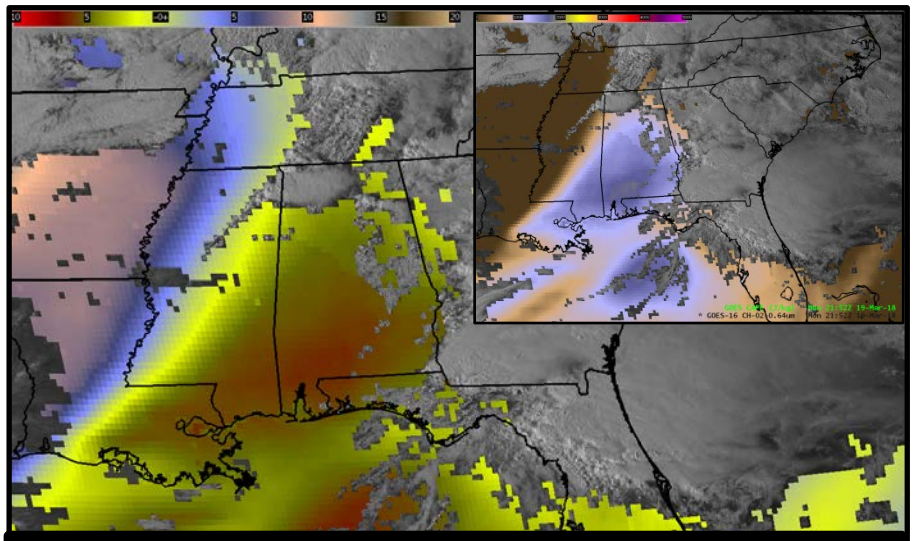
Derived Stability Indices

Quick Guide

Why are Derived Stability Indices Important?

Stability Indices can diagnose where convection might occur. The indices, especially their gradients and time tendencies, can give important information in the pre-convective environment. Five different stability indices are available: Total Totals, K, Showalter and Lifted Indices, and Convective Available Potential Energy (CAPE).



Lifted Index in clear skies with GOES ABI Band 2 (0.64 µm) overlain, 2152 UTC on 19 March 2018. (Inset: CAPE for the same time). Severe weather occurred over northern Alabama shortly after this image

Derived Stability Index Requirements

Domain	Temporal Refresh	Horizontal Resolution
Full Disk	Every 15 minutes	10 km
CONUS	Every 5 minutes	
Mesoscale	Every 1 minutes	

Impact on Operations

Primary Application: Diagnose where convection is likely to occur. Monitor destabilization in the atmosphere and identify gradients in stability along which convection might form.

Application: Some of these products can also tell you where the atmosphere is most stable.

Definition: CAPE and Lifted Index are computed using a mixed-layer parcel from the lowest 100 hPa in the atmosphere.

Limitations

Clear-sky only application: This is a clear-sky only product.

Limitation: The products are created by taking the GFS thermodynamic fields and adjusting them based on satellite observations of temperature and moisture. Satellite moisture observations have the biggest impact in the middle troposphere.

Limitation: The products have 10-km resolution vs. the 2-km resolution of ABI Infrared channels.

