



Universidad de Concepción

DATA REPORT CORRIENTES MEDIDAS CON ADCP EN TIEMPO REAL

FIORDO AYSÉN Julio-2010

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Introducción

El fiordo Aysén está centrado a los 45°22'S; 73°05'W, y pertenece a la XI Región de Chile. Un primer tramo del fiordo (desde la cabeza) se orienta en dirección NW hasta el sector más al norte del fiordo, y luego cambia de sentido hacia el SW hasta la boca del fiordo, en donde desemboca con el canal Moraleda. Los principales flujos de agua dulce que aportan al fiordo, son en primer grado el río Aysén ubicado en la cabecera, y luego los ríos Cóndor y Cuervo ubicados en el primer tramo (NW) del fiordo.

Para determinar la estructura espacial de las corrientes al interior del fiordo Aysén, se realizaron mediciones con Acoustic Doppler Currentmeter Profiler (ADCP) en dos transectos medidos a lo ancho del fiordo (~4-5 km) entre los días 22-25 de julio del 2010, que correspondió a un periodo de marea entre fines de cuadratura y principios de sicigia.

Las transectas a lo ancho del fiordo, se realizaron en las localidades cercanas al río Cóndor, y al río Cuervo (**Fig. 1**), obteniéndose perfiles de corrientes hasta 200 m de profundidad, durante un periodo de medición continua de 12-24 horas. Así, debido a que fueron efectuadas durante un periodo de mareas, fue posible ajustar armónicos para aislar el efecto mareal del residual en las componentes de la corriente a lo largo y ancho del fiordo (U,V).

Este informe se centra en presentar las componentes de la corriente a lo largo del fiordo (U) y transversal al fiordo (V). Valores positivos (color rojo) de U indican corrientes hacia fuera del fiordo, mientras que valores negativos de U (color azul) representan las corrientes hacia el interior del fiordo.

Mediciones con ADCP desde la embarcación (SIDE SHIP MOUNTED ADCP)

Para el registro de datos de corrientes, se utilizó un correntómetro perfilador acústico (ADCP) de 150 kHz (ADCP150) marca TRD-Instruments, operada en modo bottom-track (BT) el cual se instaló en un brazo de acero inoxidable a un costado de la embarcación (**Fig. 2**). En forma simultánea a las mediciones de corrientes, se registró la posición geográfica de la embarcación mediante un GPS marca GARMIN modelo GSMAP180C.

Los registros de ADCP remolcado obtenidos en esta campaña, fueron realizados a bordo de la embarcación “Don Jorge” a una velocidad máxima de 2 m s⁻¹, y el intervalo de tiempo entre cada medición fue de 3 s, lo cual implica que se efectuaron perfiles de corrientes a una distancia aproximada de 6 m. Posteriormente, los perfiles fueron promediados cada 1 minuto, lo cual entregó perfiles promedio cada 120 m aproximadamente (el detalle de las diferentes configuraciones utilizadas se muestran en el **ANEXO**).

Procesamiento de la información

El control de calidad de los perfiles de corrientes consideró la eliminación de los datos evidentemente erróneos de cada circuito, además de criterios estándares de bondad (percent good) sobre el 30%, flujo (discharge) <100 m³ s⁻¹ y error menor a 0.03 m s⁻¹, finalmente se consideraron sólo aquellos perfiles cuyas diferencias entre las velocidades registradas por el BT del ADCP y la velocidad registrada por el GPS fueron menores a 3 m s⁻¹.

Un segundo criterio consideró la corrección de la dirección, debido a que el compás magnético del ADCP es afectado por los campos magnéticos generados por el desplazamiento de la embarcación y por la desviación magnética local (**Joyce, 1989; Pollard & Read, 1989; Trump & Marmorino, 1997**). Esta corrección implica la comparación de la velocidad del bottom-track y las obtenidas desde la navegación, de esta forma se obtiene una corrección para el compás (α) y para la magnitud (β), los cuales son usados para corregir el perfil completo de velocidades (**Valle-Levinson & Atkinson, 1999**).

Resultados

Para describir la circulación al interior del fiordo Aysén durante julio 2010, se obtuvieron transectos perpendiculares al fiordo (~4-5 km) con mediciones continuas durante 12 y 24 horas, recolectando un total de 42 tracks medidos.

Las componentes U y V de las transectas efectuadas, se orientaron en función del largo y ancho del fiordo respectivamente, dependiendo de la dirección del track (**Fig. 1**). Así, las componentes de la corriente medidas en el transecto de Cóndor, fueron rotadas con un ángulo de 288°, mientras que las corrientes medidas en Cuervo se rotaron en 320°.

De esta forma, U representa la componente a lo largo del estuario con valores positivos hacia la boca, y negativos hacia la cabeza. En tanto la componente V, representa las corrientes perpendiculares a la costa del fiordo, con valores positivos hacia la rivera Sur, y negativos hacia la rivera Norte.

Finalmente, las componentes de la corriente fueron interpoladas en grillas de 100 m de distancia horizontal y cada 1 m de profundidad en la transecta Cóndor y la transecta a lo largo del fiordo, y cada 1.5 m en la transecta medida en Cuervo. Con los datos de corriente interpolados, se procedió a estimar el armónico semidiurno (M_2) de la corriente en cada punto de la grilla, y la componente diurna (K_1) en el caso en que la duración del circuito realizado fuera mayor o igual a 24 horas (**Emery & Thompson, 1998**). Además, se incorporan gráficas de la bondad de ajuste de la corriente residual (Goodness of fit).

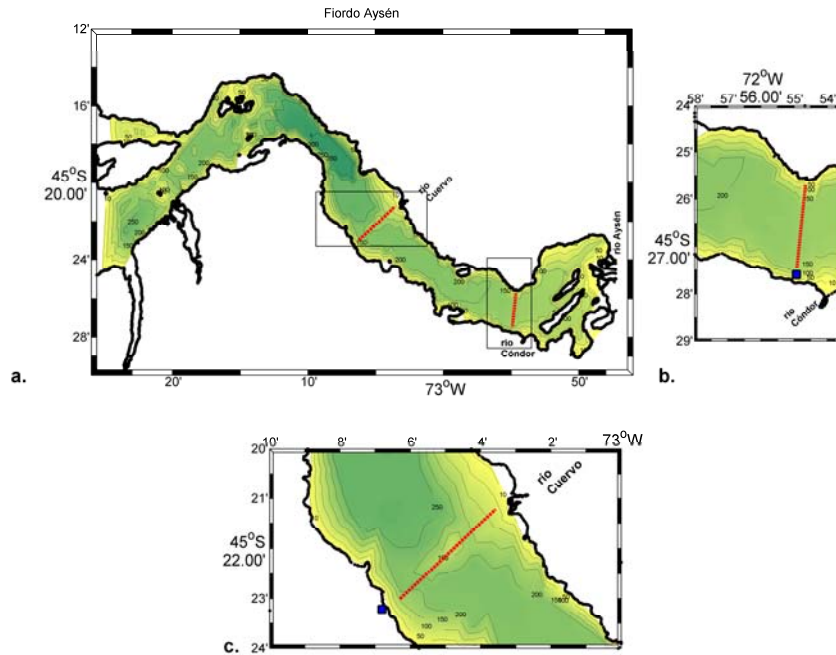


Figura 1. Transectos de ADCP remolcado al interior del fiordo Aysén (línea punteada) (a), transecta Córdor (b) y transecta Cuervo (c). El cuadro azul simboliza la posición de referencia para los tracks.

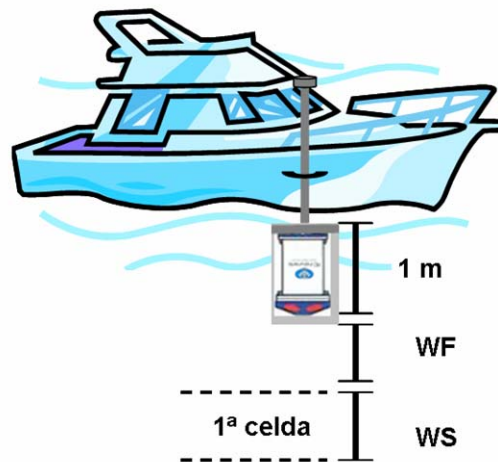


Figura 2. Figura esquemática de mediciones con ADCP, instalado en un brazo de acero inoxidable y remolcado por una embarcación (side-mounted ADCP). La figura muestra la profundidad de los transductores (~1 m), distancia del blanco (WF) y el ancho de la primera celda de medición (WS).

ANEXO

Configuraciones utilizadas para el muestreo

A continuación se presentan las configuraciones de usuario con las cuales se programaron las diferentes mediciones de ADCP desde la embarcación. El programa de toma de datos utilizados fue WINRIVER 1.03, el que permite la adquisición de datos tanto de ADCP como de GPS. Desde este programa se pueden configurar diversos parámetros del registro a través de comandos. Los principales comandos se listan a continuación:

- WN** : Número de celdas
- WS** : Tamaño de la celda en cm (el mín. y máx. depende de cada frecuencia)
- TE** : Intervalo de medición (ensemble interval, TE00000300 = cada 3.0 s)
- BP** : Número de bottom pings por cada medición
- WP** : Número de water pings por cada medición (por lo general, BP = WP)
- BX** : Máxima profundidad del fondo en dm (ej. 220 m = BX2200)
- WF** : Distancia del blanco
- WV** : Ambigüedad de la velocidad o velocidad aparente (cm/s)
- BC** : Magnitud mínima de Correlación

Los demás comandos existentes, son utilizados con su valor por defecto y pueden ser consultados en el manual del instrumento. En la siguiente tabla se muestran las configuraciones realizadas durante esta campaña.

Tabla 1: Configuraciones del ADCP 150 kHz, realizado durante la campaña septiembre 2009 al interior del fiordo Aysén.

Transecta	Cóndor	Cuervo
Fecha	24/07/2010	22/07/2010
WS	200	300
WN	125	125
TE	00000300	00000300
BX	2500	3500
WF	100	100
BA	25	25

FIGURES

**[Side-ship ADCP data from transect,
CONDOR
July-2010]**

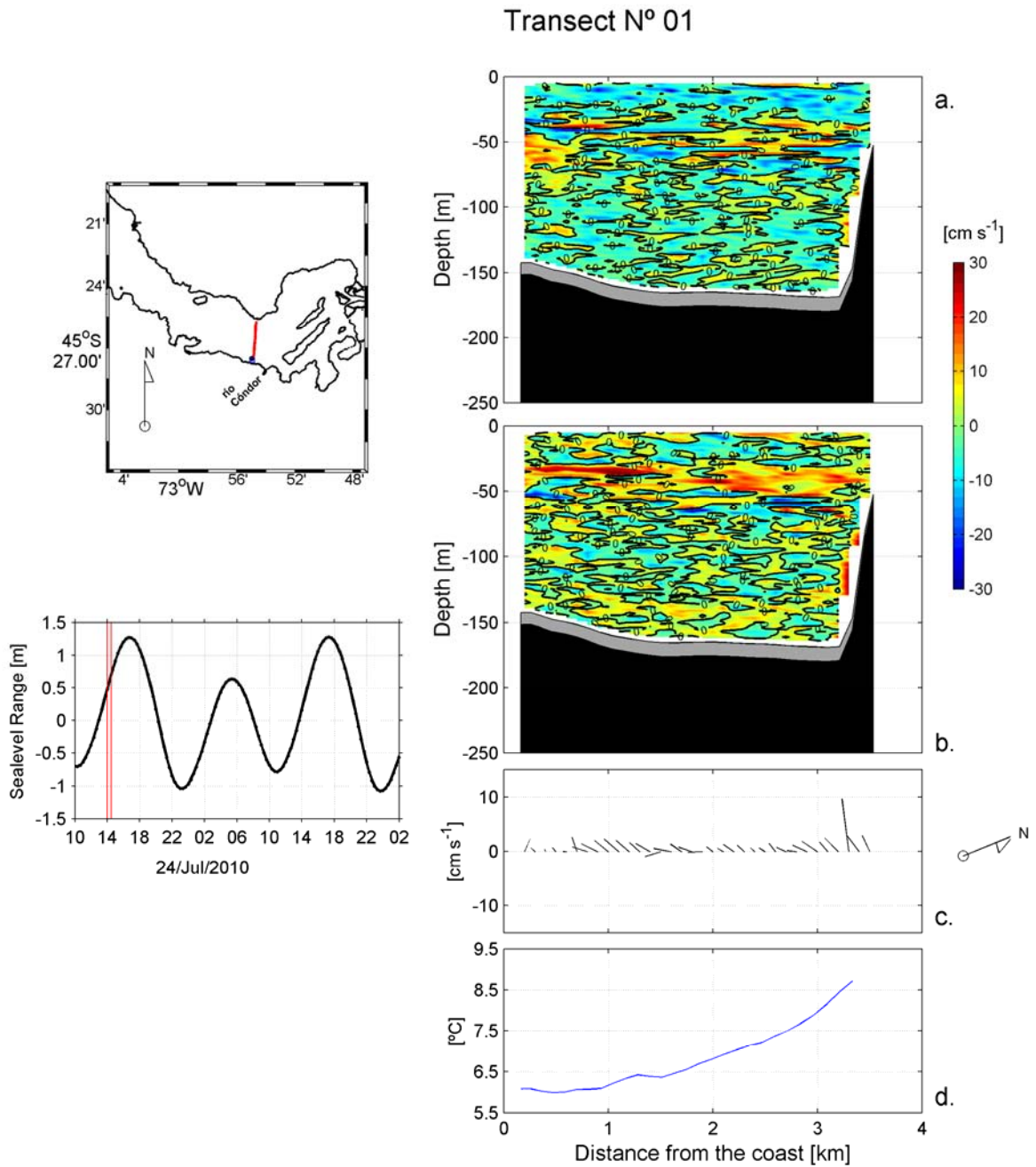


Figure 01: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 24/Jul/2010 at 14:01 UTC and 24/Jul/2010 at 14:30 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

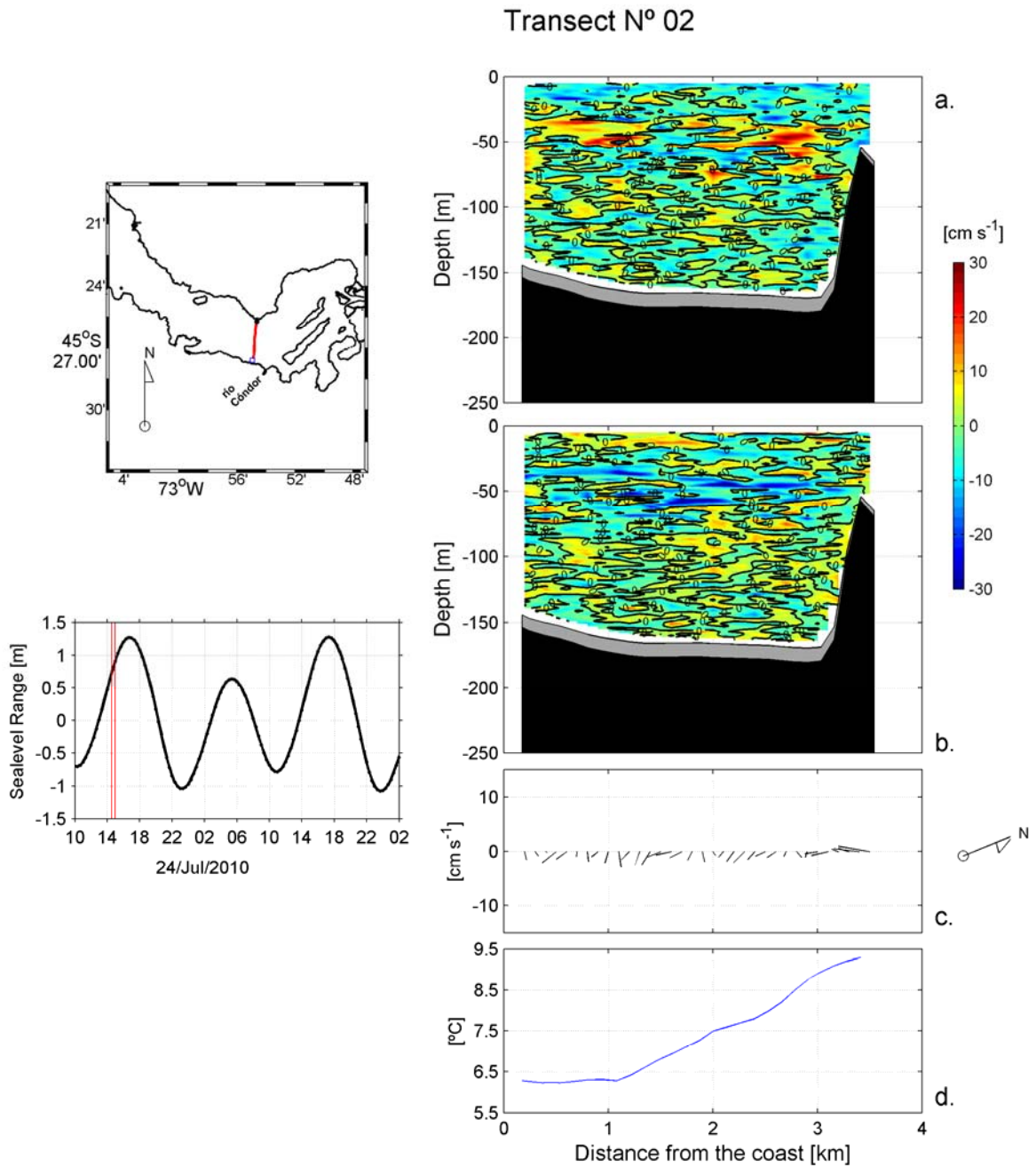


Figure 02: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 24/Jul/2010 at 14:33 UTC and 24/Jul/2010 at 14:59 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

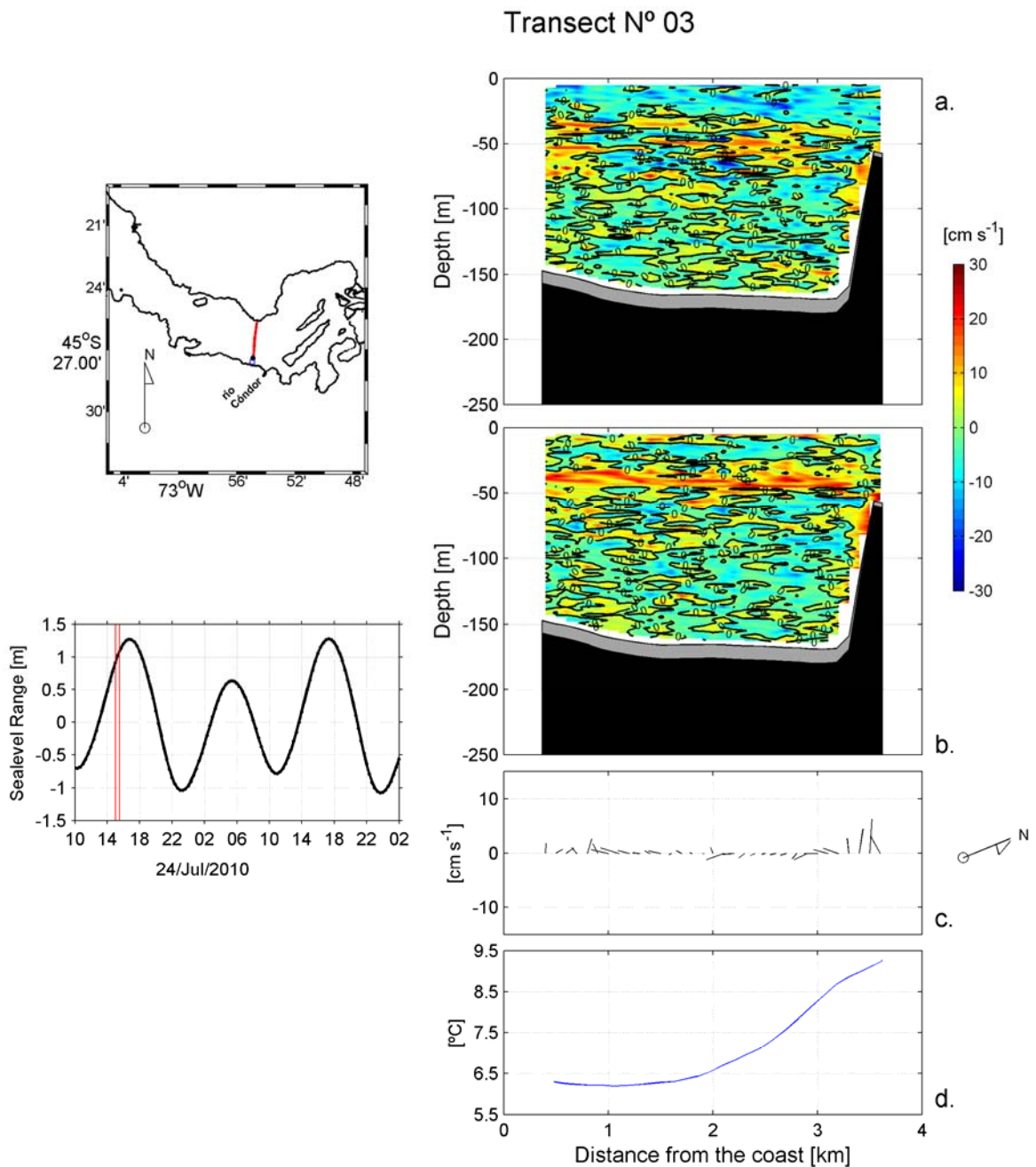


Figure 03: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 24/Jul/2010 at 15:02 UTC and 24/Jul/2010 at 15:30 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

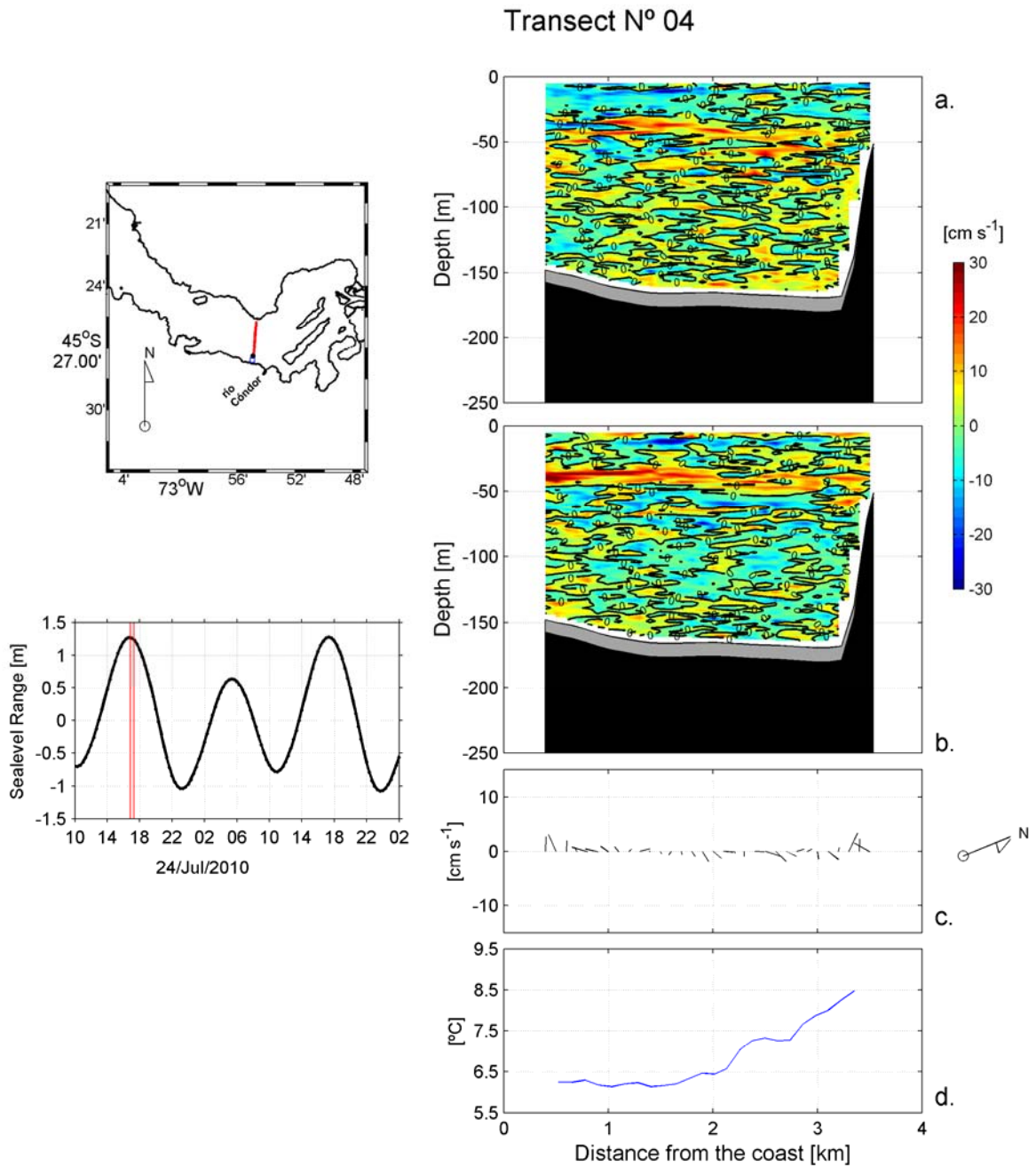


Figure 04: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 24/Jul/2010 at 16:53 UTC and 24/Jul/2010 at 17:18 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

