Flujos de dióxido de carbono y agua en tres sitios de Argentina

Monitoreo de Gases con Efecto Invernadero

GABRIELA POSSE

Cómo estimo el flujo de CO_2?

$$Fc = (m\ s^{-1}) \times (mg\ m^{-3}) = mg\ m^{-2}\ s^{-1}$$

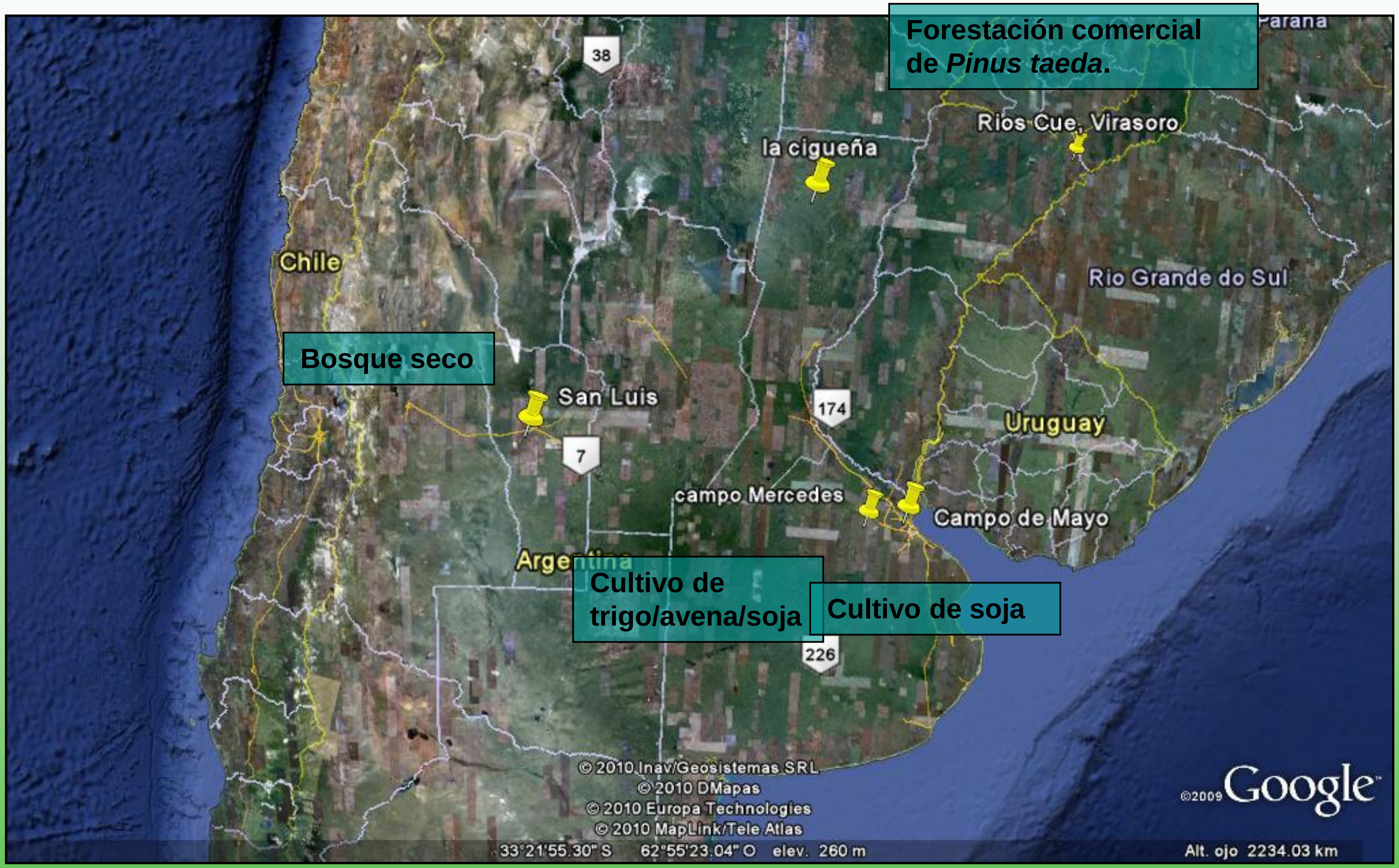
Sonic Anemometer

- Uses difference in time it takes for an acoustic signal to travel the same path in opposite directions
- ATI, Campbell, Metek, R.M. Young, Koshin-Denki, Gill Instruments, etc.

Gas Analyzer

- Non-dispersive infrared (NDIR) sensor
- Broadband infrared beam transmitted through cell, with absorption band of 4.26 µm for CO_2 & 2.59 µm for H_2O
- Beam is modulated to distinguish it from the background using a chopper wheel

