

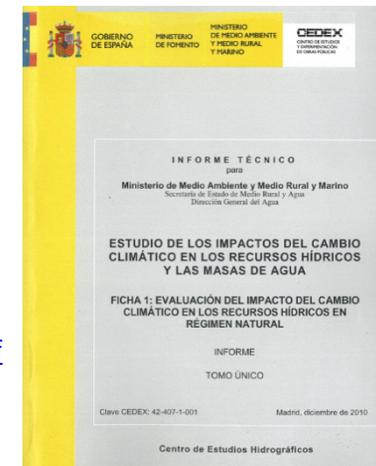
TALLER SOBRE INUNDACIONES Y CAMBIO CLIMÁTICO DGA, 21/06/2017

Impacto del Cambio Climático sobre las Precipitaciones Máximas en España (2010)

Centro de Estudios Hidrográficos
CEDEX

http://www.mapama.gob.es/es/agua/temas/planificacion-hidrologica/ImpactoCCRecursosHidricos_tcm7-310162.pdf

Barranco et al (2017).- Int. JRBM, 2017, 15 (2), 161-173



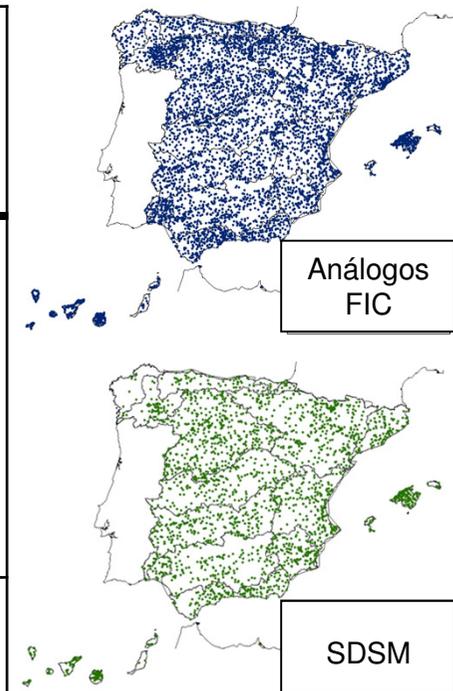
Información de partida

AEMET (2008, TAR)

8 escenarios climáticos regionalizados

Centro de Estudios Hidrográficos

Sigla	SRES	MCG	Regionaliz.	1961-1990	2011-2040	2041-2070	2071-2100	Series diarias de PRE		
CFA	A2	CGCM2	Análogos FIC	√	√	√	√	5579		
CFB	B2									
EFA	A2	ECHAM4								
EFB	B2									
hFA	A2	HadAM3		√			√			
hFB	B2									
HSA	A2	HadCM3		SDSM	√	√	√		√	2320
HSB	B2									





Metodología

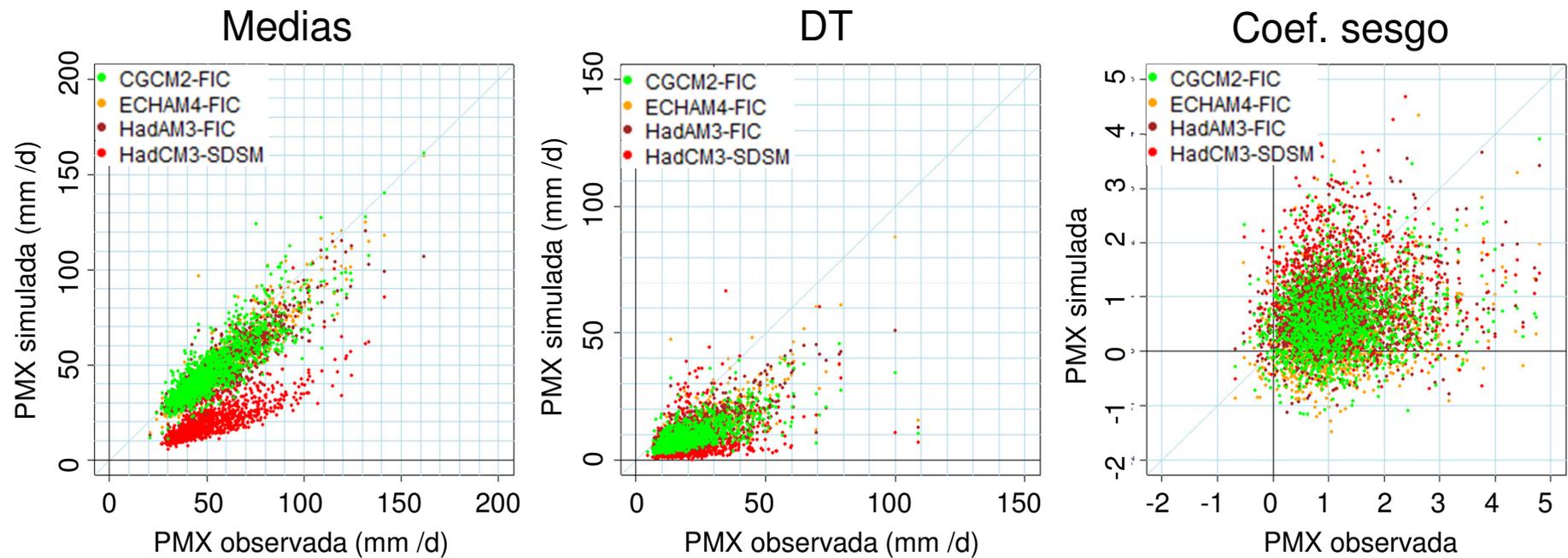
- 2 tipos de series con valores en estaciones:
 - Máximas Precipitaciones Diarias de cada Año (PMX)
 - R95T (fracción de la PRE anual debida a eventos diarios que superan el percentil 95 del PC)
- Contraste PMX
- Análisis Estadístico
 - Tendencias 2011-2100
 - Cambios 2011-2040, 2041-2070, 2071-2100 vs 1961-1990
 - Media / Mediana
 - Variabilidad
 - Estacionalidad
 - Cuantiles (SQRT et max)
 - Estaciones y Regiones (Ferrer y Ardiles)