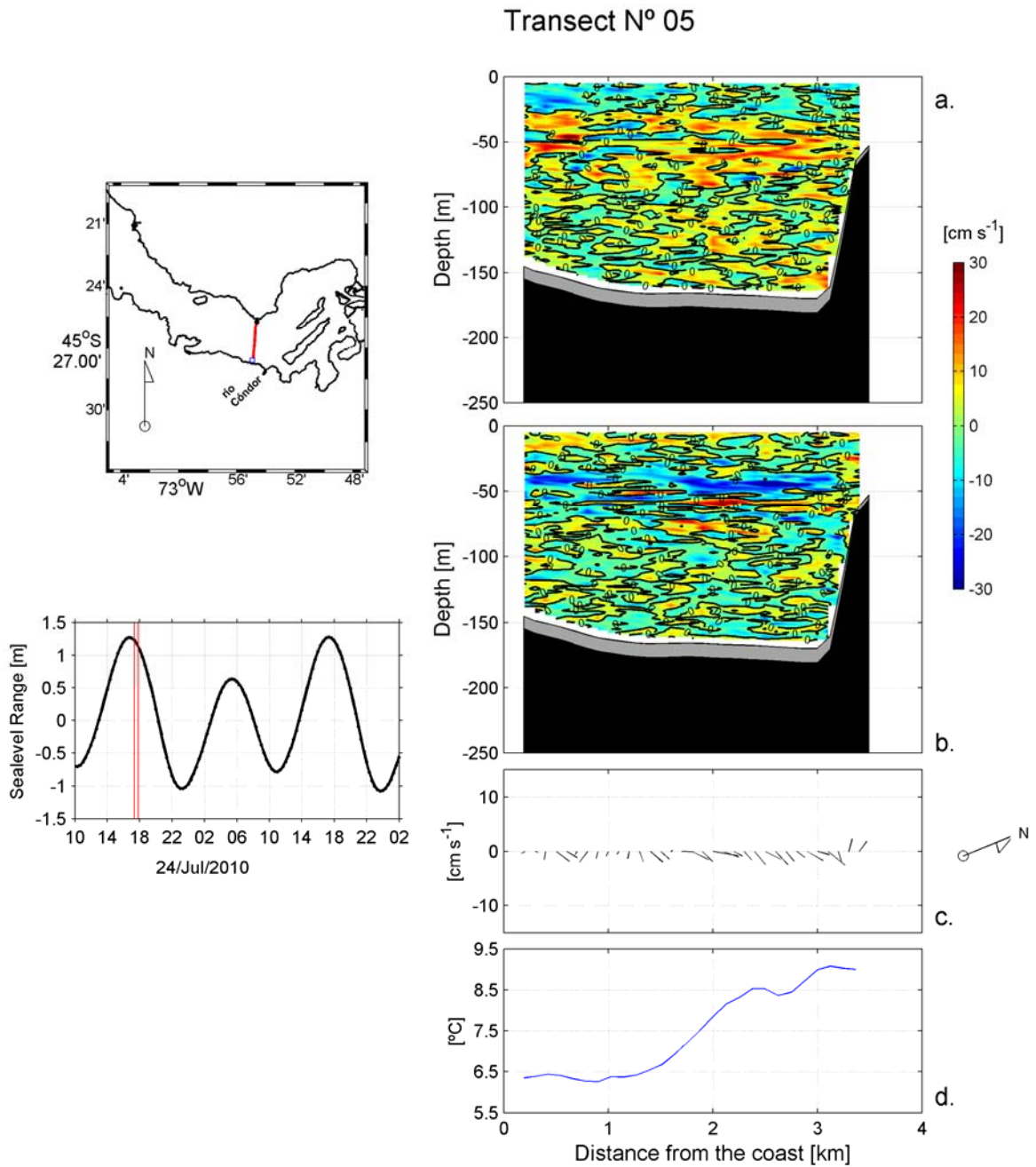


Figure 05: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 24/Jul/2010 at 17:22 UTC and 24/Jul/2010 at 17:49 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

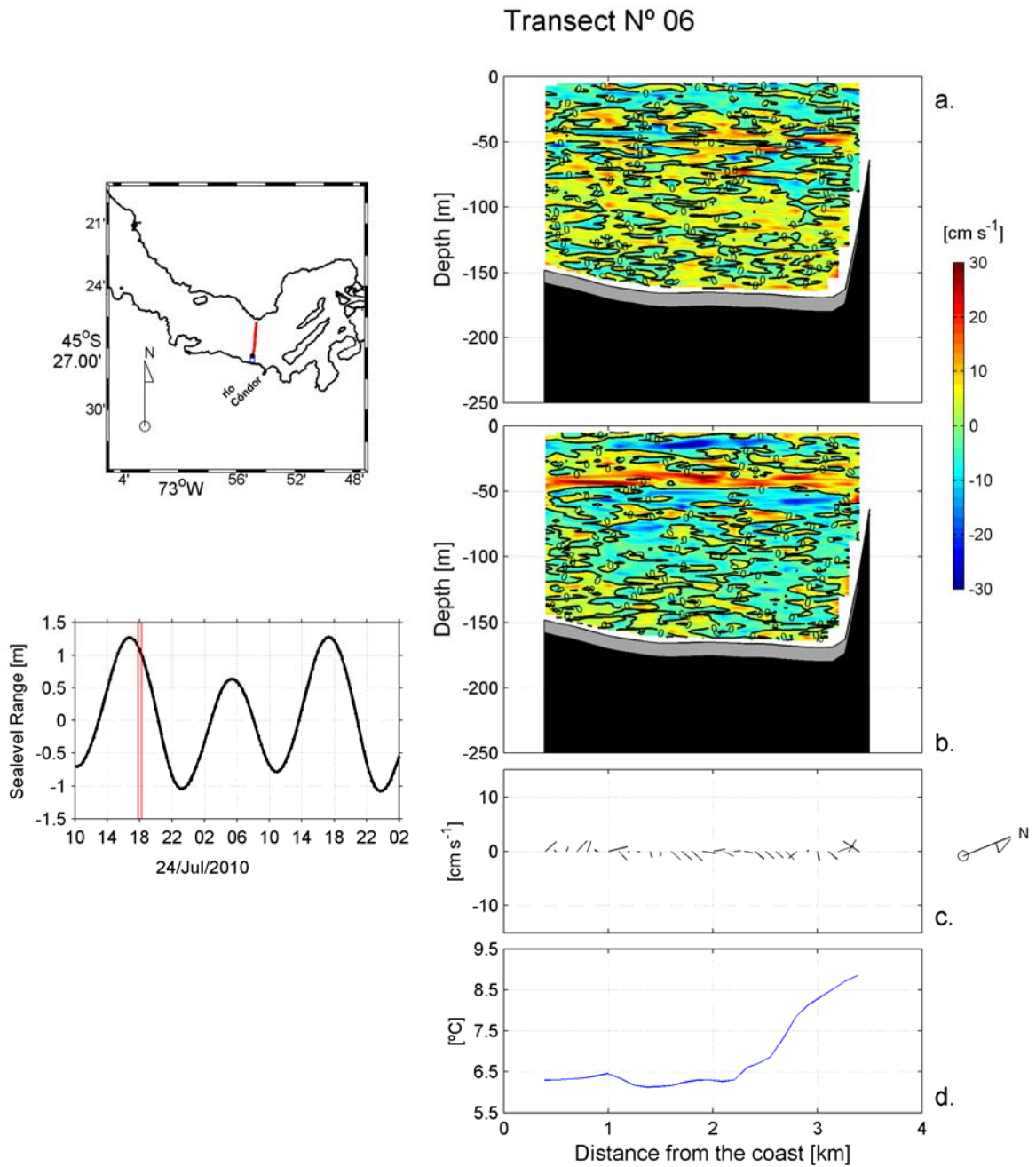


Figure 06: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 24/Jul/2010 at 17:51 UTC and 24/Jul/2010 at 18:17 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

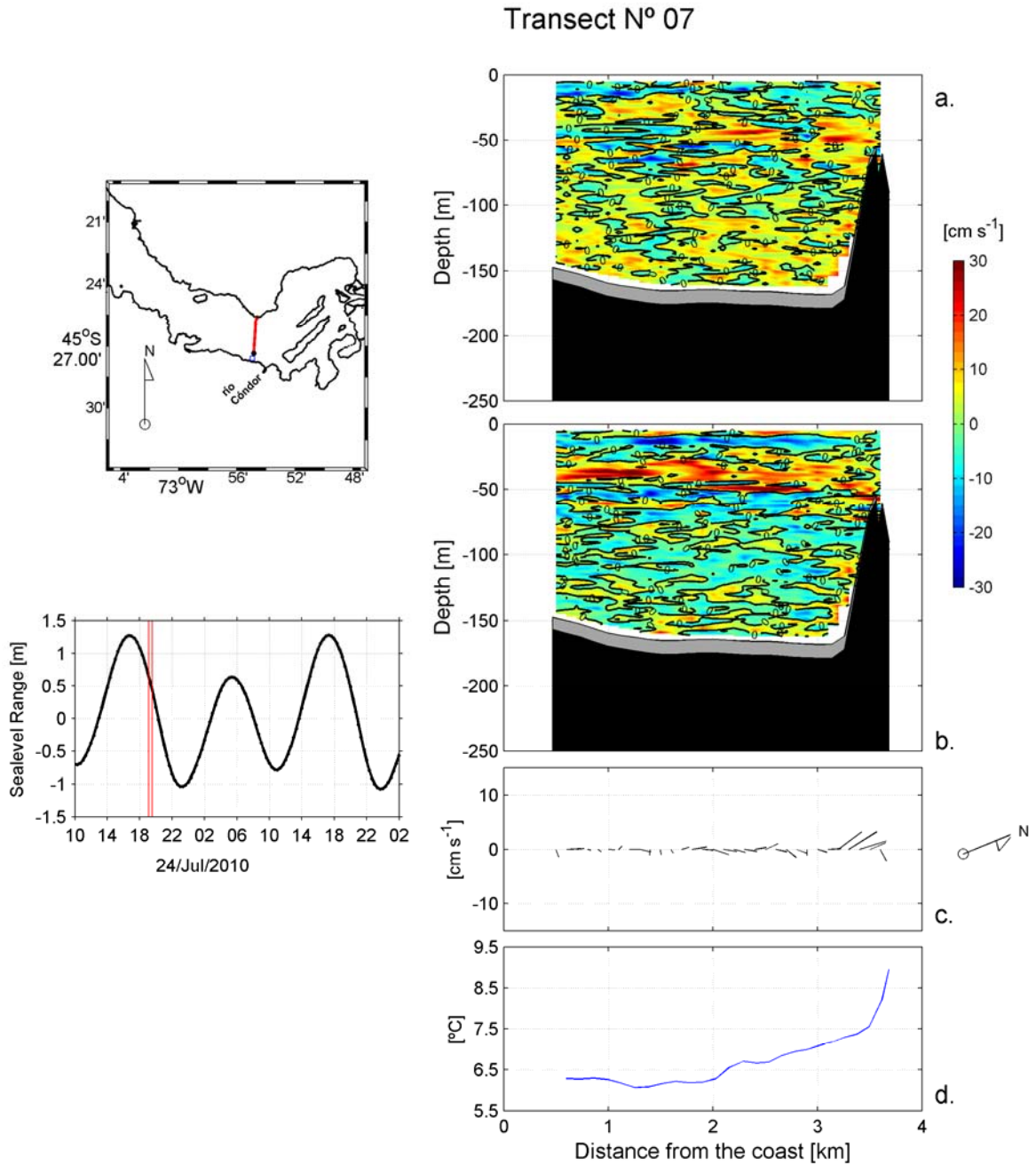


Figure 07: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 24/Jul/2010 at 19:08 UTC and 24/Jul/2010 at 19:35 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

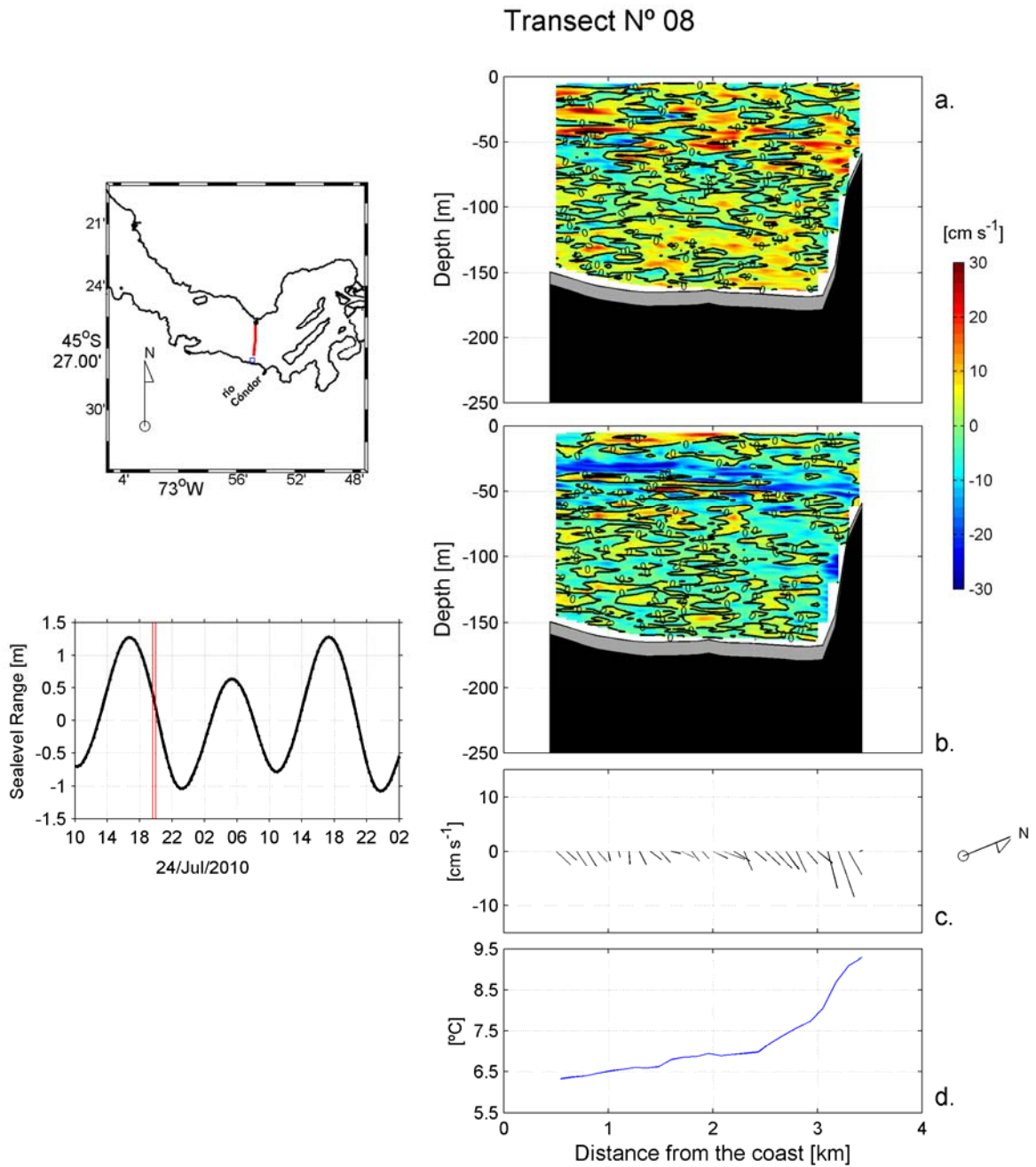


Figure 08: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 24/Jul/2010 at 19:36 UTC and 24/Jul/2010 at 20:01 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

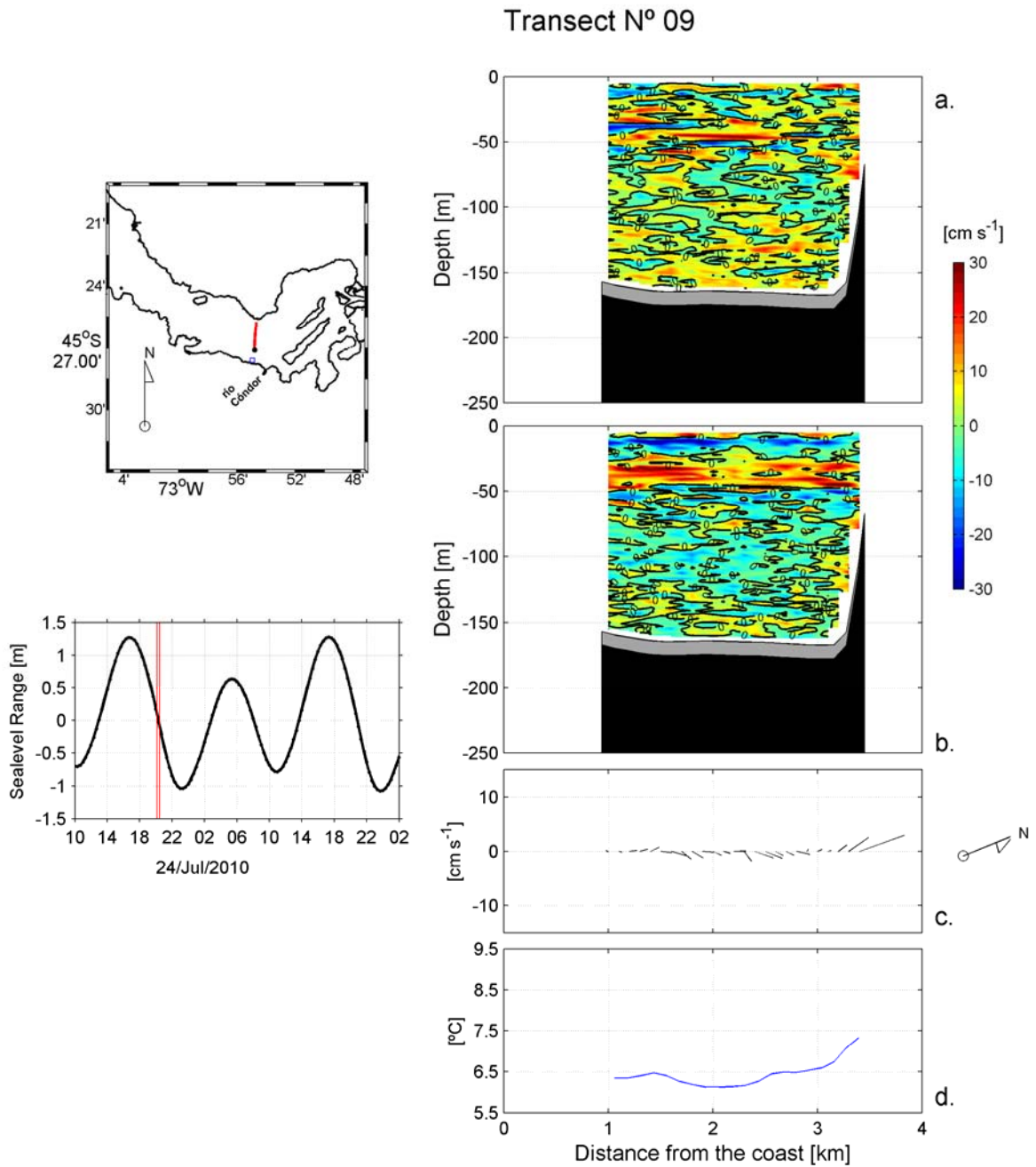


Figure 09: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 24/Jul/2010 at 20:09 UTC and 24/Jul/2010 at 20:30 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

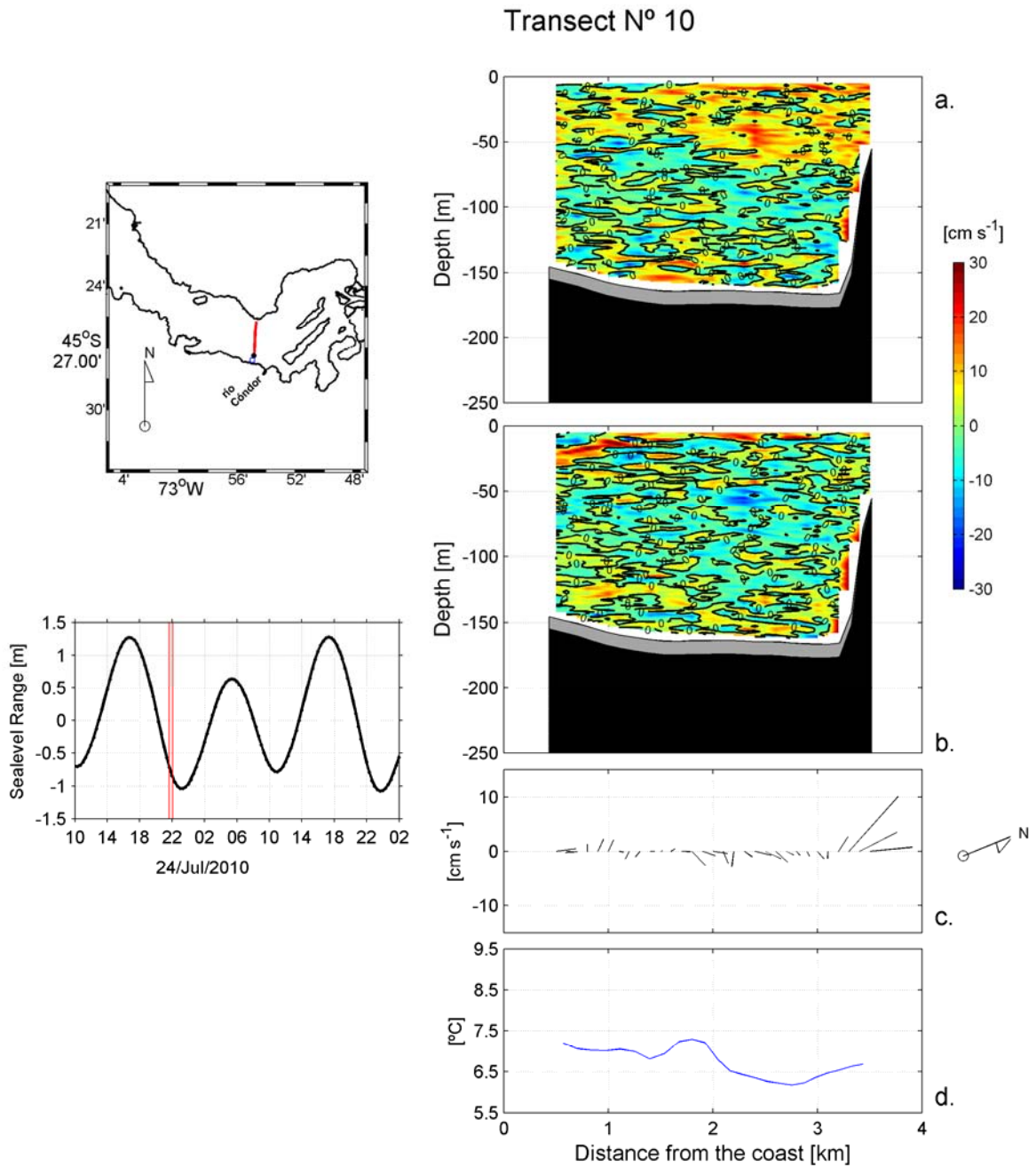


Figure 10: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 24/Jul/2010 at 21:40 UTC and 24/Jul/2010 at 22:04 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

