

**Appendix 10.4:** Examples of downscaling studies.

**Technique** (utilised in the above categories):

- WG = weather generators (e.g.: Markov-type procedures, conditional probability).
- TF = transfer functions (e.g.: Regression, canonical correlation analysis, and artificial neural networks).
- WT = weather typing (e.g.: cluster analysis, self-organising map, and extreme value distribution).

**Predictor variables:** C = circulation based (e.g.: sea level pressure fields and geopotential height fields).

T = temperature (at surface or on one or more atmospheric levels). TH = thickness between pressure levels.

VOR = vorticity. W = wind related. Q = specific humidity (at surface or on one or more atmospheric levels).

RH = relative humidity (at surface or on one or more atmospheric levels). Cld = cloud cover.

ZG = spatial gradients of the predictors. O = other.

**Predictands:** T (temperature); Tmax (maximum temperature); Tmin (minimum temperature); P (precipitation).

**Region** is the geographic domain.

**Time** is the time-scale of the predictor and predictand: H (hourly), D (daily), M (monthly), S (seasonal), and A (annual).

Region	Technique	Predictor	Predictand	Time	Author (s)
<b>Africa</b>					
South Africa	TF	C	P	D	Hewitson and Crane, 1996
<b>America</b>					
USA	WT	T	Tmax, Tmin	D	Brown and Katz, 1995
USA	WG	C	P	D	Zorita <i>et al.</i> , 1995
USA	WG, TF	C, T, VOR	P	D	Wilby and Wigley, 1997
USA	TF	C, Q	P	D	Crane and Hewitson, 1998
USA	WG, TF	C, T, VOR	T, P	D	Wilby <i>et al.</i> , 1998a, b
USA	WG, WT	C	T, P	D	Mearns <i>et al.</i> , 1999
USA	TF	C, T, RH, W	T	D	Sailor and Li, 1999
USA	WG		P	D	Bellone <i>et al.</i> , 1999
Mexico and USA	TF	C, TH, O	P	D	Cavazos, 1997
Mexico and USA	TF, WT	C, TH, Q	P	D	Cavazos, 1999
Central Argentina	TF	C, W	T, Tmax, Tmin	M	Solman and Nuñez, 1999
<b>Asia</b>					
Japanese coast	TF	C	Sea level	M	Cui <i>et al.</i> , 1995, 1996
Chinese coast	TF		Sea level variability	M	Cui and Zorita, 1998
<b>Oceania</b>					
New Zealand	WT	C	Tmax, Tmin, P	D	Kidson and Watterson, 1995
New Zealand	TF	C, TH, VOR, W	T, P	D	Kidson and Thompson, 1998
Australia	TF	C	Tmax, Tmin	D	Schubert and Henderson-Sellers, 1997
Australia	TF	C	Tmax, Tmin	D	Schubert, 1998
Australia	WT	C, T	P		Timbal and McAvaney, 1999
Australia	WT				Schnur and Lettenmaier, 1999
<b>Europe</b>					
Europe	WG	VOR, W			Conoway <i>et al.</i> , 1996
Europe	WG, TF	C, P, Tmax, Tmin, O	T, P	D	Semenov and Barrow, 1996
Europe	TF	C, W, VOR, T, Q, O	T, P	M	Murphy, 1998a, b
Europe	TF	C	T, P, vapour pressure	D	Weichert and Bürger, 1998
Germany	TF	T	Phenological event		Maak and vanStorch, 1997
Germany	TF	C	Storm surge	M	Von Storch and Reichardt, 1997
Germany	TF		Salinity		Heyen and Dippner, 1998
Germany	WT		Thunderstorms	D	Sept, 1998

Region	Technique	Predictor	Predictand	Time	Author (s)
Germany	TF		Ecological variables		Krönke <i>et al.</i> , 1998
Iberian Peninsula	WG	C	P	D	Cubash <i>et al.</i> , 1996
Iberian Peninsula	TF	C	Tmax, Tmin	D	Trigo and Palutikof, 1998
Iberian Peninsula	TF		T, P		Boren <i>et al.</i> , 1999
Iberian Peninsula	TF		T, P		Ribalaygua <i>et al.</i> , 1999
Spain (and USA)	TF	C	Tmax, Tmin	D	Palutikof <i>et al.</i> , 1997
Spain (and USA)	TF	C	Tmax, Tmin	D	Winkler <i>et al.</i> , 1997
Spain	WT			D	Goodess and Palutikof, 1998
Portugal	TF	C	P	M	Corte-Real <i>et al.</i> , 1995
Portugal	WT	C		D	Corte-Real <i>et al.</i> , 1999
The Netherlands	WT	C, VOR, W	T, P	D,M	Buishand and Brandsma, 1997
Norway	TF	C, O	T, P and others	M	Benestad, 1999a, b
Norway (glaciers)	TF	C, O	Local weather	D	Reichert <i>et al.</i> , 1999
Romania	TF	C	P	M	Busuioc and von Storch, 1996
Romania	TF	C	P	M	Busuioc <i>et al.</i> , 1999
Switzerland	TF		P		Buishand and Klein Tank, 1996
Switzerland	TF		P		Brandsma and Buishand, 1997
Switzerland	TF			D	Widmann and Schär, 1997
Switzerland	WG	C	Local Weather	H	Gyalistras <i>et al.</i> , 1997
Switzerland	TF		P		Buishand and Brandsma, 1999
Poland	TF	C	T, sea level, wave height, salinity, wind, run-off	D,M	Mietus, 1999
Alps	WT				Fuentes and Heimann, 1996
Alps	TF	C, T	T, P	M	Fischlin and Gyalistras, 1997
Alps	WT	C	Snow		Martin <i>et al.</i> , 1997
Alps	WT				Fuentes <i>et al.</i> , 1998
Alps	TF	C, T	T, P,		Gyalistras <i>et al.</i> , 1998
Alps,	TF	C, T	Snow cover		Hantel <i>et al.</i> , 1998
Alps	WT	C, T	Landslide activity		Dehn, 1999a, b
Alps	WT		T, P	D	Heimann and Sept, 1999
Alps	WT		P	D	Fuentes and Heimann, 1999
Alps	TF, WG	C, T	Weather statistics	M	Riedo <i>et al.</i> , 1999
Alps	TF	C	P	M	Burkhardt, 1999
Mediterranean	TF	C, P	T		Palutikof and Wigley, 1995
Mediterranean	TF	C	P	S	Jacobeit, 1996
North Atlantic	TF	C	Pressure tendencies	M	Kaas <i>et al.</i> , 1996
North Atlantic	TF	C	Wave height	M	WASA, 1998
North Sea	TF		Ecological variables		Dippner, 1997a, b
North Sea coast	TF	C	Sea level	M	Langenberg <i>et al.</i> , 1999
Baltic Sea	TF	SLP	Sea level	M	Heyen <i>et al.</i> , 1996
<b>Region not specified</b>					
	WT				Frey-Buness <i>et al.</i> , 1995
	WT	C			Matyasovszky and Bogardi, 1996
	WT				Enke and Spekat, 1997
	TF	C, VOR, W			Kilsby <i>et al.</i> , 1998
	TF		Ecological variables		Heyen <i>et al.</i> , 1998
	TF		P		Biau <i>et al.</i> , 1999
	WG	P	P	D	Wilks, 1999
	WT		P	D	Zorita and von Storch, 1999