Contraste de PMX

Cada punto es una estación: la media en los 30 años del PC

España

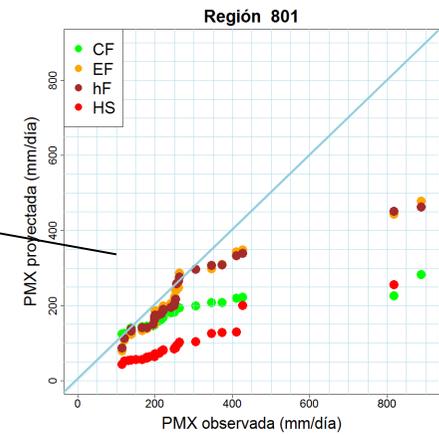
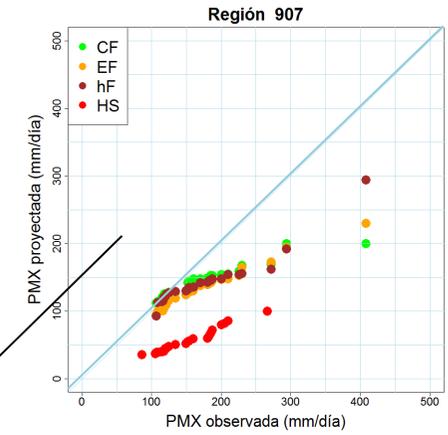
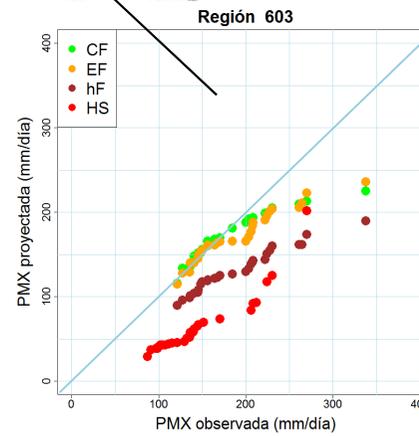
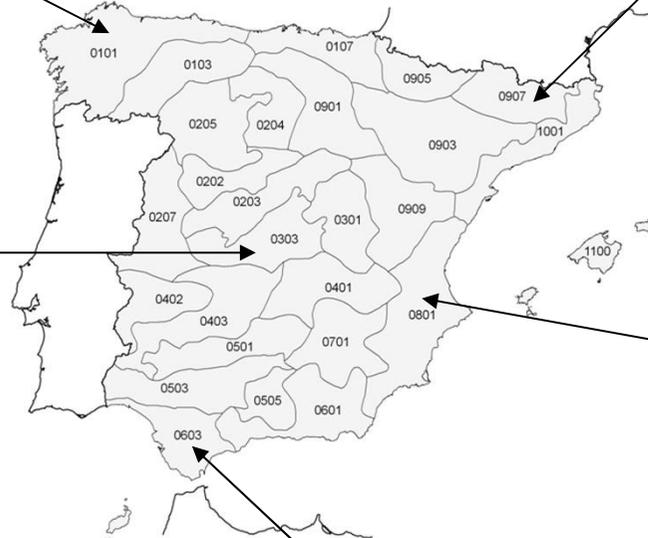
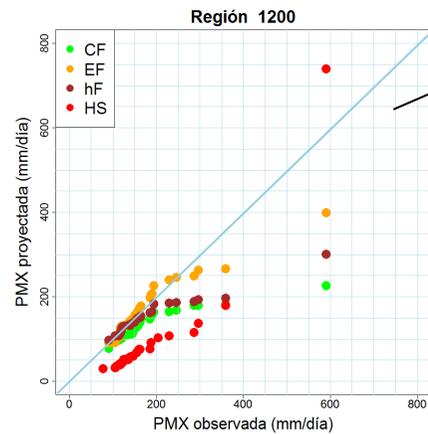
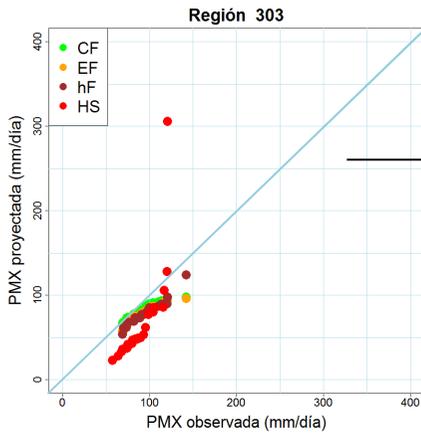
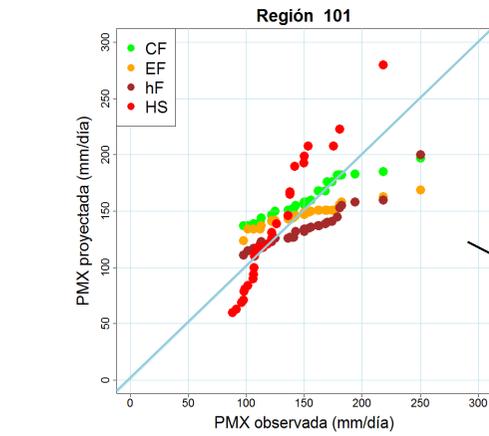


Desajuste con datos observados (infravaloran los estadísticos)