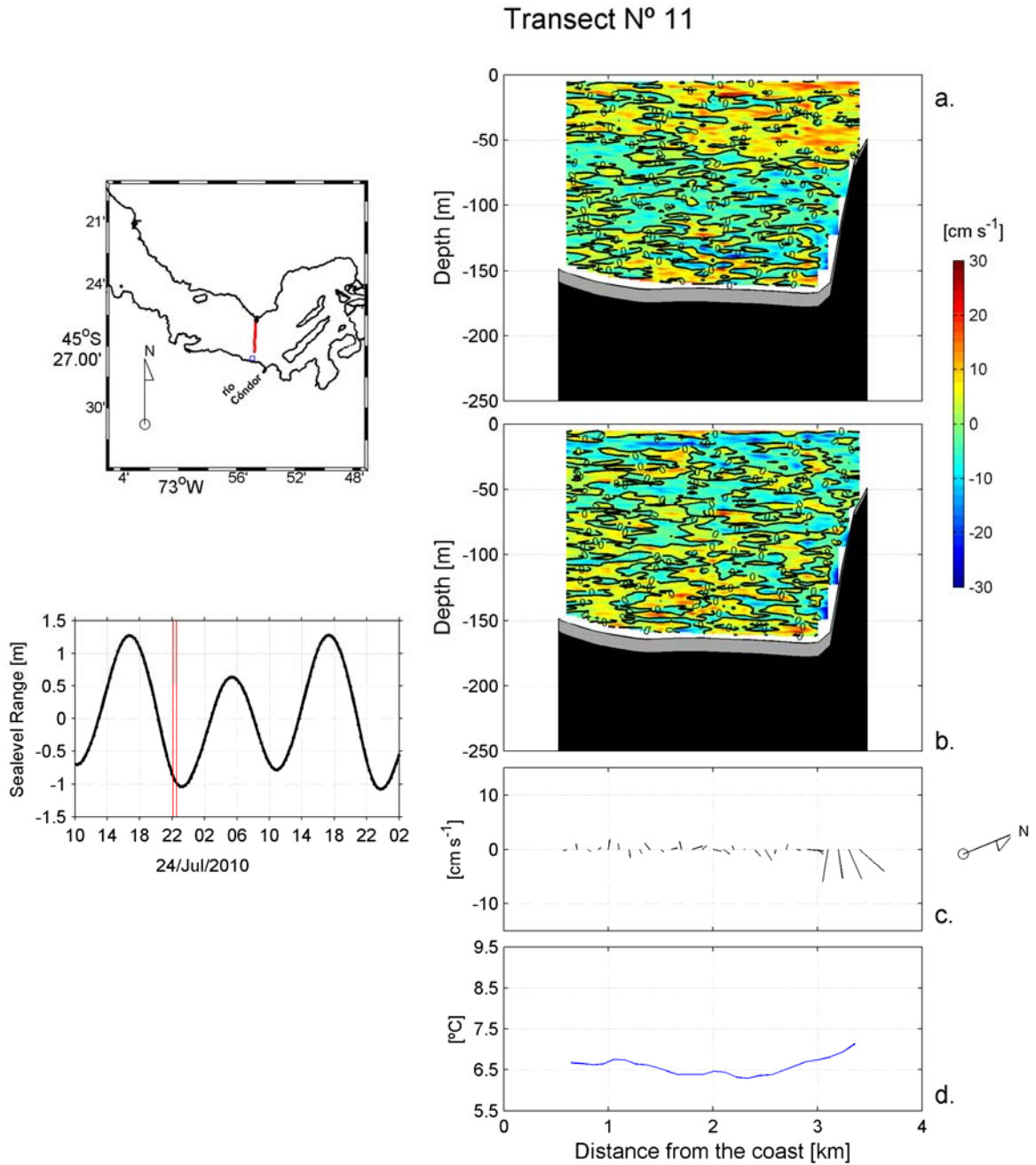


Figure 11: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 24/Jul/2010 at 22:07 UTC and 24/Jul/2010 at 22:34 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

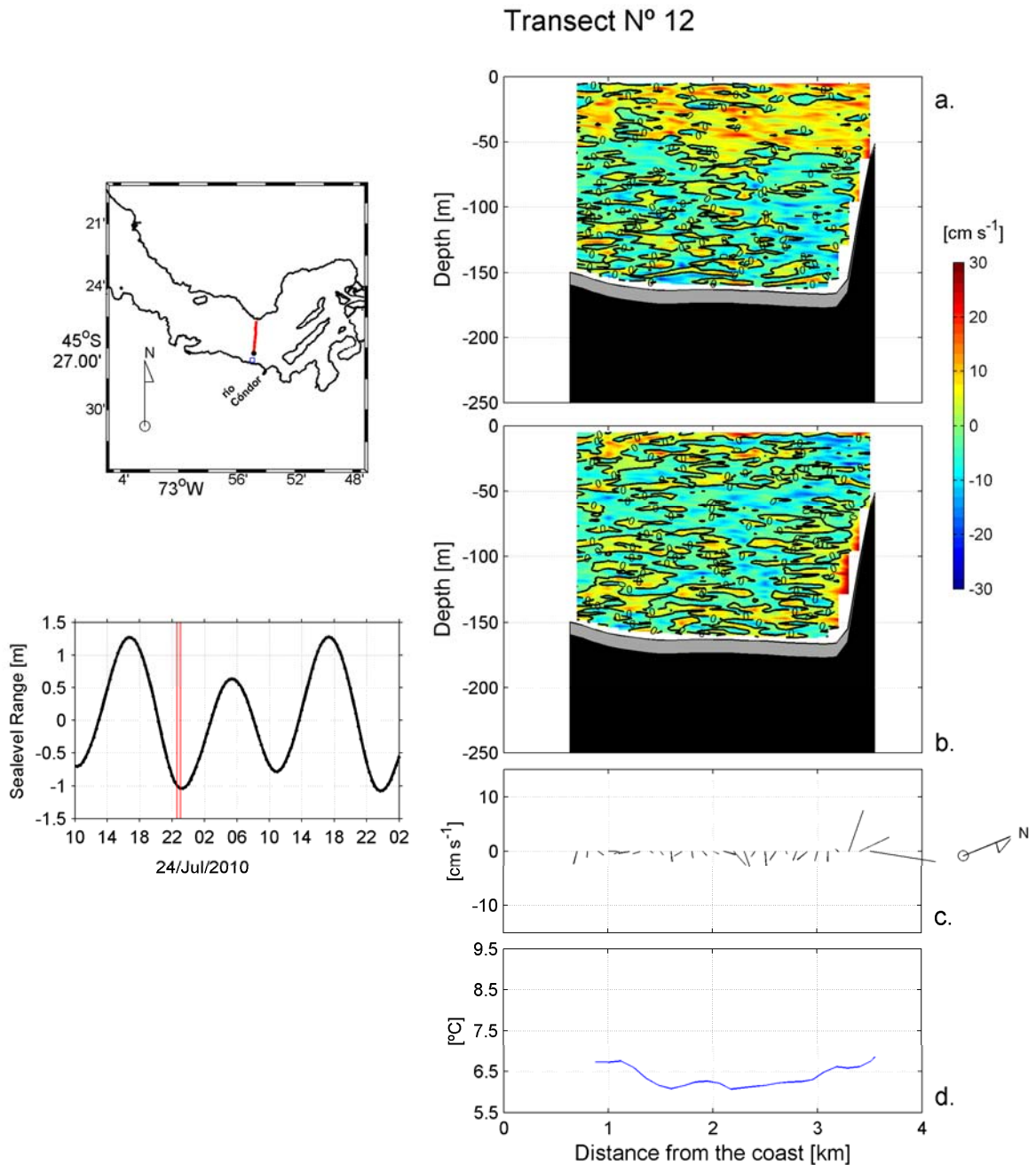


Figure 12: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 24/Jul/2010 at 22:36 UTC and 24/Jul/2010 at 23:02 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

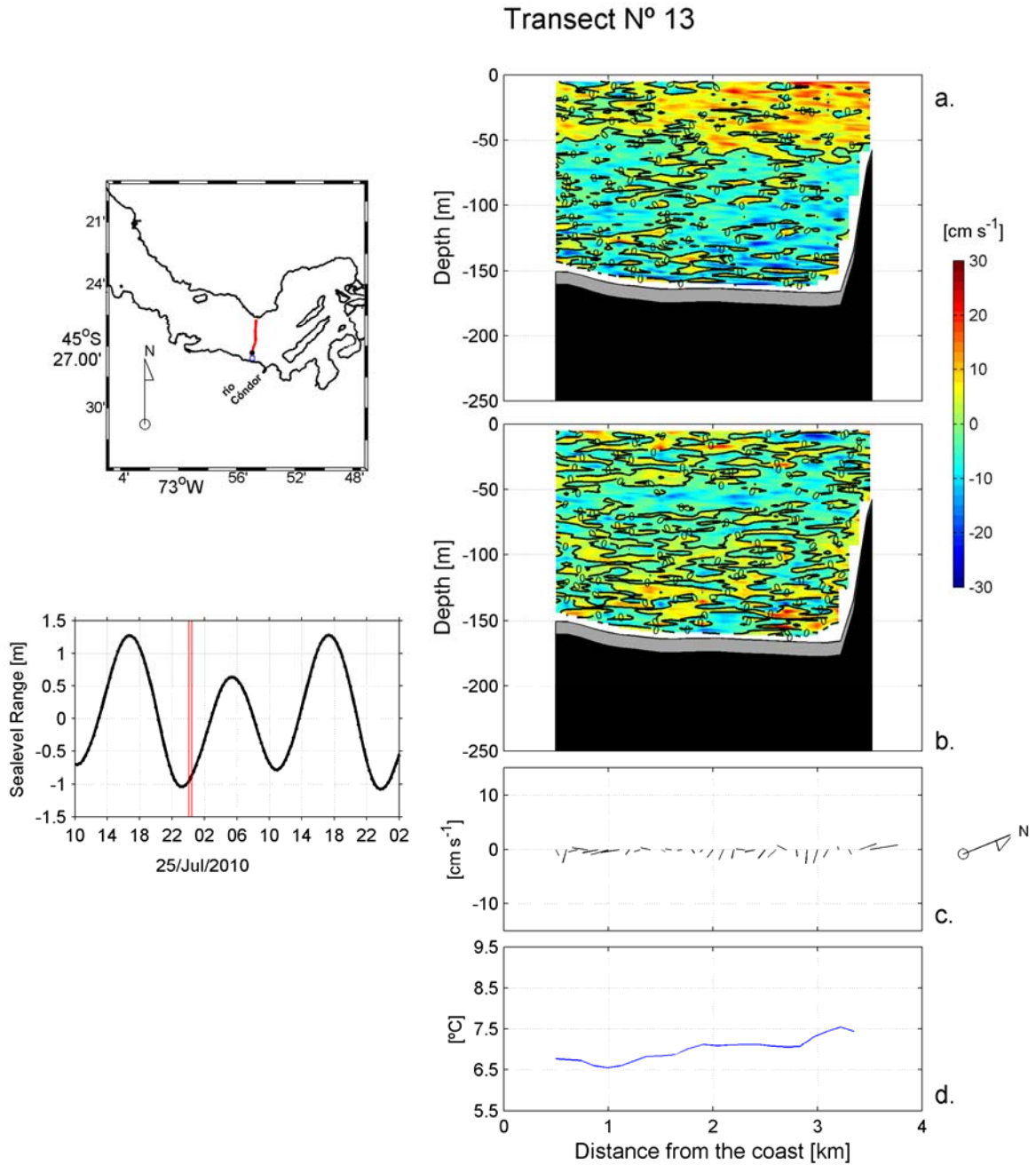


Figure 13: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 25/Jul/2010 at 00:05 UTC and 25/Jul/2010 at 00:29 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

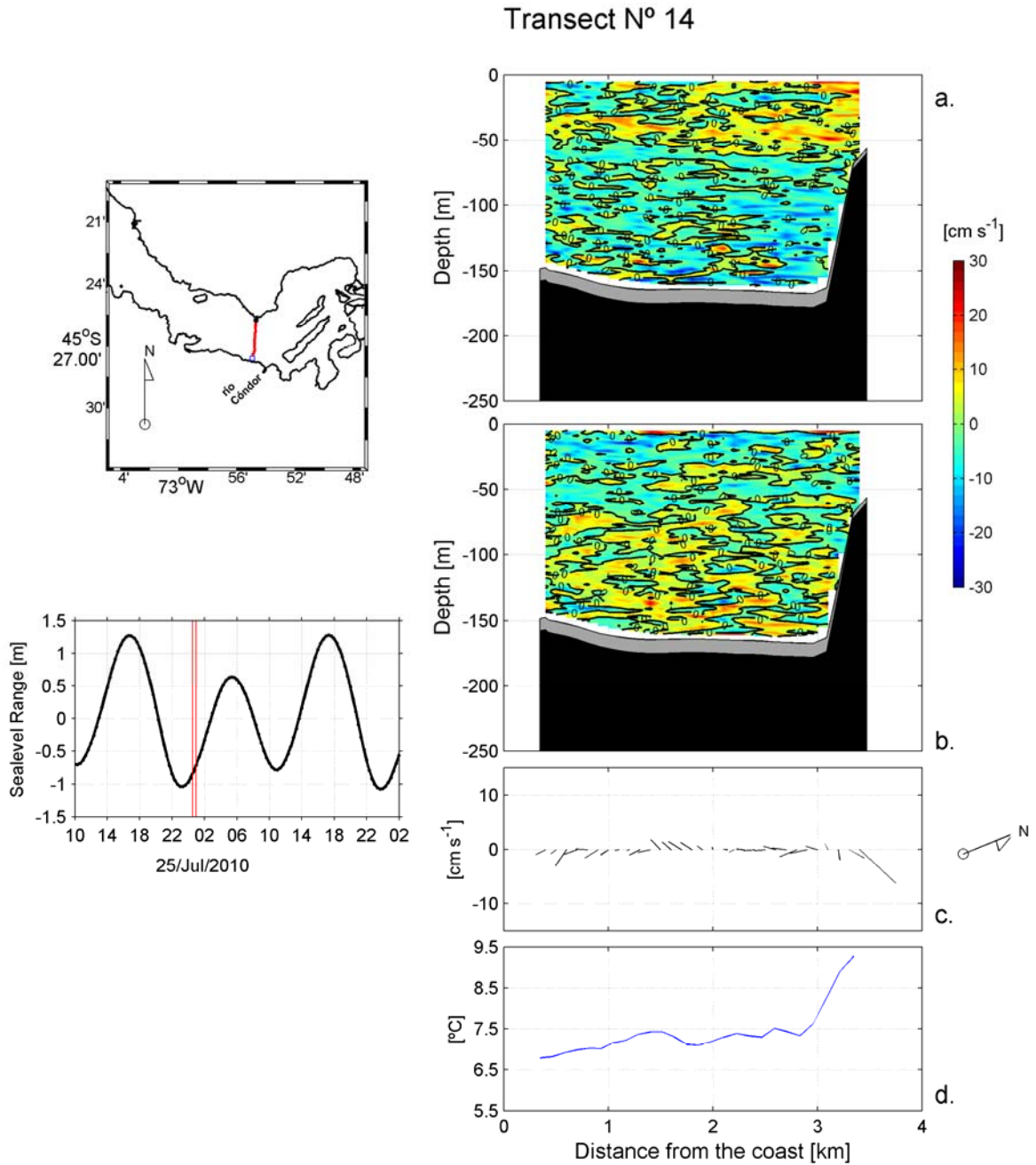


Figure 14: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 25/Jul/2010 at 00:32 UTC and 25/Jul/2010 at 00:59 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

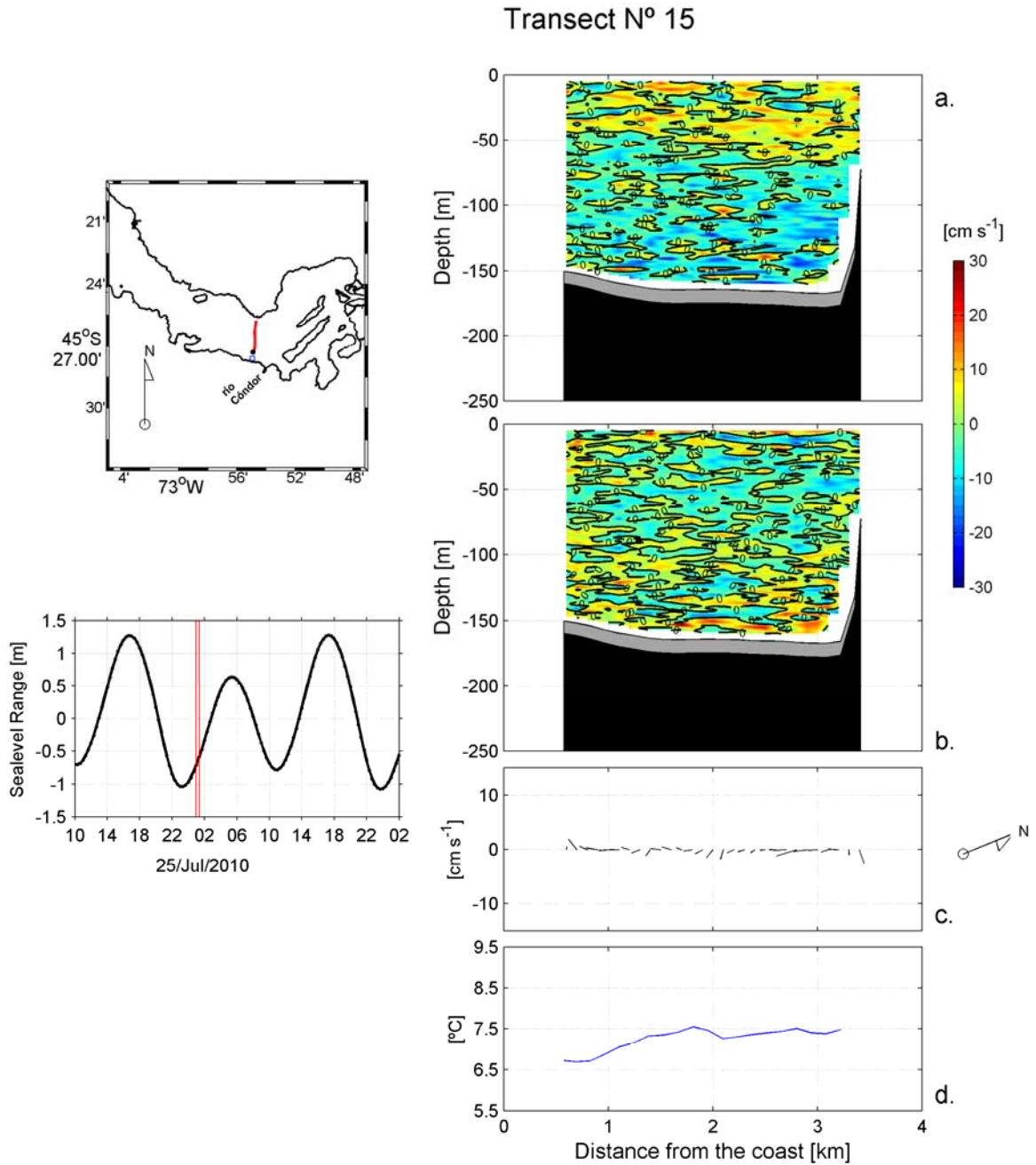


Figure 15: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 25/Jul/2010 at 01:00 UTC and 25/Jul/2010 at 01:21 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

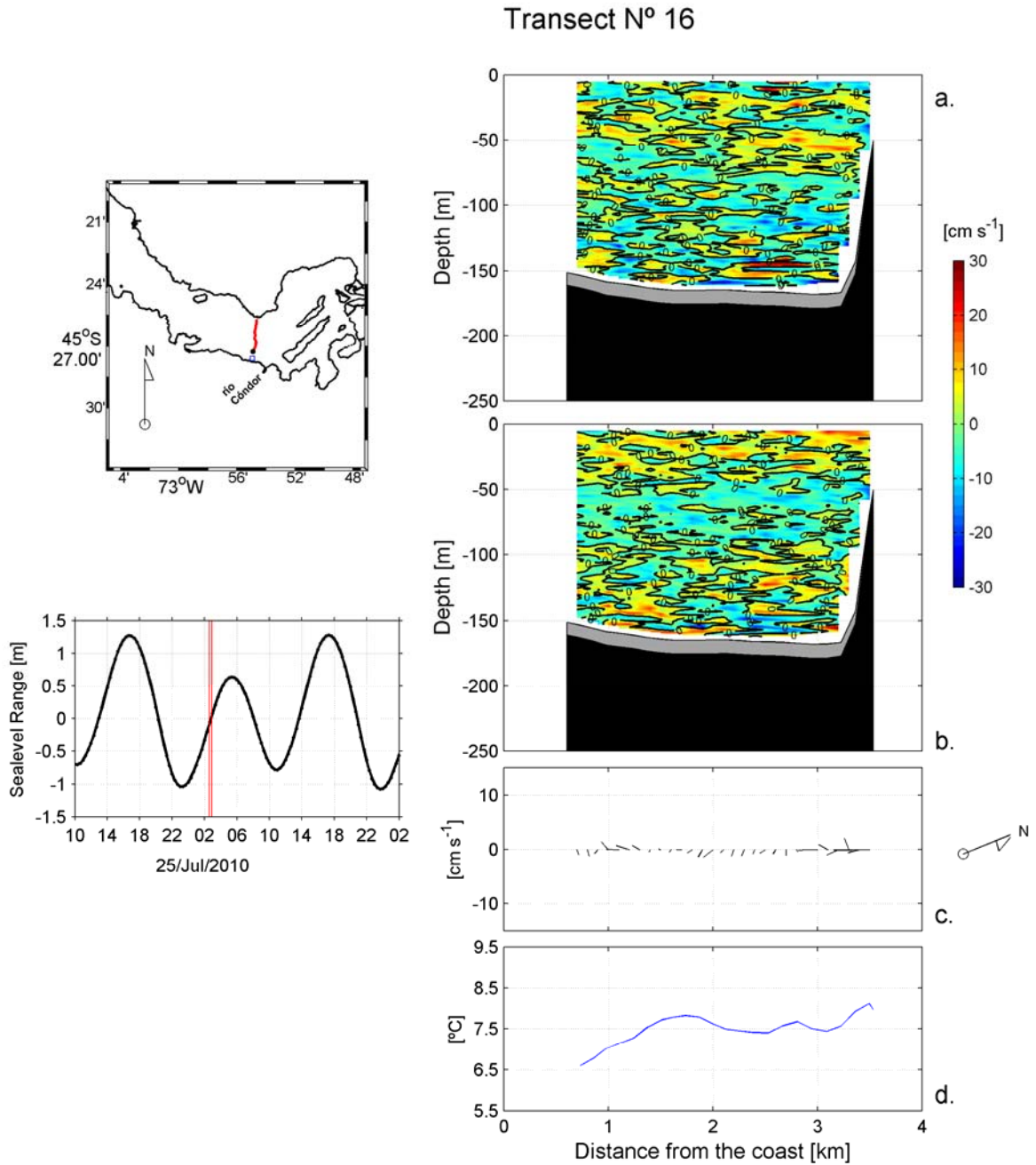


Figure 16: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 25/Jul/2010 at 02:34 UTC and 25/Jul/2010 at 02:56 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

