

The Fiordland Current: mean, variability, trends

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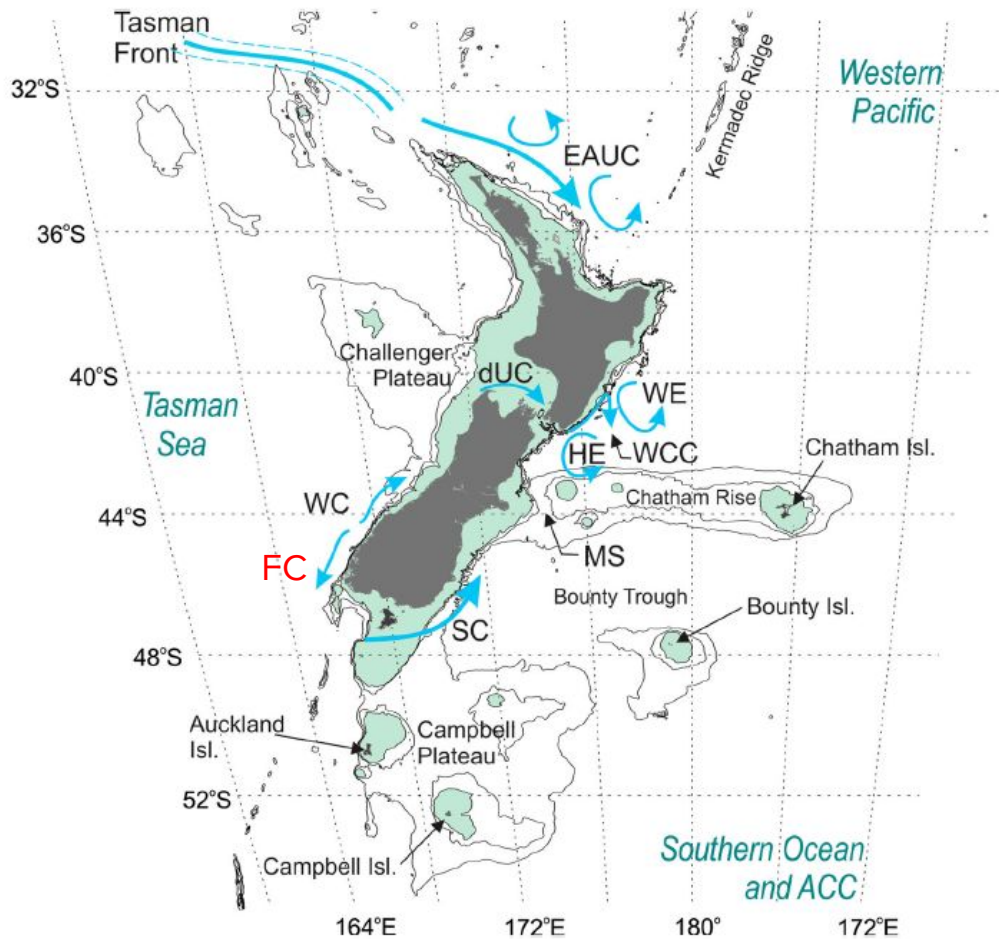
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Background