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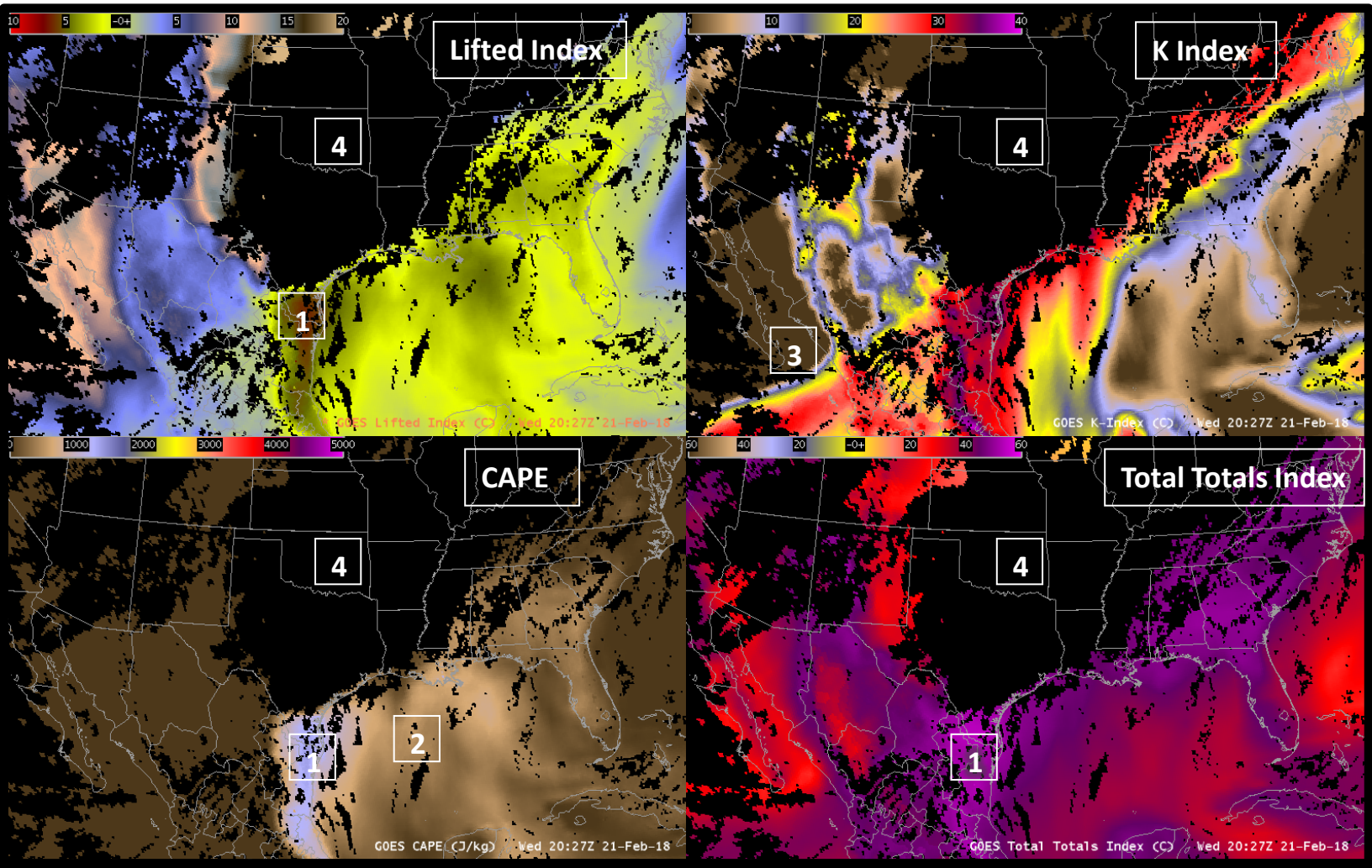


Lifted Index (Upper Left), K-Index (Upper Right), Convective Available Potential Energy (CAPE) (Lower Left), Total Totals Index (Lower Right), all at 2027 UTC on 21 February 2018

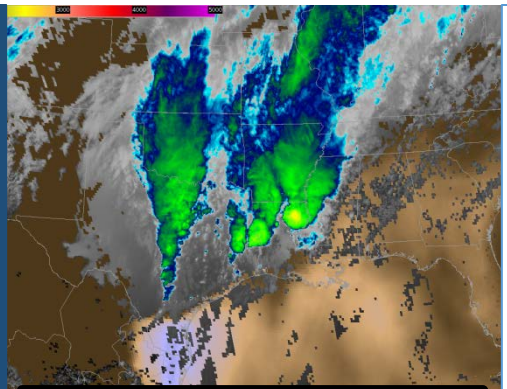
Image Interpretation

1 All of the Stability Indices diagnose the instability over south Texas

2 The Stability Indices diagnose differing amounts of instability over the Gulf of Mexico

3 Information about dry air in mid-levels is obvious in the K-Index

4 No values are present in regions of cloud



It can be helpful to put cloud information (in this case, 10.3 μm imagery) on top of the Stability Index (CAPE is shown above)

Resources

Total Totals Index
K-Index
Showalter Index
Lifted Index
CAPE
GOES-R.gov
Derived Stability Index ATBD

Hyperlinks do not work in AWIPS but they do work in VLab