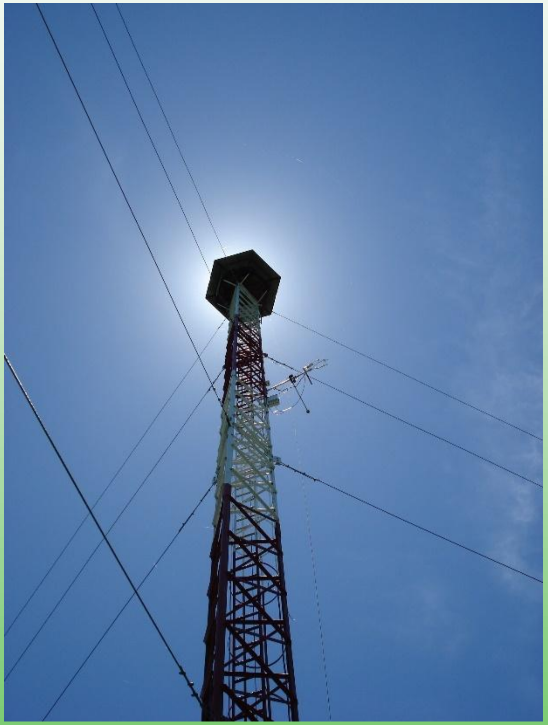
Ubicación en Argentina



Forestación comercial de Pinus taeda

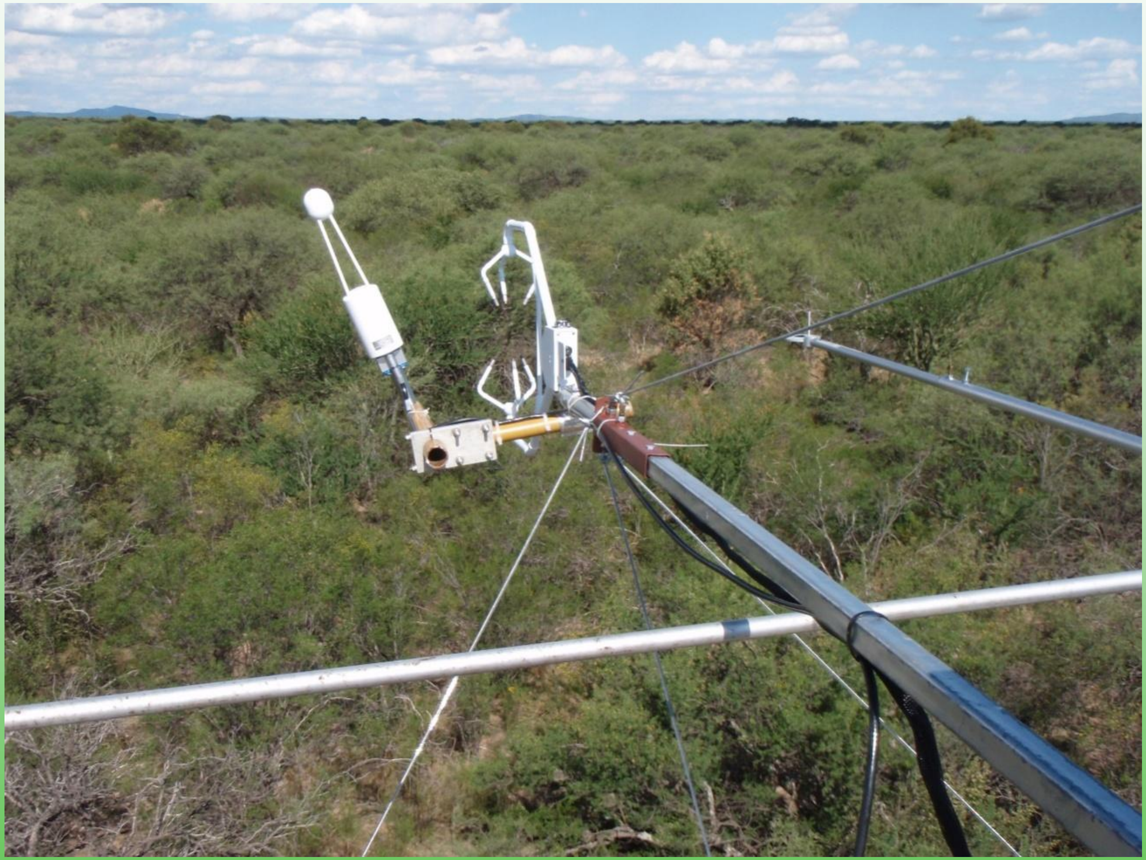
Ubicación: -28° 14' 22 .2" S; - 56° 11' 19.11" W

Edad: 7 años



Bosque seco abierto, San Luis

Ubicación: - 33°27'53.43´´; -66°27'35.22''



Especies dominantes: *Prosopis flexuosa* y Aspidosperma sp.
Estrato arbustivo dominado por Larrea, Lycium y Condalia.
Estrato herbáceo:*Aristida mendocina*, *Trichloris crinita* y *Pappophorum caespitosum*.

