaders originate from a positively charged area of the thunderstorm, typically the upper part of a thunderstorm. Most of the time, these positive leaders are shielded from the ground by the negatively charged central area of the cloud. However, if the storm becomes tilted or if the anvil spreads out in front of or behind the main thunderstorm cloud, the ground is no longer shielded from this upper positive charge. If a large charge differential develops between the upper cloud and the ground, a downward moving positive leader can develop. Since a positive leader usually is the result of a tilted cloud or an anvil cloud out in front or behind the main storm and rain area, positive flashes can occur at significant distances from the main storm. These distances can be at least 5 to 10 miles. These distant flashes are sometimes called “blue sky” lightning since the sky directly above the ground impact may not be experiencing stormy conditions. In addition, since the genesis area of the positive leader usually is at the top of the cloud and higher in the atmosphere, a much greater charge differential is required to initiate a positive flash as compared to a negative flash. As a result, positive flashes occur much less frequently with much greater distances between flashes. On average positive flashes make up only about 13% of the total flashes on the NNSS.



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<http://www.lightningsafety.noaa.gov/science/scienceintro.shtml>