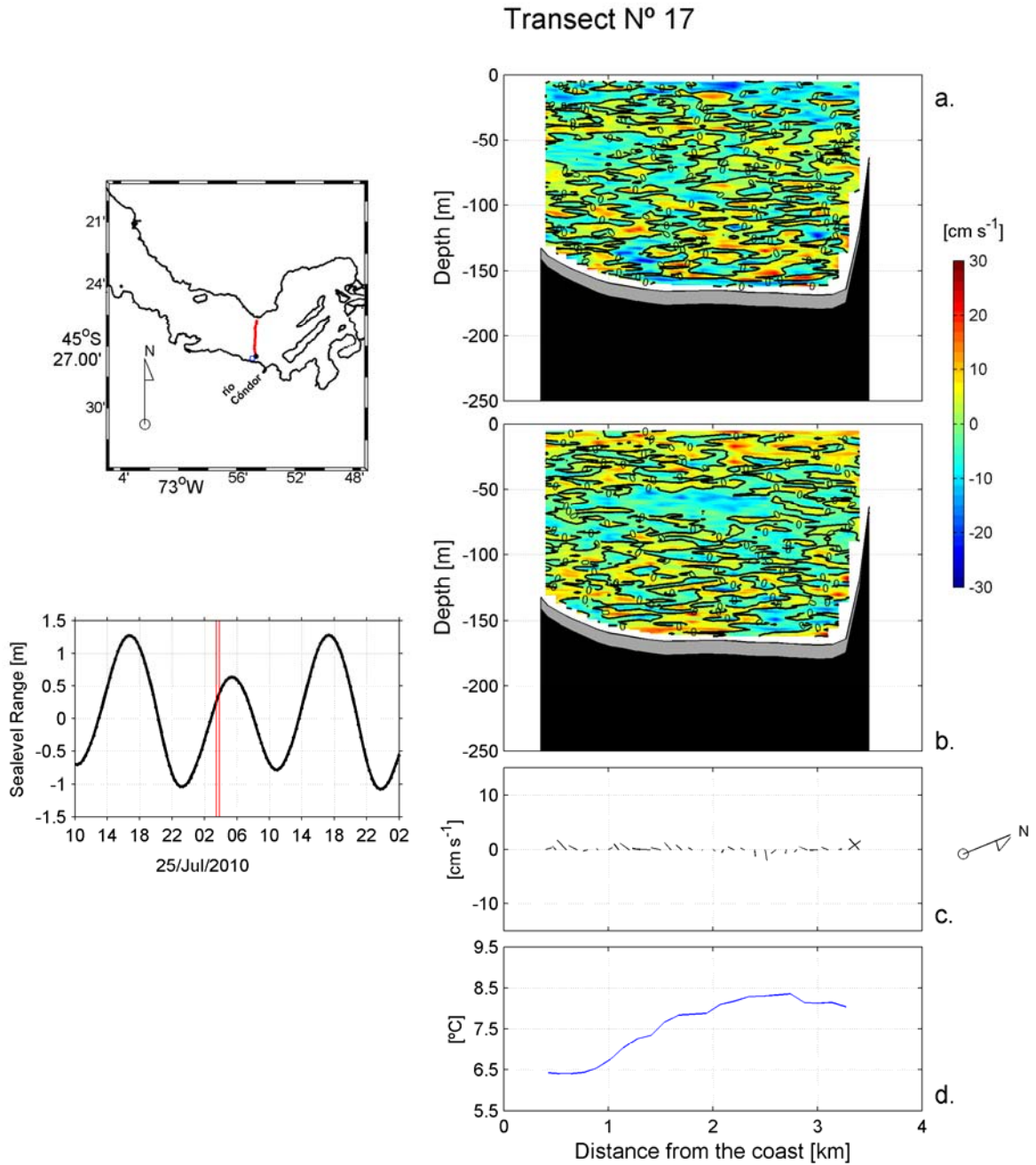


Figure 17: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 25/Jul/2010 at 03:27 UTC and 25/Jul/2010 at 03:52 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

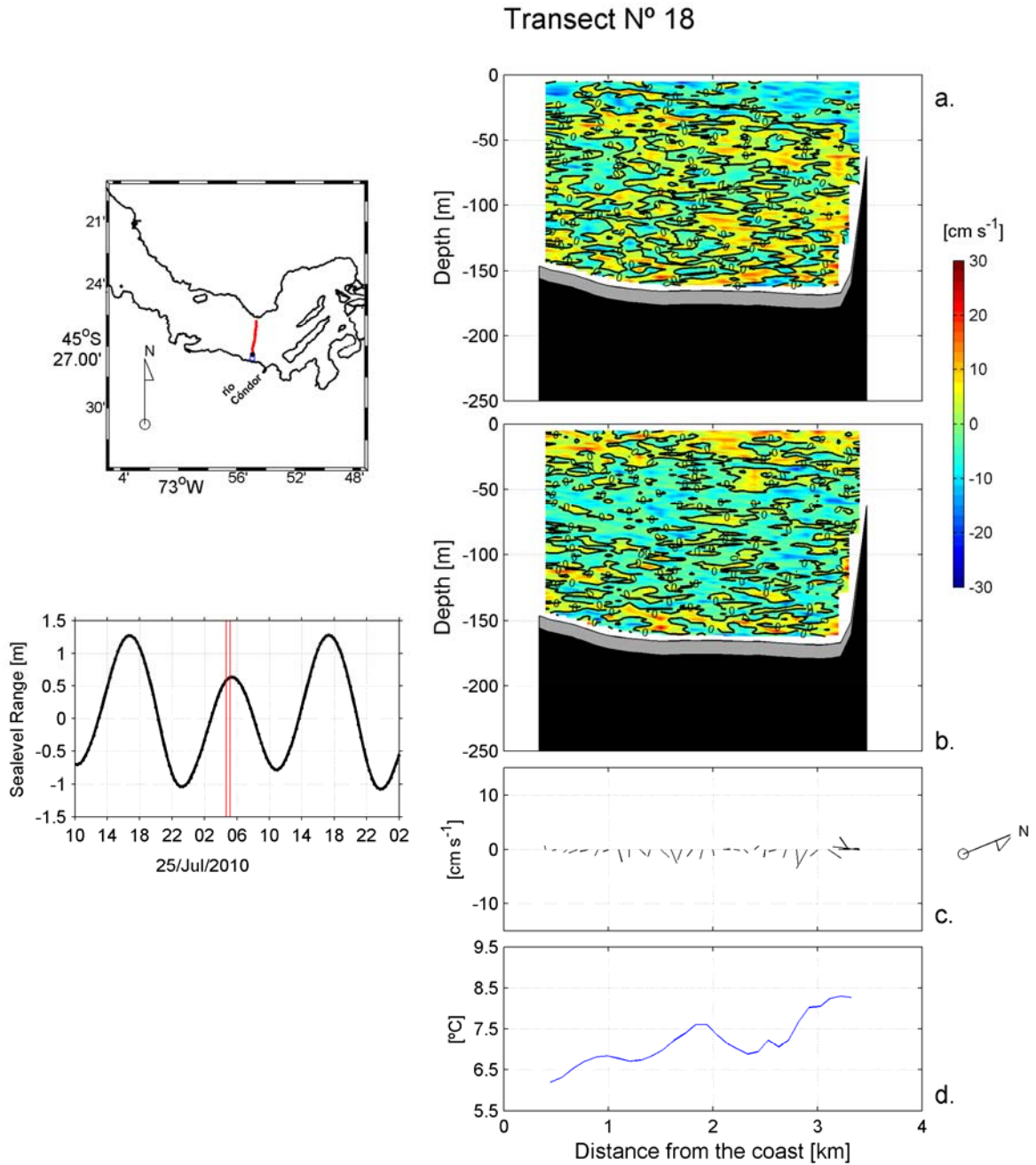


Figure 18: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 25/Jul/2010 at 04:41 UTC and 25/Jul/2010 at 05:12 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

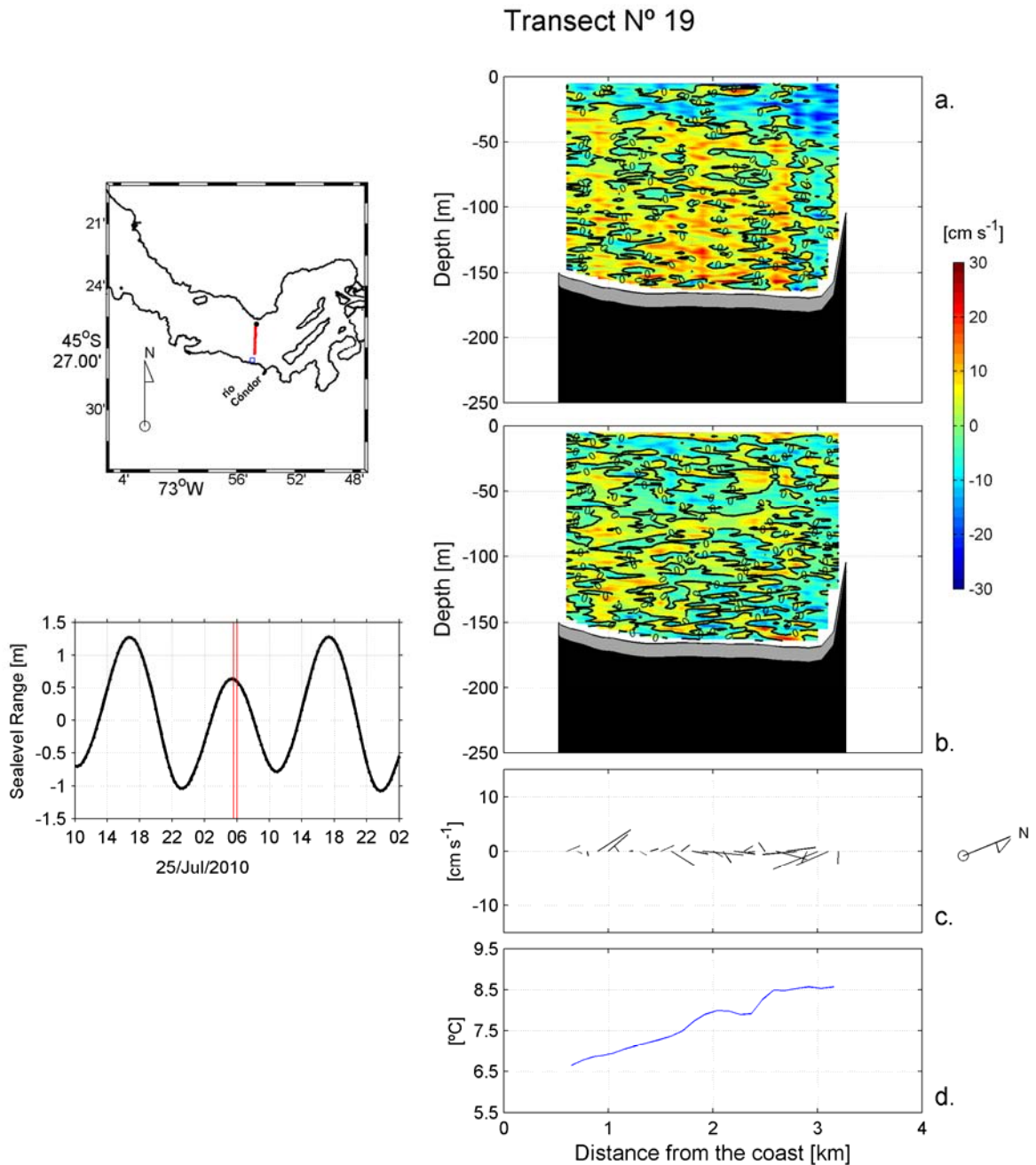


Figure 19: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 25/Jul/2010 at 05:38 UTC and 25/Jul/2010 at 06:03 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

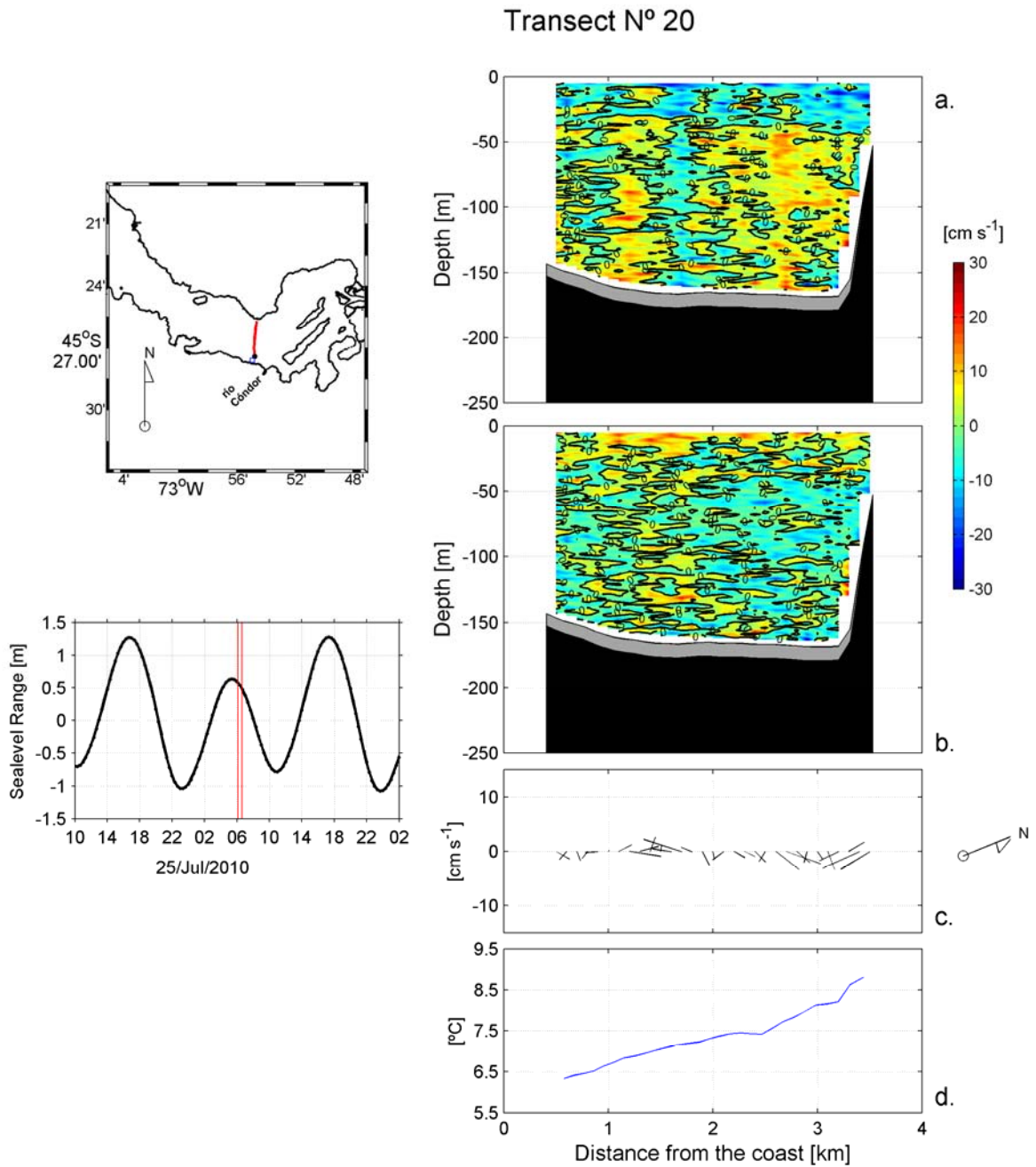


Figure 20: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 25/Jul/2010 at 06:07 UTC and 25/Jul/2010 at 06:37 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

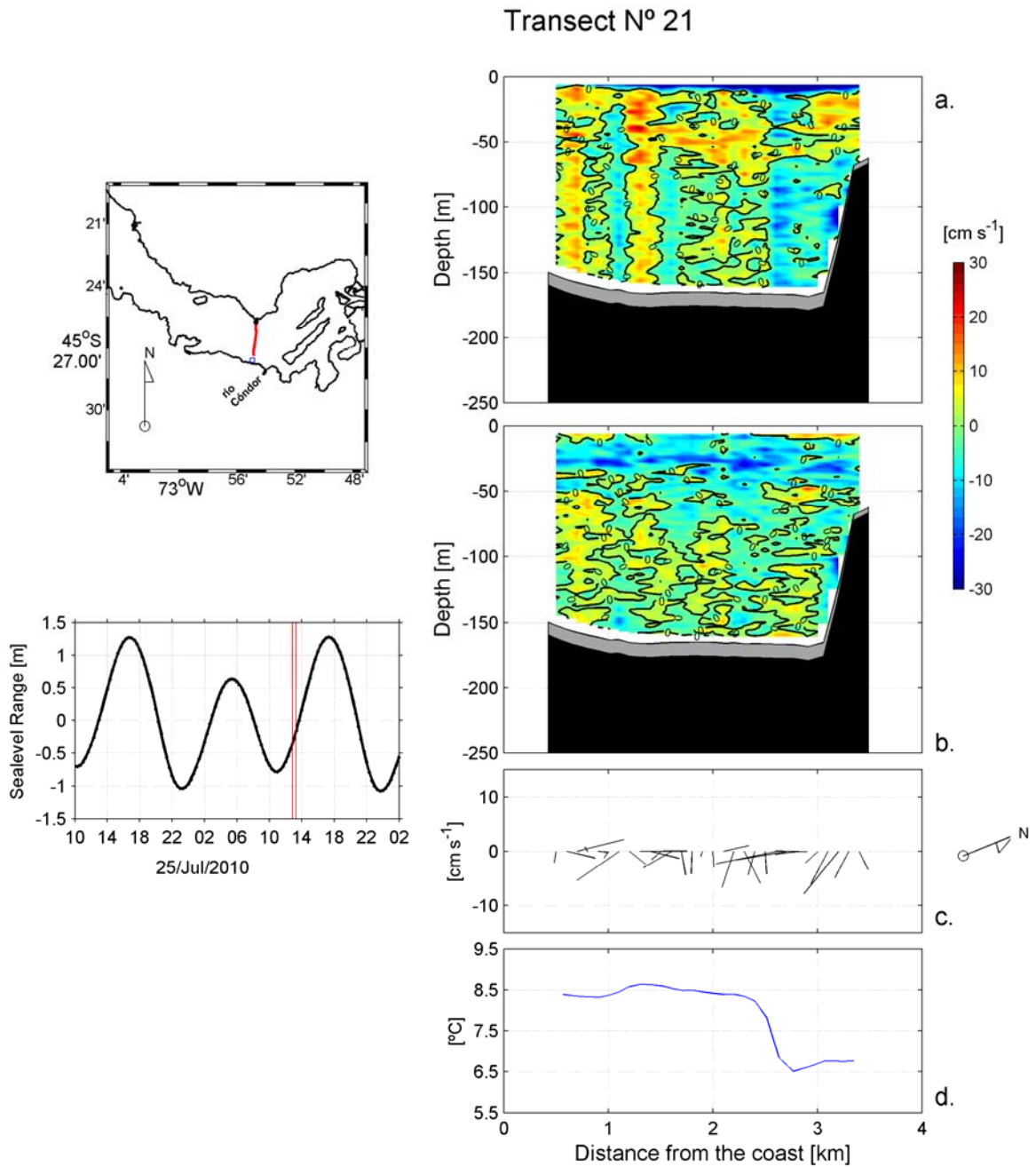


Figure 21: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 25/Jul/2010 at 12:51 UTC and 25/Jul/2010 at 13:18 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

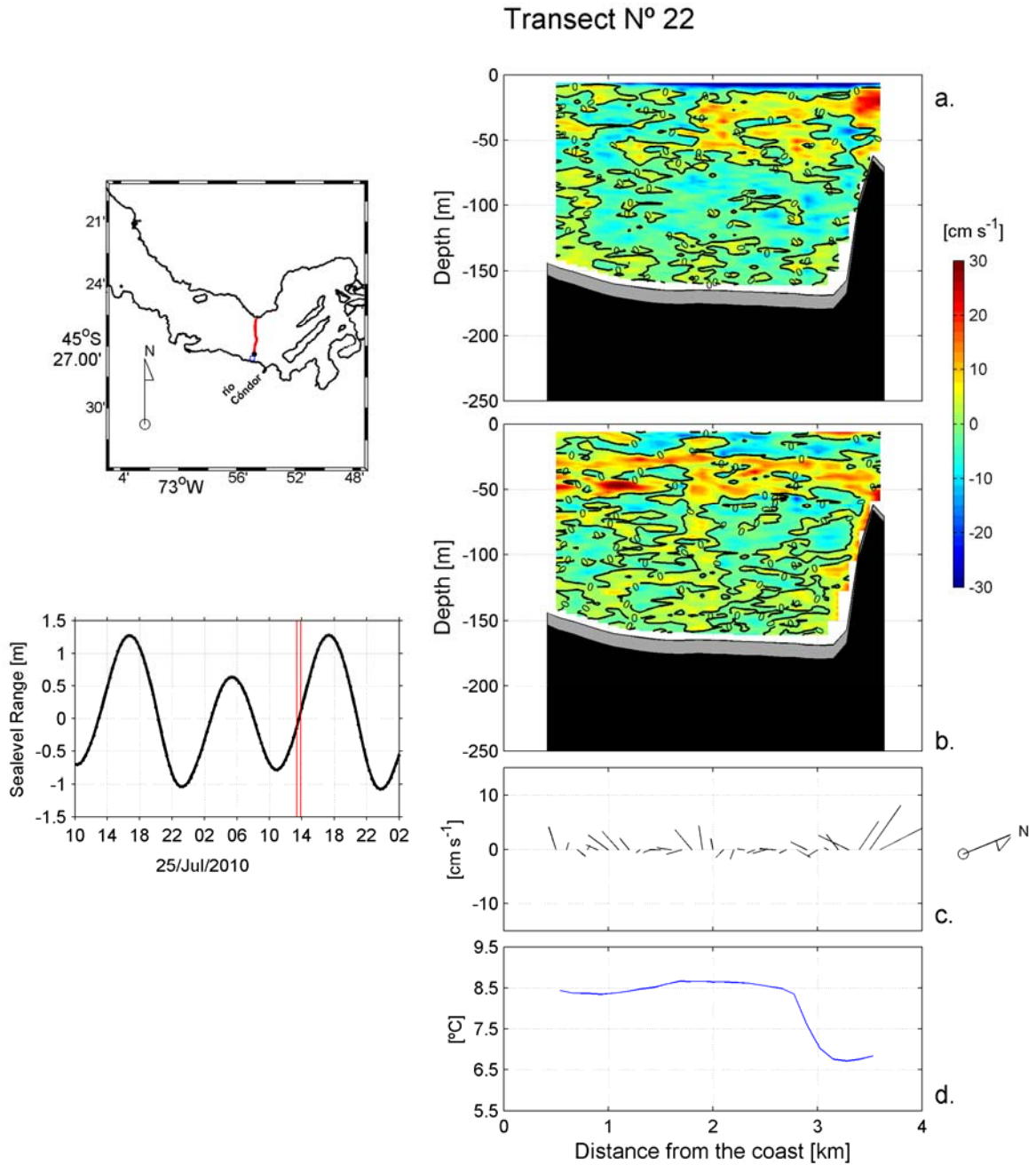


Figure 22: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 25/Jul/2010 at 13:24 UTC and 25/Jul/2010 at 13:52 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