Lotes agrícolas

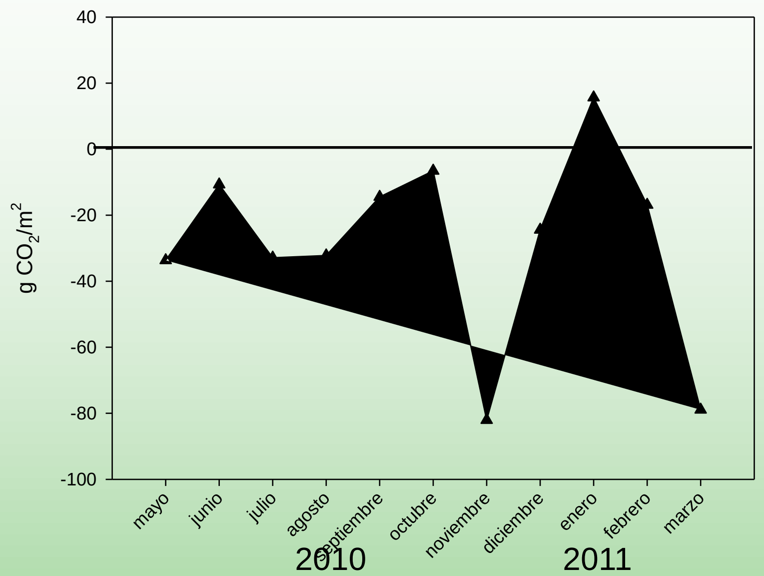
Campo de Mayo

Mercedes

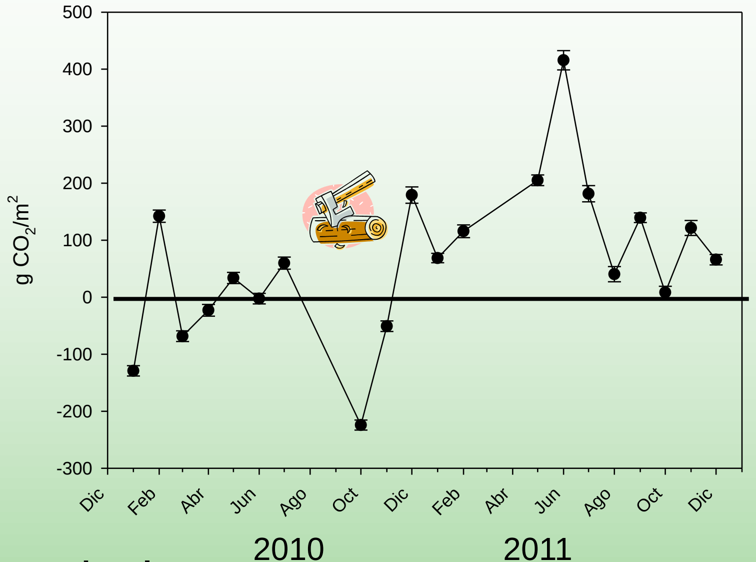
Carlos Casares

Patrones de intercambio de C

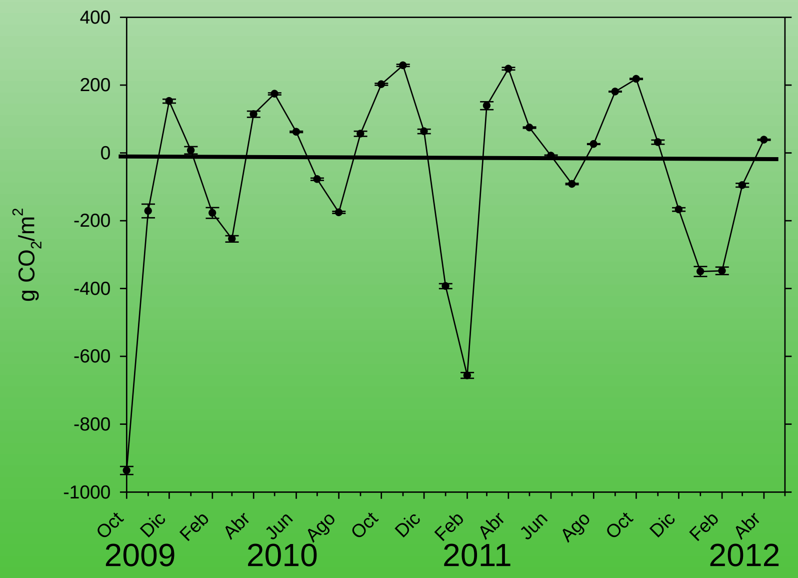
bosque seco



forestación



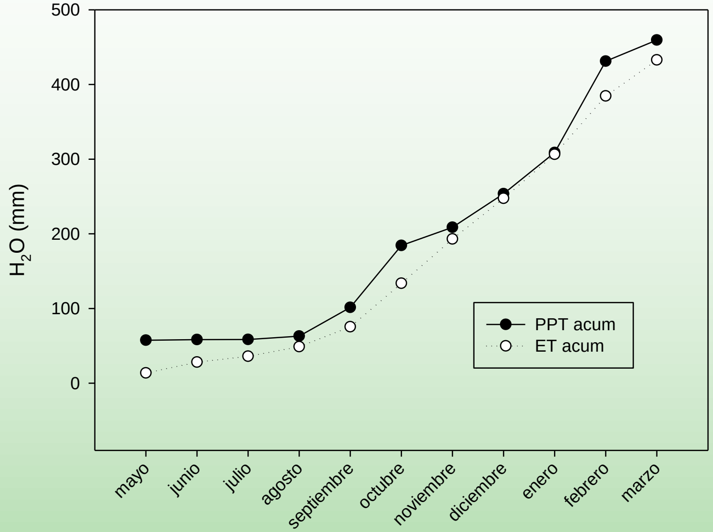
agricultura



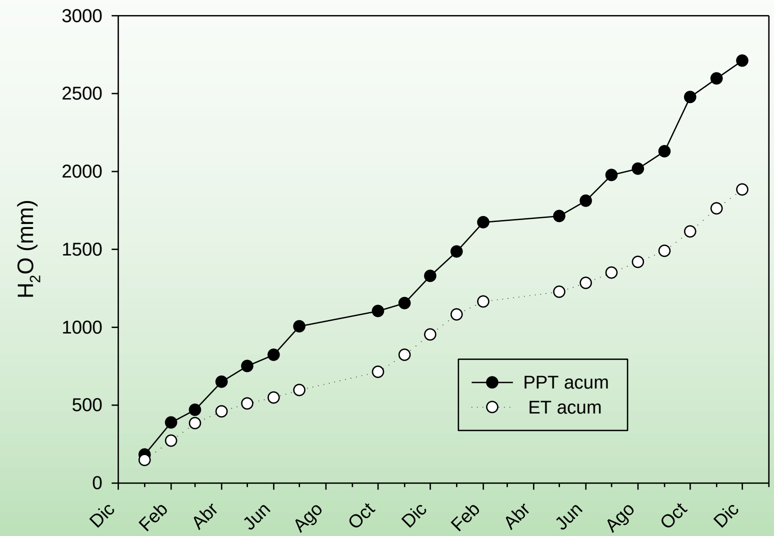
Dra. Gabriela Posse

Pérdidas de agua- relación PPT

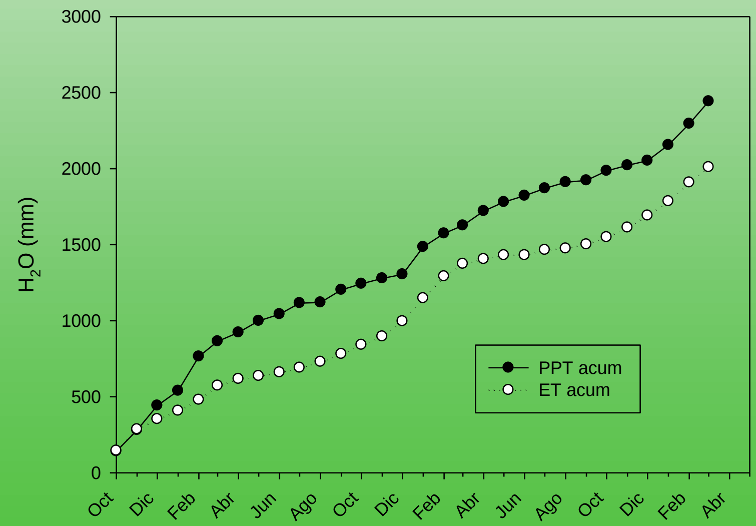
bosque seco



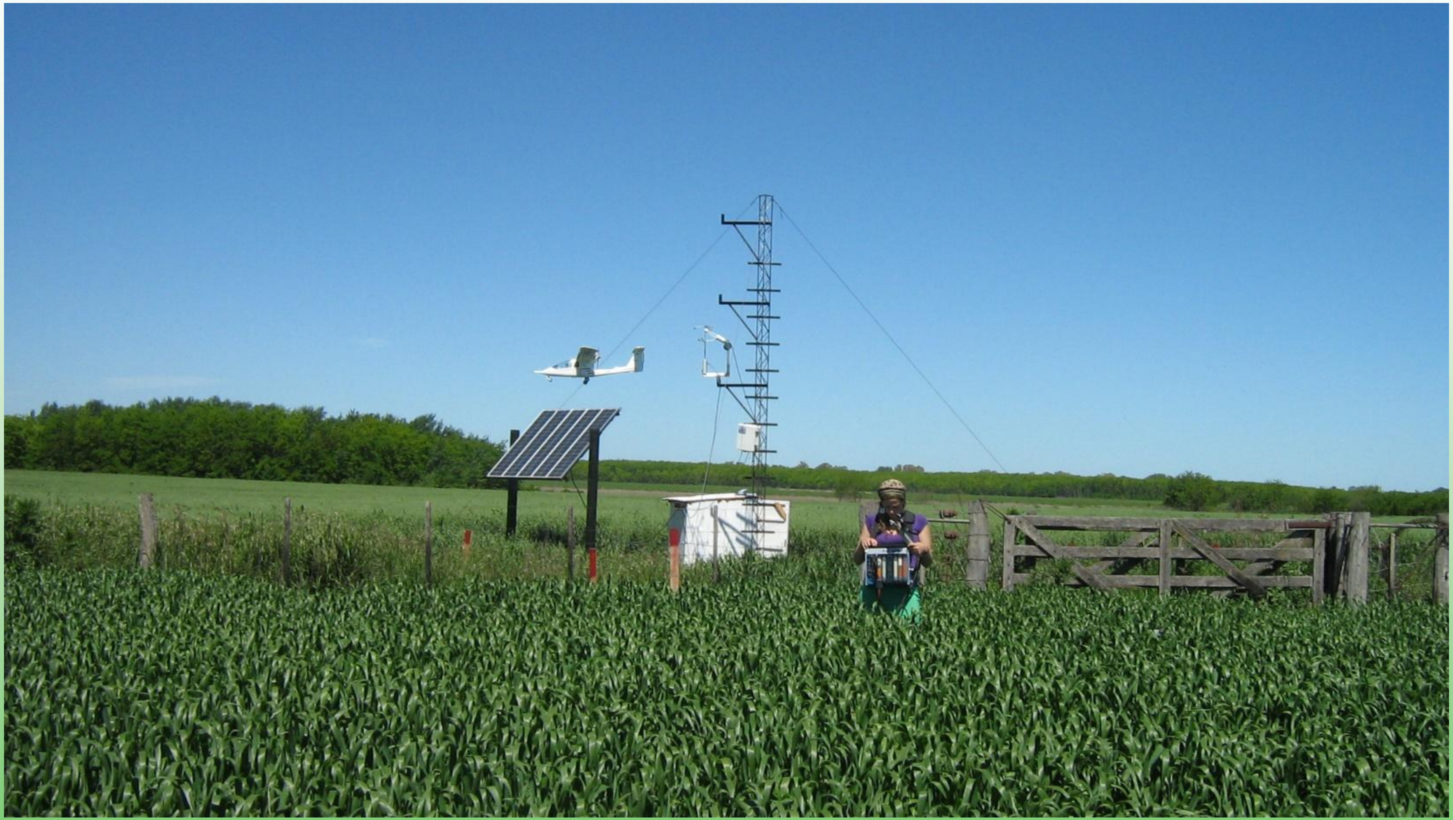
forestación



agricultura



Integración de distintas escalas



Interacción con Graciela Ulke →

INTERCAMBIOS DE MASA Y ENERGÍA ENTRE LA VEGETACIÓN Y LA CAPA LÍMITE ATMOSFÉRICA EN DOS ECOSISTEMAS DE ARGENTINA.