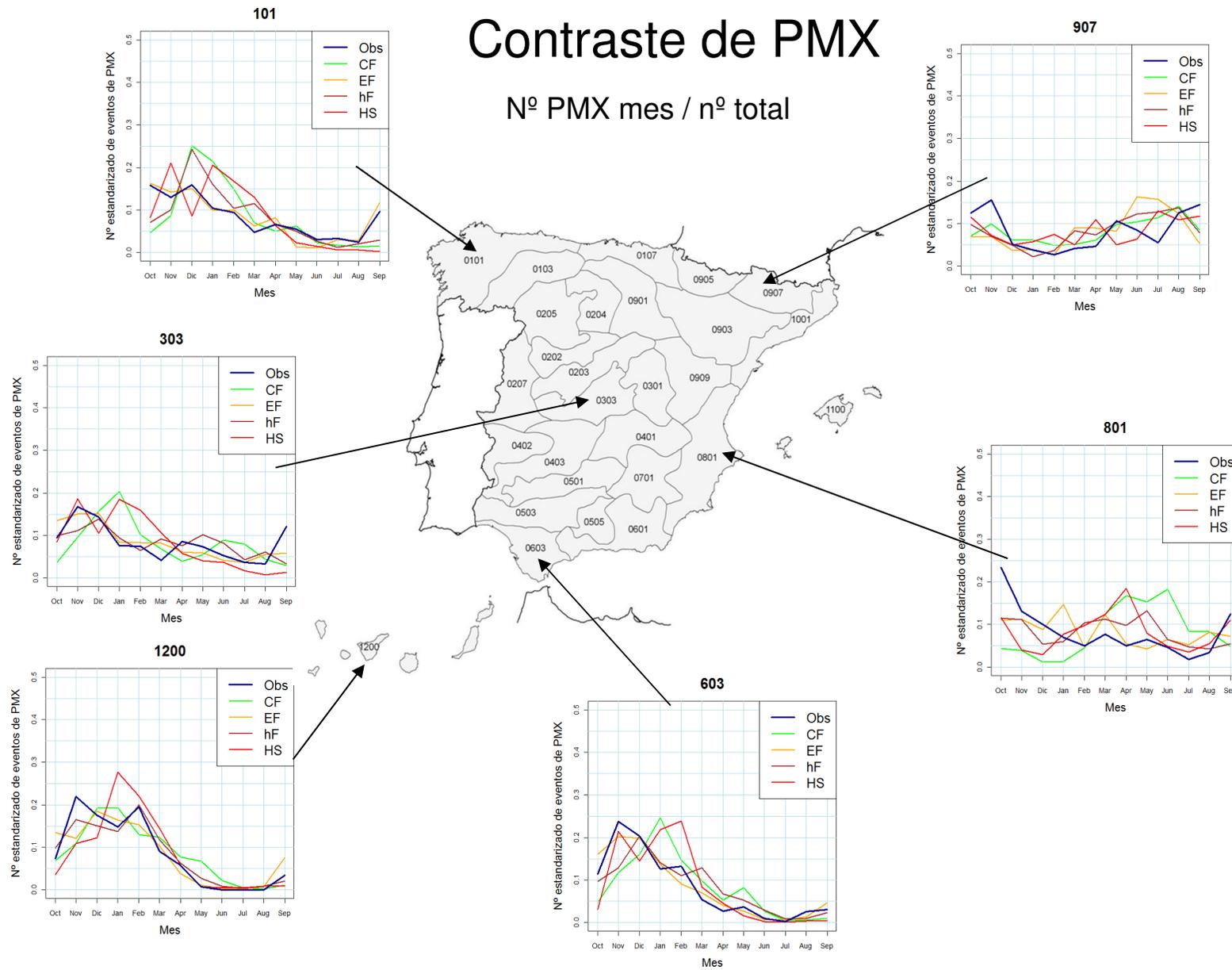
Contraste de PMX

Distribución frecuencias Q-Q
Serie anual de Máximos de PMX



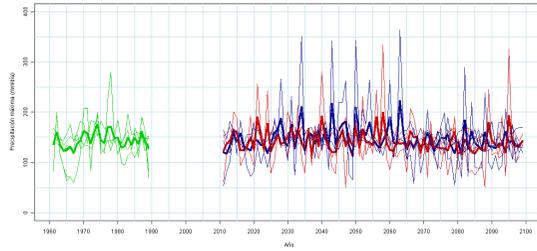
Contraste de PMX

Nº PMX mes / nº total



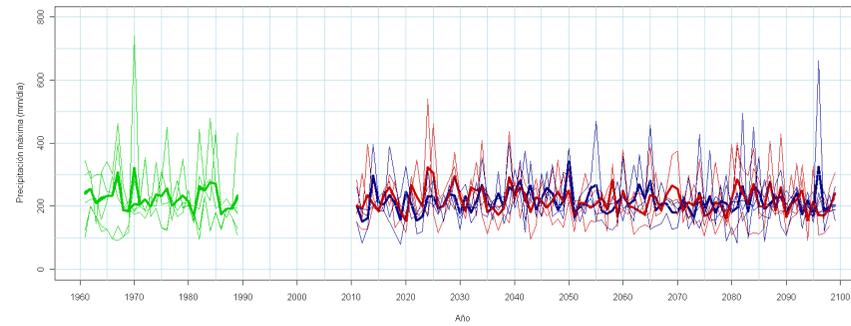
Desajuste con datos observados y diferencias entre proyecciones

NO

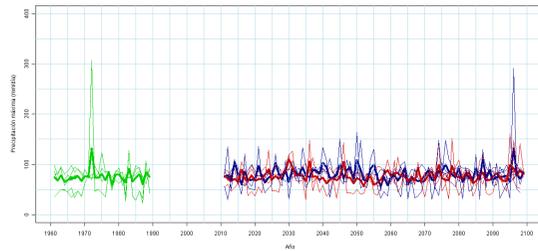


Evolución de PMX

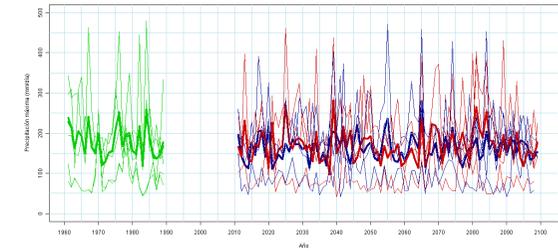
España



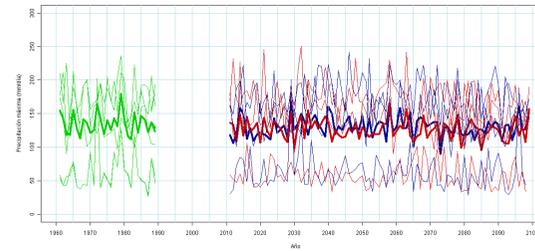
Centro



Levante



SO

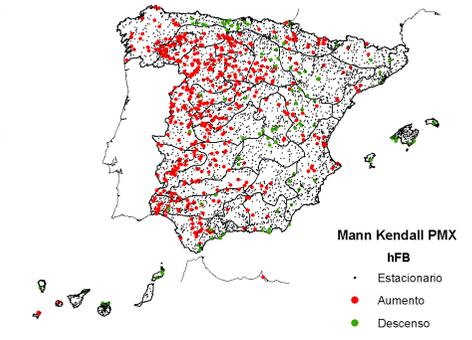
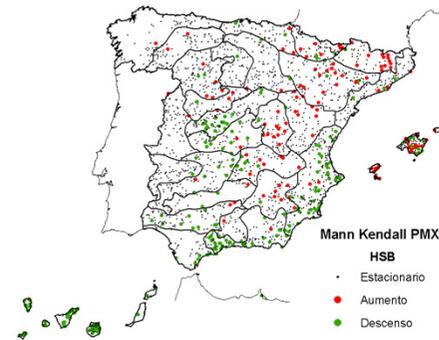
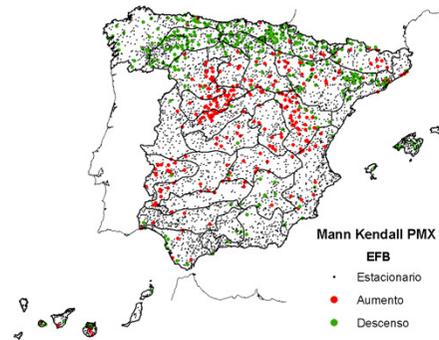
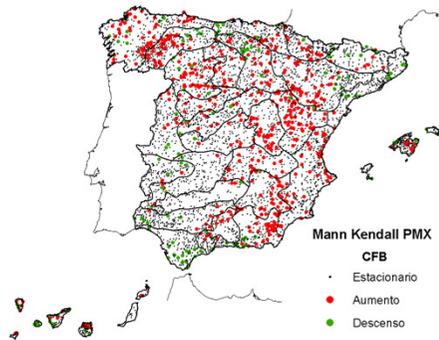
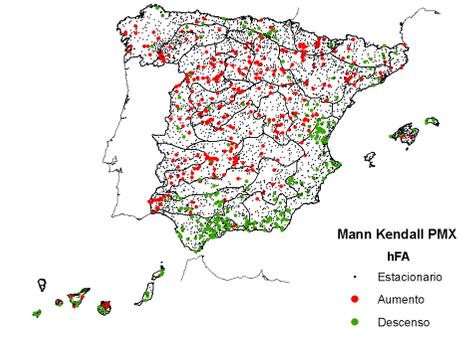
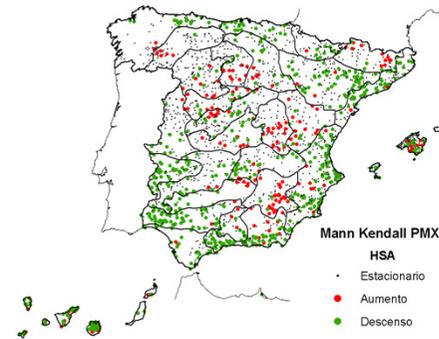
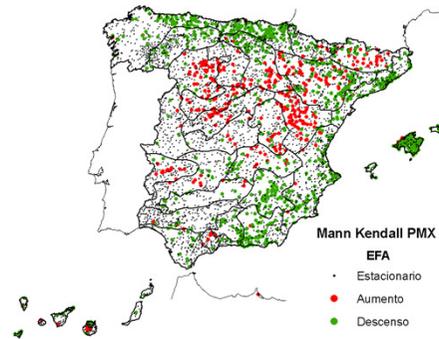
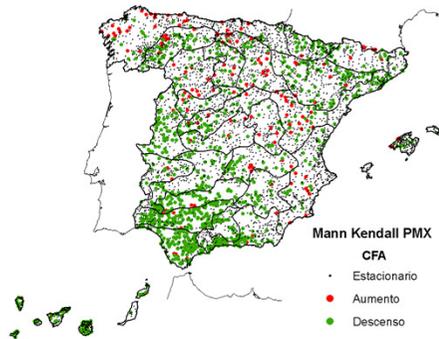




