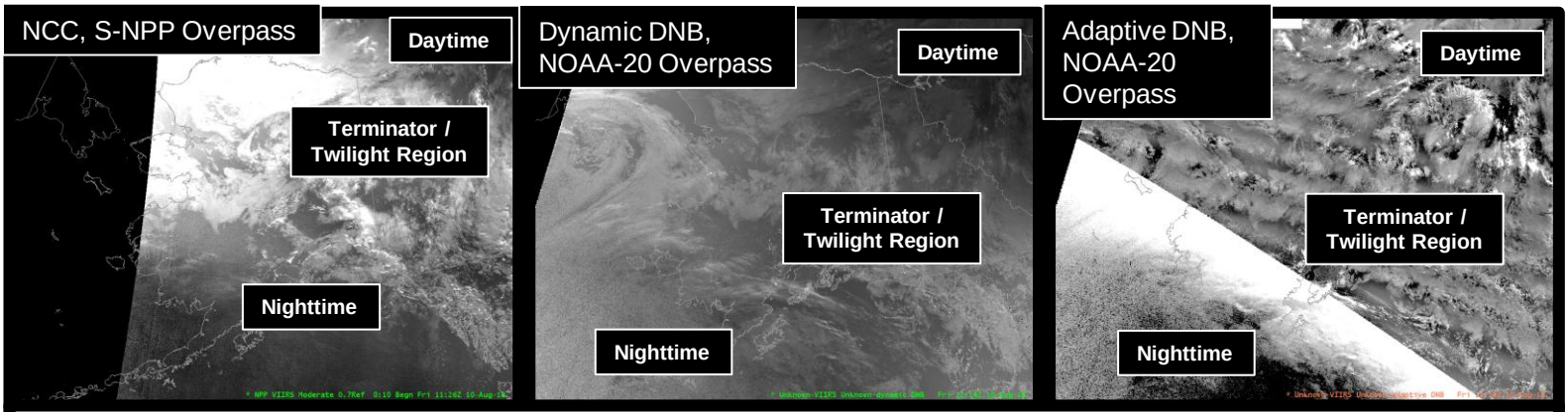
DNB Enhancements

Quick Guide

Why are Day/Night Band (DNB) Enhancements Important?

DNB is sensitive to a broad range of light intensities, that span 8-orders of magnitude, from full sunlight to moonless nights. As a result, displaying the full range of DNB data in a single image, becomes impractical. Polar2Grid software offers [1]four DNB enhancement techniques to Direct Broadcast (DB) Community Software Processing Package (CSPP) users, to identify reflected and emitted lights sources within the satellite imagery. For non-DB users, the Near-Constant Contrast (NCC) product is utilized to identify analogous features via different enhancement technique.



Three DNB Enhancements (NCC, left, Dynamic DNB, middle, and Adaptive DNB, right) over Alaska on 10 August 2018. S-NPP NCC is at 1126Z, followed by a NOAA-20 satellite overpass, showing Adaptive and Dynamic DNB's at 1214Z. S-NPP and NOAA-20 overpasses are ~50-min apart, and show each regime: Daytime, Nighttime, and Terminator/Twilight Regions. In AWIPS, more enhancements can be applied to the imagery at the user's discretion (e.g. refer to NCC Quick Guide to enhance fog/low stratus clouds). For illustrative purposes, Dynamic DNB uses the 'Sat/VIS/Linear' AWIPS enhancement.

DNB Enhancement and AWIPS data access (SBN or LDM)	Algorithm and imagery characteristics
Adaptive DNB [2]Direct Broadcast (DB) – **LDM**	Provides better contrast across Terminator Region. Region is demarcated into tiles and a 'histogram equalization' calculation is applied for each tile. Note, wave patterns are seen in the Terminator Region when enhancement is applied.
Dynamic DNB [2]Direct Broadcast (DB) – **LDM**	Implements an error function to scale DNB data. Enhancement preserves 'scene contrast' between solar and lunar illumination conditions. Features are smoothed out along Terminator region.
Near-Constant Contrast (NCC) [2]National Weather Service (NWS) – Network Central Facility (NCF) – **SBN**	Converts observed DNB radiance values into 'pseudo-albedo' values. Reduces dynamic range of data from 8 orders of magnitude to 3, while maintaining an approximate 'near constant contrast' across daytime, nighttime and twilight regimes.

[1]Two DNB enhancement techniques, from Polar2Grid software, can be accessed in AWIPS: Adaptive and Dynamic DNB's, listed above. The other two DNB enhancements: HNCC DNB and Histogram DNB, are only available via CSPP (not shown here).
[2]AWIPS data access via DB and NWS-NCF express different data latencies. S-NPP and NOAA-20 data latencies from NWS-NCF are ~1 ½ hours and ~50 minutes, respectively. DB data latency is ~20-30 minutes.

Resources: International Journal of Remote Sensing: A dynamic scaling algorithm for the optimized digital display of VIIRS DNB Imagery, and SSEC Website: Scaling of the VIIRS DNB in Polar2Grid. **Hyperlinks not available when viewing material in AIR Tool.**

Contributor: Jorel Torres (CIRA), William Straka (CIMSS) https://www.cira.colostate.edu/