Tesis presentada para optar al título de Magister de la Universidad de Buenos Aires, Área Recursos Naturales

Natalia Noemí Gattinoni

2014

Evaluación del modelo BRAMS-4.2.
resolución de 2.5k

Reprodujeron satisfactoriamente las variaciones diurnas observadas de flujos de calor latente, calor sensible, radiación neta, temperatura y viento

↓

parametrización de superficie JULES (Joint UK Land Environment Simulator) que incluye el modelado del ciclo de CO_2.

52 *Int. J. Environment and Pollution, Vol. 58, Nos. 1/2, 2015*

Analysis and modelling of turbulent fluxes in two different ecosystems in Argentina

Ana Graciela Ulke*

Facultad de Ciencias Exactas y Naturales,
Departamento de Ciencias de la Atmósfera y los Océanos,
Universidad de Buenos Aires,
C1428EGA, Buenos Aires, Argentina
and
Unidad Mixta Internacional,
Instituto Franco Argentino sobre Estudios de Clima y sus Impactos,
(IFAECI)/CNRS, Argentina
Email: ulke@at.fcen.uba.ar
*Corresponding author

Natalia Noemí Gattinoni and Gabriela Posse

Instituto de Clima y Agua, INTA,
N. Repetto y los Reseros s/n, Hurlingham,
B1686, Buenos Aires, Argentina
Email: gattinoni.natalia@inta.gob.ar
Email: posse.gabriela@inta.gob.ar

Abstract: Turbulence data measured with fast response instruments at two sites with distinct conditions were available. The ability of a mesoscale model in the simulation of turbulent fluxes and boundary layer height was assessed in case studies covering periods in the Southern Hemisphere summer and winter. The energy apportionment at both locations was properly reproduced. In summer, at the site with native forest, the sensible heat flux was well estimated and the latent heat flux was underestimated. At the other site (commercial plantation) the sensible heat flux was properly represented and the latent heat flux was slightly overestimated. In winter, the best results were obtained at the implanted forest site. The performance of the model at the native forest site was very satisfactory when homogeneous initial soil moisture was considered. A model intercomparison between the boundary layer height obtained with an analytical model and the mesoscale model showed the influence of data and methodologies used in the two approaches.

Keywords: turbulent fluxes; mixing height; mesoscale model; analytical model.

Reference to this paper should be made as follows: Ulke, A.G., Gattinoni, N.N. and Posse, G. (2015) 'Analysis and modelling of turbulent fluxes in two different ecosystems in Argentina', *Int. J. Environment and Pollution*, Vol. 58, Nos. 1/2, pp.52–62.

iForest
Biogeosciences and Forestry

Research Article
doi: 10.3832/ifor1815-009
(Early View)

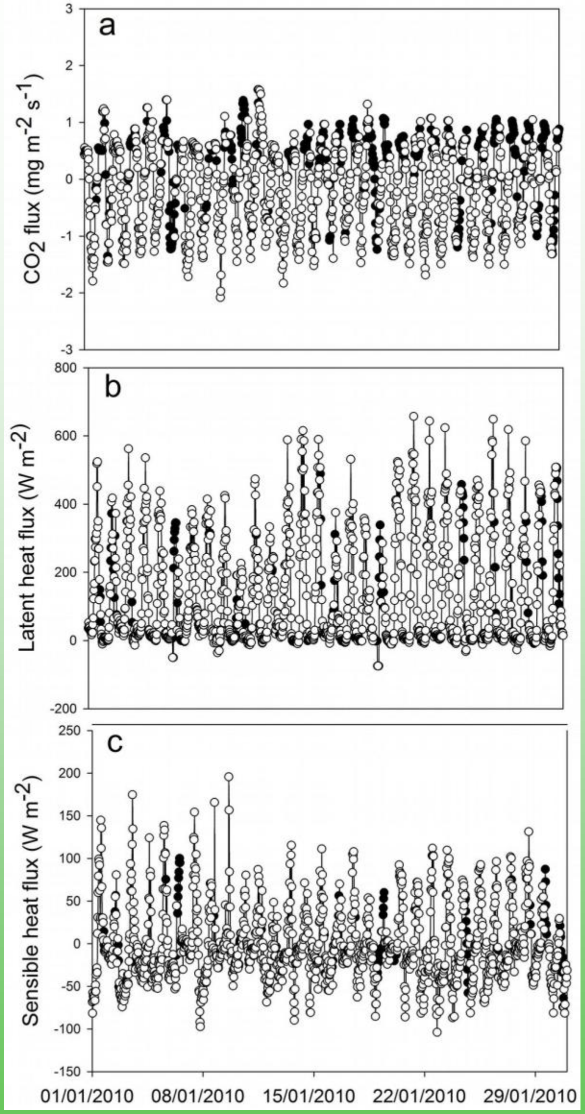
Carbon and water vapor balance in a subtropical pine plantation

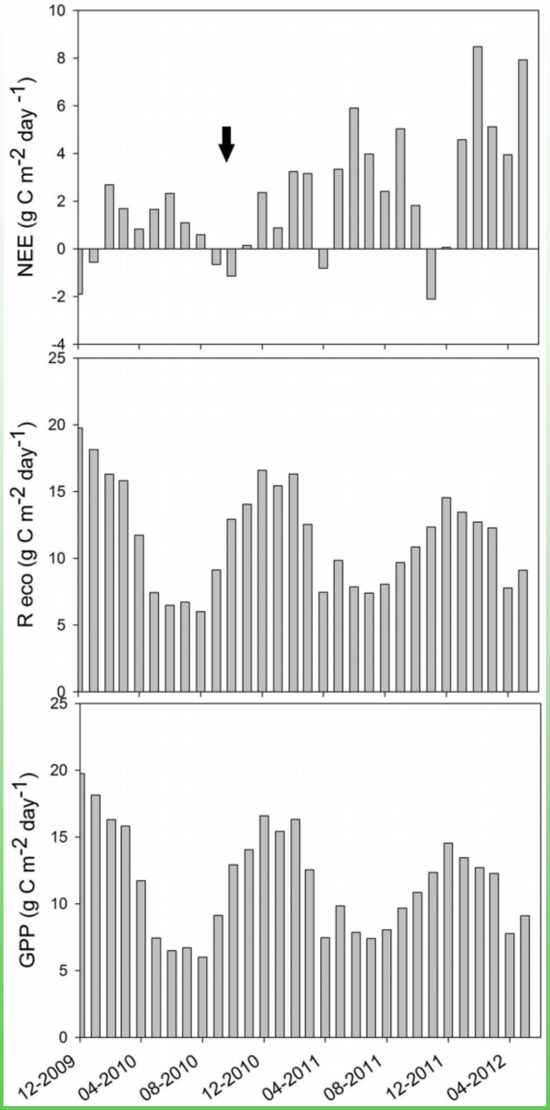
Gabriela Posse [(1)], Nuria Lewczuk [(1-2)], Klaus Richter [(1)], Piedad Cristiano [(2-3)]

Afforestation has been proposed as an effective tool for protecting primary and/or secondary forests and for mitigating atmospheric CO_2. However, the dynamics of primary productivity differs between plantations and natural forests. The objective of this work was to evaluate the potential for carbon storage of a commercial pine plantation by determining its carbon balance. Measurements started when trees were aged 6 and ended when they were older than 8 years. We measured CO_2 and water vapor concentrations using the Eddy covariance method. Gross primary productivity in 2010 and 2011 was 4290 ± 473 g C m^{-2} and 4015 ± 485 g C m^{-2}, respectively. Ecosystem respiration ranged between 7 and 20 g C m^{-2} d^{-1}, reaching peaks in all Februaries. Of the 30 months monitored, the plantation acted as carbon source for 21 months and as carbon sink for 6 months, while values close to neutrality were obtained during 3 months. The positive balance representing CO_2 loss by the system was most likely due to the cut branches left on the ground following pruning activities. The plantation was subjected to pruning in January and September 2008 and to sanitary pruning in October 2010. In all cases, cut branches were not removed but remained on the ground. Residue management seems to have a very important impact on carbon balance.

