



NPP Grassland: Media Luna, Argentina, 1981-1983, R1

Get Data

Revision Date: November 2, 2014

Summary

This data set contains two ASCII files (.txt format). One file provides monthly above-ground live biomass, dead matter, and litter data and daily above-ground net primary productivity (ANPP) data for a temperate grassland steppe at the Media Luna Ranch in Patagonia, Argentina (45.60 S, 71.42 W, Elevation 630 m) for the period May 1981 to March 1983. The second file contains climate data recorded at Media Luna Ranch from 1981 through 1985.

Productivity of the steppe was monitored at monthly or bi-monthly intervals during two growing seasons. The ANPP measurement presented here is the sum of the increase in above-ground live biomass, dead matter, and litter. ANPP was estimated to be 0.00-0.15 g/m²/day in winter months (May-September) and 0.22-0.94 g/m²/day in the warmer months. Annual ANPP was estimated to be 35 g/m²/year.

The study site is a 2.5-hectare enclosure situated on the Rio Mayo terraces. The steppe represents one of the most important grassland areas of Patagonia which occupy a narrow belt in the foothills of the Andes. The region has been over-grazed by introduced livestock since the early 1900s, and is currently used for sheep production.

Revision Notes: Only the documentation for this data set has been modified. The data files have been checked for accuracy and are identical to those originally published in 1998.

Additional Documentation

The NPP data collection contains field measurements of biomass, estimated NPP, and climate data for terrestrial grassland, tropical forest, temperate forest, boreal forest, and tundra sites worldwide. Data were compiled from the published literature for intensively studied and well-documented individual field sites and from a number of previously compiled multi-site, multi-biome data sets of georeferenced NPP estimates. The principal compilation effort (Olson et al., 2001) was sponsored by NASA's Terrestrial Ecology Program. For more information, please visit the NPP web site at http://daac.ornl.gov/NPP/npp_home.html.



Figure 1. General view of the Media Luna Ranch, looking South towards Pampa del Chalia (The habitat of *Festuca pallescens* is clearly visible in the foreground. Photograph taken 6th November 1990).

Data Citation

Cite this data set as follows:

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1. Data Set Overview:

Project: Net Primary Productivity (NPP)

2. Data Description

Site: Media Luna, Chubut, Argentina

Site Boundaries: (All latitude and longitude given in decimal degrees)

Site (Region)	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude	Elevation (m)
Media Luna, Chubut, Argentina	71.42	71.42	45.607	45.60	630

Spatial Resolution

The study area is a 2.5-hectare enclosure. Circular sampling plots were 1-m in diameter

Temporal Coverage

Biomass measurements were made from 1981/05/21 through 1983/03/20. Climate data are available from 1981/01/01 through 1983/12/31.

Temporal Resolution

Biomass measurements were made monthly or bi-monthly. ANPP estimates are based on plant dry matter accumulation, expressed as g/m²/day. Climate data are expressed as monthly and annual precipitation amounts (mm) and monthly and annual average maximum/minimum temperature (C). Monthly and annual climatic means are provided for the 1981-1983 period.

FILE NAME	TEMPORAL COVERAGE	FILE CONTENTS
mdl_npp.txt	1981/05/21 - 1983/03/20	Monthly above-ground live biomass, dead biomass, and litter data and daily ANPP data for the steppe grassland at Media Luna Ranch, Argentina
mdl_cli.txt	1981/01/01 - 1985/12/31	Monthly and annual climate data from a weather station at Media Luna Ranch, Argentina

NPP data: Biomass and productivity estimates for the Media Luna site are provided in one ASCII file (.txt format). The first 18 lines are metadata; data records begin on line 19. The variable values are delimited by semicolons. The value -999.9 is used to denote missing values. Above-ground biomass values and ANPP values are reported as g/m² and g/m²/day (dry matter weight), respectively.