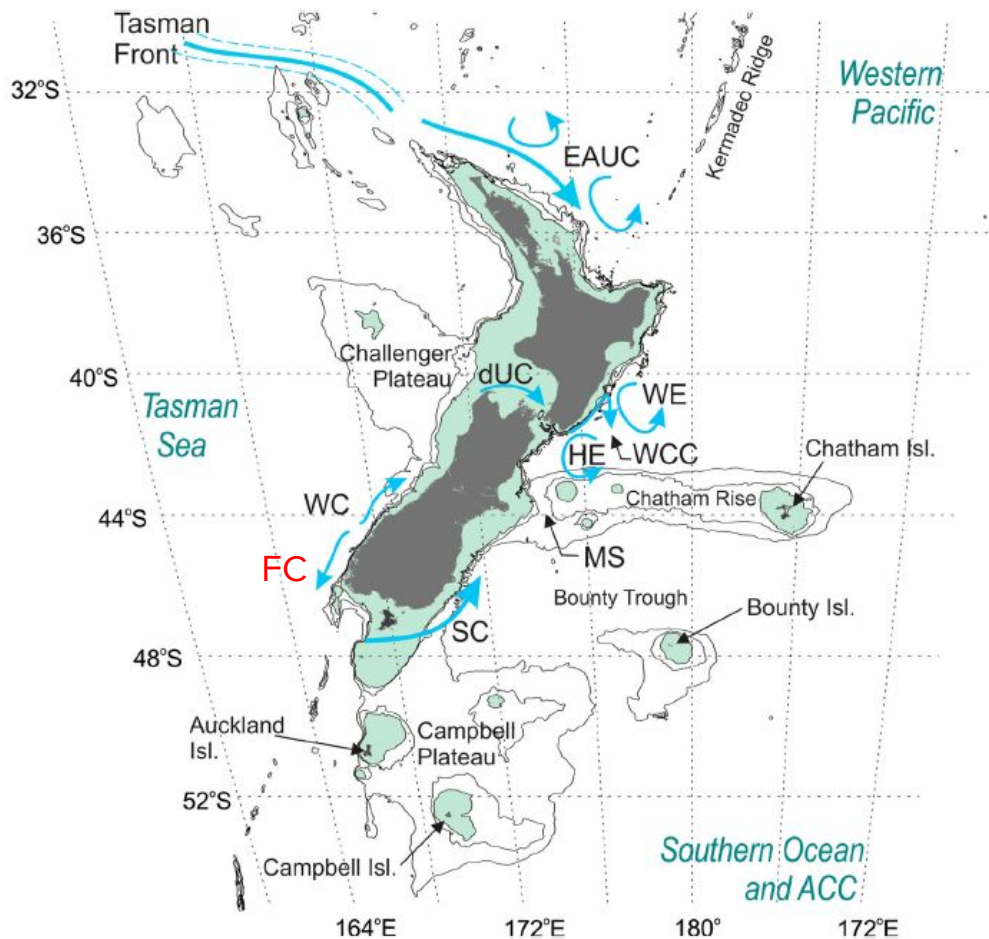
Fiordland Current is a poleward-flowing boundary current along the Fiordland coast.

Part of the anticlockwise circulation around southern New Zealand.



Aim

Use satellite altimetry to begin to examine the mean, variability, and trends in the Fjordland Current.

