Climate Change Summary, Chiricahua National Monument, Arizona

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Climate Trends for the Area within Park Boundaries

- Temperature (Figure 1) and precipitation (Figure 2) have increased since 1950, but the trends have not been statistically significant.
- If we do not reduce emissions from cars, power plants, and deforestation, models project substantial future warming (Figure 3) and slight decreases in precipitation (Figure 3).

Vulnerabilities of southern Arizona

- Field research indicates vulnerability of Sonoran tree and shrub species such as foothills palo verde (*Parkinsonia microphylla*) to mortality due to higher aridity (Munson et al. 2012).
- Sky island ecosystems are vulnerable to future upslope shifts due to climate change (Gonzalez et al. 2010), exacerbated by habitat fragmentation (Eigenbrod et al. 2014).
- Under high emissions, fire frequencies could increase up to 25% by 2100 (Moritz et al. 2012).
- Past warming has reduced snowpack widely and rainfall in some areas, which may continue to reduce summer streamflow and water supplies (Garfin et al. 2014).

Table. Historical and projected changes (data Daly et al. 2008, IPCC 2013; analysis Wang et al. in preparation). The table only gives central values. Figures 1-2 show the uncertainties.

	1950-2010	**2000-2050**	**2000-2100**
Historical			
temperature	+1ºC/century (+2ºC/century)		
precipitation	+27%/century		
Projected (compared to 1971-2000)			
Low emissions (IPCC RCP 4.5)			
temperature		+2.1ºC (+3.8ºF.)	+2.7ºC (+4.9ºF.)
precipitation		-1%	-1%
High emissions (IPCC RCP 6.0)			
temperature		+1.9ºC (+3.4ºF.)	+3.2ºC (+5.8ºF.)
precipitation		-2%	-3%
Highest emissions (IPCC RCP 8.5)			
temperature		+2.7ºC (+4.9ºF.)	+5.0ºC (+9.0ºF.)
precipitation		-2%	-5%

Figure 1. Temperature.
Historical annual average temperature for the area within park boundaries and 1950-2010 trend. (Data: Daly et al. 2008, IPCC 2013. Analysis: Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).