Tendencias PMX 2011-2100 / 2071-2100

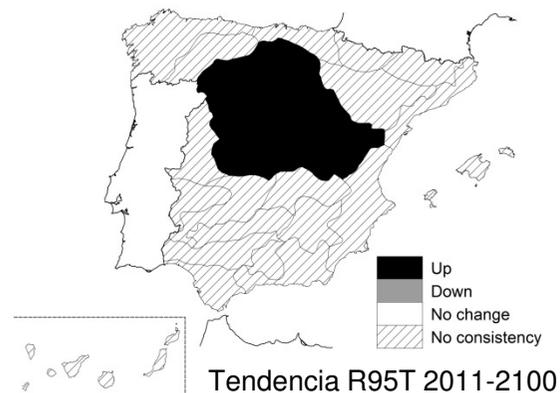
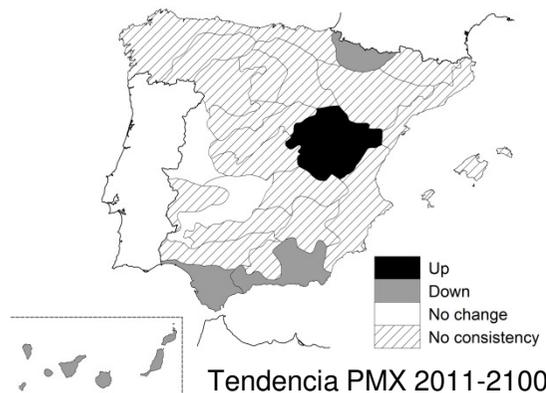
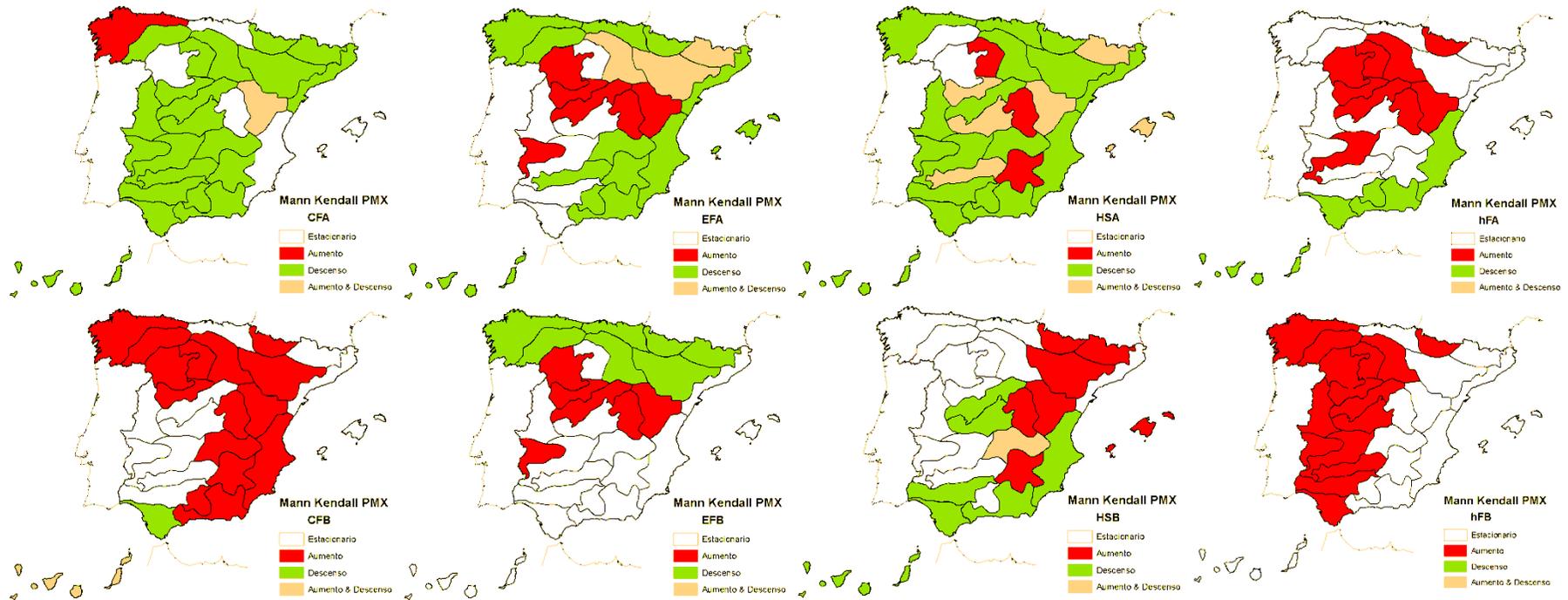
Test Mann Kendall

