Why are NUCAPS Soundings Important?

Vertical profiles of temperature and moisture are produced by the NOAA-Unique Combined Atmospheric Processing System. Over the Continental United States, the timely sounding observations are taken just as afternoon convection is starting. Data from Infrared and Microwave sounders are used (CrIS and ATMS on NPP and NOAA-20; IASI and AMSU/MHS on Metop-A and Metop-B). The soundings are driven by satellite observations and are independent of any model. Hundreds of satellite soundings are available day and night.

Dot Color Meaning

<table>
<thead>
<tr>
<th>Green</th>
<th>Yellow</th>
<th>Red</th>
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<tbody>
<tr>
<td>Successful infrared (IR) + microwave (MW) NUCAPS retrieval under clear or partly cloudy conditions</td>
<td>Failed IR + MW NUCAPS retrieval. Successful MW-only NUCAPS retrieval under cloudy conditions</td>
<td>Failed IR + MW NUCAPS retrieval. Failed MW-only NUCAPS retrieval under precipitating cloudy conditions</td>
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Impact on Operations

**Primary Application:** Afternoon NUCAPS soundings provide information that diagnoses the pre-convective environment, verifies model fields, characterizes the mesoscale thermodynamic state and improves situational awareness.

**Application:** NUCAPS moisture observations provide high-quality mid-level information to help analyze severe weather events such as hurricanes.

**Application:** NUCAPS Soundings over Alaska (and elsewhere) can identify regions of very cold air aloft for aviation guidance.

Strengths and Limitations

**Uniform Cloud Fields:** A NUCAPS footprint over a uniform cloud field means the IR + MW retrieval will fail; a microwave-only sounding with limited vertical resolution is the result.

**Limitation:** Satellite Observations are from the top of the atmosphere, and views of the boundary layer can be imprecise. AWIPS allows you to modify the sounding to match METARs or RTMA analyses if necessary.

**Characterization:** NUCAPS soundings – albeit smooth compared to radiosondes – have greater vertical resolution than other satellite-derived soundings.
Temperature and dewpoint lines plotted with accuracy but very smooth

Features in the boundary layer may or may not be well-sampled

Tropopause values (above the cloud) are sampled well

Thermodynamic variables are output with the NUCAPS Sounding. Modify the sounding to match surface METARs or RTMA analyses, and convective parameters will adjust both in the list of parameters, and next to the sounding.