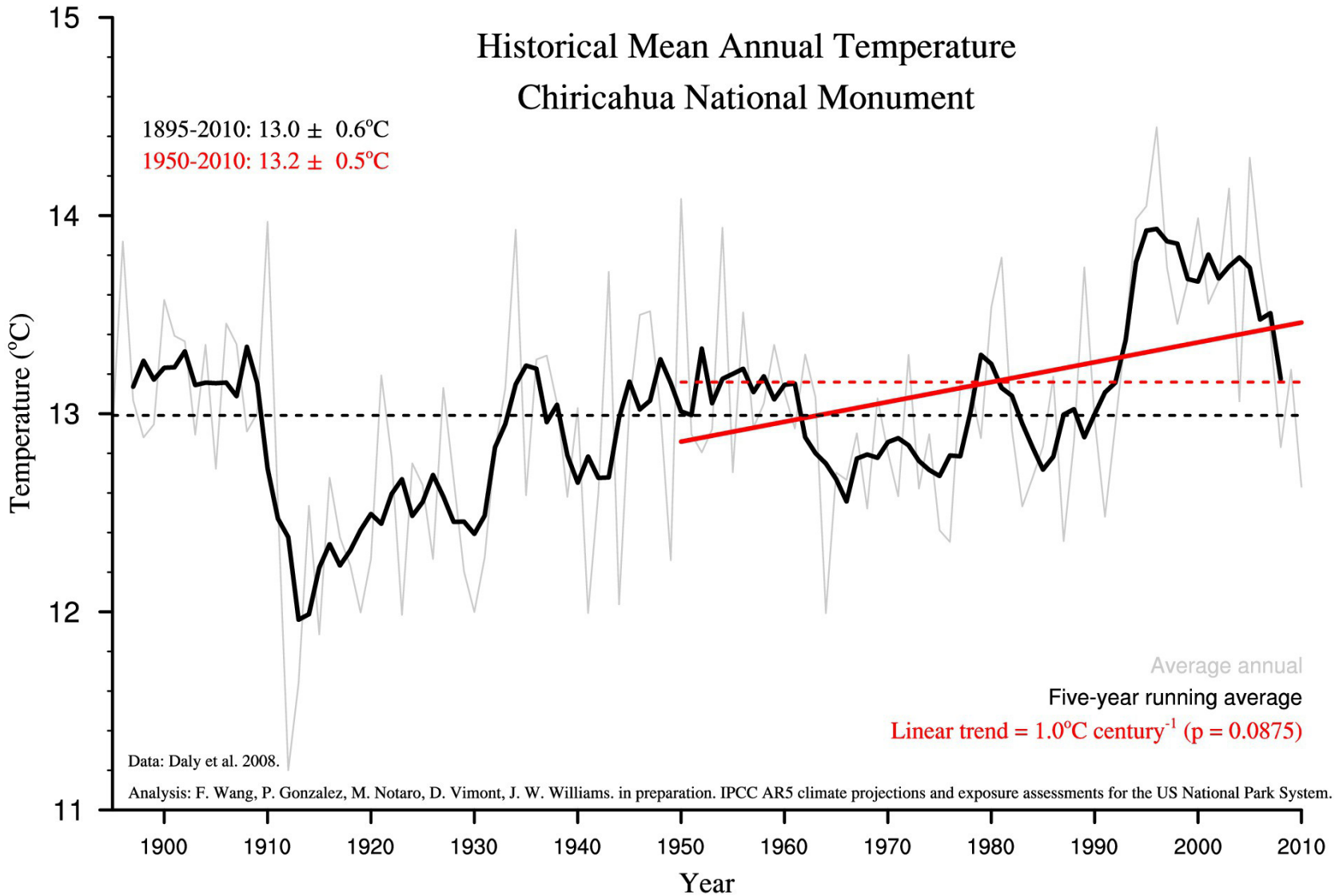


Figure 2. Precipitation.
Historical annual total precipitation for the area within park boundaries and 1950-2010 trend. (Data: Daly et al. 2008, IPCC 2013. Analysis: Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).

