SOSE VERIFICATION

iteration number 100

years 2008 - 2010
1. Adjustment of control variables:

(i) time-average, standard deviation, minimum, maximum
Air temperature (°C)


(a) Time average
(b) Standard deviation
(c) Minimum
(d) Maximum

Air pressure (Pa)


(a) Time average
(b) Standard deviation
(c) Minimum
(d) Maximum
**Downward Shortwave Radiation (W m⁻²)**

Adjustment of controls for time period: 01–Jan–2008 to 31–Dec–2010: \( \text{swdown} [\text{W m}^{-2}] \)

- **a) Time average**
- **b) Standard deviation**
- **c) Minimum**
- **d) Maximum**

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**Downward Longwave Radiation (W m⁻²)**

Adjustment of controls for time period: 01–Jan–2008 to 31–Dec–2010: \( \text{lwdown} [\text{W m}^{-2}] \)

- **a) Time average**
- **b) Standard deviation**
- **c) Minimum**
- **d) Maximum**
Precipitation (m s\(^{-1}\))

Adjustment of controls for time period: 01–Jan–2008 to 31–Dec–2010:  precip [m s\(^{-1}\)]

Specific Humidity (kg/kg)

Adjustment of controls for time period: 01–Jan–2008 to 31–Dec–2010:  aqh [kg/kg]
Zonal Wind Speed (m s\(^{-1}\))

Adjustment of controls for time period: 01–Jan–2008 to 31–Dec–2010: \( u_{\text{wind}} \) [m s\(^{-1}\)]

a) Time average

b) Standard deviation

c) Minimum

d) Maximum

Meridional Wind Speed (m s\(^{-1}\))

Adjustment of controls for time period: 01–Jan–2008 to 31–Dec–2010: \( v_{\text{wind}} \) [m s\(^{-1}\)]

a) Time average

b) Standard deviation

c) Minimum

d) Maximum
Adjustment of control variables

(ii) time-averaged over each season
Air temperature (°C)

Seasonally averaged adjustment for time period: 01–Jan–2008 to 31–Dec–2010 of atemp [°C]

Austral Summer: 20 Dec – 21 Mar

Austral Fall: 22 Mar – 21 Jun

Austral Winter: 22 Jun – 21 Sep

Austral Spring: 22 Sep – 21 Dec

Air pressure (Pa)


Austral Summer: 20 Dec – 21 Mar

Austral Fall: 22 Mar – 21 Jun

Austral Winter: 22 Jun – 21 Sep

Austral Spring: 22 Sep – 21 Dec
Downward Shortwave Radiation (W m\(^{-2}\))

Seasonally averaged adjustment for time period: 01–Jan–2008 to 31–Dec–2010 of swdown [W m\(^{-2}\)]

Austral Summer 20 Dec – 21 Mar

Austral Fall 22 Mar – 21 Jun

Austral Winter 22 Jun – 21 Sep

Austral Spring 22 Sep – 21 Dec

Downward Longwave Radiation (W m\(^{-2}\))

Seasonally averaged adjustment for time period: 01–Jan–2008 to 31–Dec–2010 of lwdown [W m\(^{-2}\)]

Austral Summer 20 Dec – 21 Mar

Austral Fall 22 Mar – 21 Jun

Austral Winter 22 Jun – 21 Sep

Austral Spring 22 Sep – 21 Dec
Precipitation (m s\(^{-1}\))

Seasonally averaged adjustment for time period: 01–Jan–2008 to 31–Dec–2010 of precip [m s\(^{-1}\)]

Specific Humidity (kg/kg)

Seasonally averaged adjustment for time period: 01–Jan–2008 to 31–Dec–2010 of aqh [kg/kg]
Zonal Wind Speed (m s\(^{-1}\))

Meridional Wind Speed (m s\(^{-1}\))

Seasonally averaged adjustment for time period: 01–Jan–2008 to 31–Dec–2010 of uwind [m s\(^{-1}\)]

Austral Summer: 20 Dec – 21 Mar

Austral Fall: 22 Mar – 21 Jun

Austral Winter: 22 Jun – 21 Sep

Austral Spring: 22 Sep – 21 Dec

Seasonally averaged adjustment for time period: 01–Jan–2008 to 31–Dec–2010 of vwind [m s\(^{-1}\)]
(iii) Times series of adjustment of control variables at selected locations
Air temperature (°C)

A) Adjustment of atemp [°C]: Time Average

B) atemp at lon= 20° E, lat= -40°

C) atemp at lon= 100° E, lat= -27°

D) atemp at lon= 85° W, lat= 52° S

E) atemp at lon= 59° W, lat= 57° S

F) atemp at lon= 10° W, lat= 35° S

Air pressure (Pa)

