

Daily maximum and minimum temperature analysis at the southern region of South America using different reanalysis datasets and station data

Mariana Barrucand^{1,2}

¹ Departamento de Ciencias de la Atmósfera y los Océanos – Facultad de Ciencias Exactas y Naturales – Universidad de Buenos Aires (DCAO-FCEN-UBA) / Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) – Buenos Aires - Argentina

² Equipo Interdisciplinario para el Estudio de Procesos Atmosféricos en el Cambio Global (PEPACG) – Pontificia Universidad Católica Argentina Facultad de Ciencias Físico-Matemáticas - Buenos Aires - Argentina

barrucand@at.fcen.uba.ar

INTRODUCTION

The Patagonia, southern region of South America, has been less studied than other regions of South America. Meteorological data coverage is poor, so it is very difficult to analyze the zone. In this work, three datasets are compared with daily maximum and minimum temperatures from some meteorological stations of a region southern 40°S

DATA AND METHODOLOGY

Daily maximum and minimum temperatures

Station data

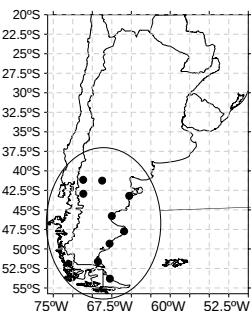
Reanalysis data

Station data
9 meteorological station
Period:1979-2010

NCEP/NCAR
Reanalysis 1 (R1)
Period:1979-2010

NCEP/DOE
Reanalysis 2 (R2)
Period:1979-2010

ECMWF-ERA
INTERIM (REI)
Period 1989-2008



STATION	Latitude (°S)	Longitude (°W)	Height (m)
BARILOCHE AERO	41.09	71.1	840
MAQUINCHAO	41.15	68.44	888
ESQUEL AERO	42.56	71.09	797
TRELEW AERO	43.12	65.16	43
COMODORO RIVADAVIA AERO	45.47	67.3	46
PUERTO DESEADO AERO	47.44	65.55	80
SAN JULIAN AERO	49.19	67.47	62
RIO GALLEGOS AERO	51.37	69.17	19
RIO GRANDE B.A.	53.48	67.45	22

Figure 1: meteorological station used in the work

- Basis statistics of differences between datasets were performed.
- Temporal variability of differences was also analyzed

Differences between datasets – Annual statistics

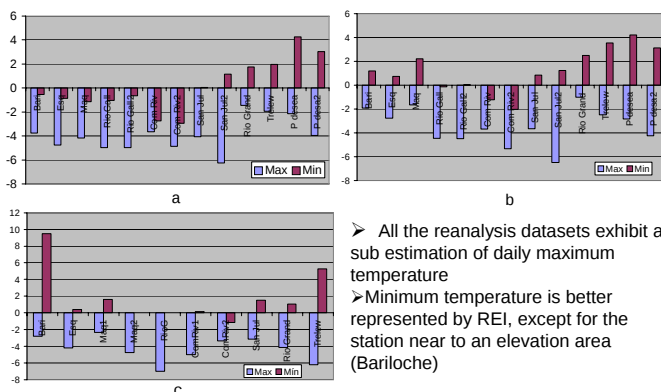


Figure 2: Median of differences between reanalysis datasets and meteorological data. Variables: Maximum and minimum temperatures (°C) a) R1 b) R2 c) REI

Seasonal differences

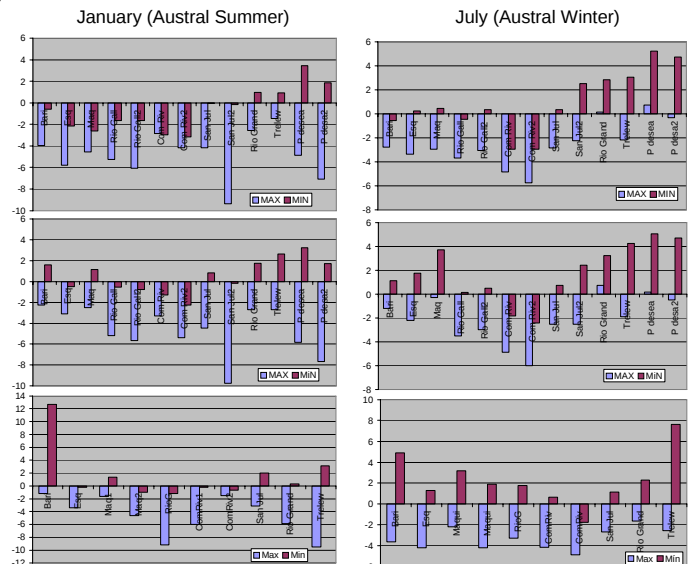


Figure 3: idem fig.2 but for January (left panel) and July (right panel). R1 (top panel), R2 (middle panel) REI (bottom panel)

- In REI, the minimum temperature is over estimated in July, and the maximum temperature is more sub-estimated in January.
- Minimum temperature is better represented in R2 than R1, specially in summer

Temporal variability

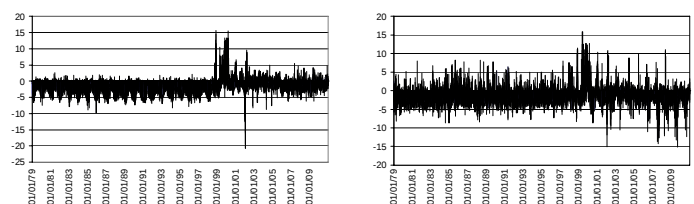


Figure 4: Example of daily difference R1-R2 for one local point near Esquel. Maximum temperature (left panel) ; Minimum temperature (right panel)

- Some of the grid points of the studied area present a shift in the difference between R1 and R2 near the year 2000, with an increase of high differences between the two datasets

Conclusions:

- ✓ All the reanalysis datasets exhibit a sub estimation of daily maximum temperature
- ✓ High differences were found in many days (differences of 10 °C, 15°C or even more), specially in daily maximum temperatures in summer. Nevertheless, these extreme differences have low frequency of occurrence.
- ✓ In Era interim datasets, the minimum temperature is over estimated in July (austral winter), but it has a better performance in January (austral summer). The maximum temperature is more sub-estimated in January.
- ✓ Minimum temperature is sub estimated at R1 and over estimated in R2, but not at all the stations
- ✓ R1 and R2 comparison shows more differences between both datasets after the end of 90's