Table 2. Column headings in NPP file

COLUMN HEADING	DEFINITION	UNITS
Site	Site where data were gathered (code refers to site identification)	Text
Treatmt	Long term management of site (code refers to treatment described in metadata in data file)	Text
Year	Year in which data were collected	Numeric
Mn	Month in which data were collected	
Dy	Day on which data were collected	
Jdate	Date in Julian year	
Tyear	Date in decimal year (year plus the Julian date divided by 365)	
AGbiomass	Monthly above-ground living biomass	g/m ²
Newdead	Monthly above-ground standing recent dead matter	
Olddead	Monthly above-ground standing old dead matter	
litter	Monthly above-ground litter	
AGtotclip	Monthly above-ground standing plant biomass (living plus recent and old dead material)	
AGtotmatter	Monthly total above-ground standing biomass (living + dead material + litter)	g/m ² /d
ANPP	Daily average above-ground net primary production by month	

Notes: All data values are from Defosse et al. (1990).

Sample NPP Data Record

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Site; Trtmnt; Yr; Mon; Day; Jdate; Tyear; AGbiomass; Newdead; Olddead; litter; AGtotclip; AGtotmatter; ANPP
mdl; none; 1981; 5; 21; 142; 1981.389; 29.54; 82.87; 174.82; 59.51; 287.23; 346.74; -999.99
mdl; none; 1981; 8; 11; 224; 1981.614; 15.59; 65.15; 132.76; 57.07; 213.50; 270.57; 0.00
mdl; none; 1981; 9; 16; 260; 1981.712; 18.11; 56.50; 123.79; 51.22; 198.40; 249.62; 0.08
...
```

Climate Data. The climate data set is an ASCII file (.txt format). The first 18 lines are metadata; data records begin on line 19. The variable values are delimited by semicolons. There are no missing values.

COLUMN HEADINGS	DEFINITION
Site	Unique 3-character code for each site based on the first three consonants in the site name (e.g., mdl for Media Luna)

Temp (Temporal)	<p>Indicates whether the values in that row are either long-term (i.e, multi-year) or annual data for the specified parameter.</p> <p>For multi-year, the values are: mean=mean values (monthly and annual) calculated for the years of data as noted in the documentation numb=number of years of data included in a reported mean value stdv=standard deviation of a mean value</p> <p>Annual data: 19XX=monthly and annual parameter values for the specified year (e.g., 1972)</p>
Parm	<p>Parameter, indicates the meteorological data reported in that row. prec-total precipitation for the month or year tmax=maximum temperature for the month or year reported in degrees C tmin=minimum temperature for the month or year reported in degrees C</p>

Description of specific Temp and Parm data values:

Long-term data:

site;mean;prec;

Multi-year mean of total precipitation for each month [Jan, Feb, Mar, ..., Dec] and mean of total annual precipitation across all years [Year] (mm)

site;mean;tmax;

Multi-year mean of maximum temperature for each month [Jan, Feb, Mar, ..., Dec] and mean of annual maximum temperature across all years [Year] (C)

site;mean;tmin;

Multi-year mean of minimum temperature for each month [Jan, Feb, Mar, ..., Dec] and mean of annual minimum temperature across all years [Year] (C)

... site; numb and stdv; repeat for prec, tmax, and tmin;

Annual data:

site;19XX;prec;

Total precipitation for each month [Jan, Feb, Mar,.....Dec] and total precipitation for the year 19XX [Year] (mm)

site;19XX;tmax;

Maximum temperature for each month [Jan, Feb, Mar,.....Dec] and maximum for the year 19XX [Year] (C)

site;19XX;tmin;

Minimum temperature for each month [Jan, Feb, Mar,.....Dec] and minimum for the year 19XX [Year] (C)

... site;19XX;(prec, tmax, and tmin); repeat for reported years.

Annual data missing value note: If a monthly parm value is missing, the parm value for [Year] is also set to missing (-999.9).

Sample Climate Data Record

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Site;Temp;Parm; Jan; Feb; Mar; Apr; May; Jun; Jul; Aug; Sep; Oct; Nov; Dec; Year
mdl ;mean;prec; 15.90; 13.90; 17.84; 22.16; 57.24; 38.34; 33.24; 18.92; 39.48; 28.78; 20.00; 32.68;338.48;
mdl ;mean;tmax; 18.08; 16.46; 14.96; 11.76; 6.32; 2.56; 2.06; 6.18; 8.88; 11.30; 14.66; 16.66; 18.34;
mdl ;mean;tmin; 3.90; 2.88; 1.00; -1.20; -2.88; -7.02; -6.76; -3.92; -2.94; -1.24; 0.86; 3.06; -7.38;
mdl ;numb;prec; 5; 5; 5; 5; 5; 5; 5; 5; 5; 5; 5; 5; 5; 5;
mdl ;numb;tmax; 5; 5; 5; 5; 5; 5; 5; 5; 5; 5; 5; 5; 5; 5;
mdl ;numb;tmin; 5; 5; 5; 5; 5; 5; 5; 5; 5; 5; 5; 5; 5; 5;
mdl ;stdv;prec; 13.57; 10.83; 12.69; 30.14; 39.48; 22.27; 28.10; 7.06; 19.62; 17.57; 8.58; 47.74;128.45;
mdl ;stdv;tmax; 1.44; 1.07; 1.03; 1.42; 1.82; 2.56; 3.12; 1.02; 1.43; 1.25; 1.39; 1.22; 1.15;
mdl ;1981;prec; 37.10; 20.50; 11.40; 3.40; 99.30; 37.00; 25.20; 19.00; 60.30; 7.00; 20.10; 1.80;342.10;
mdl ;1981;tmax; 16.80; 16.20; 15.20; 12.30; 5.60; 4.70; 4.90; 7.00; 6.80; 12.50; 13.00; 15.00; 16.80;
mdl ;1981;tmin; 4.20; 3.20; 1.20; -2.00; -3.70; -3.40; -4.40; -3.40; -4.20; -1.50; 0.40; 1.90; -4.40;
...
Where,
mean = mean based on all years
numb = number of years
stdv = standard deviation based on all years
Parm (parameter):
prec = precipitation for month or year (mm)
    
```