A) Adjustment of apressure [Pa]: Time Average

B) apressure at lon= 20° E, lat= -40°

C) apressure at lon= 100° E, lat= -27°

D) apressure at lon= 85° W, lat= 52° S

E) apressure at lon= 59° W, lat= 57° S

F) apressure at lon= 10° W, lat= 35° S
Downward Shortwave Radiation (W m\(^{-2}\))

A) Adjustment of swdown [W m\(^{-2}\)]; Time Average

B) swdown at lon= 20° E, lat= −40°

C) swdown at lon= 100° E, lat= −27°

D) swdown at lon= 85° W, lat= 52° S

E) swdown at lon= 59° W, lat= 57° S

F) swdown at lon= 10° W, lat= 35° S

Time (years)

Downward Longwave Radiation (W m\(^{-2}\))

A) Adjustment of lwdown [W m\(^{-2}\)]; Time Average

B) lwdown at lon= 20° E, lat= −40°

C) lwdown at lon= 100° E, lat= −27°

D) lwdown at lon= 85° W, lat= 52° S

E) lwdown at lon= 59° W, lat= 57° S

F) lwdown at lon= 10° W, lat= 35° S

Time (years)
Precipitation (m s^{-1})

A) Adjustment of precip [m s^{-1}]: Time Average

B) precip at lon= 20° E, lat= -40°

C) precip at lon= 100° E, lat= -27°

D) precip at lon= 85° W, lat= 52°

E) precip at lon= 59° W, lat= 57°

F) precip at lon= 10° W, lat= 35°

Specific Humidity (kg/kg)

A) Adjustment of aqh [kg/kg]: Time Average

B) aqh at lon= 20° E, lat= -40°

C) aqh at lon= 100° E, lat= -27°

D) aqh at lon= 85° W, lat= 52°

E) aqh at lon= 59° W, lat= 57°

F) aqh at lon= 10° W, lat= 35°
Zonal Wind Speed (m s\(^{-1}\))

A) Adjustment of uwind [m s\(^{-1}\)]; Time Average

B) uwind at lon= 20° E, lat= -40°

C) uwind at lon= 100° E, lat= -27°

D) uwind at lon= 85° W, lat= 52° S

E) uwind at lon= 59° W, lat= 57° S

F) uwind at lon= 10° W, lat= 35° S

Meridional Wind Speed (m s\(^{-1}\))

A) Adjustment of vwind [m s\(^{-1}\)]; Time Average

B) vwind at lon= 20° E, lat= -40°

C) vwind at lon= 100° E, lat= -27°

D) vwind at lon= 85° W, lat= 52° S

E) vwind at lon= 59° W, lat= 57° S

F) vwind at lon= 10° W, lat= 35° S

Time (years)
2. SOSE air-sea fluxes
SOSE air-sea heat flux, heat-equivalent salt flux and heat-equivalent buoyancy flux (all in W m$^{-2}$)

a) Time-averaged: Net air-sea heat flux [W m$^{-2}$]

b) Heat equivalent salt flux [W m$^{-2}$]

c) Heat equivalent buoyancy flux (sum of heat and freshwater flux) [W m$^{-2}$]
Time and zonally averaged SOSE air-sea heat flux, heat-equivalent salt flux and heat-equivalent buoyancy flux (all in W m\(^{-2}\))

a) Time and zonally averaged: Net air-sea heat flux [W m\(^{-2}\)]

b) Time and zonally averaged: Heat equivalent salt flux [W m\(^{-2}\)]

c) Time and zonally averaged: Net air-sea buoyancy flux [W m\(^{-2}\)] = a) + b)
SOSE and ERA-interim time-averaged air-sea heat flux

a) Time-averaged SOSE net air-sea heat flux [W m$^{-2}$]

b) Time-averaged ERA-Interim net air-sea heat flux [W m$^{-2}$]

Time-averaged SOSE minus ERA-Interim net air-sea heat flux [W m$^{-2}$]
3. SOSE MASS TRANSPORT
SOSE time-averaged zonally integrated meridional mass transport across 30°S
SOSE and Ganachaud and Wunsch (2000) time-averaged mass transport

Zonally integrated meridional mass transport at 30°S (Sv): Zonal mass transport (Sv):

a) Atlantic

SOSE: 19 ± 5, −19 ± 4, 0 ± 3

GW: 16 ± 3, −23 ± 3, 6 ± 1.3

b) Indian

SOSE: −12 ± 6, −4 ± 3, 6 ± 5

GW: −27 ± 6, 3 ± 5, 8 ± 4

c) Pacific

SOSE: 12 ± 9, −10 ± 6, 8 ± 5

GW: 19 ± 5, −9 ± 3, 7 ± 2

d) South of Australia

SOSE net transport 157 ± 9 Sv

GW net transport 157 ± 10 Sv

e) Drake Passage

SOSE net transport 146 ± 9 Sv

GW net transport 140 ± 6 Sv

GW denotes mass transports estimates by Ganachaud and Wunsch (2000)