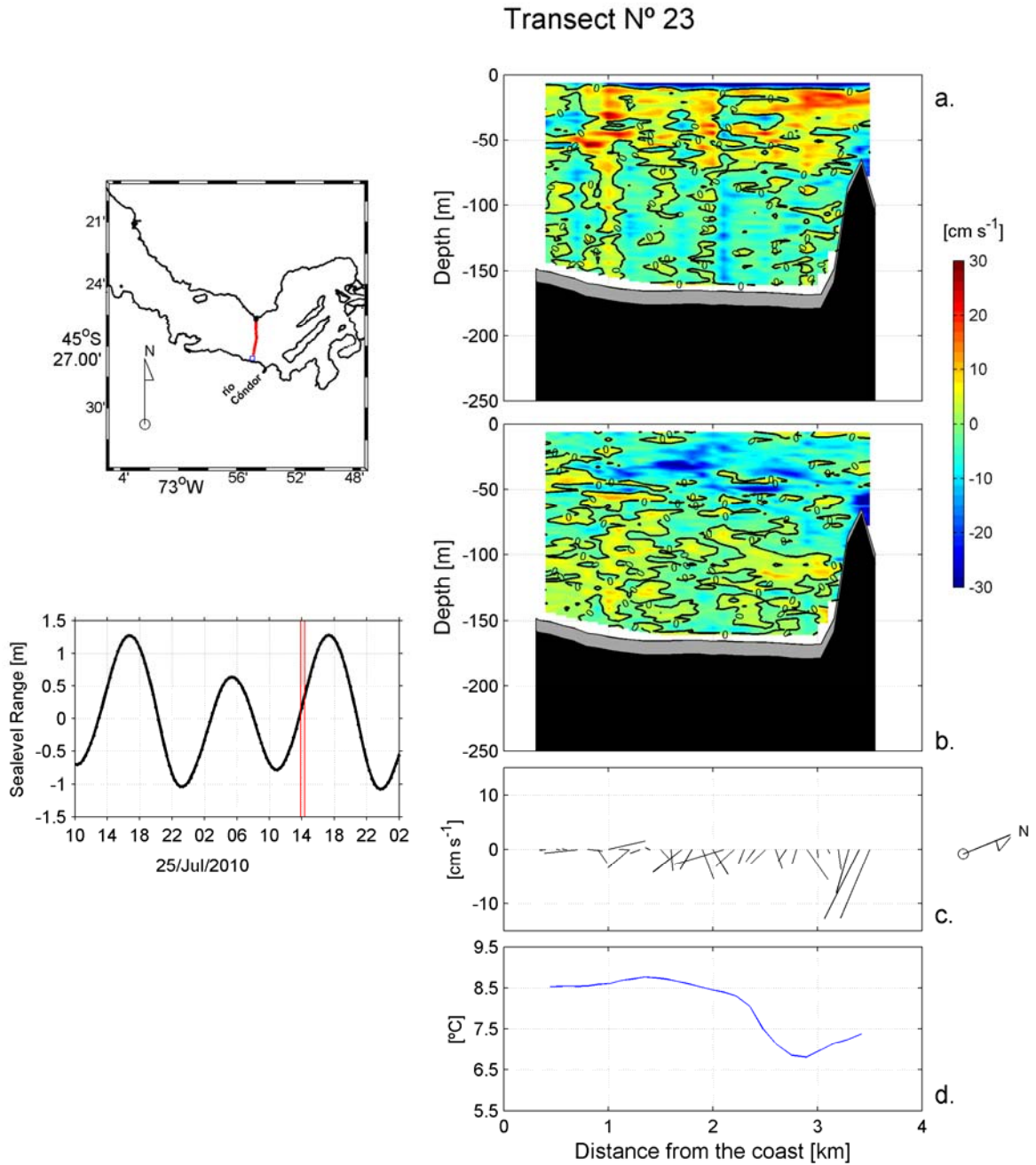


Figure 23: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 25/Jul/2010 at 13:55 UTC and 25/Jul/2010 at 14:22 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

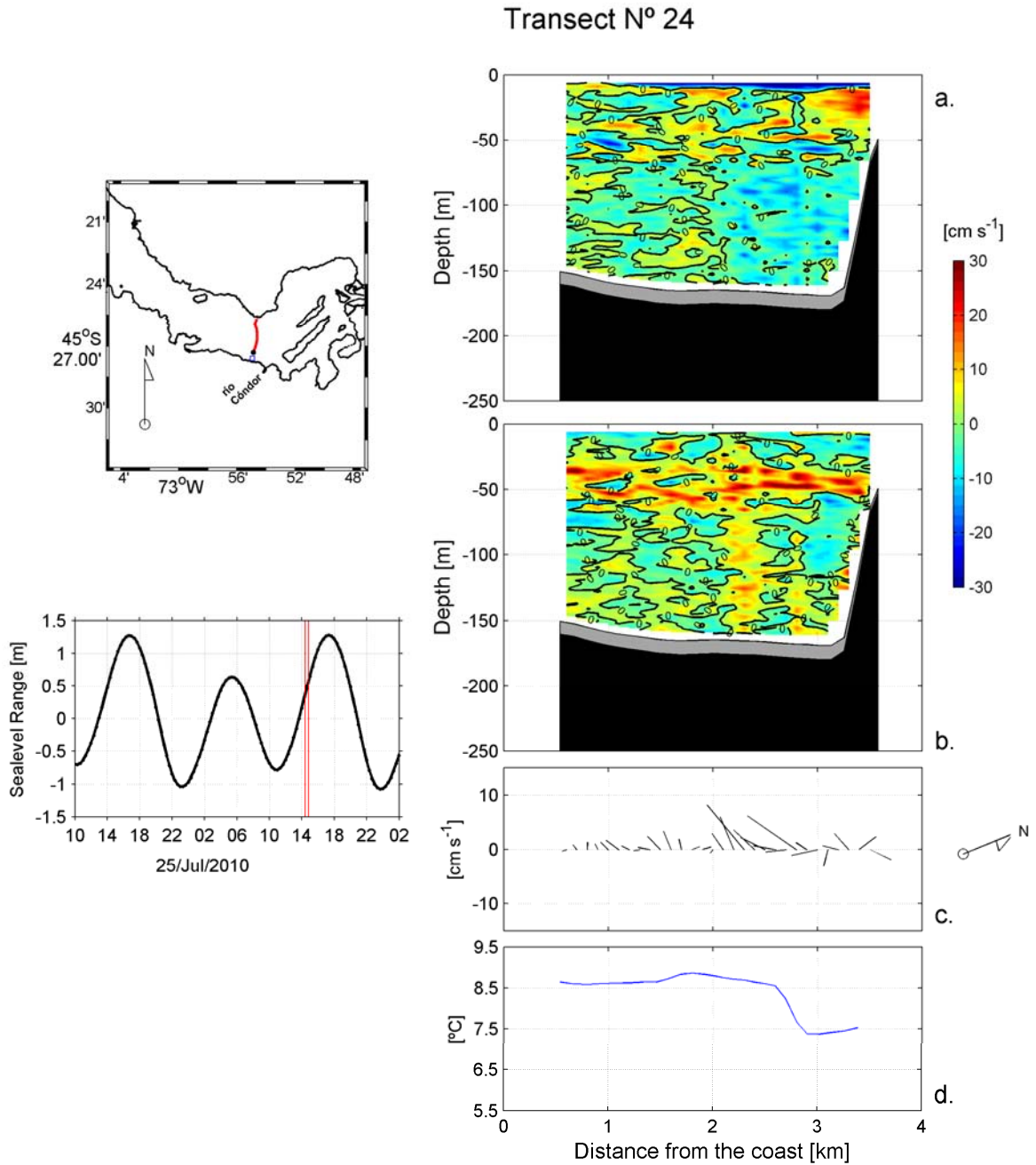


Figure 24: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 25/Jul/2010 at 14:25 UTC and 25/Jul/2010 at 14:52 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

ALONG-FJORD
Semidiurnal harmonic

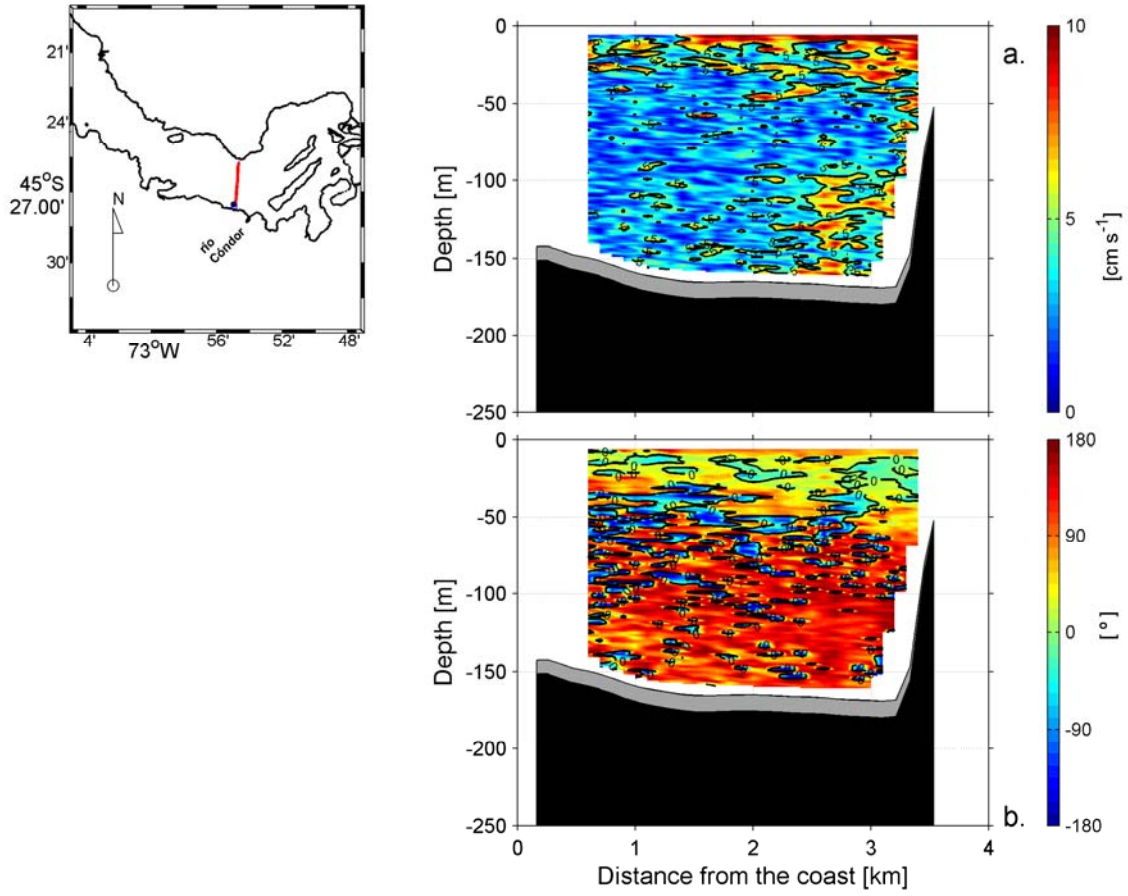


Figure 25: (a) Amplitude and (b) Phase of the cross-fjord component, during the study of the Aysen Fjord.

CROSS-FJORD
Semidiurnal harmonic

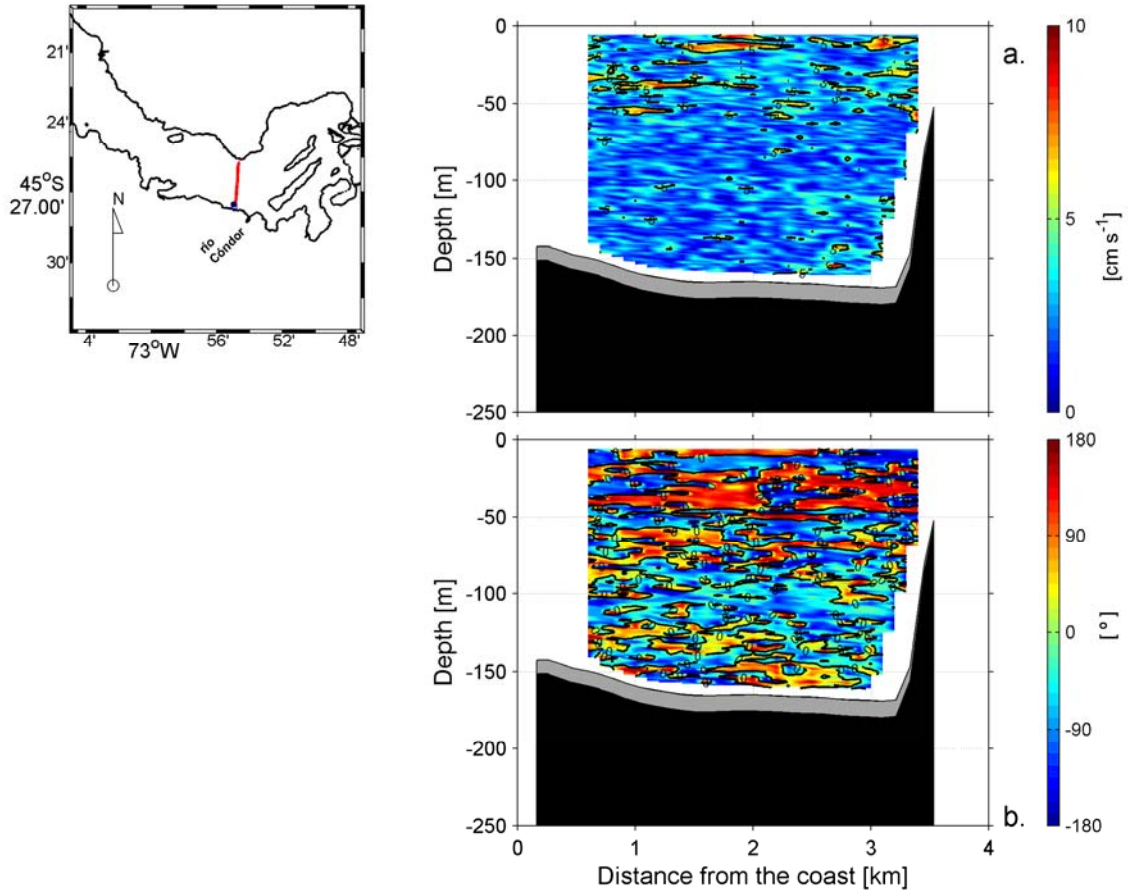


Figure 26: (a) Amplitude and (b) Phase of the along-fjord component, during the study of the Aysen Fjord.

RESIDUAL CURRENTS

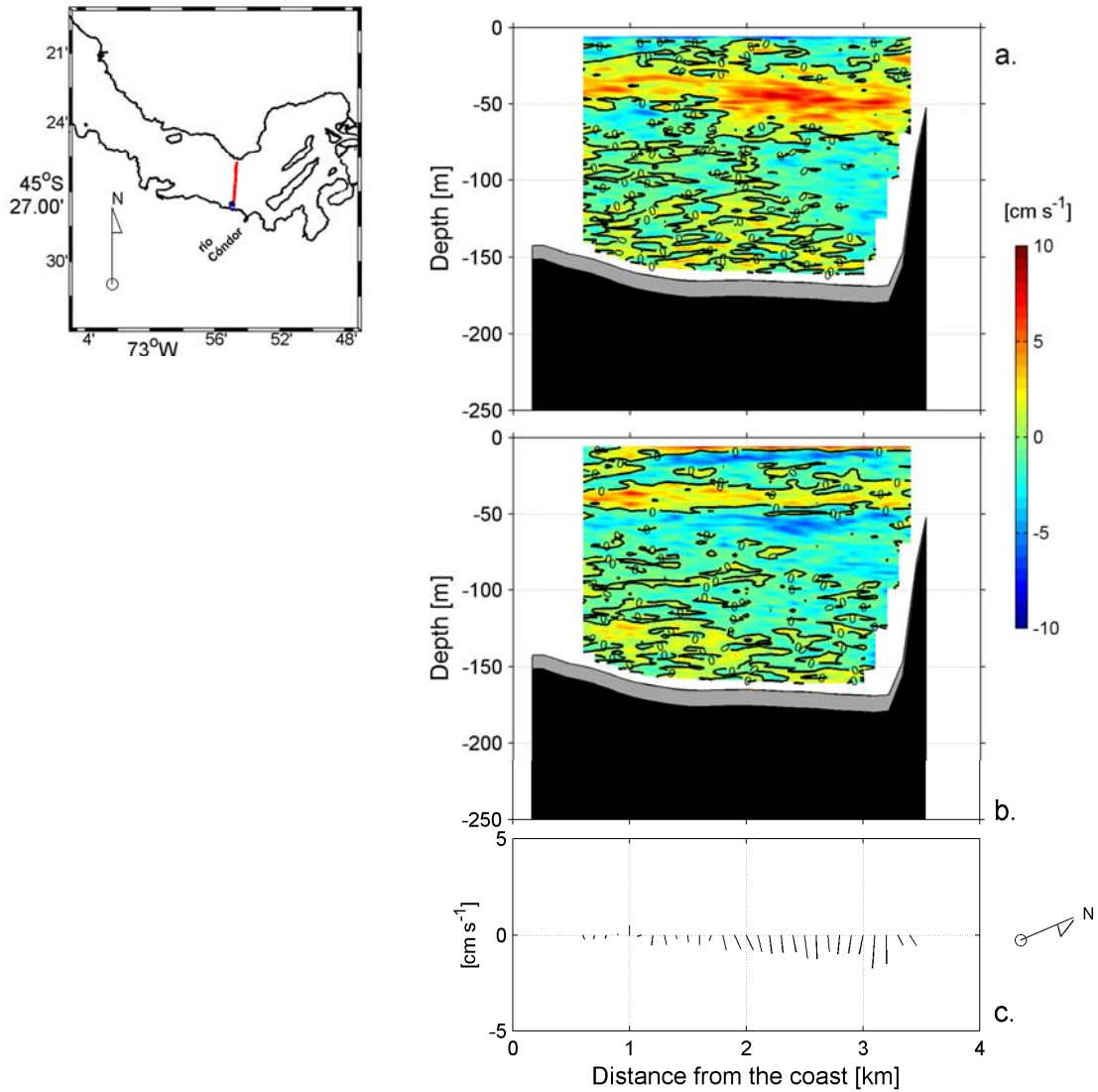


Figure 27: (a) Along-fjord and (b) Cross-fjord residual currents and (c) sticks diagram of residual currents, during the study of the Aysen Fjord. Note that positive (negative) values in Along-fjord component indicate currents through the mouth (head) of the fjord.

GOODNESS OF FIT

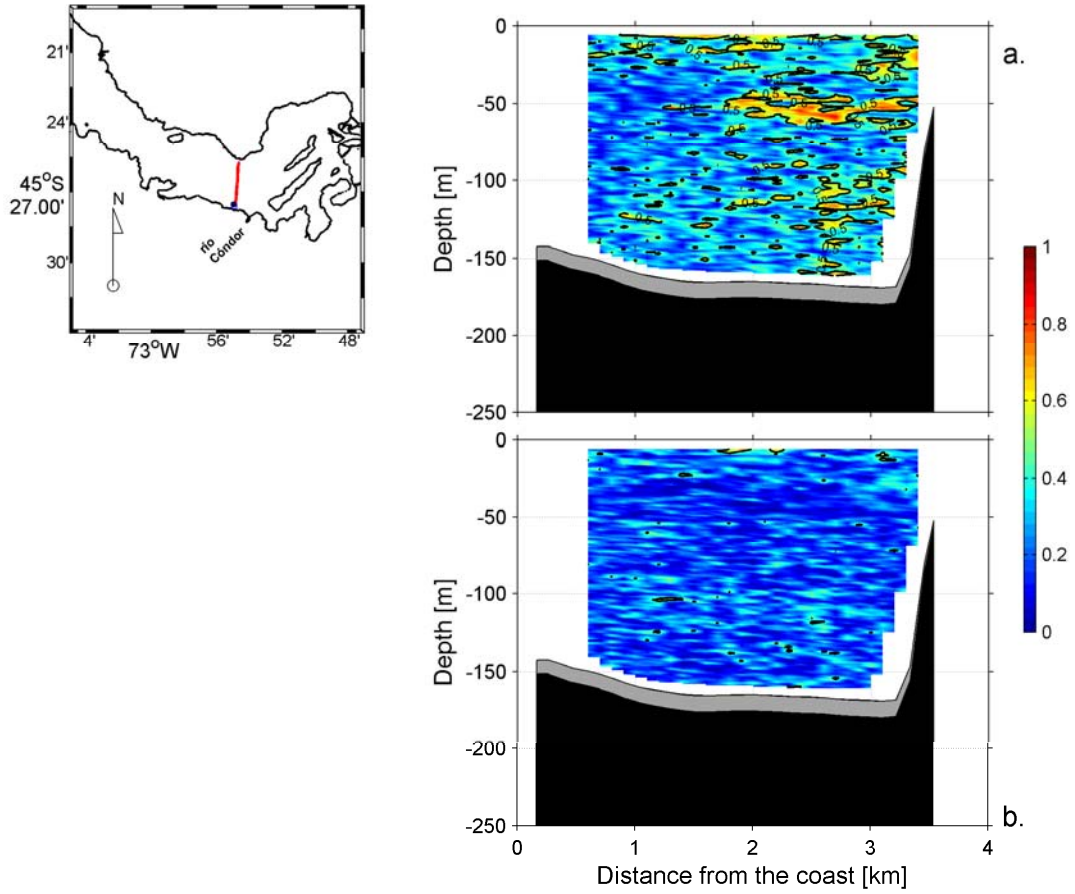


Figure 28: (a) Along-fjord and (b) Cross-fjord components goodness of fit, during the study of the Aysen Fjord.

FIGURES

**[Side-ship ADCP data from transect,
CUERVO
July 2010]**

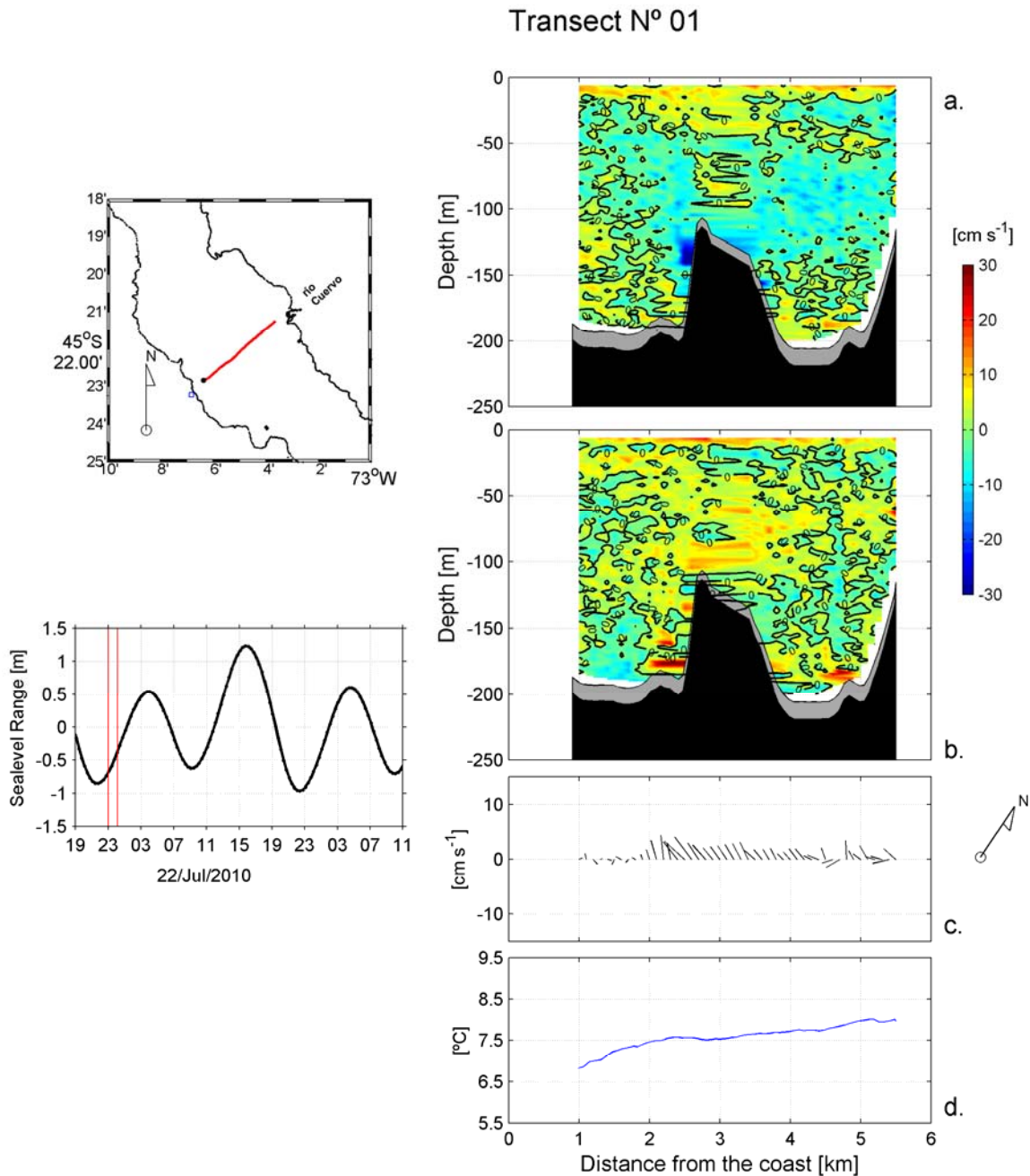


Figure 01: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 22/Jul/2010 at 23:14 UTC and 23/Jul/2010 at 00:21 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