Keywords: Afforestation, Carbon Source, Ecosystem Respiration, Pruning, Thinning

Resultados


a
b
c
CO2 flux (mg m-2 s-1)
Latent heat flux (W m-2)
Sensible heat flux (W m-2)
01/01/2010
08/01/2010
15/01/2010
22/01/2010
29/01/2010


NEE (g C m-2 day-1)
R eco (g C m-2 day-1)
GPP (g C m-2 day-1)
12-2009
04-2010
08-2010
12-2010
04-2011
08-2011
12-2011
04-2012

Resultados

Soil & Tillage Research 169 (2017) 65–70

Contents lists available at ScienceDirect

Soil & Tillage Research

journal homepage: www.elsevier.com/locate/still

Short communication

CO_2 and N_2O flux balance on soybean fields during growth and fallow periods in the Argentine Pampas—A study case

Nuria A. Lewczuk[a,b], Gabriela Posse[a,*], Klaus Richter[a], Antonio Achkar[c]

[a] Instituto de Clima y Agua, CIRN CNIA INTA Castelar, N. Repetto y De Los Reseros s/n (1686), Hurlingham, Provincia de Buenos Aires, Argentina
[b] CONICET, Av. Rivadavia 1917 (C1033AAJ), CABA, Argentina
[c] Universidad Católica de Santa Fe, Área Informática, Echagüe 7151, Santa Fe, Provincia de Santa Fe, Argentina

ARTICLE INFO

Article history:
Received 23 September 2015
Received in revised form 23 December 2016
Accepted 27 January 2017
Available online xxx

Keywords:
Carbon balance
Nitrous oxide emissions
Eddy covariance
Vented static chambers
Soybean

ABSTRACT

The estimation of the GHG balance of agroecosystems is essential to evaluate the impact of agriculture on the composition of the atmosphere. Cultivated soils may act as a sink or a source of CO_2 and usually emit N_2O. The aim of the present study was to assess the CO_2 and N_2O balances, and to analyze the relationships between N_2O fluxes and environmental variables for two soybean growing seasons and the fallow period between them, in an agricultural field in the Pampas region of Argentina. The fluxes of CO_2 and N_2O were measured by the eddy covariance and the static-chamber methods, respectively. The net ecosystem exchange from sowing to harvest was −2543 and −2307 kg CO_2-C ha^{-1}, for the first and second growing seasons, respectively. The N_2O net balance over the same periods was 1.45 and 0.96 kg N_2O-N ha^{-1}. A multivariate analysis showed that during the growing season the most important variable influencing N_2O emission was % water filled pore space (% WFPS), followed by nitrate content and soil temperature. During fallow, soil temperature was the main control factor, followed by % WFPS. The total balance (including CO_2 and N_2O) showed that the soil gained 753.5 kg Ceq ha^{-1} on average during cultivarion cycle. Taking into account the fallow period, the global balance resulted in a carbon loss of 1328.5 kg Ceq ha^{-1} over about one year. Our results clearly indicate the need to incorporate winter cover crops for improving the production system, as they can provide carbon to the soil and use the available stubble nitrogen from the previous crop.

Resultados

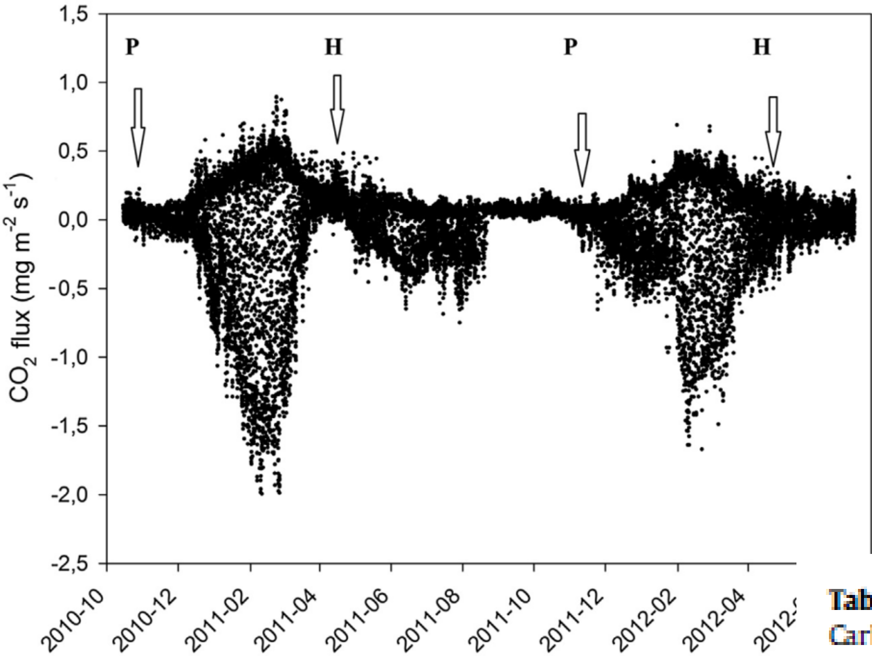
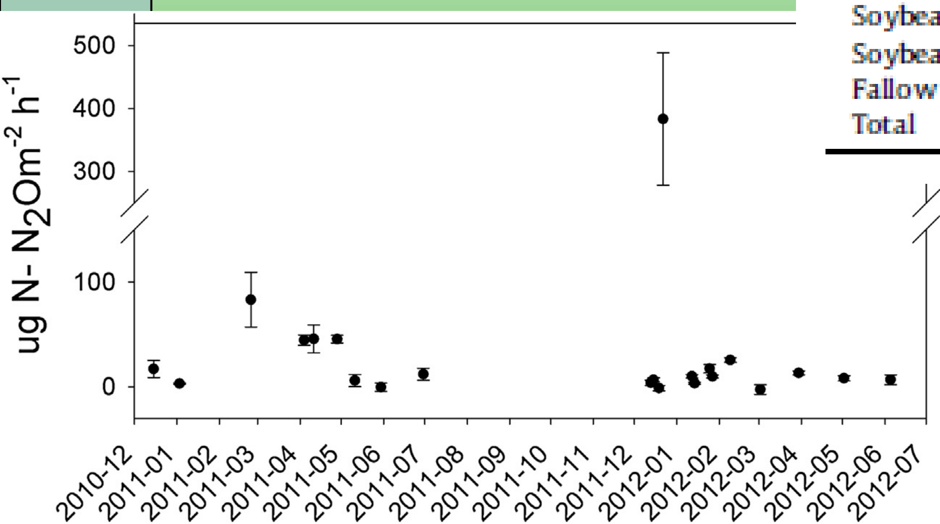


Table 1

Carbon equivalent fluxes became from N_2O and CO_2 exchange for two soybean growing seasons and fallow period. The carbon exported through harvest was also added. Negative values indicate ecosystem gains and positive values indicate ecosystem loss.