Estaciones



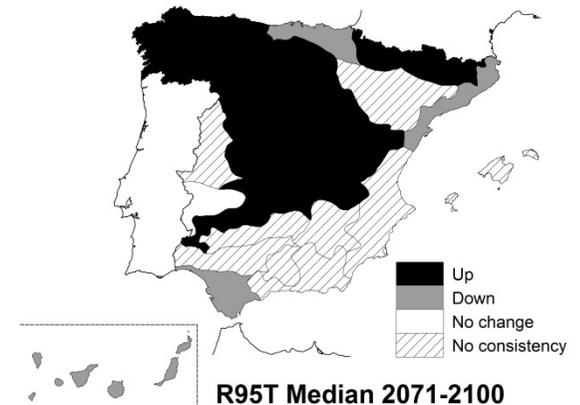
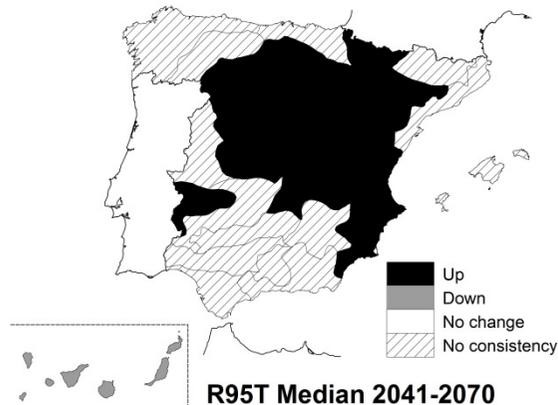
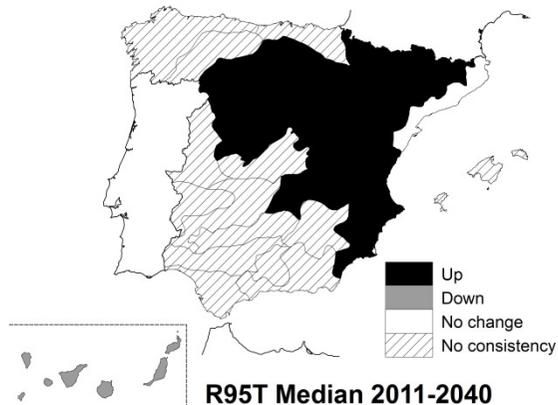
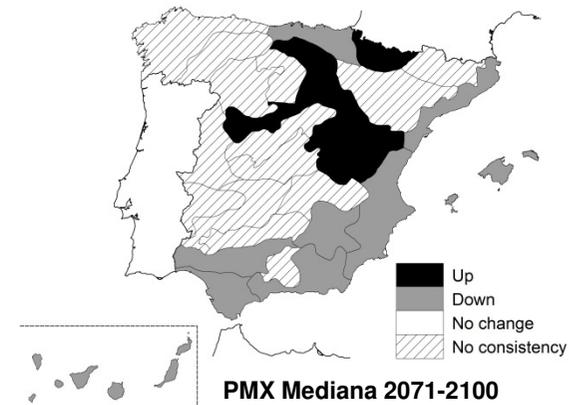
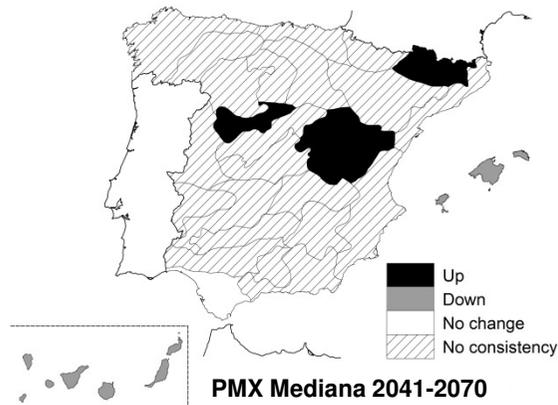
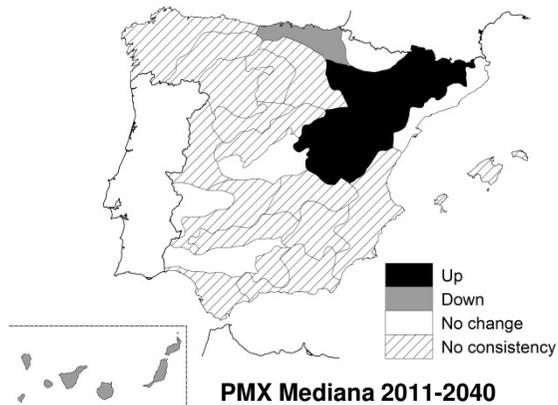
Tendencias PMX 2011-2100 / 2071-2100

Significación regional test Mann Kendall: test binomial



Cambios Mediana PMX y R95T

Significación regional test Wilcoxon: test binomial

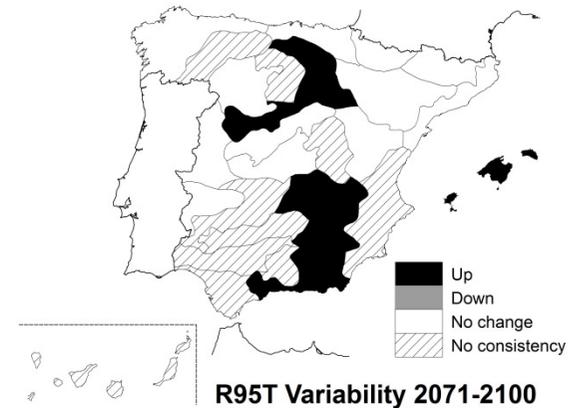
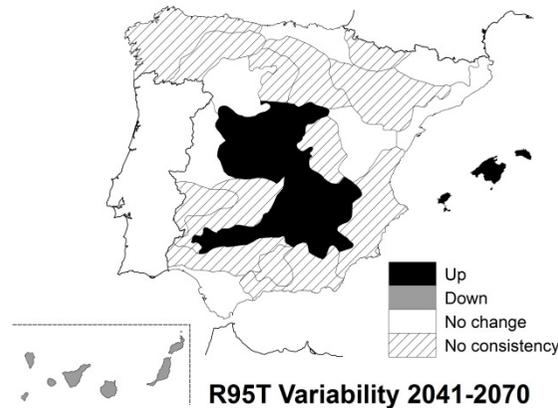
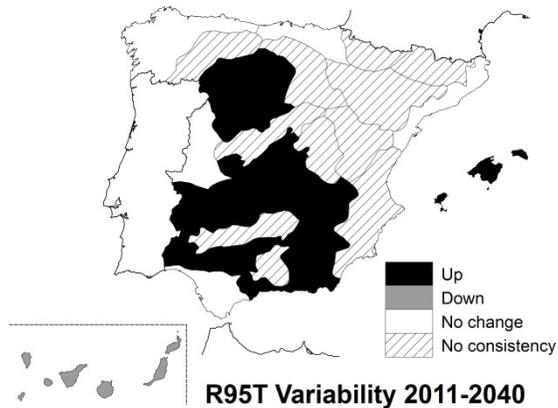
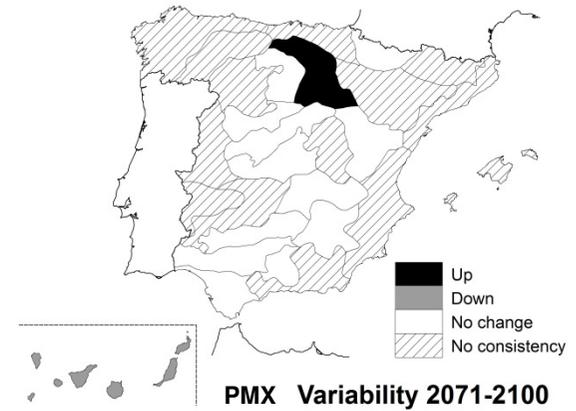
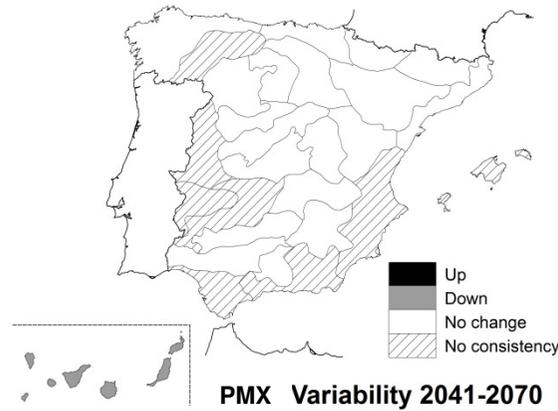
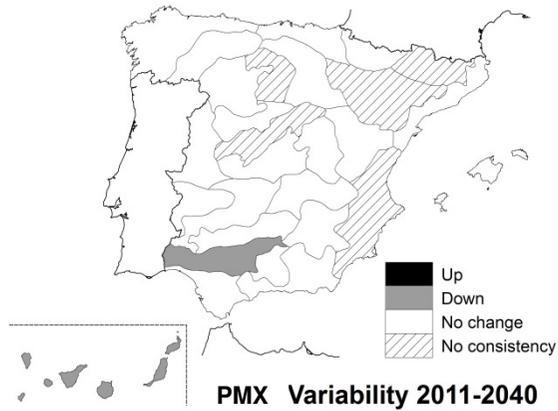


