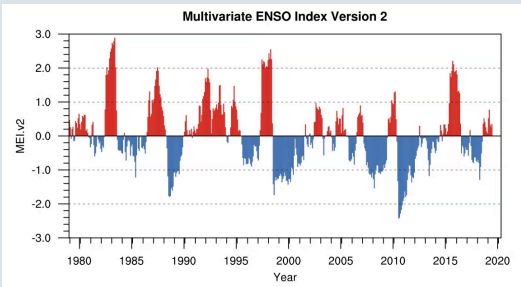


Multivariate ENSO Index



The Multivariate ENSO Index (MEI) is said to capture a more holistic representation of the atmospheric and oceanic anomalies that occur during ENSO events than do single-variables timeseries like the NinoSST indices. The MEIv2 is based on five variables from the tropical Pacific. These five variables are: sea-level pressure (P), zonal (U) and meridional (V)

components of the surface wind, sea surface temperature (S), and outgoing longwave radiation (OLR). The MEI is computed separately for each of twelve sliding bi-monthly seasons (Dec/Jan, Jan/Feb,..., Nov/Dec). After spatially filtering the individual fields into clusters (Wolter, 1987), the MEI is calculated as the first unrotated Principal Component (PC) of all six observed fields combined. This is accomplished by normalizing the total variance of each field first, and then performing the extraction of the first PC on the co-variance matrix of the combined fields (Wolter and Timlin, 1993). In order to keep the MEI comparable, all seasonal values are standardized with respect to each season and to the 1980–2018 reference period. (<http://www.esrl.noaa.gov/psd/enso/mei/>)

Key Strengths

- Captures a more holistic picture of the state of ENSO than do SST-based indices

Key Limitations

- As it requires several variables, extending it back in time is more challenging than for SST-based indices
- More complicated to calculate than single-variable SST indices

Data Access

Please cite data sources, following the data providers' instructions

Dataset DOIs

None

Hosted Climate Index Files

None

Data Access

1. [MEIv2 Index at NOAA](#)

Multivariate ENSO Index

Years of record
1979–01 to 2019–05

Dataset collections
[Climate Analysis Section \(CAS\)](#)
[Data Catalog](#)

Type of data product
[Climate Indices](#) | [ENSO](#) | [MEI](#)

Institution and PIs
Klaus Wolter , Mike Timlin

Usage Restrictions

None

Cite this page

Acknowledgement of any material taken from or knowledge gained from this page is appreciated:

National Center for Atmospheric Research Staff (Eds). Last modified 2022-11-07 "The Climate Data Guide: Multivariate ENSO Index." Retrieved from

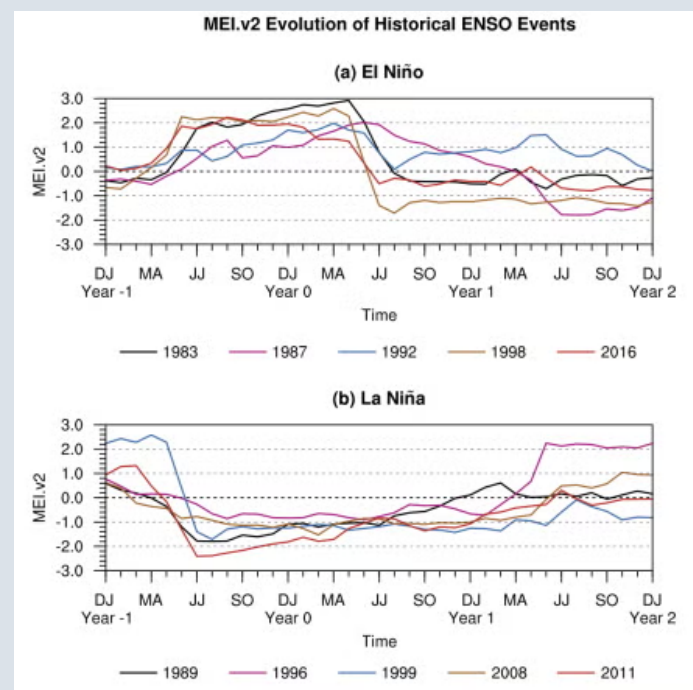
<https://climatedataguide.ucar.edu/climate-data/multivariate-enso-index> on 2025-03-07.

Citation of datasets is separate and should be done according to the data providers' instructions. If known to us, data citation instructions are given in the Data Access section, above.

Acknowledgement of the Climate Data Guide project is also appreciated:

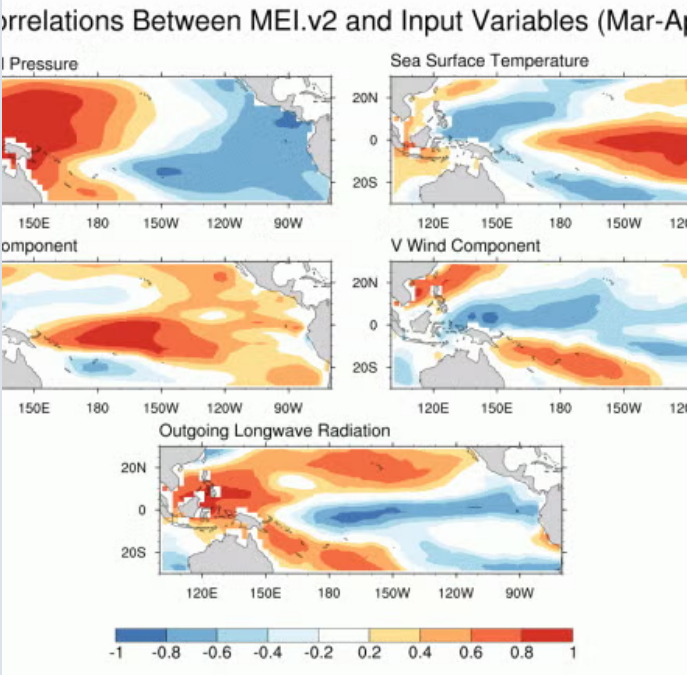
Schneider, D. P., C. Deser, J. Fasullo, and K. E. Trenberth, 2013: Climate Data Guide Spurs Discovery and Understanding. Eos Trans. AGU, 94, 121–122, <https://doi.org/10.1002/2013eo130001>

Key Figures



Evolution of ENSO events as indicated by the MEI. El Niño (top panel) and La Niña (bottom panel). Figure from <https://www.esrl.noaa.gov/psd/enso/mei/>

<https://www.esrl.noaa.gov/psd/enso/mei/>



Correlation coefficients between the MEI and its 5 input variables for the March–April season. Figure from <https://www.esrl.noaa.gov/psd/enso/mei/>

Other Information

Main Variables & Data Classification	▼
Metadata	▼
References	▼

Postal Address:
P.O. Box 3000, Boulder, CO 80307-3000

Shipping Address:
3090 Center Green Drive, Boulder, CO 80301



This material is based upon work supported by the NSF National Center for Atmospheric Research, a major facility sponsored by the U.S. National Science Foundation and managed by the University Corporation for Atmospheric Research. Any opinions, findings and conclusions or recommendations expressed in this material do not necessarily reflect the views of the [U.S. National Science Foundation](#).