"CARBON DYNAMICS IN NORTHWESTERN MEXICAN ECOSYSTEMS"

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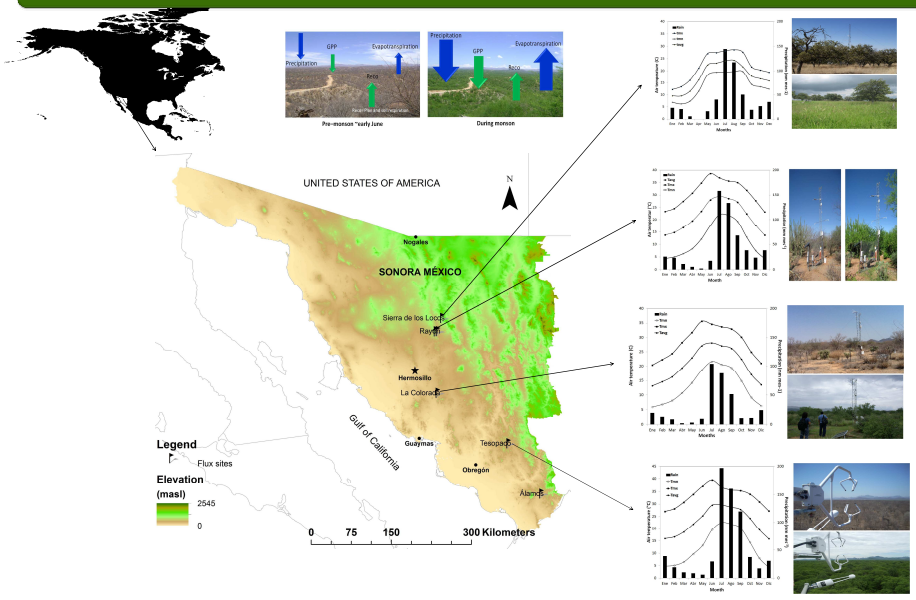
CONTEXT

Carbon dynamics in northwestern Mexican ecosystems are fundamentally driven by the seasonality and frequency of precipitation events modulated by the North American Monsoon. The dominancy of seasonally-driven ecosystems in this region brings a special susceptibility to changes in rainfall intensity and distribution during the monsoon under projected climate change scenarios. Furthermore, societal demands for natural resources and ecosystem services have created a mosaic of successional stages in natural settings that additionally modulate ecosystem responses to environmental drivers. Working within the Mexican Eddy Covariance Network (MexFlux) and the Programa Mexicano del Carbono (PMC), we are seeking to answer questions related to the mechanistic controls of carbon exchange as landscapes are fragmented in key ecosystems in the state of Sonora Mexico.

We are currently monitoring sites in a semiarid gradient spanning an annual precipitation range of 350 to 700 mm and a 18 to 23 °C in mean annual temperature (a range underrepresented in the global flux network). In our array, we have instrumented an Oak savanna (550 mm, 18 °C), a mesquite woodland near an ephemeral stream and a cropping system (524 mm, 21.4 °C), a mature tropical dry forest (TDF; 712 mm, 22 °C) and two semiarid shrublands, one influenced by the presence of induced Buffel grass (348 mm, 22.7 °C) and one moderately grazed but free of Buffel (524 mm, 21.4 °C). At the TDF and the shrubland-Buffel sites, a formal attempt to increase capacity to monitor turbulent fluxes and soil and plant physiological variables in paired sites is in progress. We believe that an ecohydrological approach to understand the effect of land productive practices and the contribution of this semiarid region to the North American carbon cycle would aid planning and managing natural resources as we adapt to climate change.

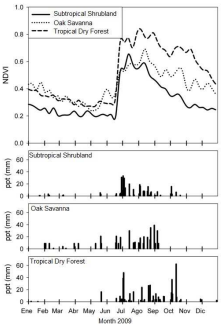
SEASONALLY DRY SONORAN FLUX SITES



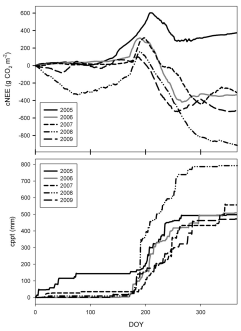
Amplitude of turbulent fluxes at different sonoran ecosytems

Monitoring Site	Ecosystem Type	NEE (Early rains)	Mean NEE during peak monsoon	NEE Amplitude	ET (peak Monson)	Mean Temp	Mean PPT	Altitude	Latitude	Longitude	Data Years
		g CO_2 m^{-2} s^{-1}	g CO_2 m^{-2} s^{-1}	g CO_2 m^{-2} s^{-1}	mm	°C	mm	m.a.s.l			
Sierra de Locos	Oak Savanna	3.08	-10.9	**14.0**	2.65	18	497.8	1403	-110.46	29.96	2008-2013
Rayon	Surbtropical Shrubland	12.65	-9.45	**22.1**	3.77	21.4	545.4	630	-110.53	29.74	2007-2013
Colorada	Surbtropical Shrubland (buffel pasture transformed)	9.97	-8.7	**18.7**	3.49	22.7	349	398	-110.54	28.70	2011-2013
Tesopaco	Tropical Dry Forest (rather secondary)	19.00	-14.8	**33.8**	3.1	22.1	712	460	-109.3	27.84	2004-2009

ECOSYSTEM SEASONALITY

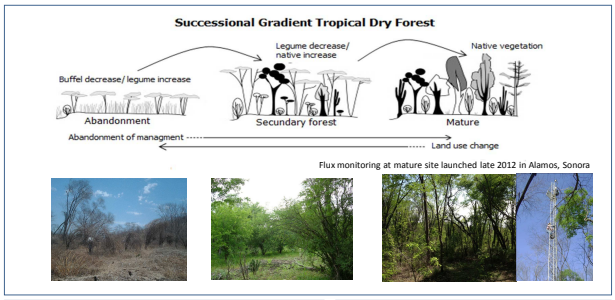


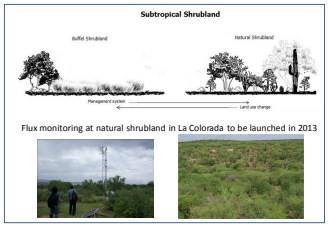
Rainfall and NDVI for 3 seasonally dry ecosystems in Sonora, Mexico during 2009

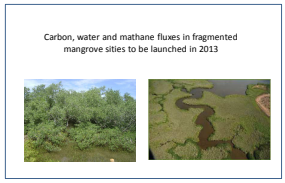


Cummulative rainfall and NEE fluxes at the tropical dry forest of Tesopaco, Sonora during 5 year of continuos measurements

FUTURE DIRECTIONS







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