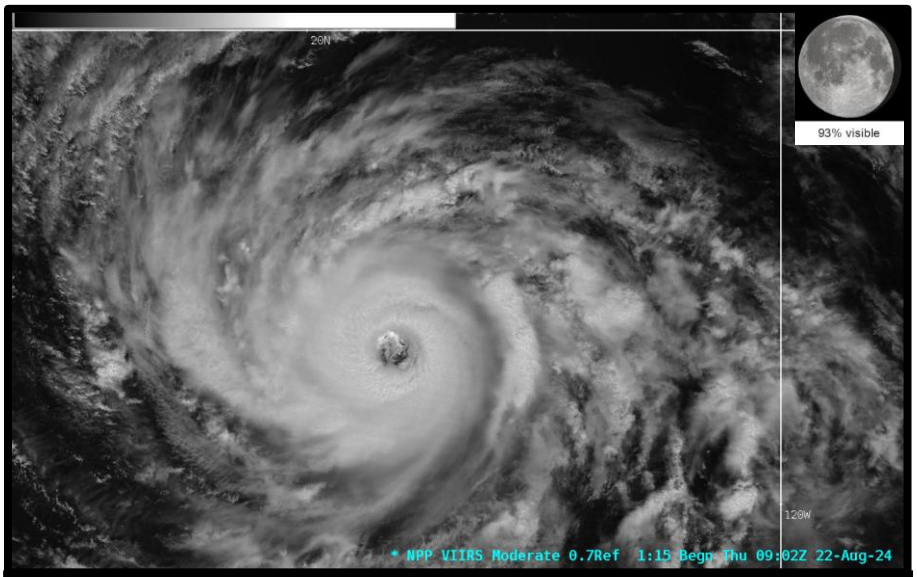
# Near-Constant Contrast (NCC)

Enhanced Day Night Band (DNB) visible imagery

# Quick Guide

## Why is the Near-Constant Contrast (NCC) Important?

The Near-Constant Contrast (NCC) is a derived product of the 0.7 µm Day/Night Band (DNB) that provides unique visible imagery at night. DNB detects a broad range of light intensities (8 orders of magnitude in radiance space) and is very sensitive to low levels of light, including both reflected and emitted sources. The wide range of light intensities detected by the DNB makes it difficult to display imagery without losing detail at either end of the radiance scale. NCC was developed to mitigate these enhancement challenges by using a model of the sun and moon to convert DNB radiance values into a pseudo-reflectance value.




VIIRS NCC showing Hurricane Gilma in the eastern Pacific Ocean during August 2024. The nighttime visible imagery was captured during the full moon phase of the lunar cycle.

| Phase of lunar cycle | Reflected from clouds, snow, ice, and surfaces | Emitted light from cities, fishing boats, gas flares, lightning, aurora, and fires |
|---|---|---|
| **New Moon** | Lowest NCC values (very dim): illumination primarily by nightglow, cloud tops appear fuzzy | High NCC values (brighter): significantly brighter than surroundings |
| **Full Moon** | Highest NCC values (very bright): ability to see details in cloud top texture | High NCC values (bright): proportionally less bright than surroundings |

## Impact on Operations

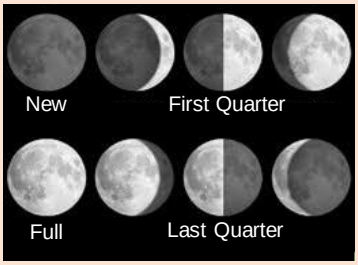
### Primary Application

**Nighttime "Visible" Imagery:** Provides a view of features such as clouds, snow, and lake, sea, or river ice at night that are more challenging to detect with single-channel infrared imagery. When moonlight is available, smoke may be detected at night.

**Tropical Cyclones:** Similar to the daytime visible counterpart, NCC is used for tropical cyclone center location and eye detection. This is important for weaker storms that tend to be less organized.

**Emitted Lights:** City lights, gas flares, fires, lightning, ship lights, and auroras show up clearly. Applications include monitoring wildfire perimeters and hot spots, identifying power outages (i.e., the disappearance of emitted lights) and the geolocation of regional features.

## Limitations




**Lunar Cycle:** The illumination of clouds at night is a function of moon phase and elevation above the horizon. For the 0130 local overpass, there is no moonlight from 2 days after the last quarter until 2 days after the first quarter lunar phase. During this time, emitted lights will dominate the scene.

**Infrequent and Latency:** This product is limited to low-earth orbiting satellites which provide global coverage twice per day. VIIRS NCC is not available on geostationary satellites. Data latency is ~15 min via Direct Broadcast and ~1-1.5 h via Satellite Broadcast Network.