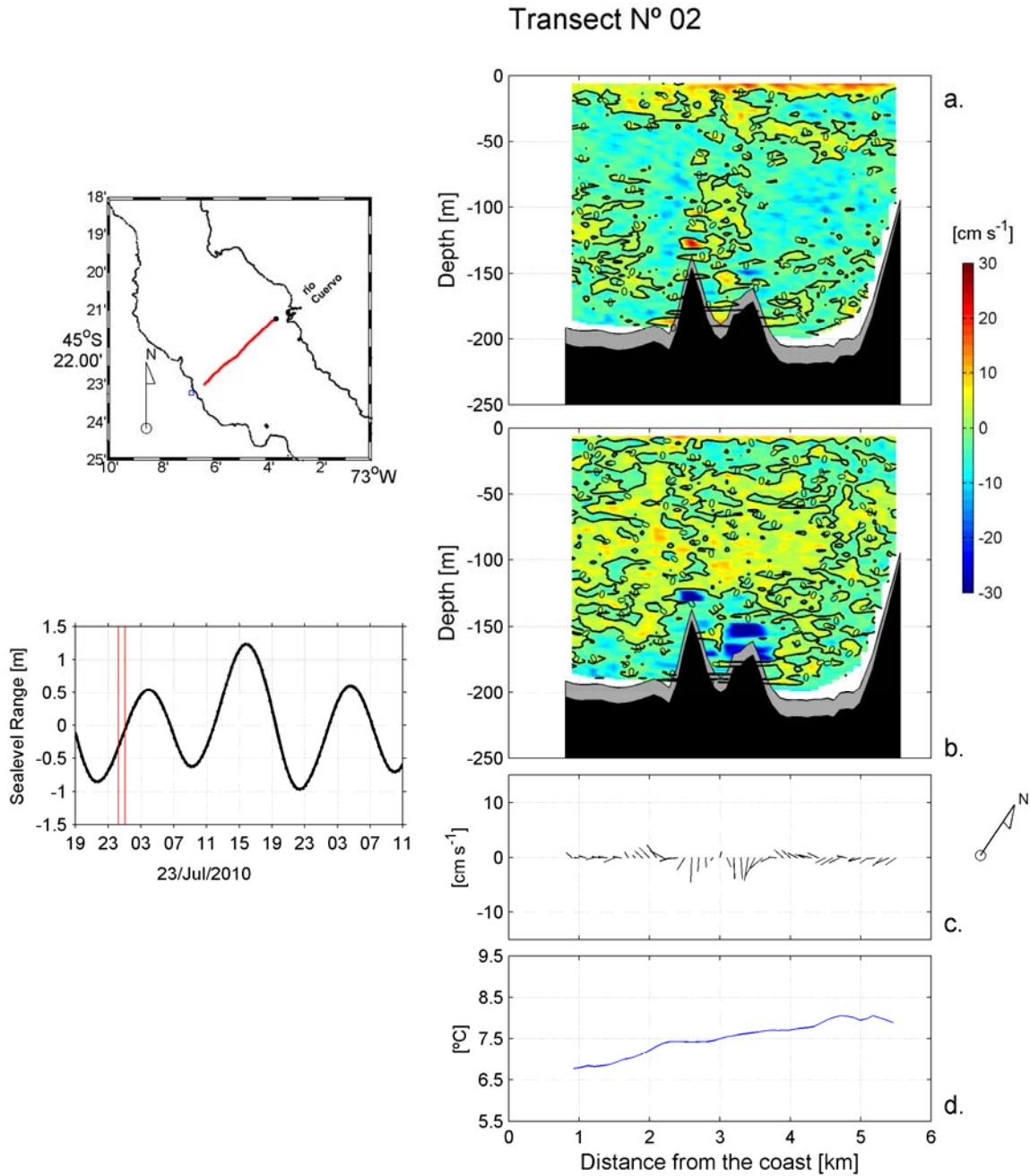


Figure 02: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 23/Jul/2010 at 00:28 UTC and 23/Jul/2010 at 01:18 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

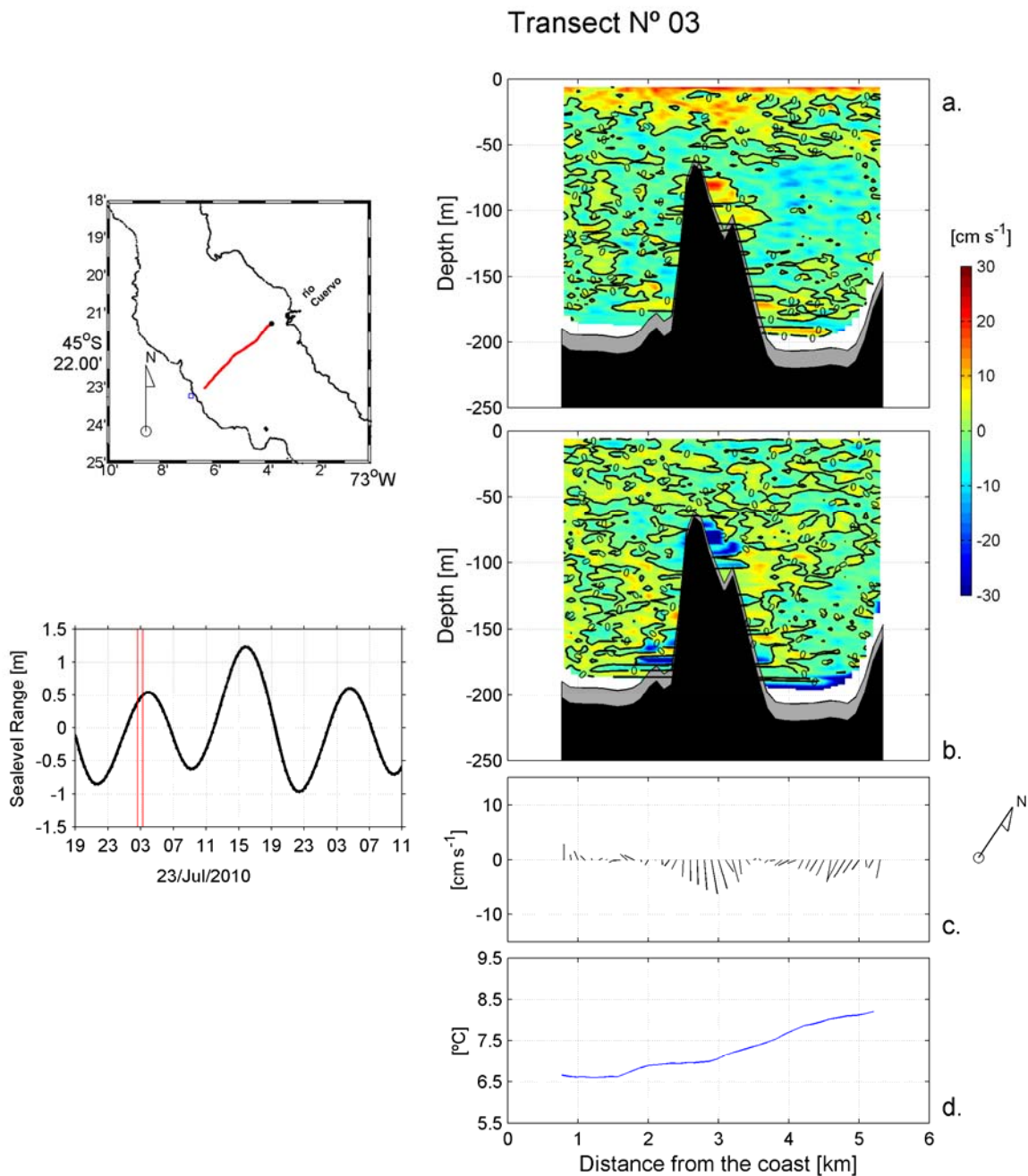


Figure 03: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 23/Jul/2010 at 02:51 UTC and 23/Jul/2010 at 03:30 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

Transect N° 04

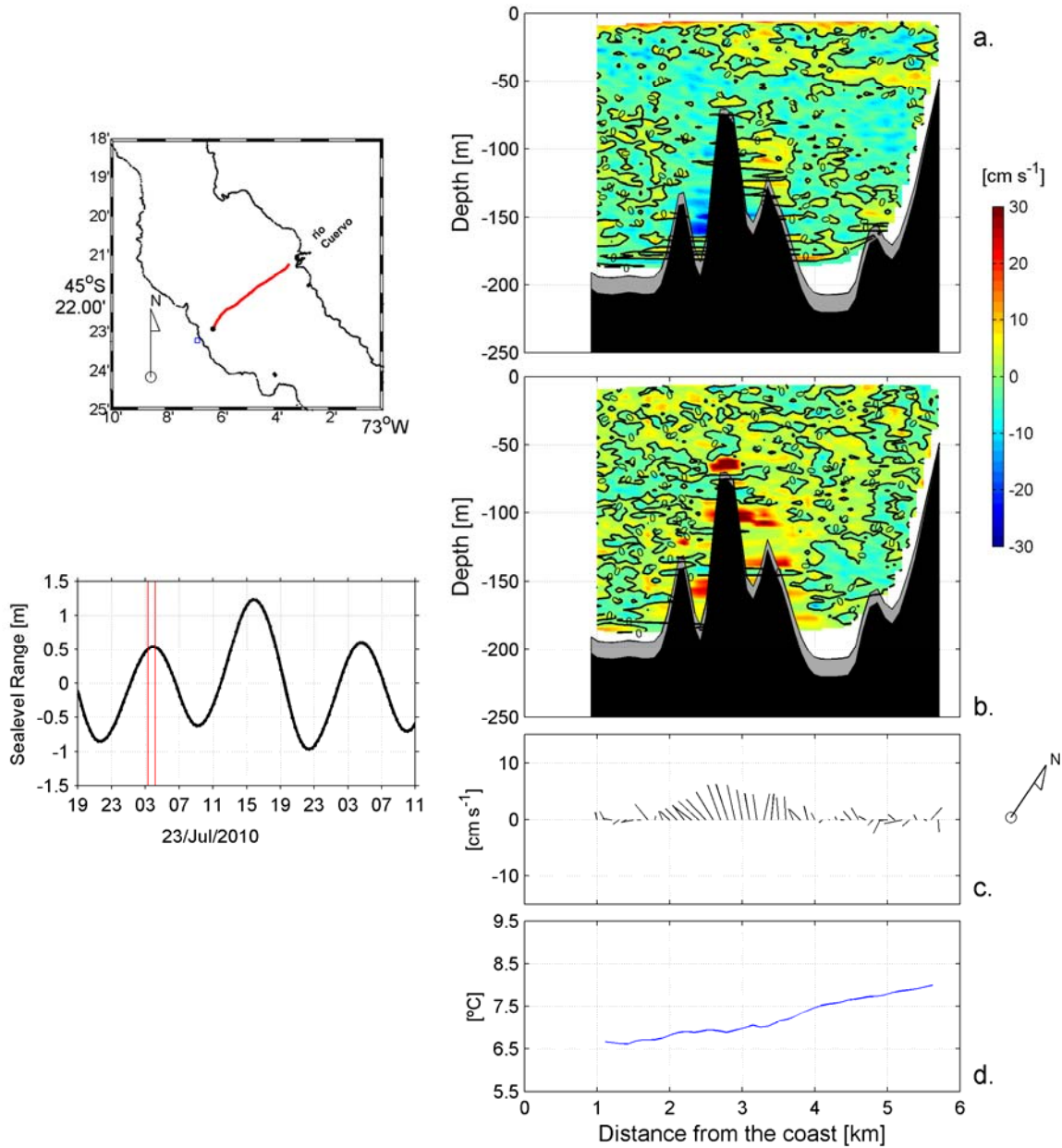


Figure 04: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 23/Jul/2010 at 03:33 UTC and 23/Jul/2010 at 04:23 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

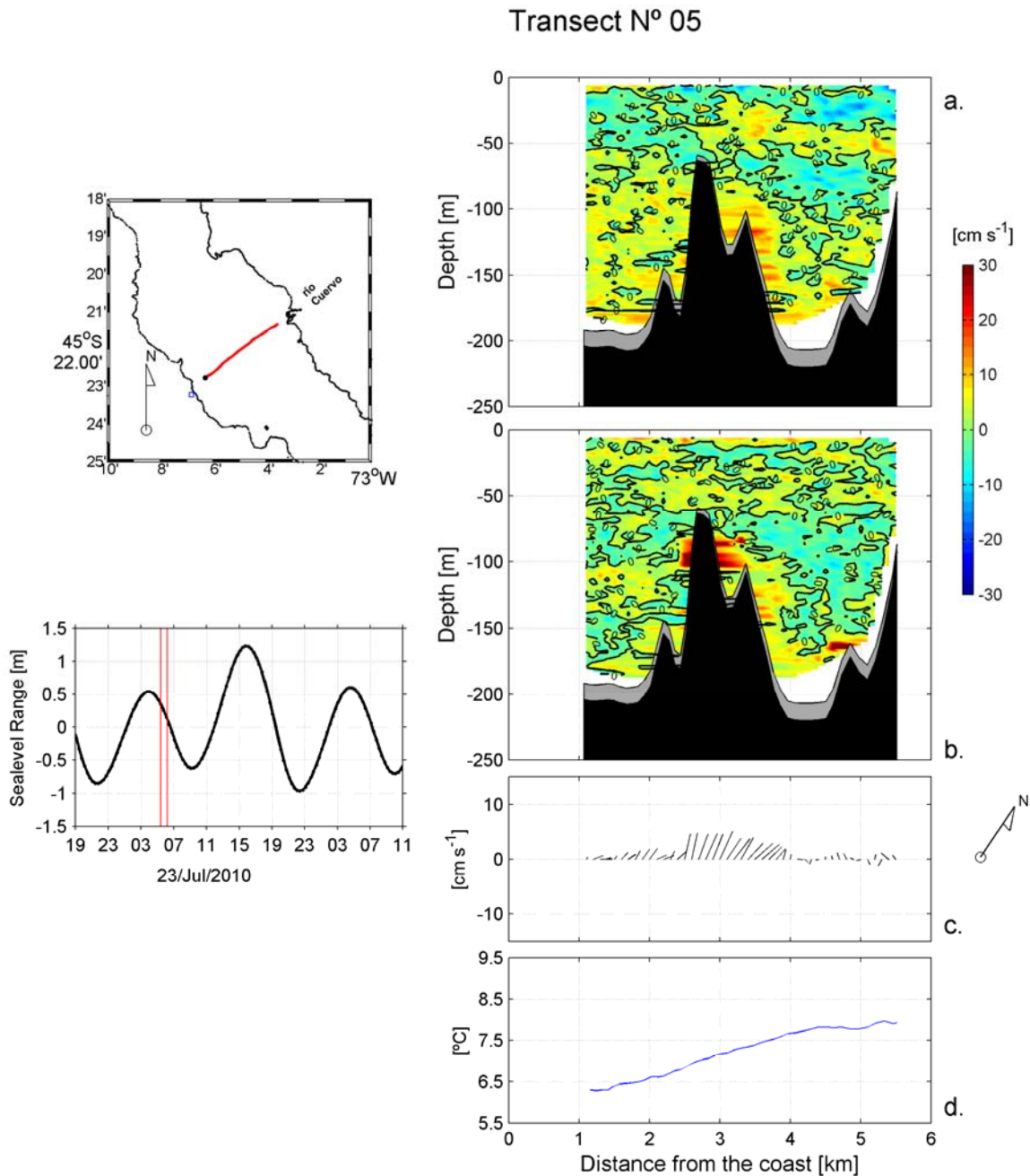


Figure 05: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 23/Jul/2010 at 05:39 UTC and 23/Jul/2010 at 06:25 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

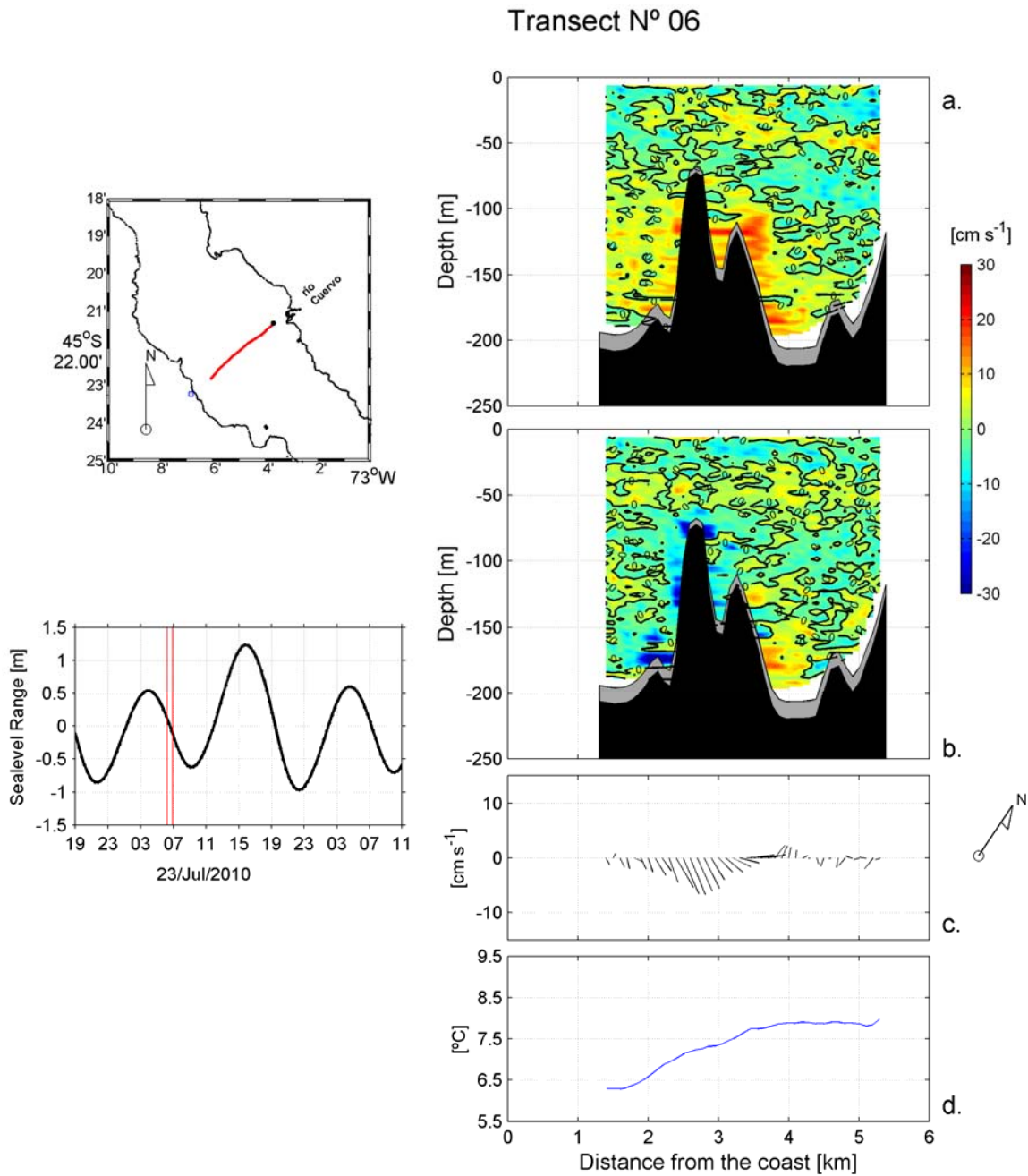


Figure 06: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 23/Jul/2010 at 06:27 UTC and 23/Jul/2010 at 07:11 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

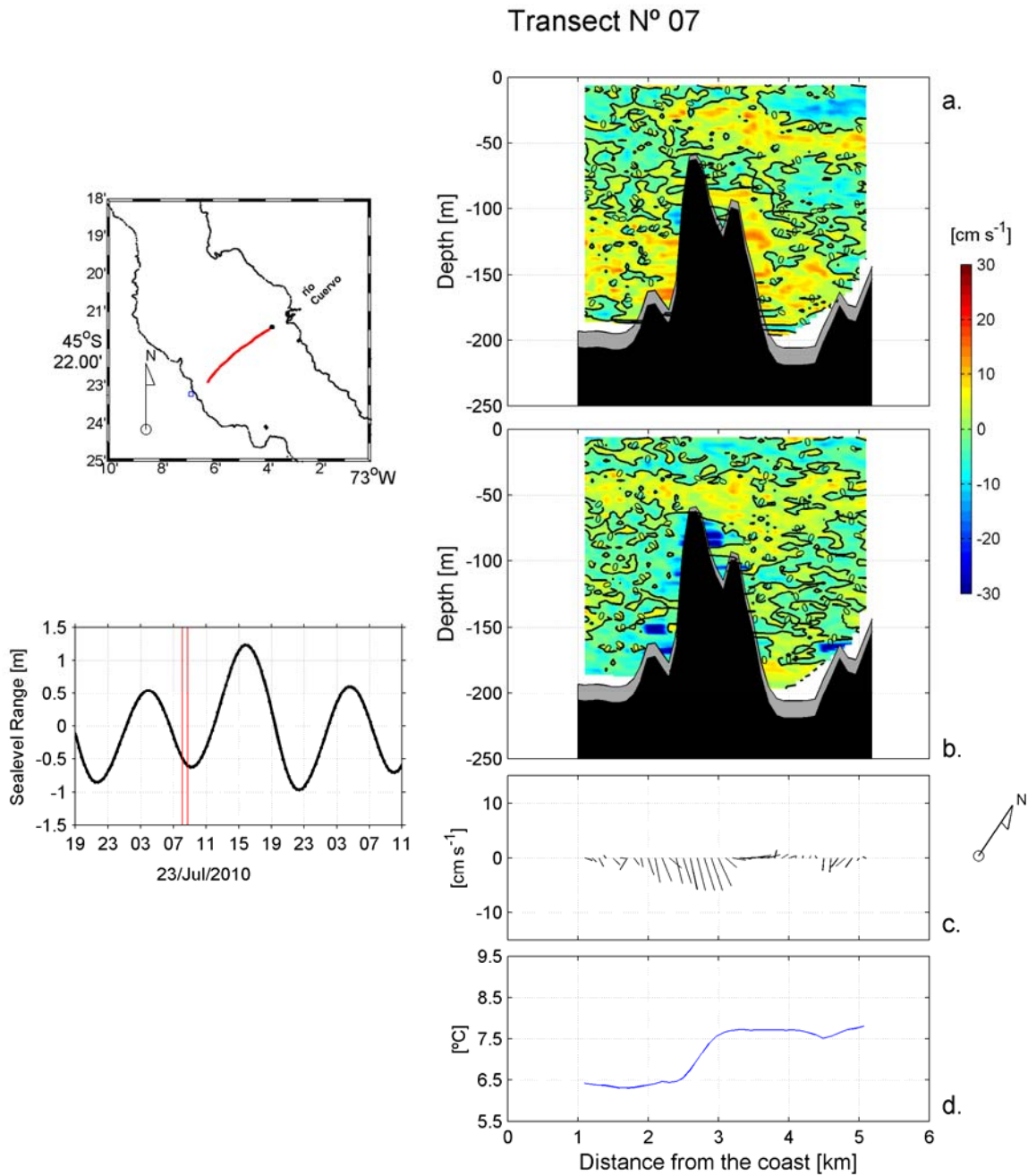


Figure 07: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 23/Jul/2010 at 08:18 UTC and 23/Jul/2010 at 08:59 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