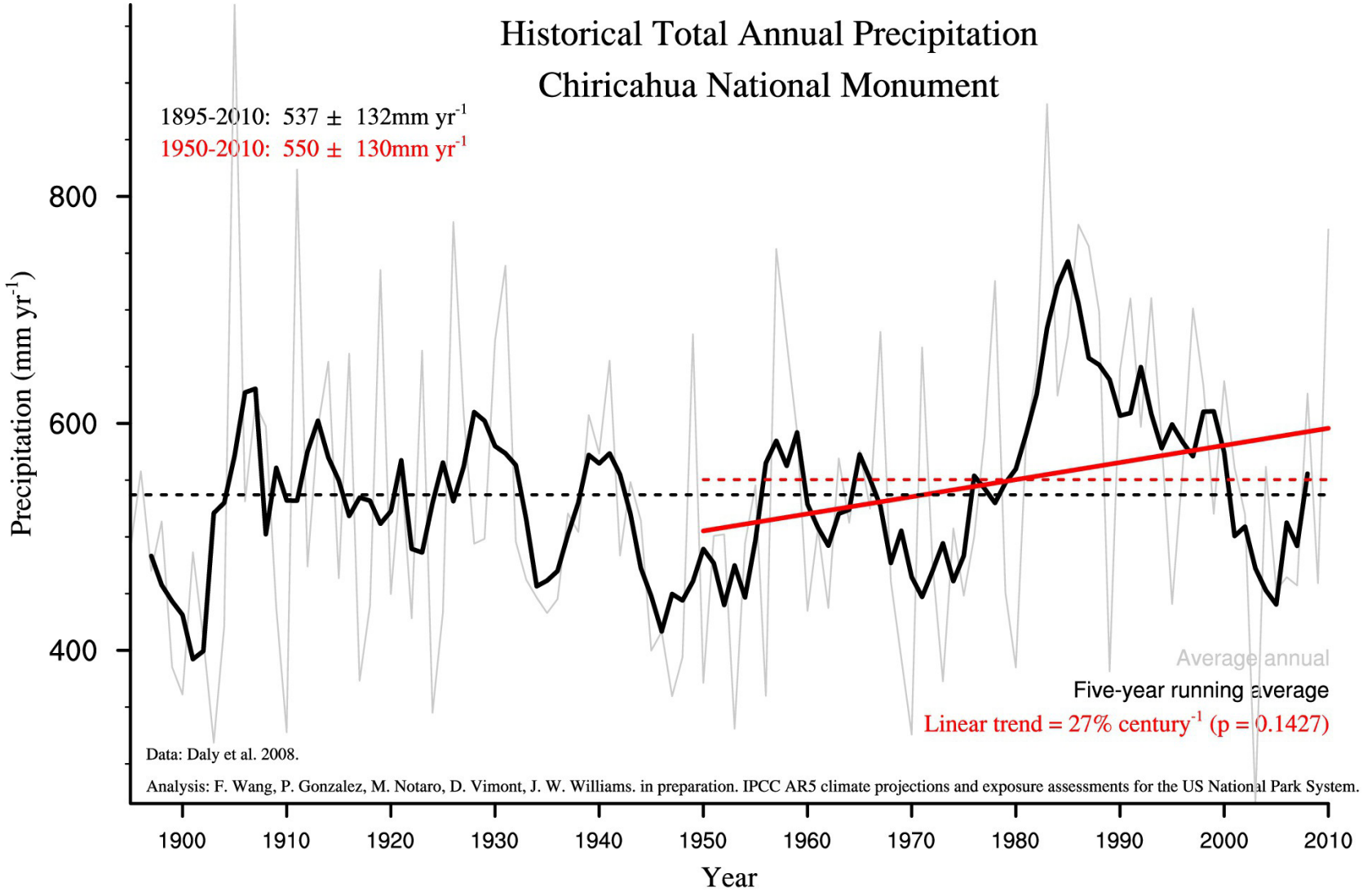
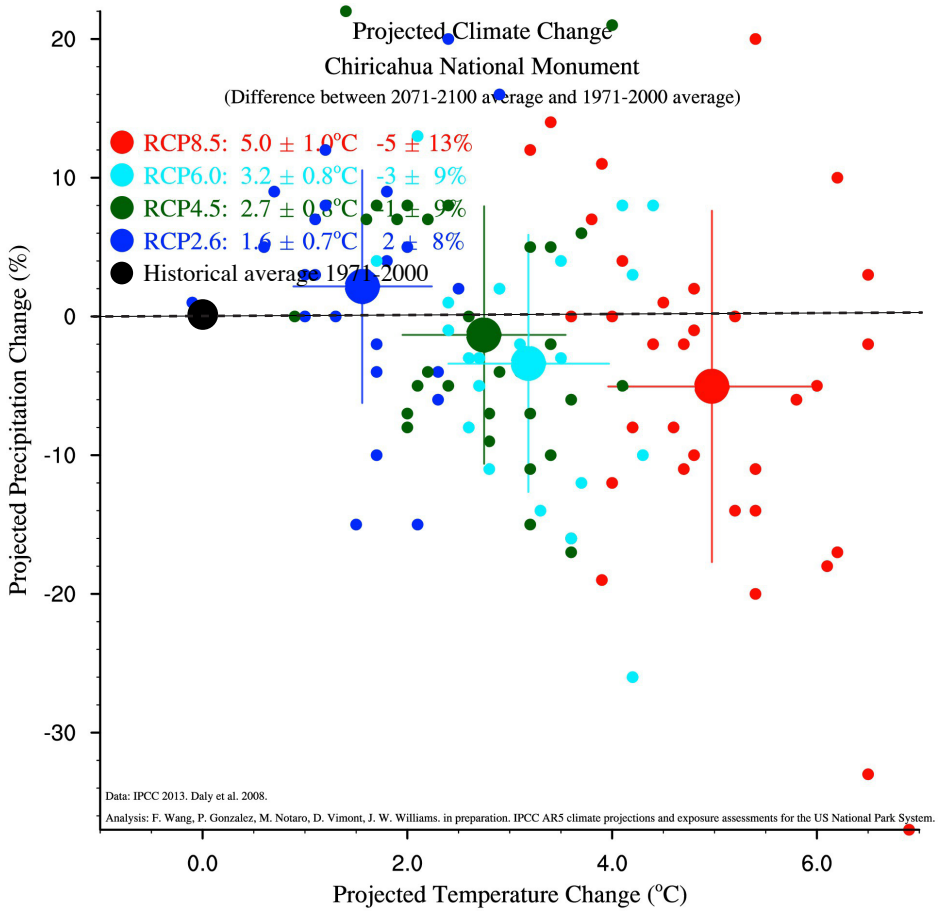


Figure 3. Projections of future climate for the area within park boundaries. The large black dot is the current combination of temperature and precipitation. Each small dot is the output of a single climate model. The large color dots are the average values for the four IPCC emissions scenarios. The lines are the standard deviations of each average value. (Data: IPCC 2013, Daly et al. 2008; Analysis: Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).



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