Section III: The Large Scale Predictors

The database for predictors, METANAL, is derived from historical synoptic analyses. From 1970 to 1993, at 00 UTC and 12 UTC, grid point analyses for Australian region have been archived, by the Australian Bureau of Meteorology. The analyses are available on a regular 1.5 x 1.5 grid from 50 S to 10 S and from 90 E to 170 E. This dataset contain Mean Sea Level pressure (MSLP), geopotential at various height, Temperature at 850 hPa and wind speed at 500 hPa.

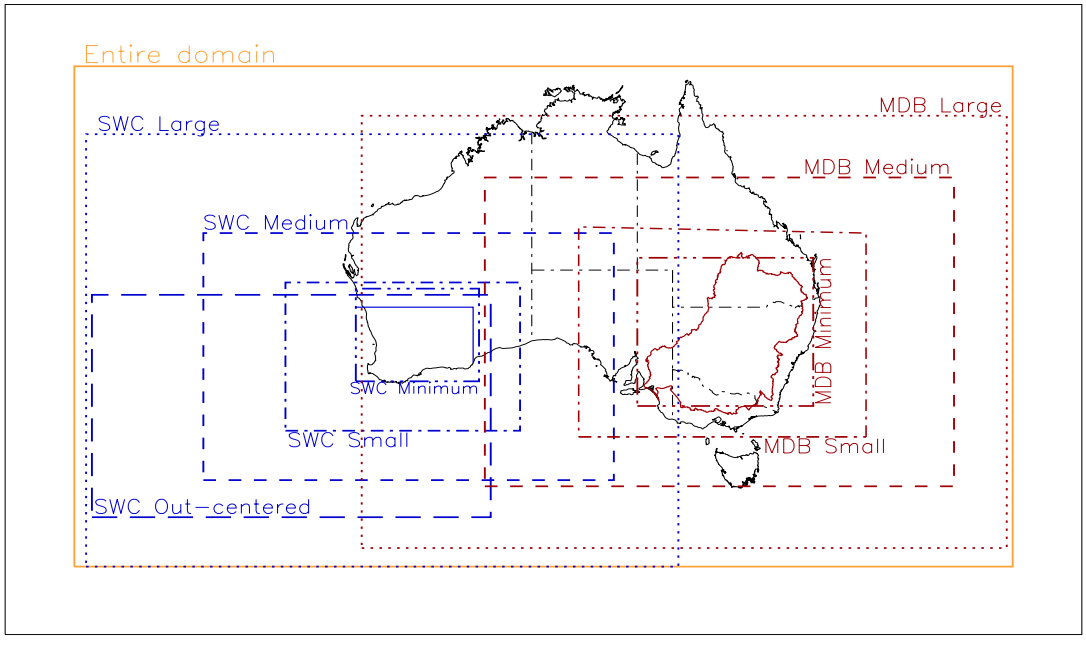
Several atmospheric predictors were tested, the selection was based on the following criteria:

1. Being realistically simulated by GCMs
2. Having a strong predictive skill for surface temperature
3. Being complementary to the other atmospheric forcing

The best combination was found to be MSLP and Temperature at 850 hPa.
The domain size applied to predictors in order to optimize recognition of synoptic systems from unnecessary noise is a key parameter of the SM. Both primary fields and their decomposition in to Principal Components (PCs) were used. In the latter case the number of PCs used varies and has been optimized for each domain. This number decreases with the size of the domain as more variance is explained by fewer leading PCs. In large domains PCs, by filtering synoptic signal from remanent noise, increase the predictive skill from the raw fields. But in smaller domains, primary variables yield to better results.

The search for the best matching analogue, using Euclidean distance, is based on several metrics taking into account the weather situation on the day or over several days and thus the evolution of the atmosphere. The latter has been particularly useful in improving the representation of anomalous spells as it partially incorporates the auto-correlation of surface temperature.

The different domains



Root Mean Square Errors		Entire	Large	Medium	Small	Minimum	Random	Persist
Rawfield	T_max	2.64	2.52	2.33	2.23	2.32	3.56	2.41
	T_min	3.42	3.26	3.04	2.90	2.96	4.12	2.94
PCs	T_max	2.57	2.48	2.34	2.37	2.49	3.56	2.41
	T_min	3.39	3.22	3.14	3.03	3.13	4.12	2.94