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# CLIMATE & MODERN NEOTROPICAL PLANT DISTRIBUTIONS:
## Macroecological and Macroevolutionary Implications

**ABSTRACT**

The climatic correlates of plant family and genus distributions have macroecological and macroevolutionary significance. For instance, environmental preferences shared by individuals of a given family or genera are likely inherited, evolutionary characteristics. These preferences provide the basis for interpreting compositional changes in fossil pollen and fossil plant records. They also provide the basis for predicting ecosystem response to past and future climate change.
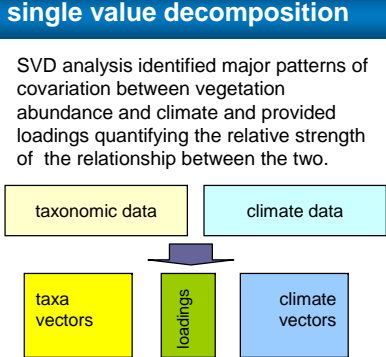
Here, the results of a multivariate SVD (Single Value Decomposition) analysis run counter to usual patterns in species richness, number of individuals, and vegetation type, all of which correlate most strongly with water availability. In contrast, the results suggest that although richness may be most strongly affected by precipitation, the taxonomic composition of tropical forests and the diversity of families are governed by *temperature*.

**DATA & ANALYSIS**

## taxonomic data

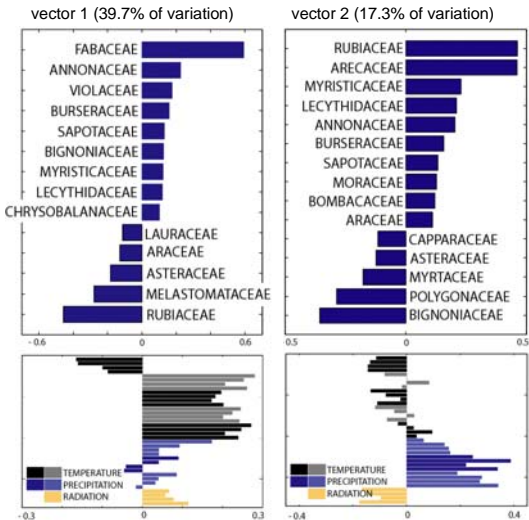| | |
|---|---|
| SITES | 122 |
| FAMILIES | 165 |
| GENERA | 1092 |
| SPECIES | 4693 |
| INDIVIDUALS | 44544 |

## climate data

**Diurnal temperature range (Su, F, W, Sp)**

**Minimum daily temperature (Su, F, W, Sp)**

**Maximum daily temperature (Su, F, W, Sp)**

**Mean daily temperature (Su, F, W, Sp)**

**Vapor pressure (Su, F, W, Sp)**

**Monthly precipitation (Su, F, W, Sp)**

**Daily precipitation (Su, F, W, Sp)**

**Number of wet days (Su, F, W, Sp)**
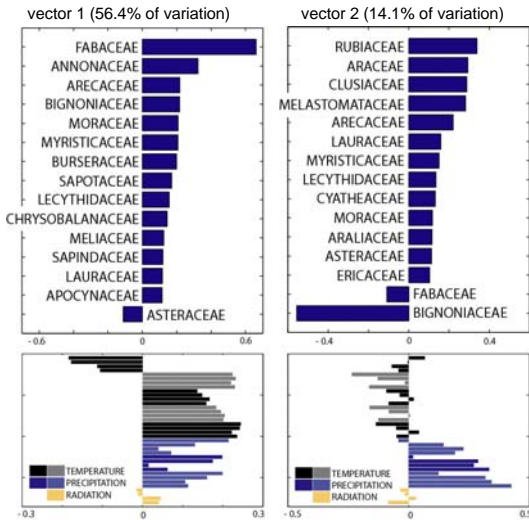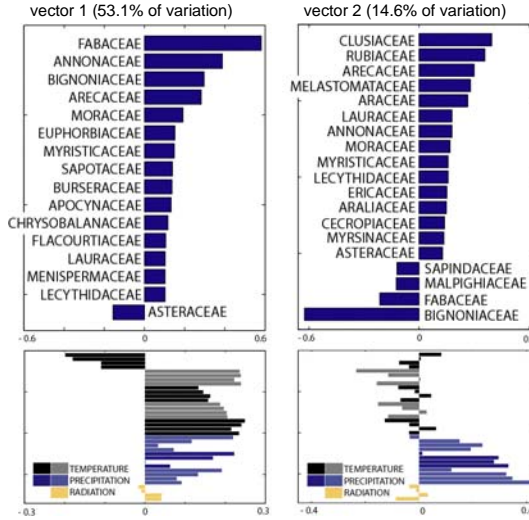
**Daily solar radiation (Su, F, W, Sp)**

## single value decomposition

SVD analysis identified major patterns of covariation between vegetation abundance and climate and provided loadings quantifying the relative strength of the relationship between the two.

taxonomic data → climate data

taxa vectors → loadings → climate vectors

**RESULTS**



Taxonomic data from Miss. Bot. Gardens. Climate data from iridl.ideo.columbia.edu/SOURCES/.NOAA/.NCDC/.DAILY/.STATION.cuf; geographical domain: 35S-25N, 95-30W; maximum possible daily time coverage: 1/1/1994-31/12/1999 (2191 days)