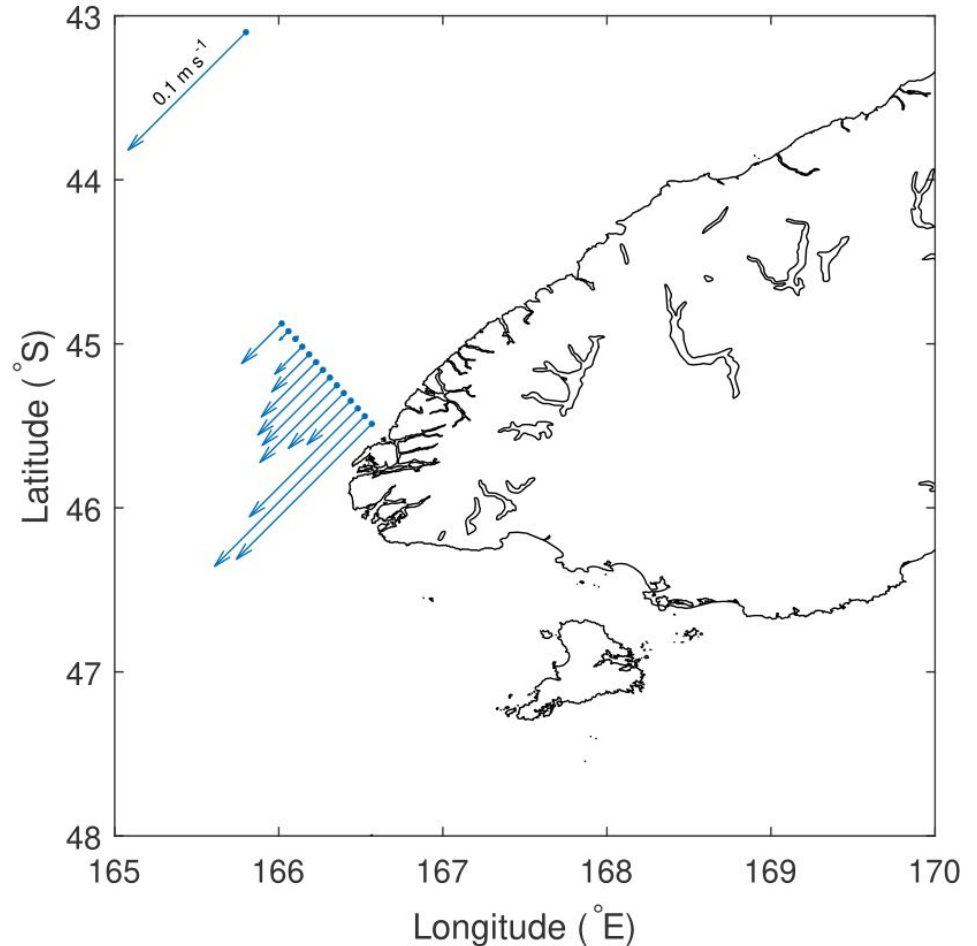


Mean Current

September 1992 - May 2017 mean
across-track surface geostrophic velocity

$$\overline{v_g} = \frac{g}{f} \frac{\overline{\partial ADT}}{\partial x}$$

Mean current was found to be poleward
with a spatially-averaged velocity of 0.06
m/s.



Forcing

Poleward downsloping alongshore pressure gradient dominated over the equatorward alongshore wind stress, suggesting that the mean poleward flow is driven by this poleward pressure gradient.

$$\int \frac{Dv}{Dt} dz - R + fU = \boxed{-g \frac{\partial S}{\partial y} + \frac{\tau}{\rho_0}}$$

Depth-integral of stress terms

Combined alongshore forcing

Alongshore pressure gradient forcing

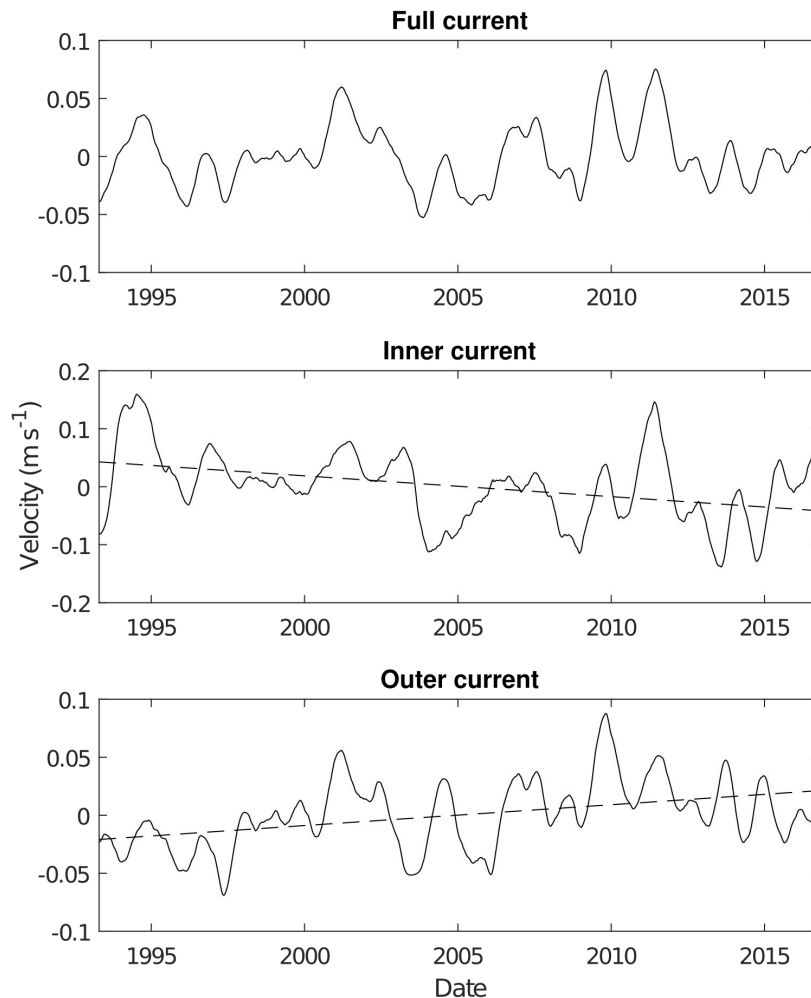
Alongshore wind stress forcing

Timeseries

April 1993 - November 2016 smoothed
across-track surface geostrophic velocity
anomalies