Transect N° 08

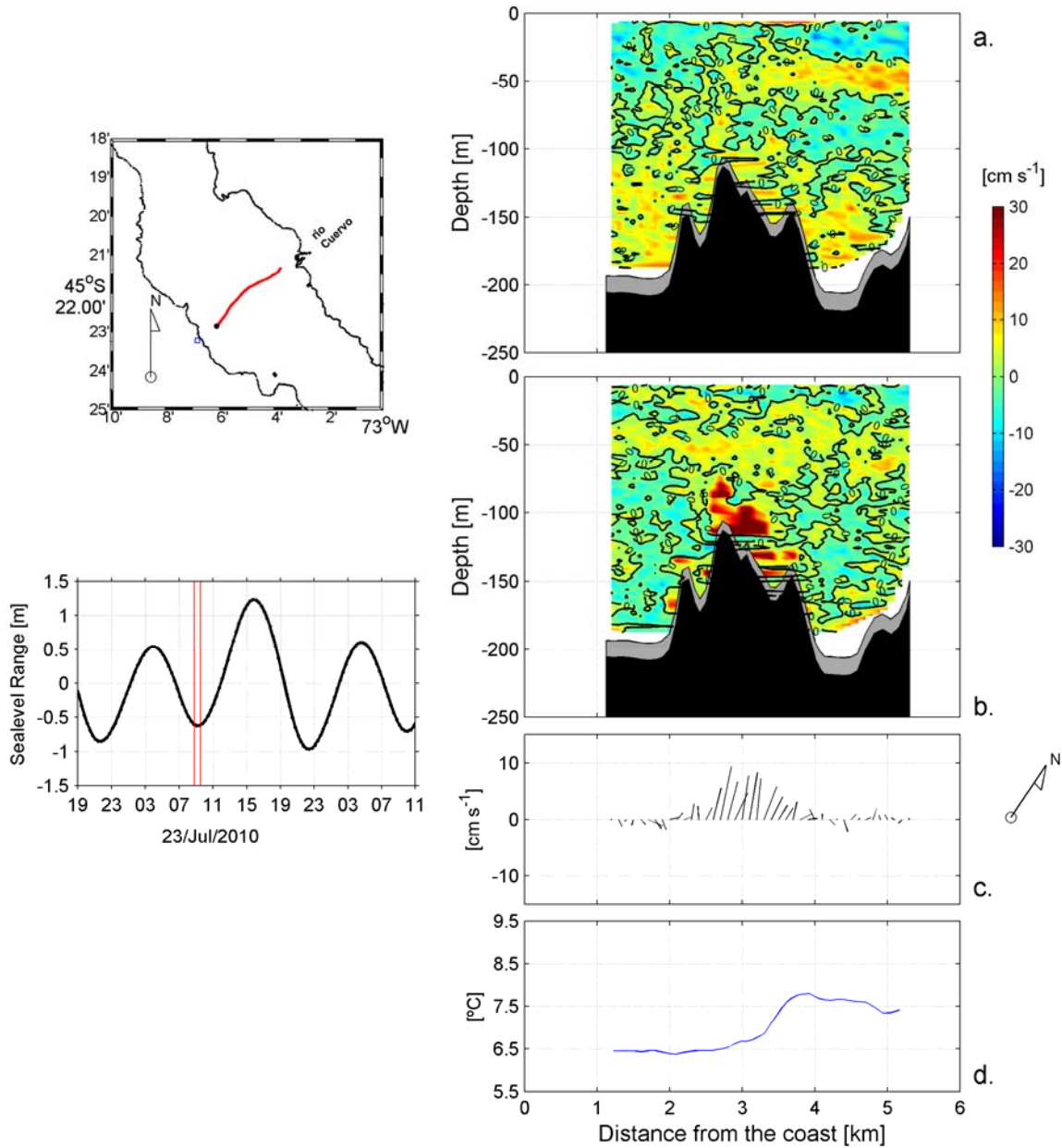


Figure 08: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 23/Jul/2010 at 09:00 UTC and 23/Jul/2010 at 09:48 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

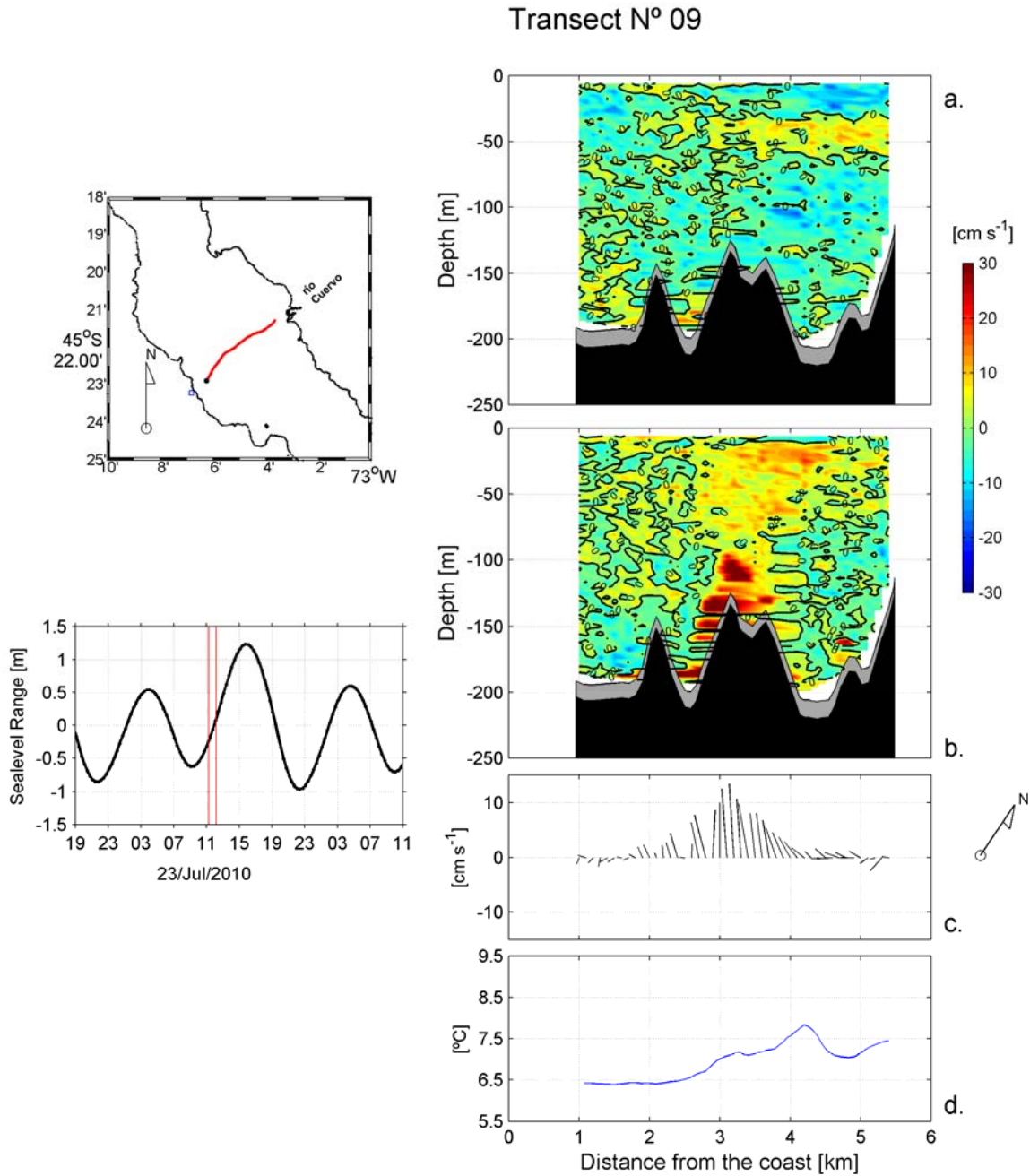


Figure 09: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 23/Jul/2010 at 11:29 UTC and 23/Jul/2010 at 12:24 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

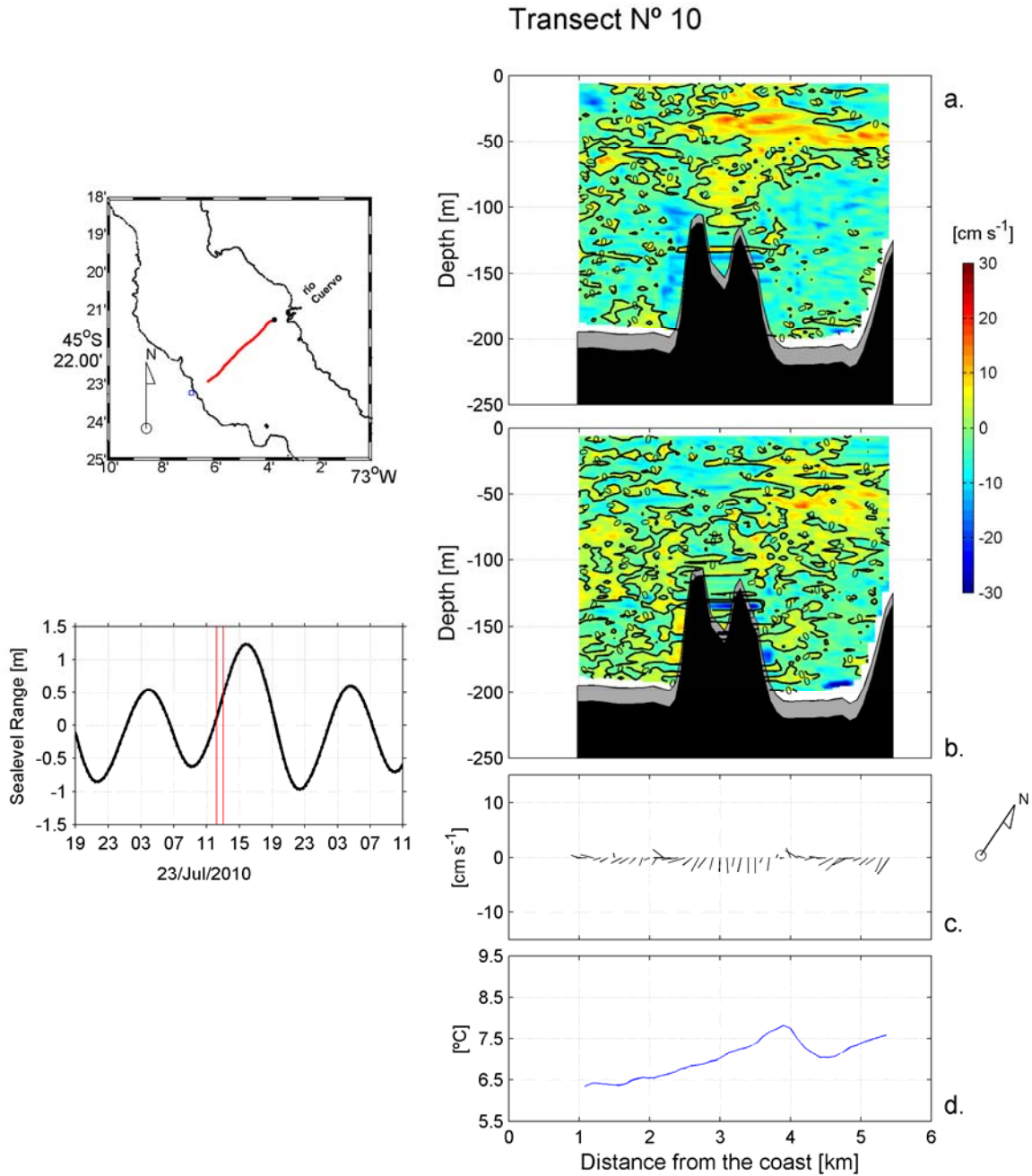


Figure 10: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 23/Jul/2010 at 12:26 UTC and 23/Jul/2010 at 13:18 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

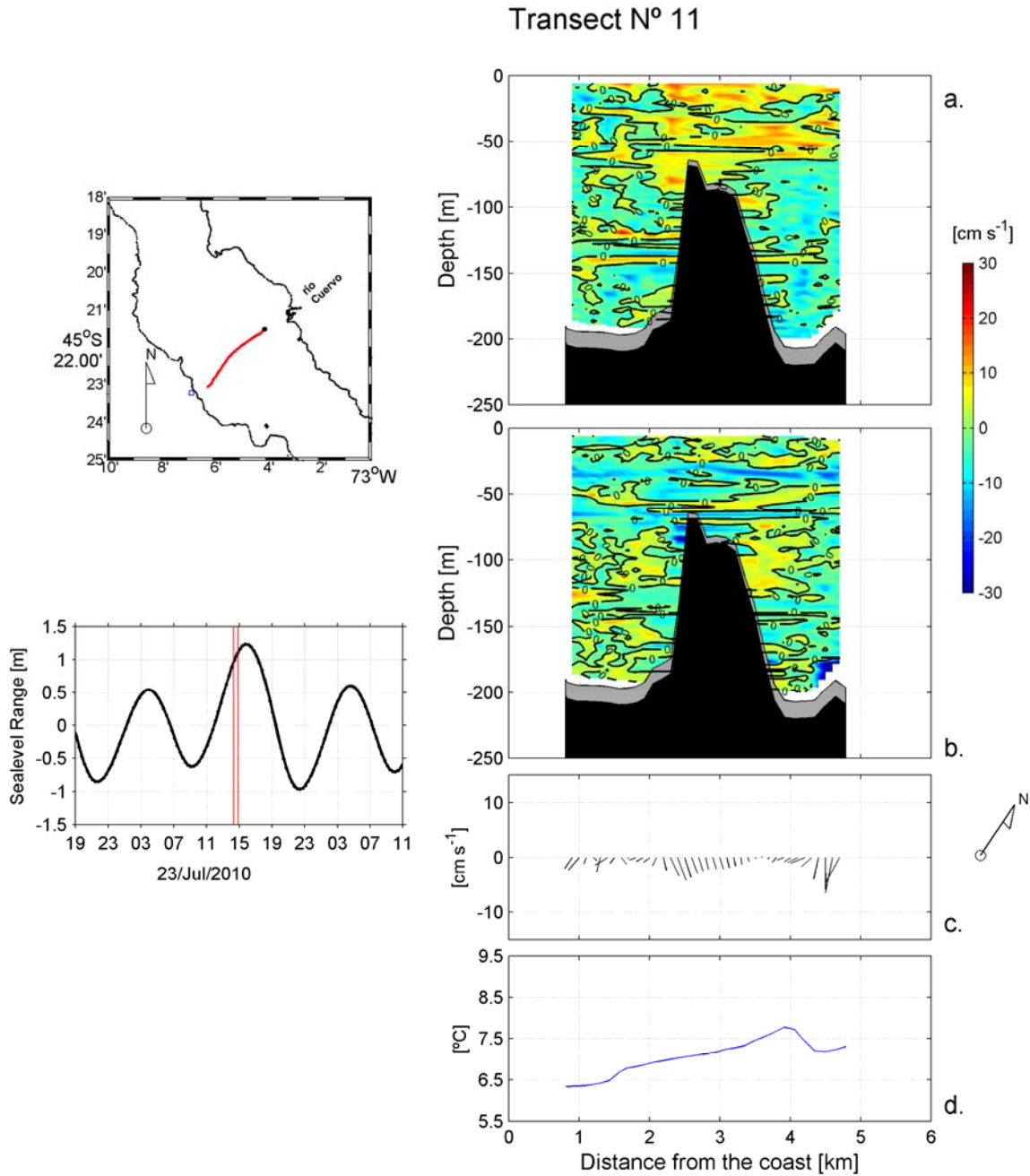


Figure 11: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 23/Jul/2010 at 14:35 UTC and 23/Jul/2010 at 15:05 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

Transect N° 12

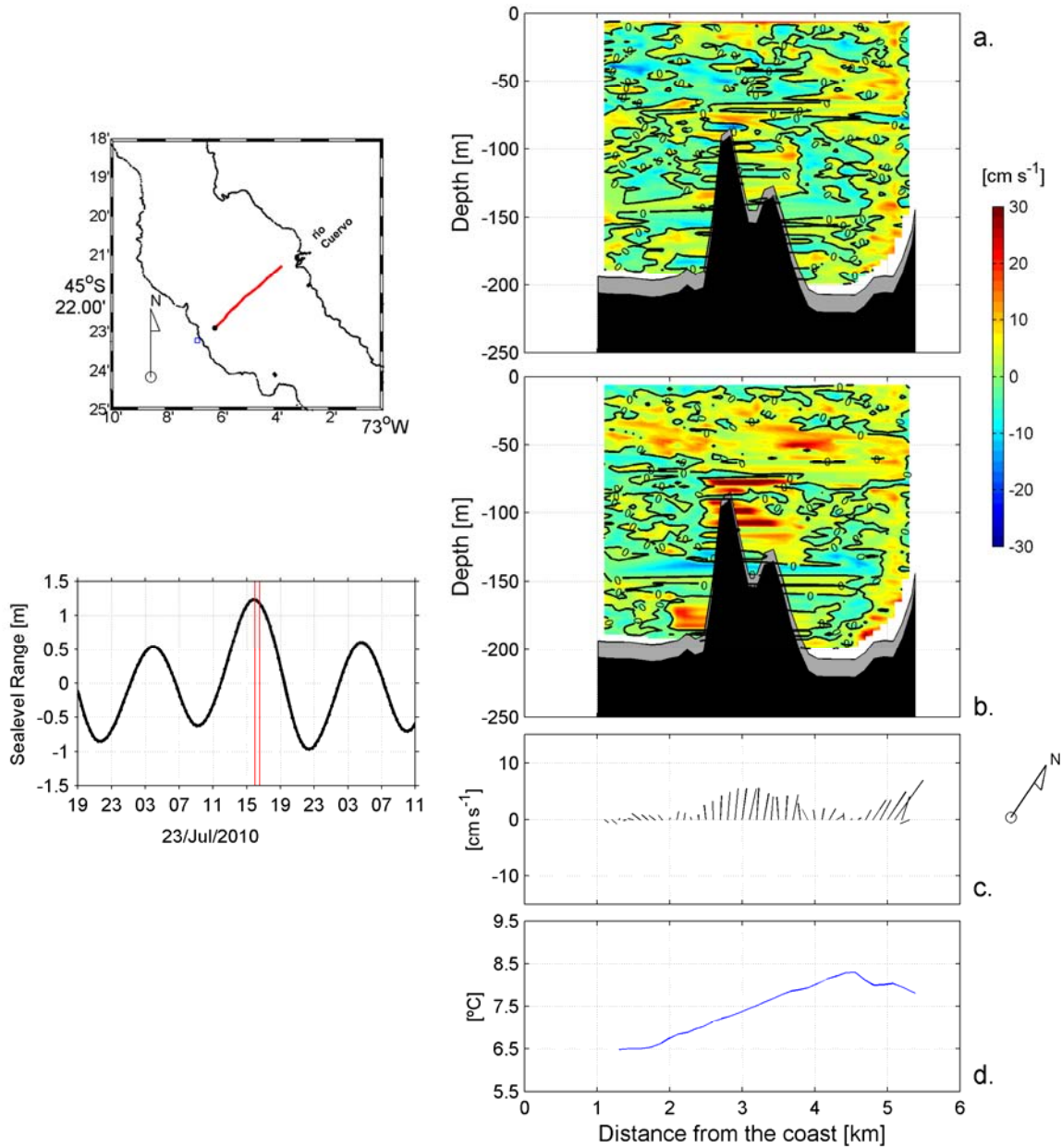


Figure 12: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 23/Jul/2010 at 16:12 UTC and 23/Jul/2010 at 16:46 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

Transect N° 13

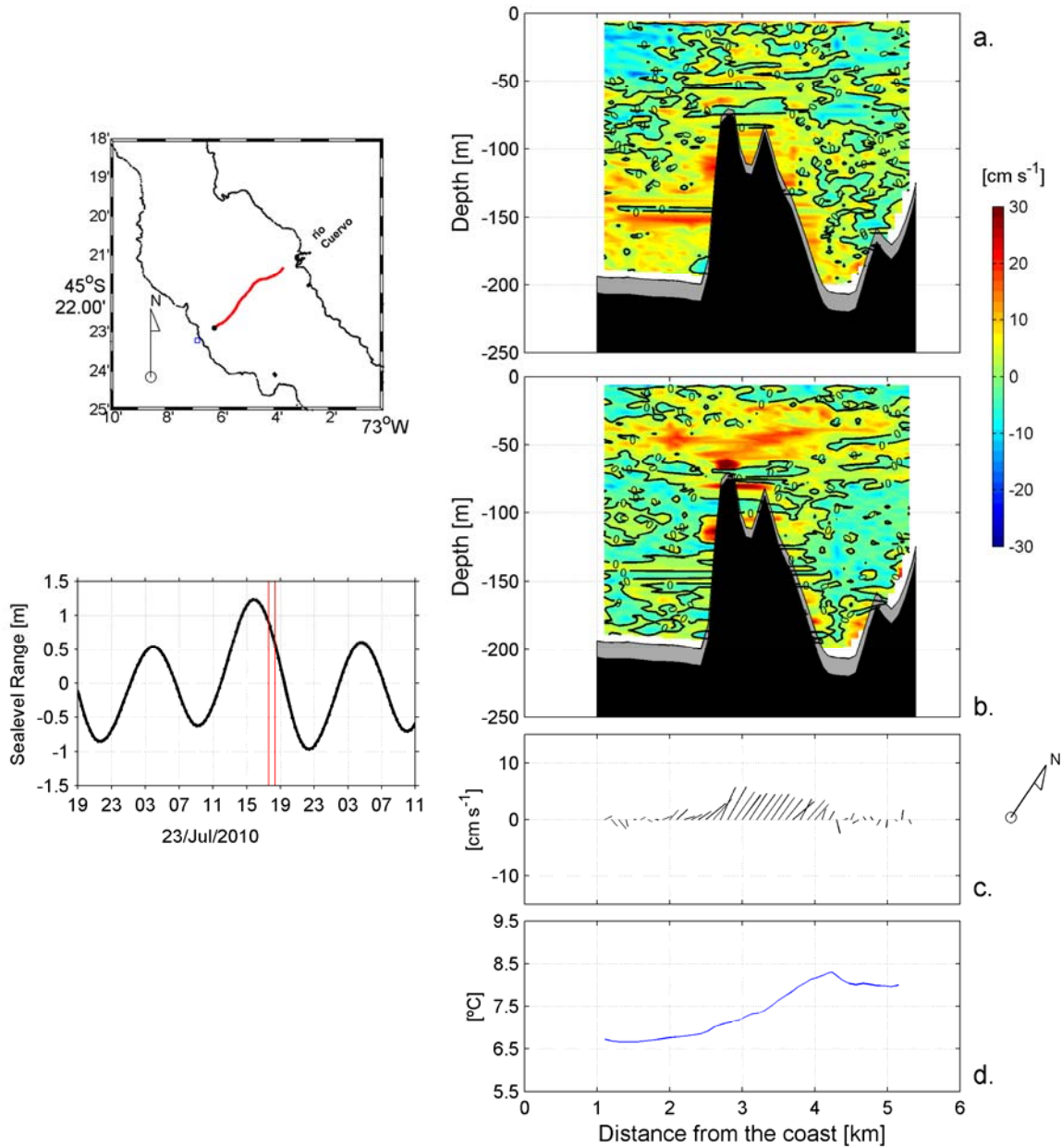


Figure 13: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 23/Jul/2010 at 17:51 UTC and 23/Jul/2010 at 18:37 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

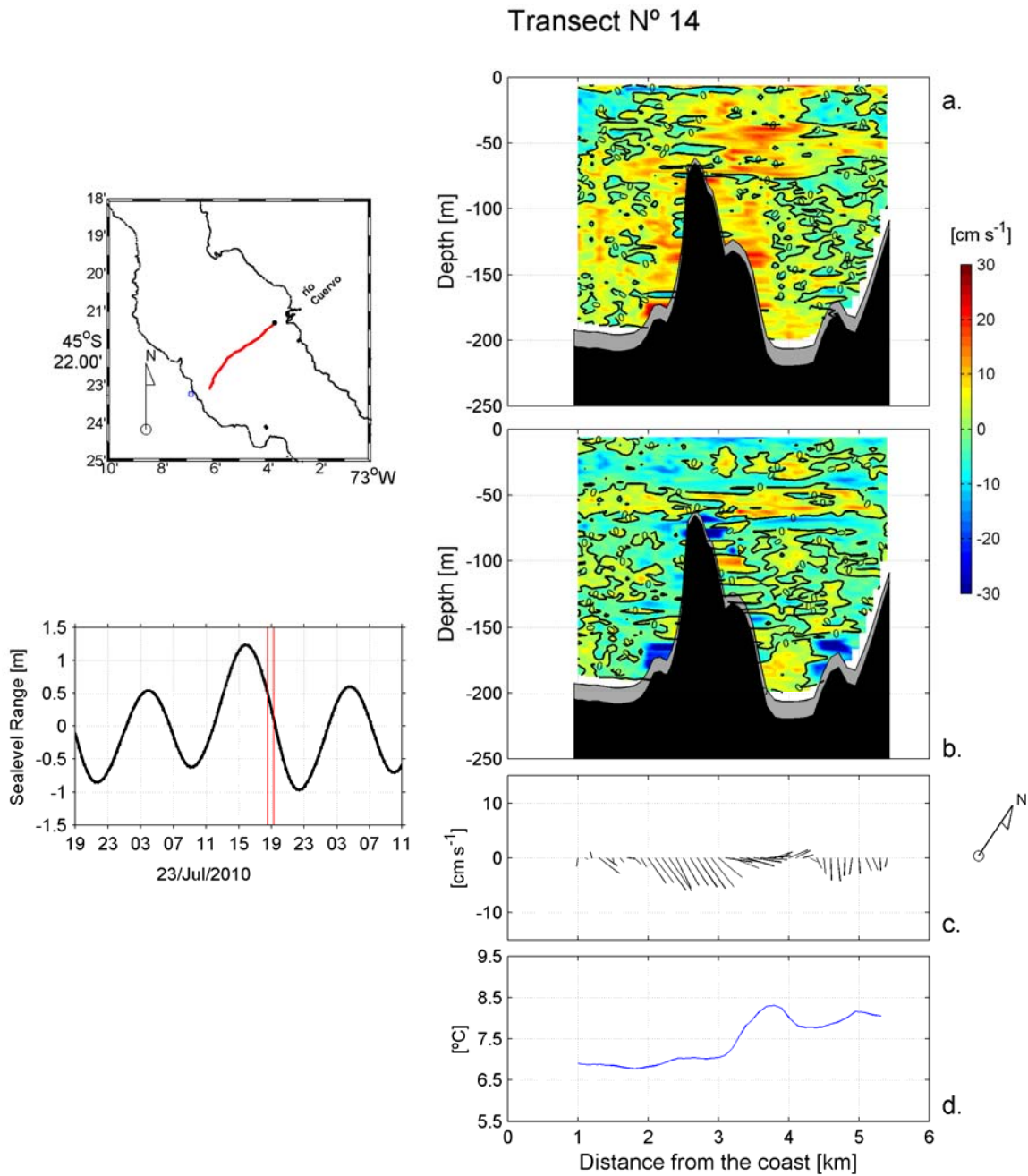


Figure 14: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 23/Jul/2010 at 18:43 UTC and 23/Jul/2010 at 19:32 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