Period Kg Ceq ha^{-1}	N_2O	CO_2	harvest	Net balance
Soybean (2010–2011)	449	−2543	1391	−703
Soybean (2011–2012)	298	−2307	1205	−804
Soybean average	373.5	−2425	1298	−753.5
Fallow	379	1703		2082
Total	752.5	−722	1298	1328.5



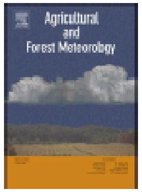
Agricultural and Forest Meteorology 247 (2017) 520–532

Contents lists available at ScienceDirect

Agricultural and Forest Meteorology

journal homepage: www.elsevier.com/locate/agrformet

ELSEVIER



Research Paper

Patterns and controls of carbon dioxide and water vapor fluxes in a dry forest of central Argentina

CrossMark

Alfredo G. García[a], Carlos M. Di Bella[a,b], Javier Houspanossian[c], Patricio N. Magliano[c], Esteban G. Jobbágy[c], Gabriela Posse[a], Roberto J. Fernández[d], Marcelo D. Nosetto[c,e,*]

[a] Instituto de Clima y Agua, Instituto Nacional de Tecnología Agropecuaria (CIRN-INTA Castelar), Hurlingham, Buenos Aires, Argentina
[b] Departamento de Métodos Cuantitativos, Universidad de Buenos Aires, Facultad de Agronomía, Buenos Aires, Argentina
[c] Grupo de Estudios Ambientales (GEA), IMASL, CONICET & UNSL, San Luis, Argentina
[d] Instituto de Investigación Fisiológicas y Ecológicas Vinculado a la Agricultura, IFEVA, CONICET & Univ. Buenos Aires, Argentina
[e] Cátedra de Climatología, Facultad de Ciencias Agropecuarias, Universidad Nacional de Entre Ríos,, Entre Ríos, Argentina

ARTICLE INFO

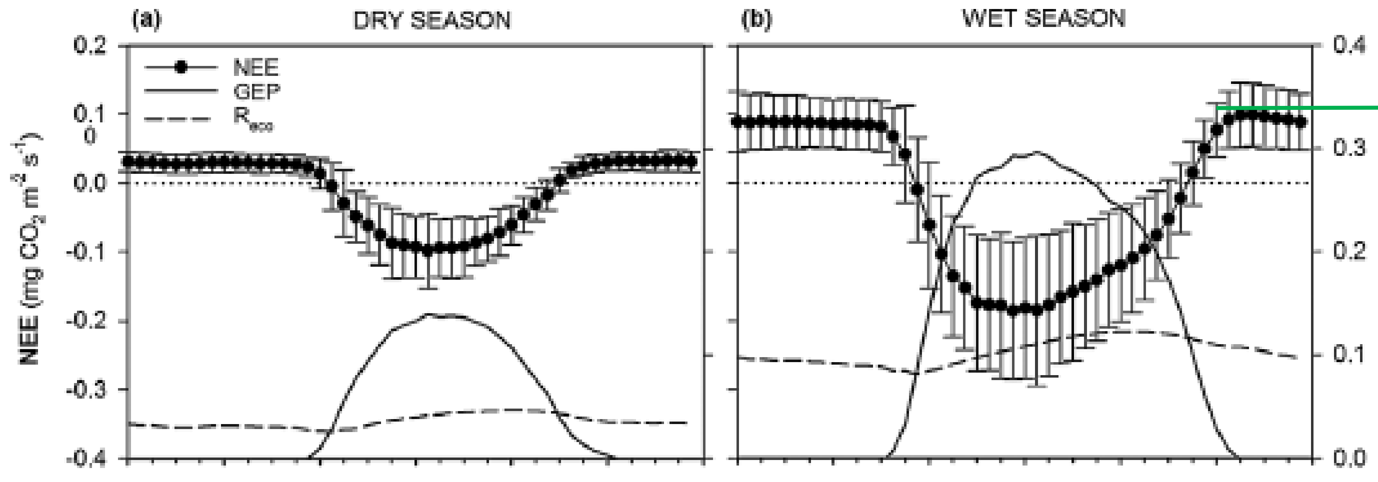
Keywords:
Eddy covariance
Deforestation
Chaco
Net ecosystem exchange
Carbon balance

