**Launch Forecast FAQs**

### WHAT IS THE DIFFERENCE BETWEEN LIGHTNING LAUNCH COMMIT CRITERIA (LLCC) AND USER CONSTRAINTS?

- **The LLCC** consist of 10 rules that are designed to avoid natural and rocket-triggered lightning strikes to in-flight rockets. These are evaluated for every launch, regardless of the type of rocket or mission. A detailed description of the LLCC can be found at [https://standards.nasa.gov/standard/nasa/nasa-std-4010](https://standards.nasa.gov/standard/nasa/nasa-std-4010).
- **User constraints** are other weather criteria not defined in the LLCC, and are different for each type of rocket. They are established by the different launch providers.

### WHAT IS THE DIFFERENCE BETWEEN NATURAL LIGHTNING AND ROCKET-TRIGGERED LIGHTNING?

- **Natural lightning** is a giant spark of electricity that is caused by the build up of opposite charged particles in towering thunderstorm clouds.
- **Rocket-triggered lightning** is also a giant spark of electricity, but does not form naturally in our atmosphere. It only occurs when a large rocket flies through a strong enough atmospheric electric field.
- The electric field needed to induce rocket-triggered lightning is much lower than for natural lightning. A cloud that is not producing natural lightning could still cause rocket-triggered lightning.

### WHAT IS THE PROBABILITY OF VIOLATION (POV), AND WHAT DOES IT INCLUDE?

- **The POV** represents the probability that a Lightning Launch Commit Criteria (LLCC) or a user constraint will be violated during the launch window.
- **45th Weather Squadron Launch Weather Officers (LWOs)** use a combination of meteorological and climatological data, weather models, local knowledge, and experience to forecast this probability.
- LWOs evaluate and report violations of these weather constraints during the countdown.
- Typical user constraints included in the LLCC are:
  - Surface winds
  - Flight through precipitation

### WHAT DOES THE POV NOT INCLUDE?

- **The POV** includes most, but not all user constraints.
- Some user constraints are highly variable and/or dependent on the exact mission characteristics. For these, the 45th Weather Squadron may report constraint violations or provide data to the launch provider, but it is the launch provider who makes the launch decision.
- Examples of typical user constraints not included in the LLCC are:
  - Upper level wind shear
  - Solar activity
  - Recovery conditions

### WHAT IS THE POB, AND WHAT DOES IT INCLUDE?

- **Surface Electric Fields Rule**
- **Lightning Rule**
- **Detached Anvil Cloud Rule**
- **Debris Cloud Rule**
- **Smoke Plume Rule**
- **Triboelectrification Rule**

### WHAT DOES THE POB NOT INCLUDE?

- **Surface Electric Fields Rule**
- **Lightning Rule**
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### PROBABILITY OF VIOLATION (POB) CONSIDERATIONS

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**45th SPACE WING**

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