tmax = mean maximum temperature for month or year (C)

tmin = mean minimum temperature for month or year (C)

3. Data Application and Derivation

The accumulation of biomass, or NPP, is the net gain of carbon by photosynthesis that remains after plant respiration. While there are many fates for this carbon, the productivity measurement presented here is the sum of the increase in above-ground live biomass, dead matter, and litter. These are considered the major components of ANPP. The accumulation of biomass, or NPP, is the net gain of carbon by photosynthesis that remains after plant respiration. While there are many fates for this carbon, the productivity measurement presented here is the sum of the increase in above-ground live biomass, dead matter, and litter. These are considered the major components of ANPP.

The grassland monthly biomass dynamics data for the Media Luna grassland site are provided for comparison with models and estimation of NPP. Climate data are provided for use in driving ecosystem/NPP models.

The results of this study contribute to the knowledge of seasonal above-ground biomass dynamics and forage availability in this grassland in Patagonia and are part of the data necessary for proper range management planning. Prior to this study, range management in Patagonia had been carried out based only on empirical observations. These results quantify the production of this grassland and permit the designing of appropriate grazing schedules and range management planning by balancing the number of grazing animals to the forage resources available.

4. Quality Assessment

The number, shape, and size of the plots was assessed in exploratory trials to produce phytomass data of the main species within 10% of error of the mean at 5% level according to the Milner and Hughes (1970) formula.