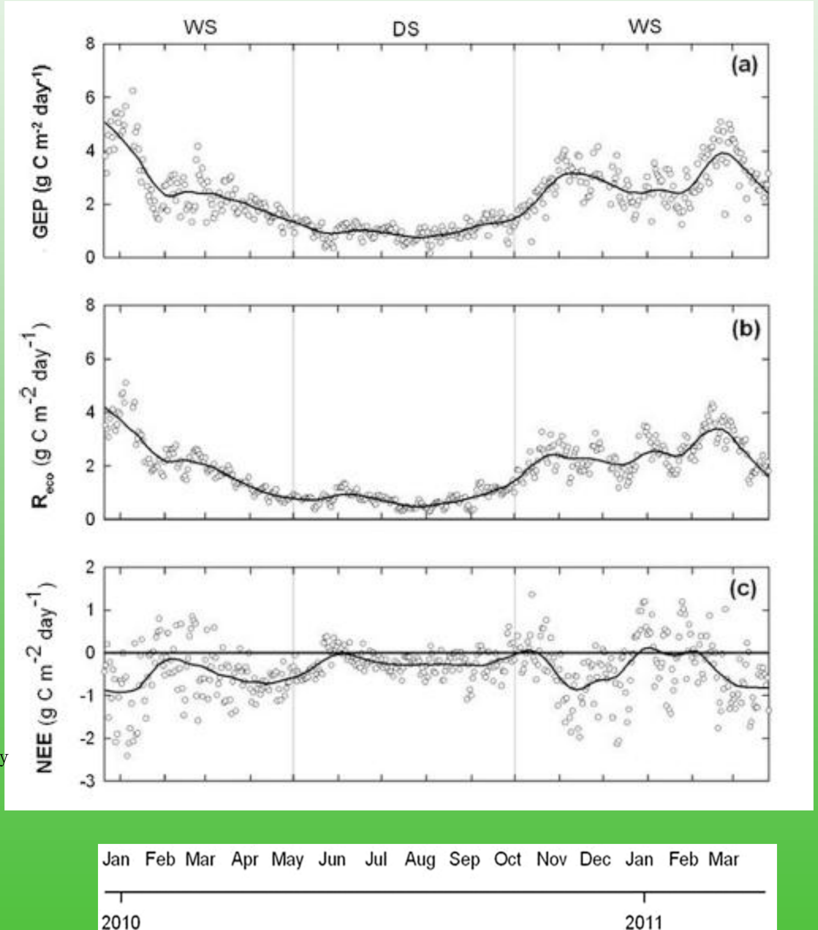
ABSTRACT

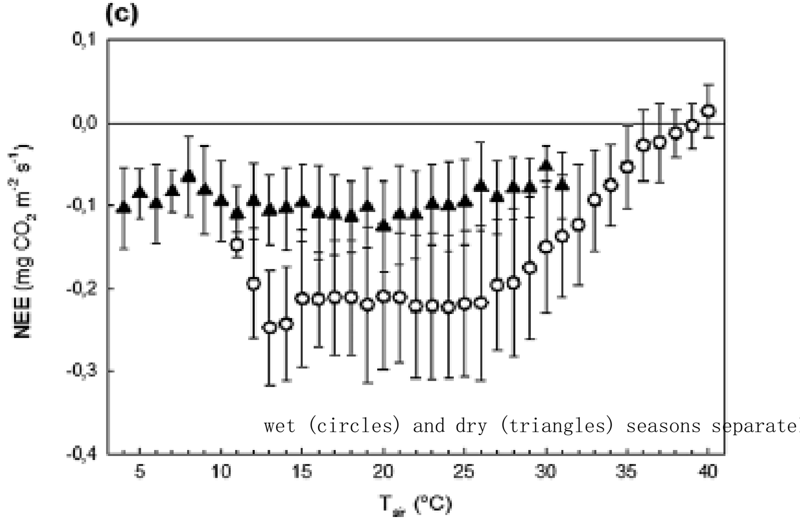
Covering 16% of global land surface, dry forests play a key role in the global carbon budget. The Southern Hemisphere still preserves a high proportion of its native dry forest cover, but deforestation rates have increased dramatically in the last decades. In this paper, we quantified for the first time the magnitude and temporal variability of carbon dioxide and water vapor fluxes and their environmental controls based on eddy covariance measurements in a dry forest site of central Argentina. Continuous measurements of CO_2 and water vapor exchanges spanning a 15-month period (Dec. 2009 – March 2011) showed that the studied dry forest was a net sink of carbon, with an overall integrated net ecosystem exchange (NEE) of -172 g C m^{-2} (-132.8 g C m^{-2} for year 2010). The cool dry season (May–Sept.) accounted for a quarter of the total annual NEE of year 2010 with low but steady CO_2 uptake rates (1 g C m^{-2} d^{-1} on average) that were more strongly associated with temperature than with soil moisture. By contrast, in the warm wet season (Oct.–April), almost three times greater CO_2 uptake rates (2.7 g C m^{-2} d^{-1} on average) resulted from a highly pulsed behavior in which CO_2 uptake showed sharp increases followed by rapid declines after rainfall events. Cumulative evapotranspiration (ET) during the whole study (595 mm) accounted for most of the rainfall inputs (674 mm), with daily water vapor fluxes during the wet season being four times greater compared to those observed during the dry season (1.7 mm d^{-1} vs. 0.45 mm d^{-1}). Modeling of the partition of all evaporative water losses suggested that transpiration was the dominant vapor flux (67% of ET), followed by interception (20%) and soil evaporation (13%). The influence of air temperature on half-hourly CO_2 fluxes was notably different for the dry and wet seasons. In the 11–34 °C air temperature range, CO_2 uptake rates were higher in the warm wet rather than the cool dry season, yet this

INTA

Resultados

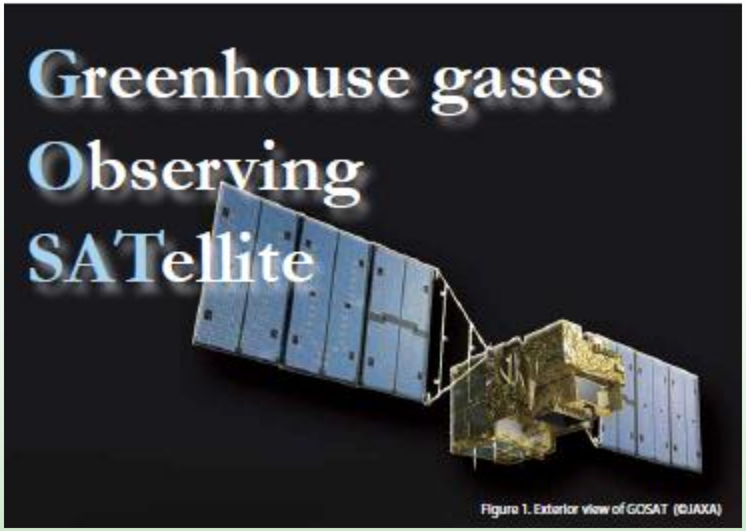


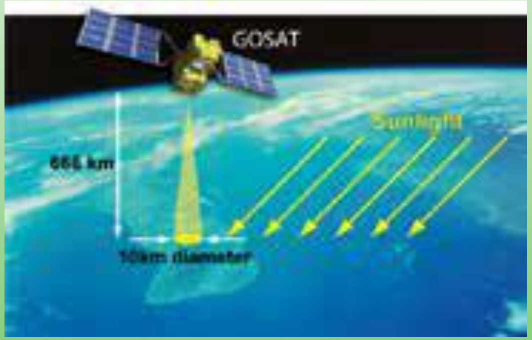


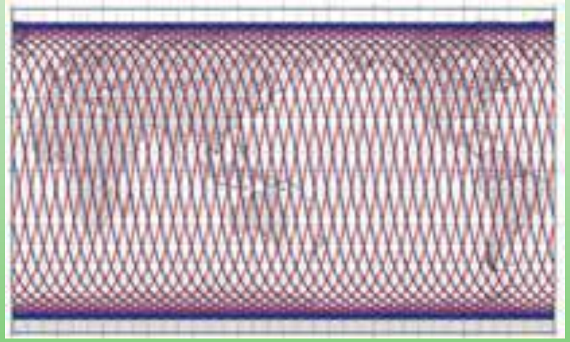


wet (circles) and dry (triangles) seasons separately

Comparaciones locales


Greenhouse gases
Observing
SATellite
Figure 1. Exterior view of GOSAT (©JAXA)


GOSAT
Sunlight
666 km
10km diameter



+ información sensores remotos

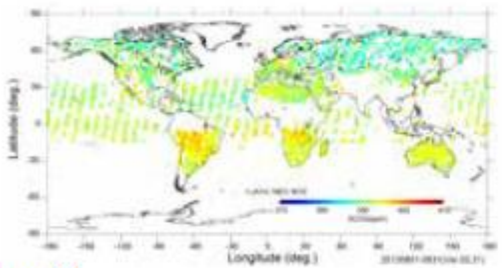


Figure 13.
FTS SWIR Level 2 CO_2 column abundance (2.5 deg mesh) for August 2013 derived for cloud-free regions. Blanks in white denote no available data.

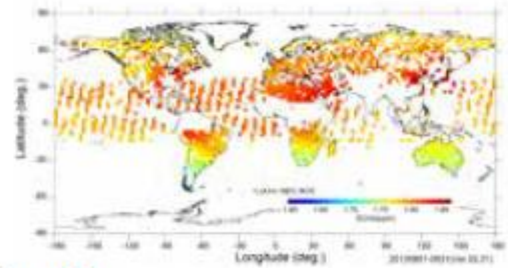


Figure 14.
FTS SWIR Level 2 CH_4 column abundance (2.5 deg mesh) for August 2013 derived for cloud-free regions. Blanks in white denote no available data.

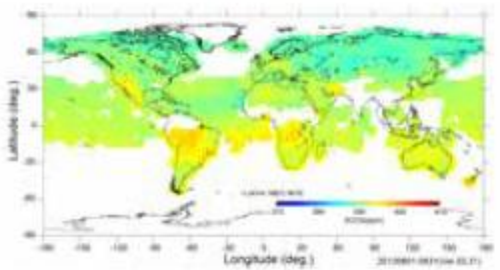


Figure 16.
FTS SWIR Level 3 global CO_2 distribution for August 2013 (in 2.5 deg mesh). Blanks in white denote data grids more than 500 km away from the nearest GOSAT scans.

