Ecología Austral 8:85-101, 1998
Asociación Argentina de Ecología

The climate of Patagonia: general patterns and controls on biotic processes

José M. Paruelo [1], Adriana Beltrán [2], Esteban Jobbágy [1,3], Osvaldo E. Sala [1] and Rodolfo A. Golluscio [1]
1 IFEVA y Cátedra de Ecología, Facultad de Agronomía, UBA. Av. San Martín 4453, 1417 Buenos Aires, Argentina. E-mail: paruelo@ifeva.edu.ar. 2 Cátedra de Climatología y Fenología Agrícola, Facultad de Agronomía, UBA. Av. San Martín 4453, 1417 Buenos Aires, Argentina. 3 Present address: Department of Botany, Duke University, Durham, NC 27708, USA.

Abstract. *In this article we review the main characteristics of the Patagonian climate, the spatial and temporal patterns of the most important climatic variables, and the influence of climate on ecosystem processes. The winter distribution of precipitation determines an asynchrony between the wet and the growing season in Patagonia. The amount of water that can be transferred from the wet season to the growing season depends mainly on the physical characteristics of the soil. In the semiarid steppe of Chubut, drainage accounted for 10% of annual precipitation. Winter distribution of precipitation determines also an asynchronic dynamics of evaporation and transpiration fluxes. The ENSO phenomenon have a significant impact on regional precipitation. In central-west Patagonia, spring precipitation (September to November) was lower than normal during La Niña events and greater than normal during El Niño events. From December to February the opposite pattern can be observed: higher than normal precipitation during La Niña events and lower than normal precipitation during El Niño events. The impact of this phenomenon on the seasonal temperature was not as clear as for precipitation. We did not detect any temporal trends in annual precipitation for the period 1961-1996. The phenology of carbon gains is quite homogeneous in Patagonia. Most of the region showed a peak of production in November, when, simultaneously, water availability and temperature are high. Toward the west, production peaked later (December). Deciduous forests showed the peak in January and February.*

Introduction

Previous attempt to describe the climate of Patagonia focused in a particular climatic factor (i.e., precipitation, Barros et al. 1979) or provided a general overview of atmospheric processes and patterns (Prohaska 1976, Soriano 1983). In this article we took a more comprehensive approach. We described the general characteristics of the Patagonian climate and the spatial and temporal patterns of the main climatic variables (precipitation, temperature, wind, humidity and radiation). We devoted special attention to the influence of climate on ecosystem processes.

Characterizing the climate of Patagonia from an ecological perspective has a major shortcoming: the availability of data. The density of official meteorological stations is extremely low (aprox. 30000 km^2/station before 1950 and 40000 km^2 in 1997) and they are mainly concentrated in coastal areas. In addition to the official data we compiled climatic data (mainly precipitation) from different sources (private ranches, experimental stations, global databases, provincial networks) reaching an aproximate density of one station every 12000 km^2 and a better spatial coverage.

The article is divided in two sections, the first is devoted to the general characteristics of the Patagonian climate. We summarized most of the published information on Patagonian climate at different spatial scales. Special attention was devoted to the analysis of temporal trends of annual