Aumento en R95T por descenso de la precipitación total

$$R95T = PMX / PRE$$

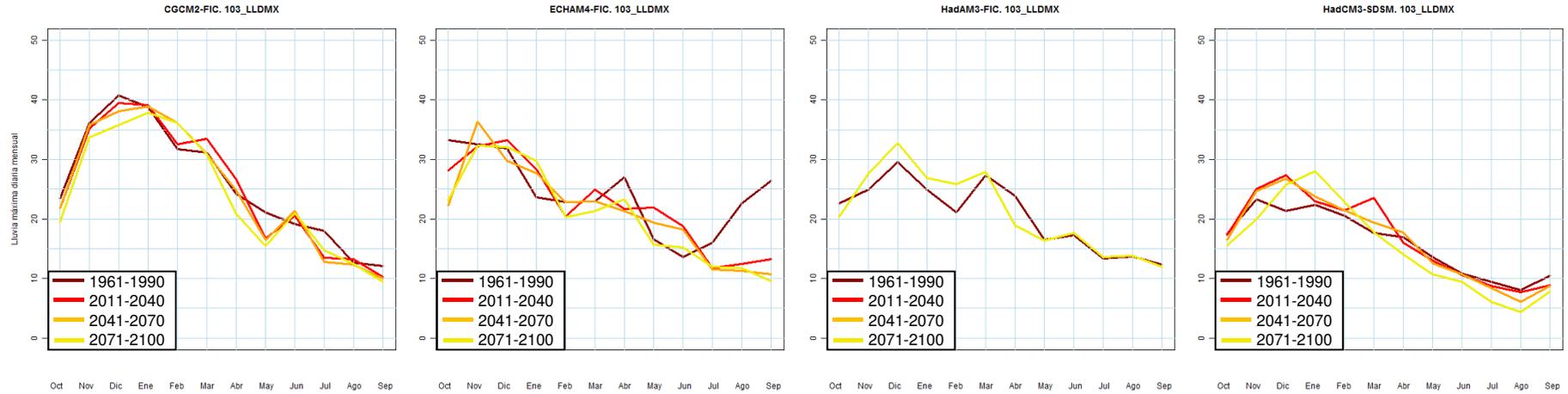
Cambios Variabilidad PMX y R95T

Significación regional test Fligner Killeen: test binomial

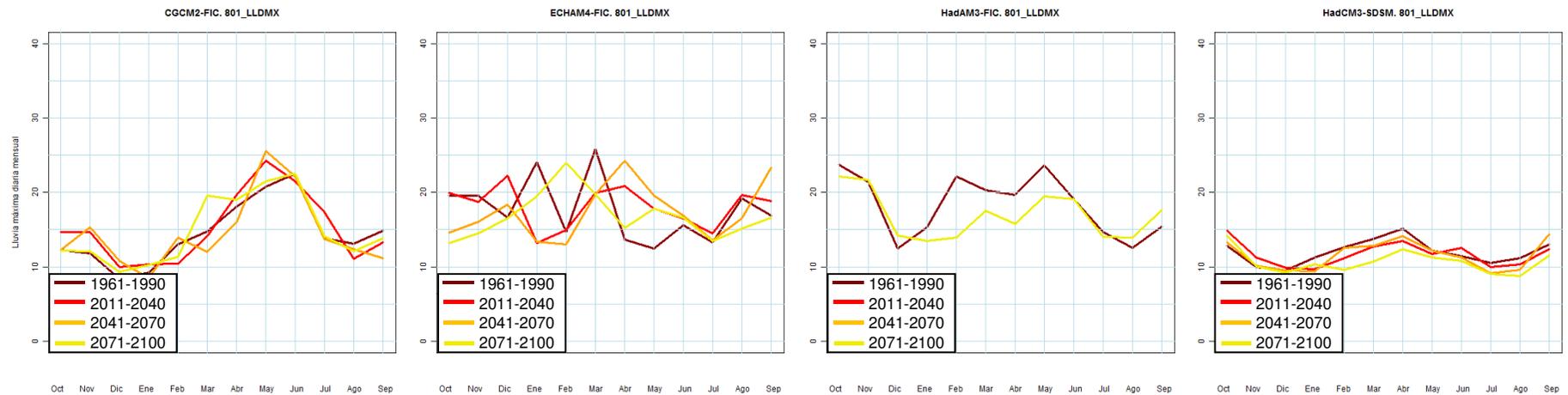


Ciclo anual

Región 103 (Galicia SE) A2



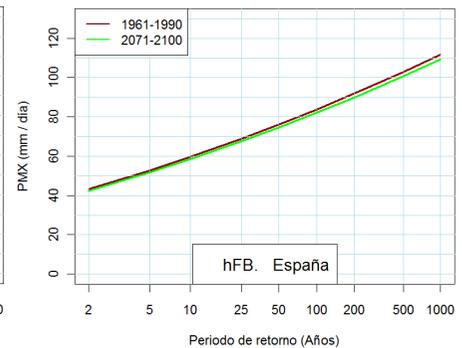
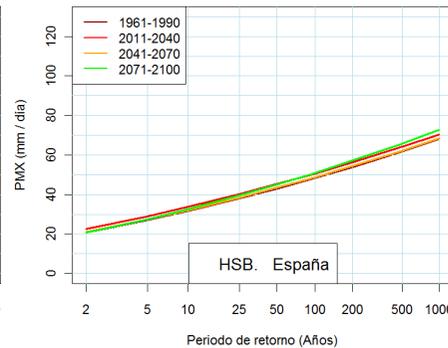
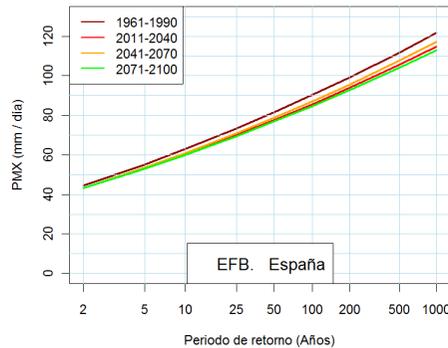
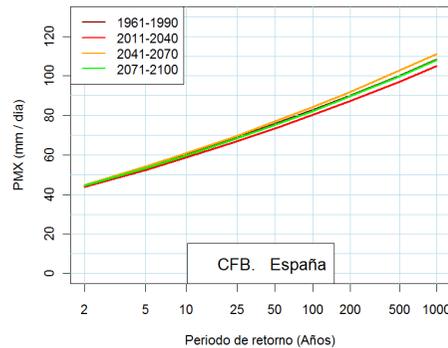
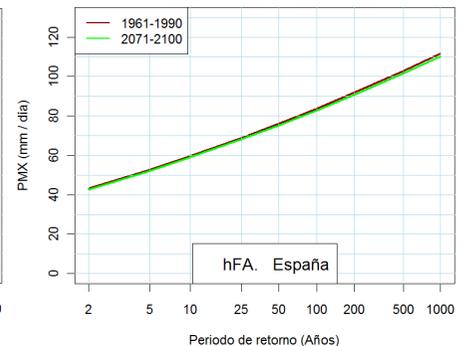
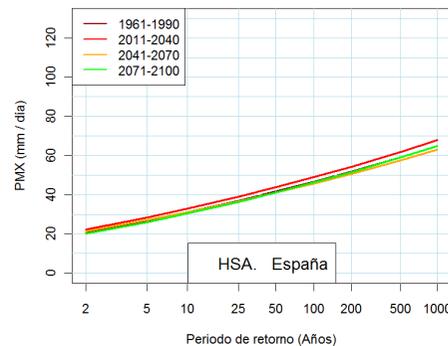
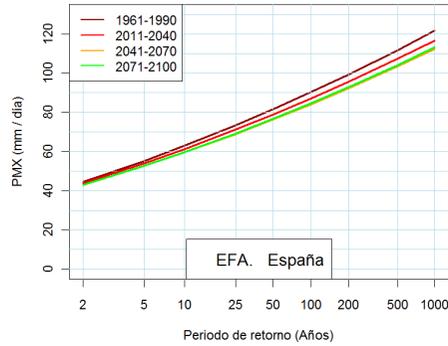
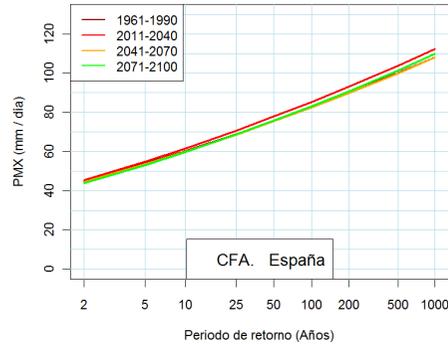
Región 801 (Levante) A2



