

>> SYNTHESIZE MOUNTAINS OF KNOWLEDGE <<

Submitted Abstract

ID IMC22-FSAbstr- 782

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Country	France
Region	Western Europe
Title	Acceleration Of Subalpine Forest Limit Upward Shift And Densification In The French Pyrenees.
Keywords	Pyrenees, Subalpine Forest Limit Shift, Forest Expansion, Forest Densification, Global Change
Type	List Of Focus Session
Focus Session ID	05

Abstract

The upper subalpine forest limit is characteristic of mountain landscapes. This limit is influenced by global change. We studied subalpine forest in its extent with its upper limit shift, and in its structure with the transition from closed to open forest. The studied period goes from the forest minimum to its current maximum. We focused on the French Pyrenees because it is the first digitized area in the map which dates back to 1840 ("Etat-Major" map). We used two other maps from 1996 and 2010, made by the National Forest Inventory according to aerial photographs interpretation. We estimated the altitude of open and closed subalpine forest limits for each municipal district and each date. We then calculated the difference in altitude between these dates. We observed a positive altitudinal shift of open forest limit between 1840 and 1996 in most of the municipal districts (84 %), and of open and closed forest limits after 1996 (78 % and 88 % of municipal districts). On average, the open forest limit raised of about 180 m between 1840 and 1996, and open and closed forest limits raised of about 50 m and 100 m respectively after 1996. Hence, the open forest limit raised on average of 13 m per decade between 1840 and 1996 and of 35 m per decade after 1996, while the closed forest limit raised on average of 65 m per decade after 1996. Our study shows an acceleration of upward shift and densification. Since land abandonment have been constant during the studied period, this acceleration may be due to climate change acceleration. Moreover, these results suggest a need to consider both subalpine forest upward shift and densification in studies quantifying impacts of forest expansion on carbon cycle.