**Auroras:** Auroras can be very bright and cover large areas, obscuring surface features.

Contributors: CSU/CIRA. https://www.cira.colostate.edu/ [Updated: 2026]

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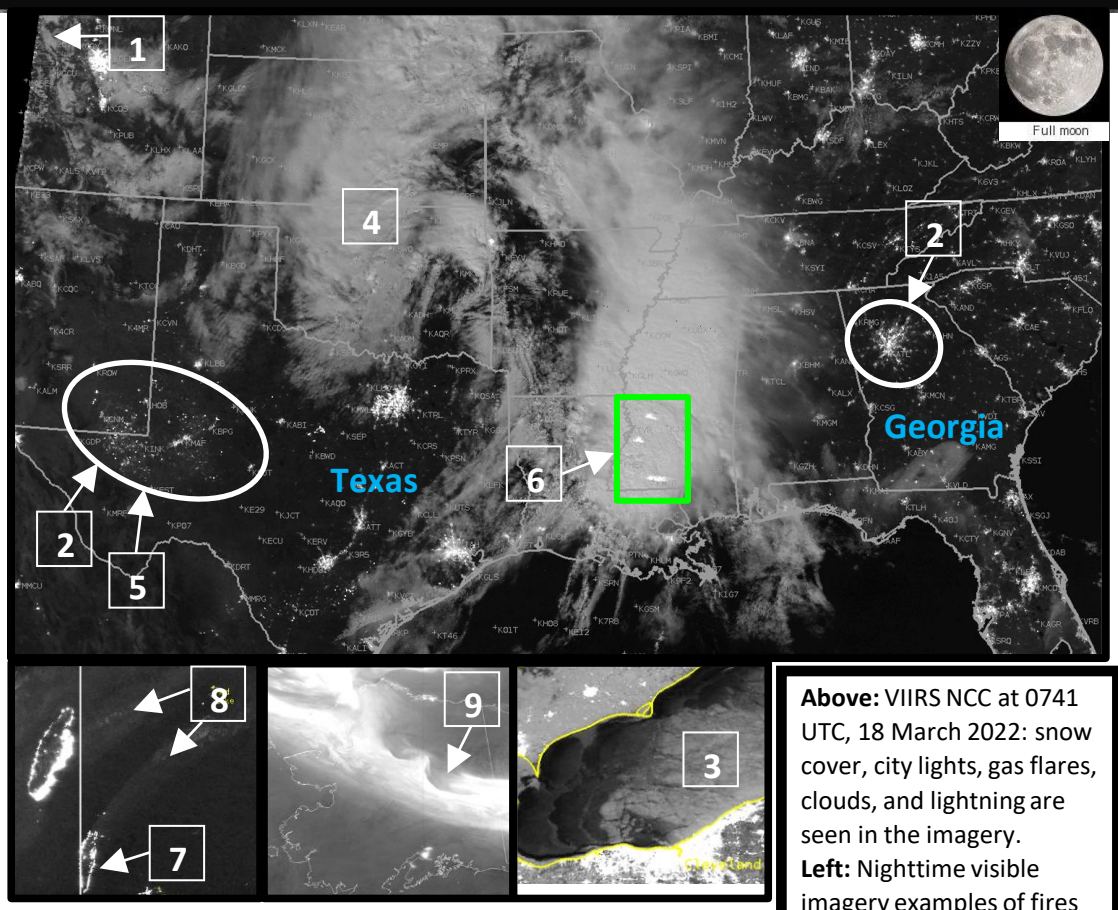
## Imagery Interpretation

1. **Snow Cover** *(swath or dendritic pattern)*
2. **City and Town Lights** *(individual pixels or clusters)*
3. **Lake, Sea, or River Ice** *(smooth appearance with distinct edges)*
4. **Clouds** *(smooth, bumpy, or wispy)*
5. **Gas Flares** *(individual pixels or clusters)*
6. **Lightning** *(bright streak within cloud)*
7. **Fires** *(bright)*
8. **Smoke** *(diffuse plume from a point or area source)*
9. **Aurora** *(irregular, elongated bright streak)*

**Note: relative brightness varies by season, moon phase and moon elevation above horizon.**







**Above:** VIIRS NCC at 0741 UTC, 18 March 2022: snow cover, city lights, gas flares, clouds, and lightning are seen in the imagery. **Left:** Nighttime visible imagery examples of fires and smoke in Canada (14 May 2025), an aurora spotted across the Alaskan Interior (13 Feb 2024), and ice found along Lake Erie (2 Feb 2026).

**Resources** --> **CIRA VISIT Training Session:** VIIRS NCC Imagery in AWIPS, **GINA:** Alaska DB Satellite Data Portal, **COMET Module:** SatFC-J - The VIIRS DNB, **CIRA SLIDER** JPSS Sectors: CONUS, Northern Hemisphere & Southern Hemisphere, **and the** DNB Enhancements - Quick Guide.

**NCC imagery enhancement:** The NCC color table scale in AWIPS can be customized to bring out atmospheric features in the satellite imagery. Two imagery enhancements of fog / low stratus on 12 May 2018 at 0935 UTC are seen over southern California during the new moon phase of the lunar cycle. Notice how the NCC 0-0.5 scale brightens the ambient cloud cover but also increases the saturation of city lights in comparison to the default NCC 0-1 scale. Different scales will bring out certain features more than others.