No hay cambios durante el siglo XXI

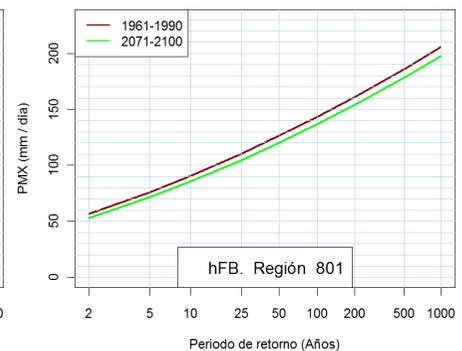
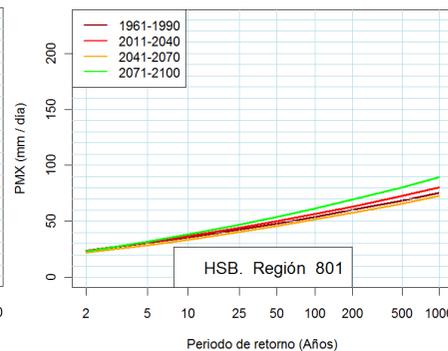
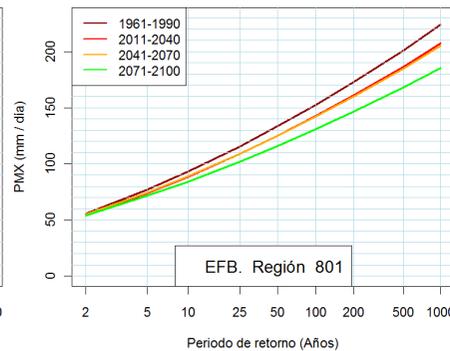
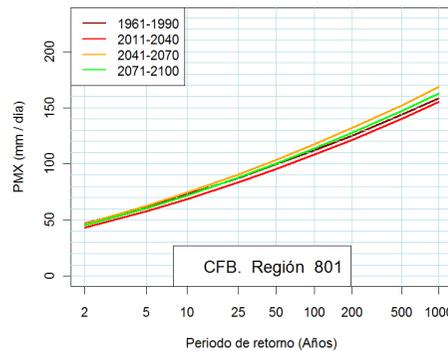
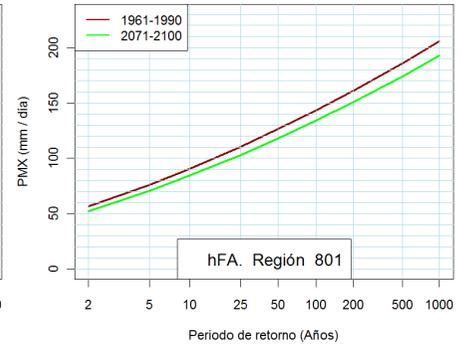
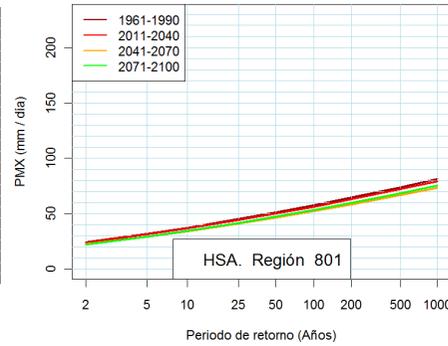
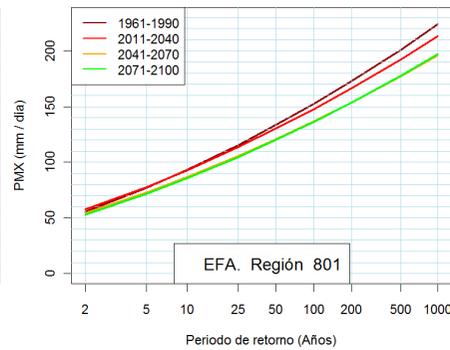
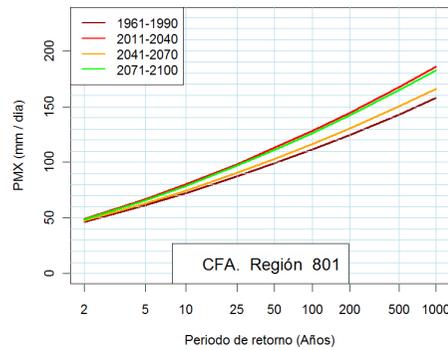
Cambios en las distribuciones de frecuencia PMX SQRT et max