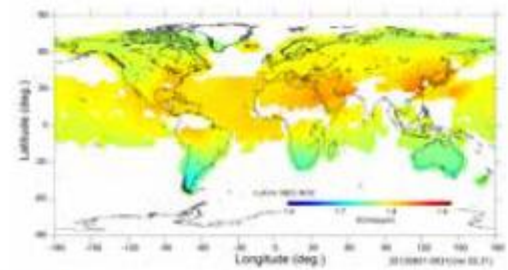
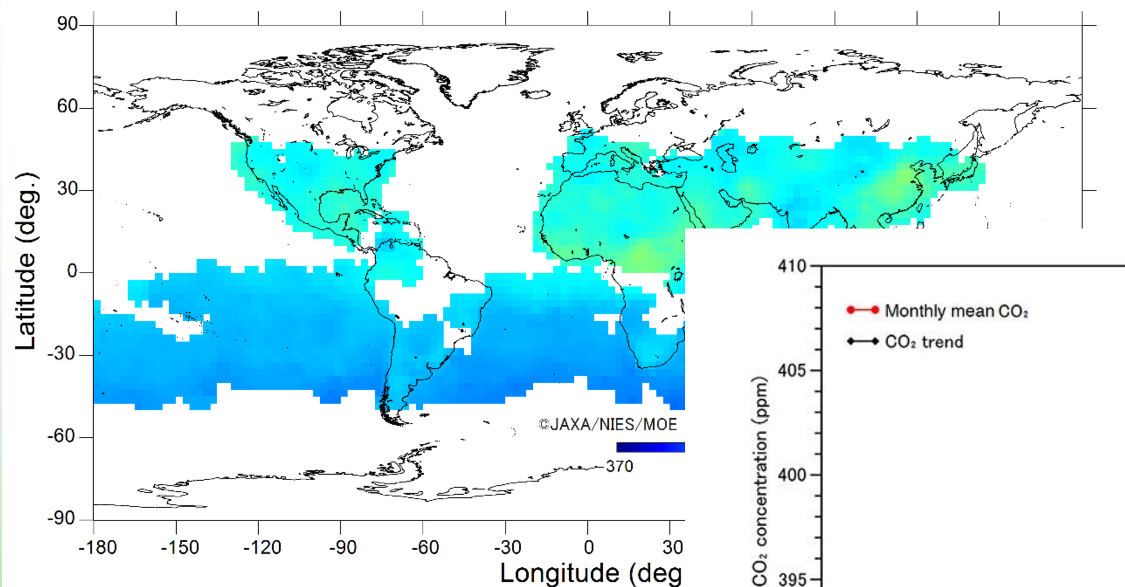
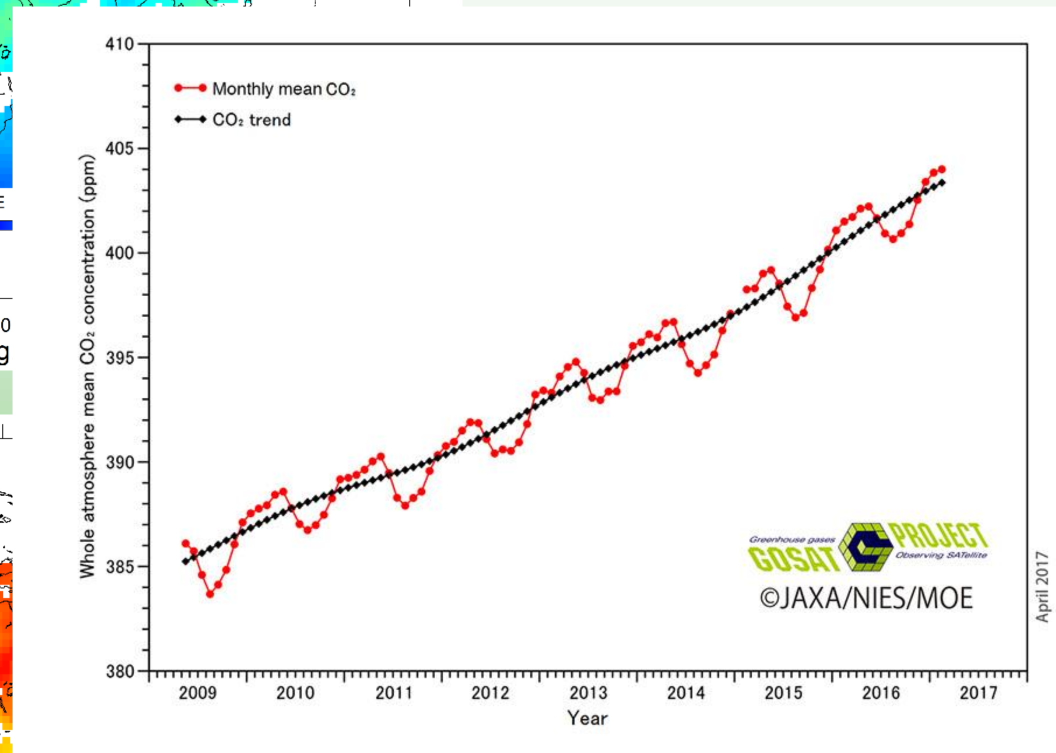


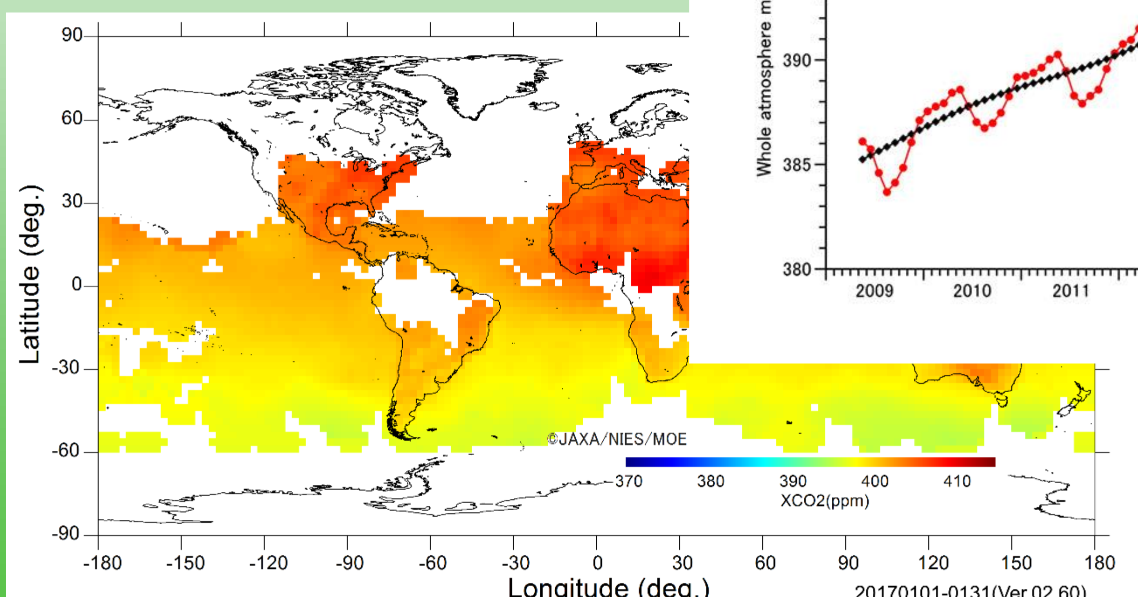
Figure 17.
FTS SWIR Level 3 global CH_4 distribution for August 2013 (in 2.5 deg mesh). Blanks in white denote data grids more than 500 km away from the nearest GOSAT scans.

Greenhouse gases Observing SATellite Project

+ información sensores remotos







Dra. Gabriela Posse

Muchas gracias!

posse.gabriela@inta.gob.ar

gabiposse@gmail.com