5. Data Acquisition Materials and Methods

Site Information

The study site is located on a temperate grassland steppe at the Media Luna Ranch (45.60 S, 71.42 W, Elevation 630 m) in Patagonia, Argentina. The grassland steppe is vegetated by grasses and shrubs and is classified as modified Bailey ecoregion temperate dry steppe, #331/332. The study site is a 2.5-hectare enclosure situated on the Rio Mayo terraces. It represents one of the most important grassland areas of Patagonia which occupy a narrow belt in the foothills of the Andes. The region has been over-grazed by introduced livestock since the early 1900s, and is currently used for sheep production.

The dominant native perennial graminoids species is the tussock grass *Festuca pallescens*, which accounts for 95% of the above-ground live biomass. *F. pallescens* is considered to be one of the best Patagonian forage species because of its palatability and preference by sheep. Less abundant forage grasses include *Poa ligularis*, *Bromus setifolius*, *Hordeum comosum*, *Rytidosperma virescens*, and *Koeleria vurilochensis*. Shrubs and forbs represent less than 2% of the total annual biomass. Soil type is typic cryoborols (sandy, pH about 6.0).

This region has been classified climatologically as an arid temperate desert and has many climatic and vegetational characteristics similar to some western North American rangelands. Climate data for the grassland are available from a weather station at the study site, at an elevation of 630 m. The area is characterized by a cold and wet winter (June to September) and a warm and dry summer (December to March). The growing season extends from September to April, with moist spring and fall periods interrupted by midsummer drought. The mean annual precipitation (1981-1985) was 338.48 mm, with over half falling during winter and early spring as either rain or snow. Mean annual temperature is 4.5 degrees C. July (-3.7 degrees C) and January (11.7 degrees C) are the coldest and hottest months, respectively. There is no frost free period, and strong westerly winds blow continuously throughout the year.

Methods

Aerial phytomass and litter dynamics of a grassland steppe in Patagonia, Argentina, were studied at either monthly or bi-monthly intervals for 2 years. A 2.5-ha enclosure was constructed at Media Luna Ranch in March 1981 (late summer in southern hemisphere) to exclude grazing by large herbivores (sheep, cattle, and horses). Aerial phytomass and litter samples were collected at monthly or bi-monthly intervals within the enclosure in 15 circular plots that were 1 m in diameter. The number, shape, and size of the plots was assessed in exploratory trials to produce phytomass data of the main species within 10% of error of the mean at 5% level according to the Milner and Hughes (1970) formula.

The sampling procedure followed the technique proposed by McIntyre (1951) using three ranked sets per plot to be harvested. Phytomass was harvested at the soil surface and litter collected. Phytomass of each forage grass species was separated by hand into green (photosynthetically active tissues), dry (tissues completely dry, yellow colored), and old dead (tissues deteriorated, gray colored). Each phytomass category was then oven-dried at 70 degrees C to constant weight and weighed.

Cylindrical soil samples of 4-cm in diameter were collected inside the harvested plots in 3 layers (0 to 20, 20 to 40, and 40 to 60 cm soil depth) to fully represent the soil profile explored by the root system of *Festuca pallescens* in that area. These samples were also used for estimating soil water potential of each layer. Soil data are presented in the literature.

Climate data

The climate data accompanying this NPP data set was compiled from daily observations of Tmax, Tmin, and precip amount.

For a given month, the maximum value of the daily Tmax for that month and the minimum value of the Tmin for that month is provided. For the year, the maximum value of the monthly Tmax is the annual Tmax and for the year the minimum value of the monthly Tmin values is the annual Tmin. Daily

precipitation amount is summed to yield a monthly precipitation amount and the monthly precipitation is summed to provide an annual precipitation amount.

The multi-year mean monthly Tmax is the average of the Tmax values for that month for each year of the record. For example the mean monthly Tmax for April is the mean of each April's Tmax for the observation period of record. Mean monthly Tmin and Mean monthly precip amount are calculated similarly.

6. Data Access:

This data is available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

Data Archive Center:

Contact for Data Center Access Information:

E-mail: uso@daac.ornl.gov

Telephone: +1 (865) 241-3952

7. References:

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