España



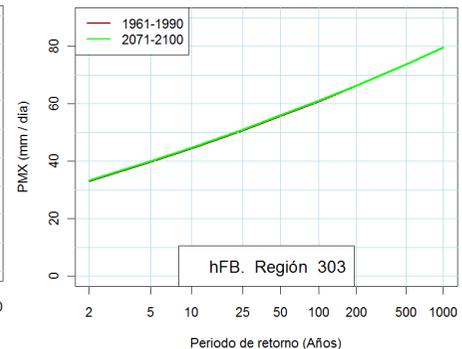
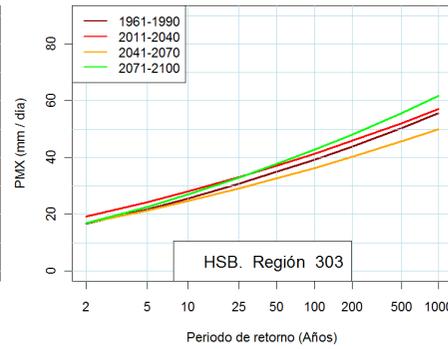
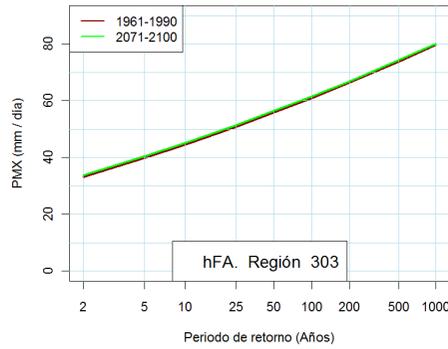
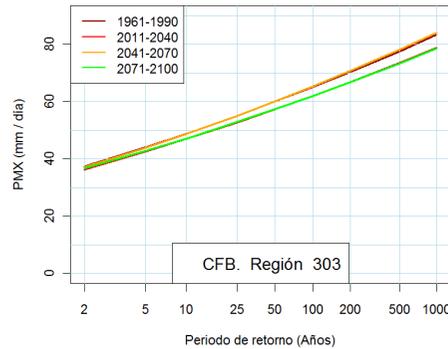
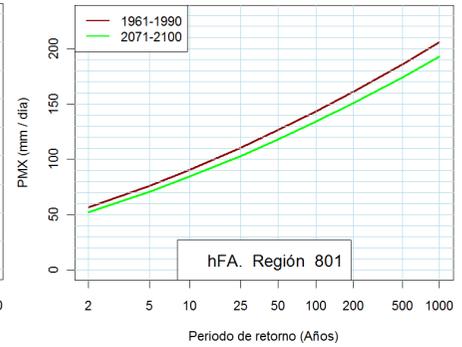
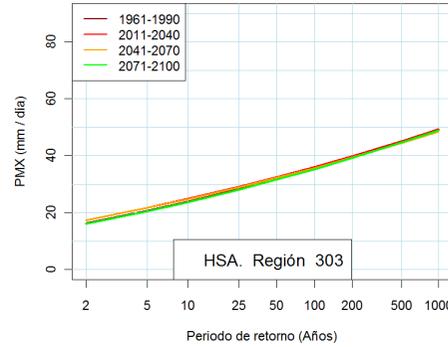
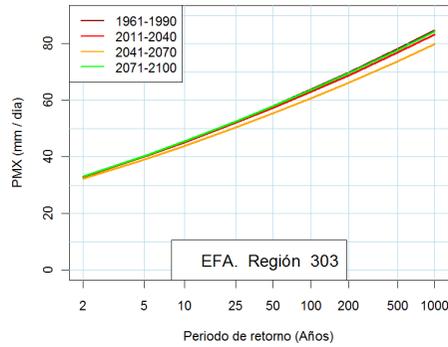
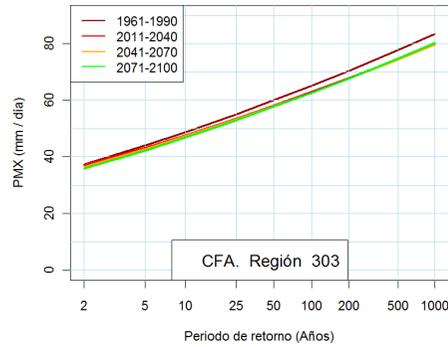
Cambios en las distribuciones de frecuencia PMX SQRT et max

Levante



Cambios en las distribuciones de frecuencia PMX SQRT et max

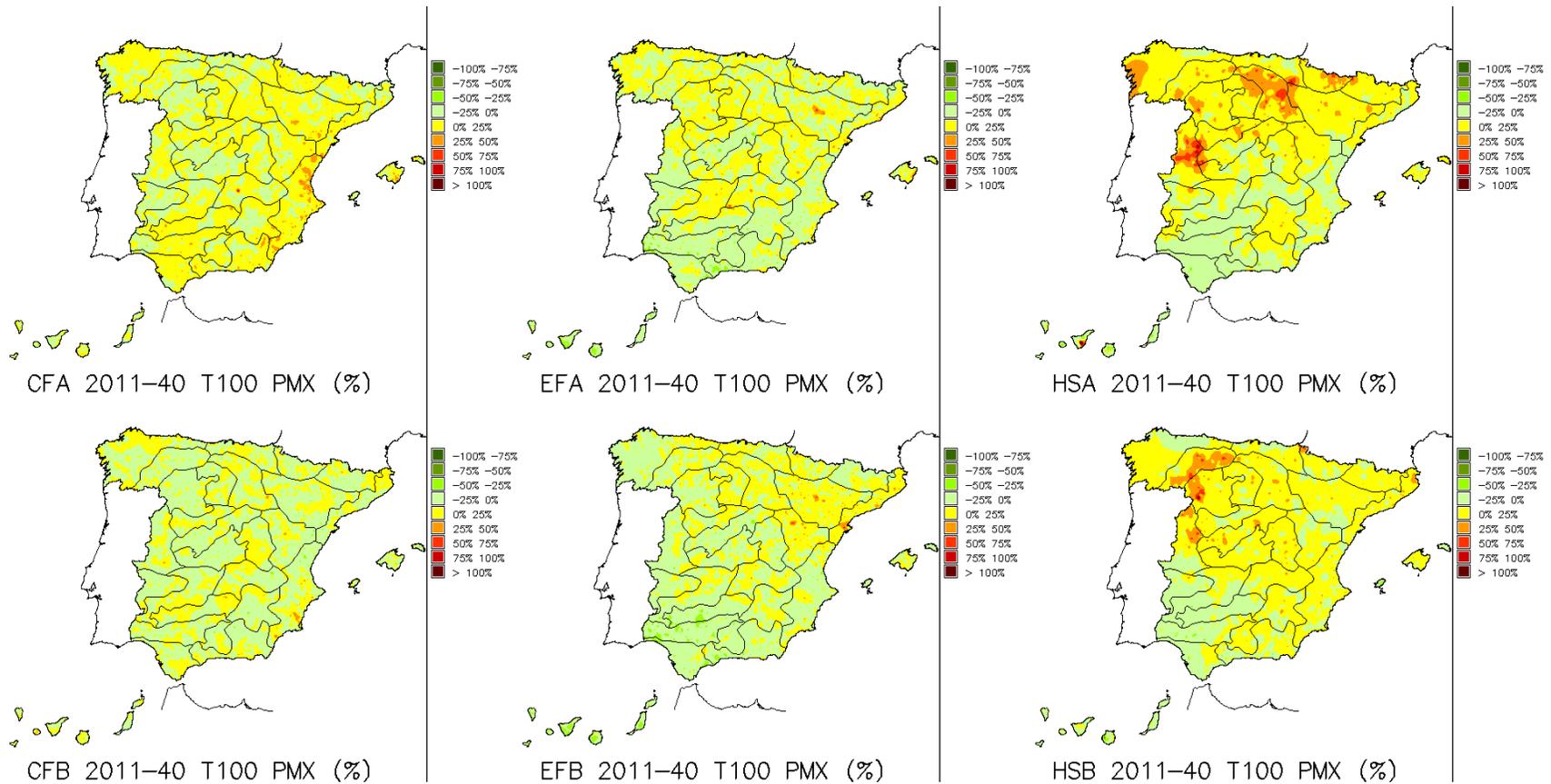
Centro



Cambios en las distribuciones de frecuencia PMX SQRT et max

Cambio de cuantiles PMX para T=100 años en 2011-2040

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Conclusiones

1. Incertidumbre de los resultados: escasa señal de cambio climático en las 8 proyecciones climáticas
 - Desajuste con datos observados
 - Resultados dispares
 - No se estiman aumentos generalizados de PMX
 - Poca continuidad espacial y temporal de los cambios
2. Hay más regiones con aumento de R95T que con aumento de PMX, centro Península (descenso de la precipitación total)
3. Resultados acordes con:
 1. AEMET AR4: Petisco de Lara et al (2012) y AR5.
 2. IPCC, dificultad de simular PMX
4. Nuevas proyecciones ¿mejor señal?

