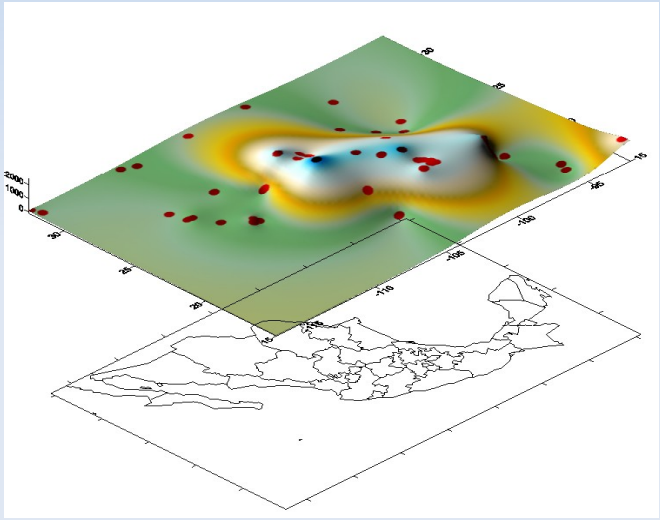
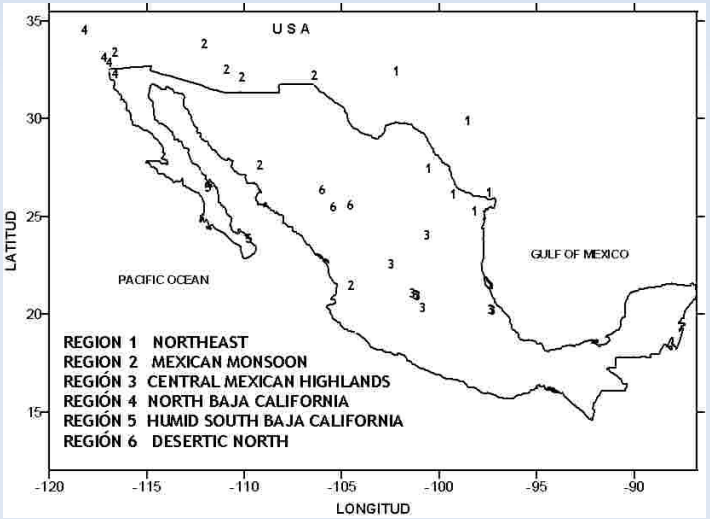
REGIONAL MODES OF VARIABILITY OF ANNUAL MEAN AIR TEMPERATURE OVER MEXICO

Salas-Flores, Marco A.[1]; Jones, P.D.[2]; Gay, C.[3]; Ritter, O.W.[3]; Patiño, R.[3]

THE NETWORK



THE REGIONALIZATION



Climatic regionalization applied to a set of 49 stations containing annual mean temperatura using Principal Component Analysis (PCA, Promax, kappa=2)

(1) Programa de Investigación en Cambio Climático (PINCC)
(2) Climatic Research Unit (CRU) of the University of East Anglia (UEA)
(3) Centro de Ciencias de la Atmósfera (CCA)

msalas@ceaqueretaro.gob.mx

DATA and METHODOLOGY

- Database of 49 stations containing annual Air Surface Mean Temperature (ASMT) from 1941 to 2001
- Data Quality Control (QC): climatological normals calculated by García (1988), basic statistical parameters computed and double-mass plots (Cluis, 1983) prepared for detecting spurious values
- Standardized annual anomalies (Jones and Hulme, 1996) for each time-series
- Time-gradients or annual First Difference (FD) series (Peterson et al., 1998) of the standardized anomalies determined
- Principal Component Analysis (PCA) applied
- S-Mode for regionalización and oblique rotated solution (Promax, kappa=2) (Richman, 1986),
- Scree Test (Cattell, 1966) combined with the Cliff Analogy (Wuensch, 2005) to determine the number of components
- Eigenvalues > 1.0, absolute loadings > 0.4 (White et al., 1991), Pattern Loading and Correlation Coefficients Matrices used in the study

CONCLUSIONS AND REMARKS

- PCA resulting climatic regionalization for the annual First Difference (FD) series of the standardized anomalies of the ASTM shows great consistency with the Mexican climatology (Mosiño and García, 1974; García, 1988) and clear geographic correspondence with the complex climatic variability of the country
- The groups of stations that vary coherently also have a great correspondence with their large-scale atmospheric controls
- One important finding of the present study is the important influence of the orography on the climate of Mexico
- Improvement of the spatial density of the network of instrumental data and to explore other seasonal alternatives are necessary for future research
- Finally, this study has led to an important advance for a meteorological parameter on which had been difficult to obtain clear climatic results

KEY REFERENCES

- *Cattell R.B.* 1966 The Scree Test for the Number of Factors.
- *Cluis D.A.* 1983. Visual techniques for the detection of water quality trends: Double-mass curves and CUSUM functions.
- *García E. 1988*. Modificaciones al sistema de clasificación climática de Köppen.
- *Jones P.D., Hulme M.* 1996. Calculating Regional Climatic Time Series for Temperature and Precipitation: methods and illustrations.
- *Peterson T.C., Karl T.R., Jamason P.F., Knight R., Easterling D.R.* 1998. First Difference Method: Maximizing station density for the calculation of long-term global temperature change.
- *Richman, M.B.* 1986. Review article: rotation of principal components.
- *Salas-Flores, M.A.* ASSESSING THE VARIABILITY OF LONG-TERM MEXICAN INSTRUMENTAL RECORDS AND THE ENSO MODULATING FORCE. http://www.cru.uea.ac.uk/cru/pubs/thesis/2008-salas/