$$v'_g = \frac{g}{f} \frac{\partial \eta}{\partial x}$$

- Inner current had strengthened.
- Outer current had weakened.
- No significant trend over the full FC.



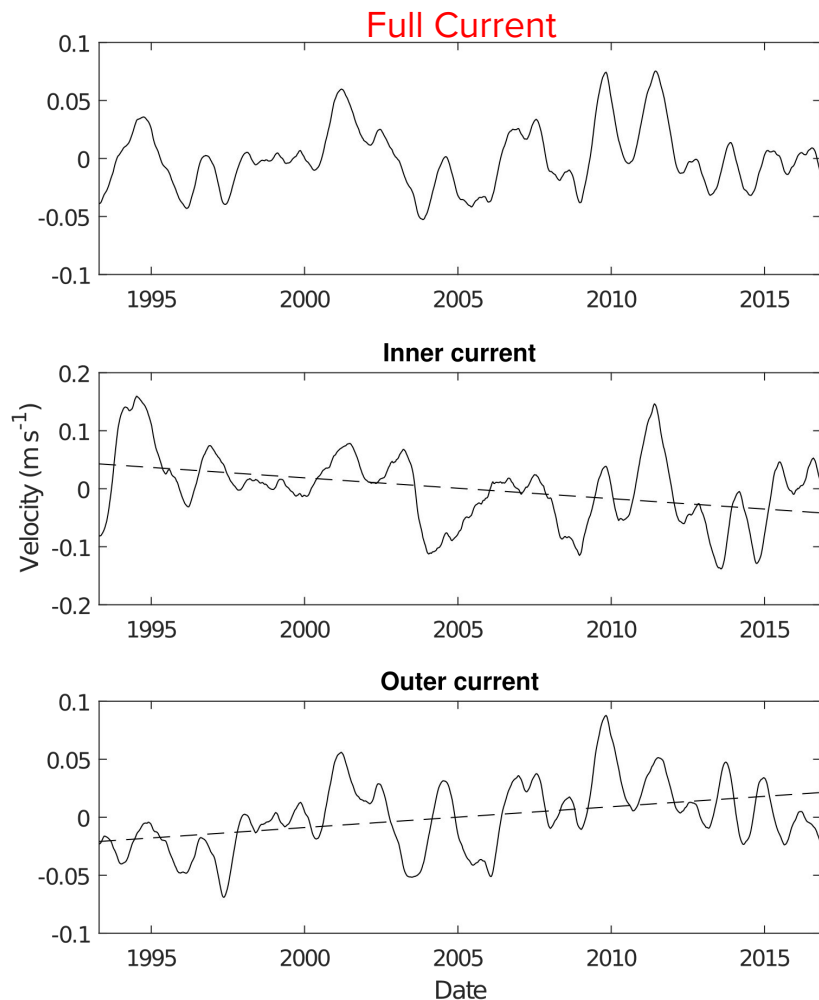
Timeseries

April 1993 - November 2016 smoothed
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anomalies

$$v'_g = \frac{g}{f} \frac{\partial \eta}{\partial x}$$

Correlated with possible drivers of
variability:

- Alongshore SLA gradient
- SOI
- S Pacific wind stress curl
- SE Tasman wind stress curl
- **Alongshore wind stress**
- Cross-shore wind stress



Key points

- The FC is the southwestward flow along NZ's southern west coast.
- In the mean this flow seems to be driven by the poleward downsloping alongshore pressure gradient.
- No significant trend was found in the strength of the FC.
- At interannual timescales variability in the FC was correlated with the alongshore wind stress.

See paper for further details: **Chandler et al. (2019). The Fiordland Current, southwest New Zealand: mean, variability, and trends. *NZJMFR*.**

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