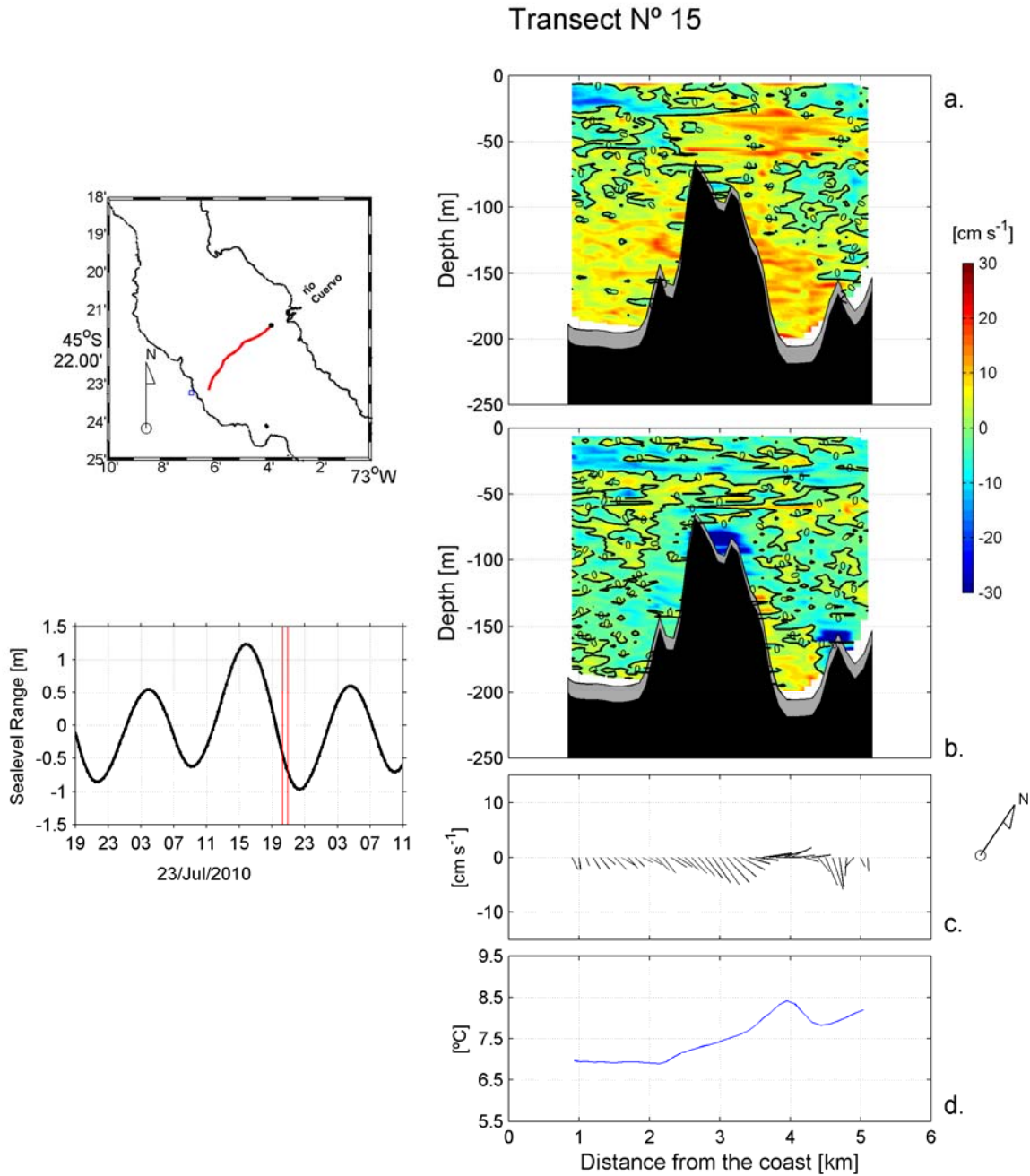


Figure 15: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 23/Jul/2010 at 20:33 UTC and 23/Jul/2010 at 21:13 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

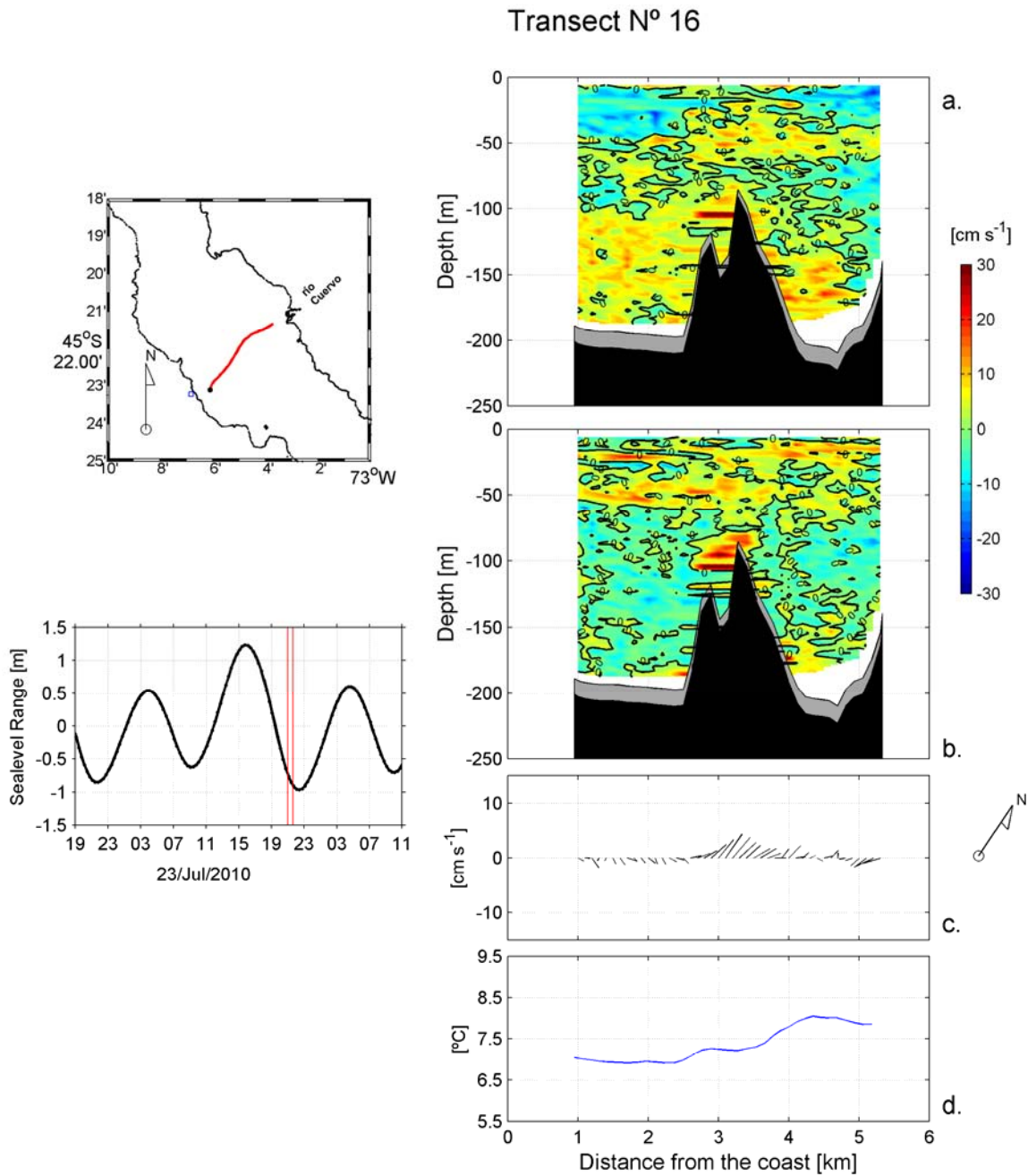


Figure 16: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 23/Jul/2010 at 21:16 UTC and 23/Jul/2010 at 21:52 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

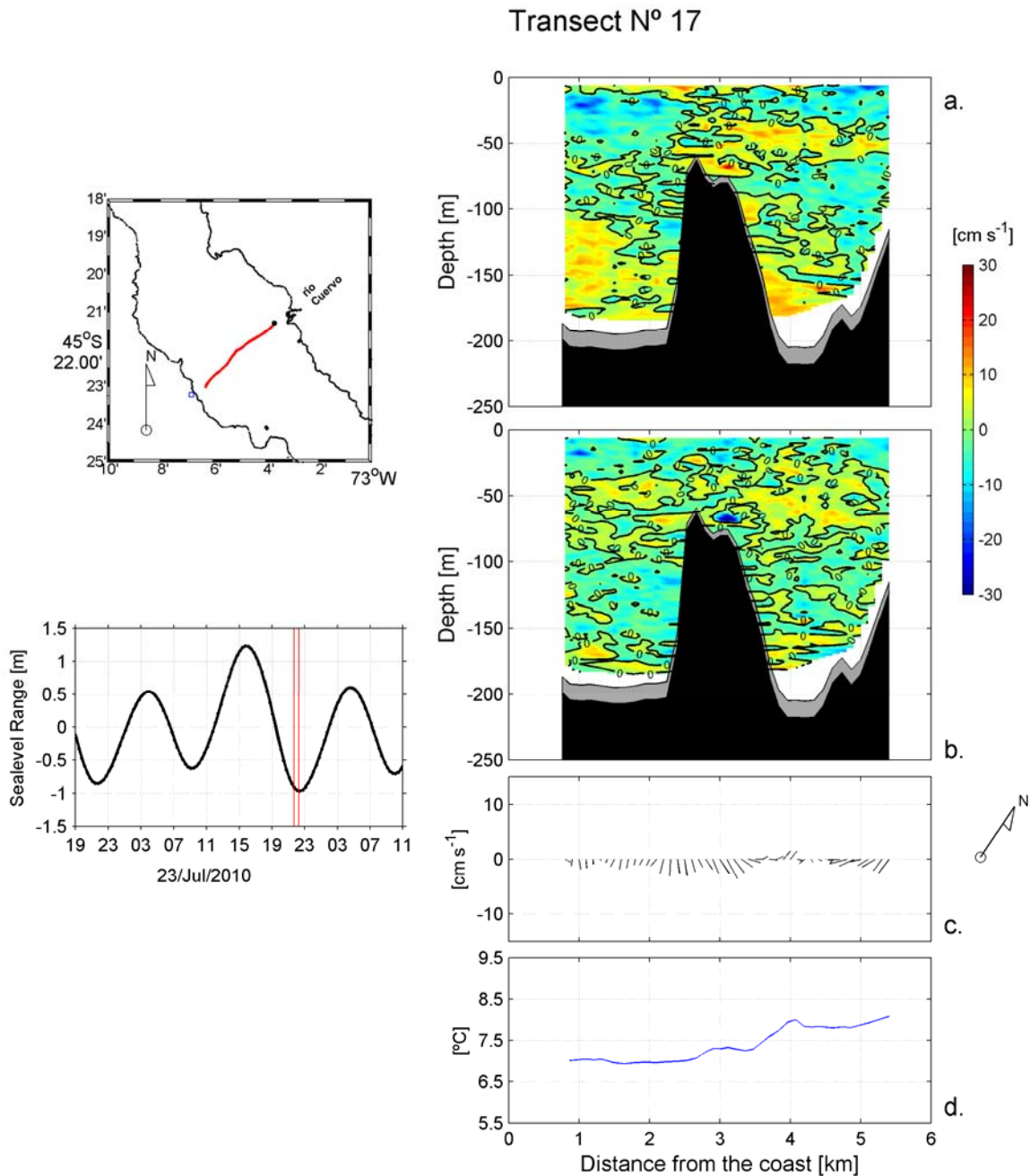


Figure 17: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 23/Jul/2010 at 21:56 UTC and 23/Jul/2010 at 22:31 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

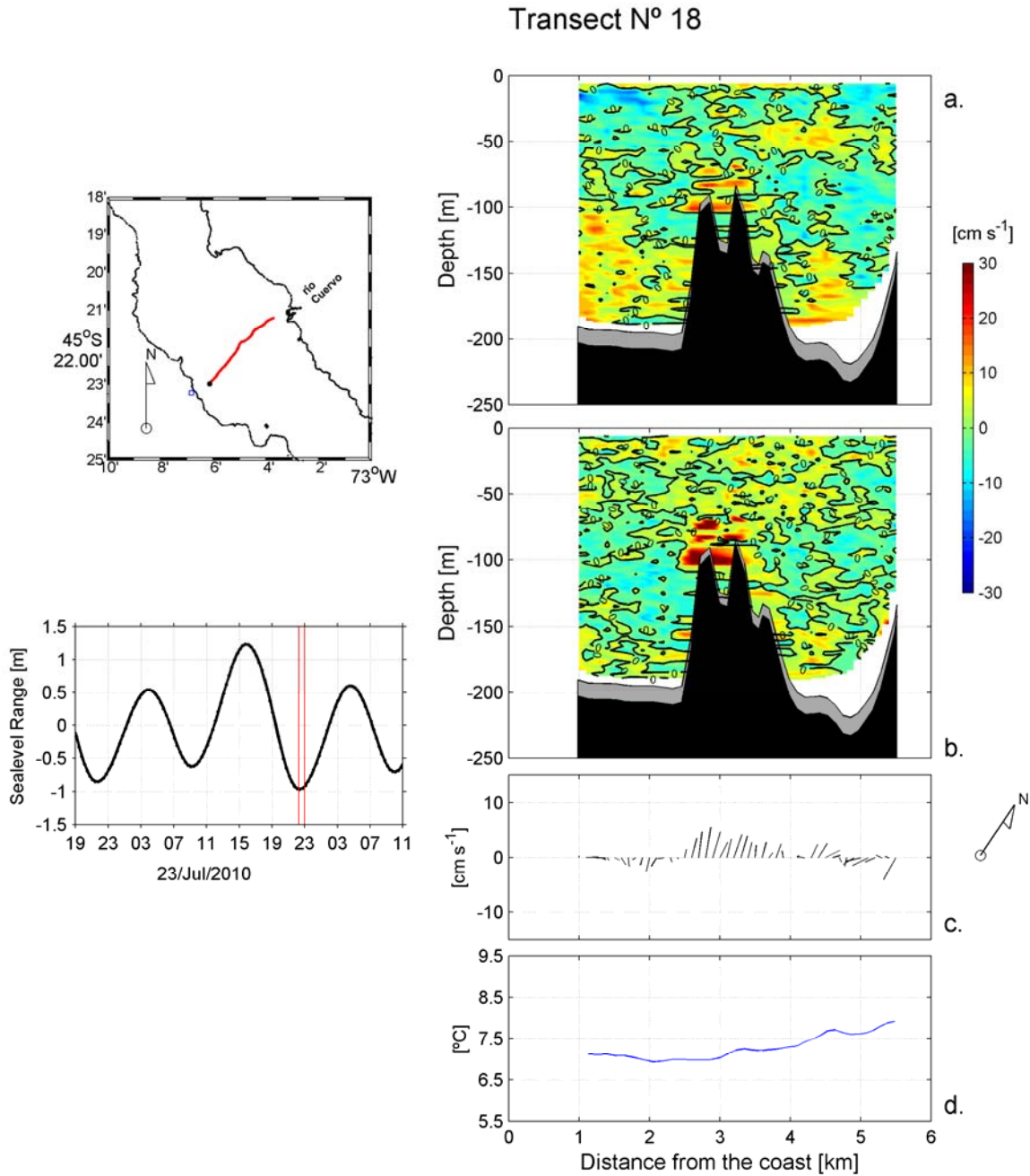


Figure 18: (a) Along-fjord and (b) Cross-fjord components of the current, (c) stick diagrams of mean currents and (d) 1m-depth temperature. Note that positive (negative) values in along-fjord component indicate currents trough the mouth (head) of the fjord. Transect were carried out between 23/Jul/2010 at 22:33 UTC and 23/Jul/2010 at 23:12 UTC. The upper-left insert show the path of each transect (dot indicate the transect end) and the lower-left insert show the sealevel range forecast, where the red lines indicates the transect time.

ALONG-FJORD
Diurnal harmonic

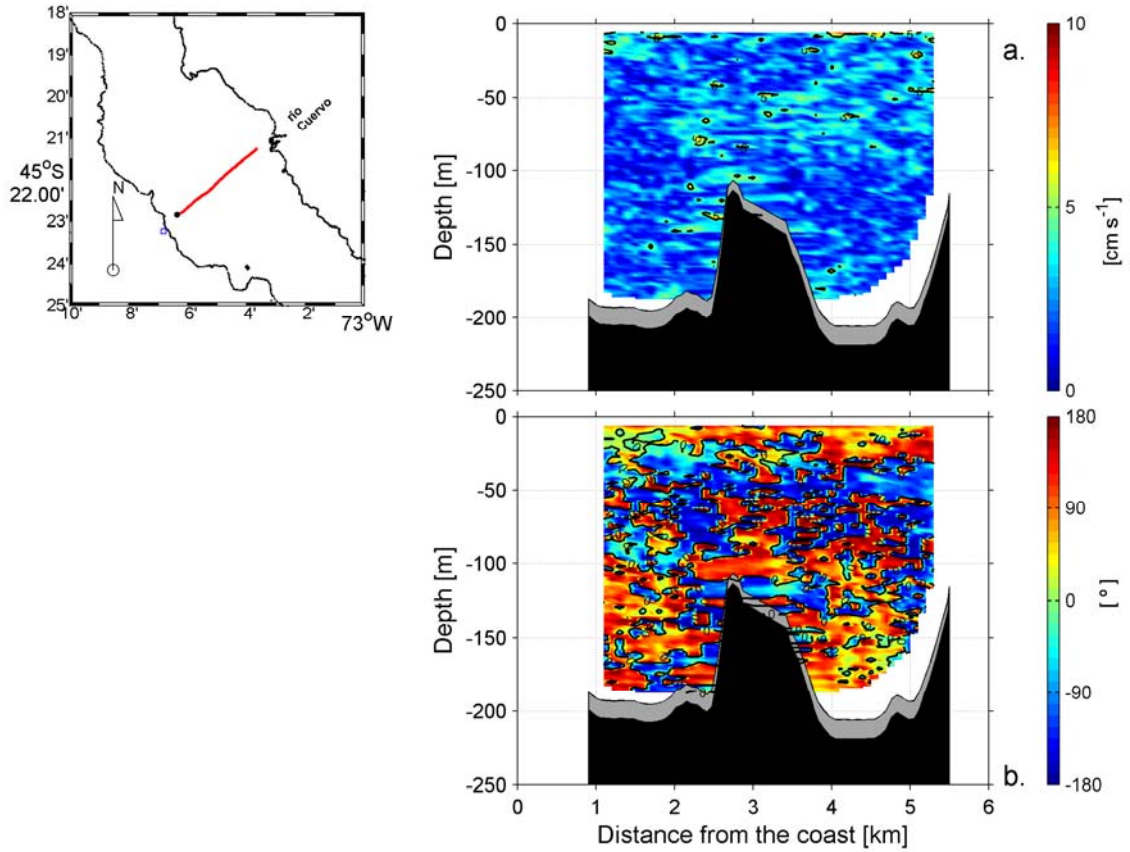


Figure 19: (a) Amplitude and (b) Phase of the along-fjord component, during the study of the Aysen Fjord.

ALONG-FJORD
Semidiurnal harmonic

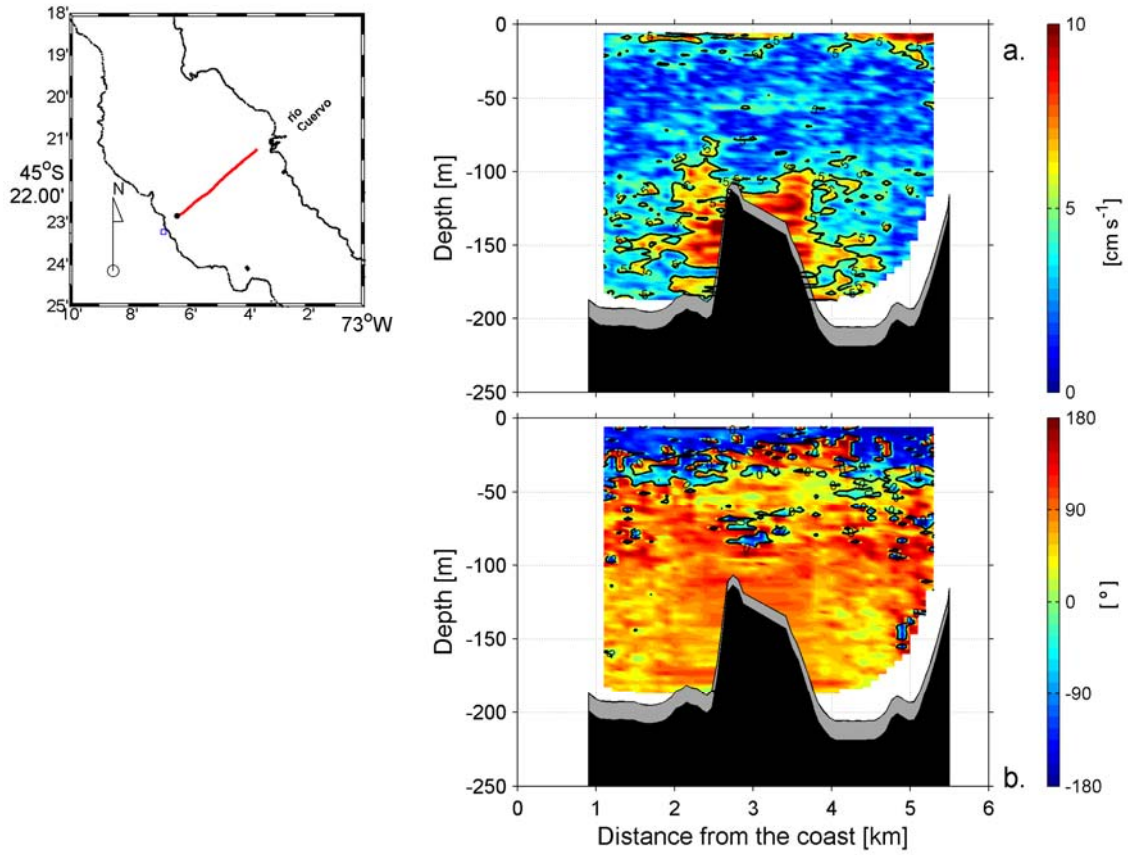


Figure 20: (a) Amplitude and (b) Phase of the along-fjord component, during the study of the Aysen Fjord.

CROSS-FJORD
Diurnal harmonic

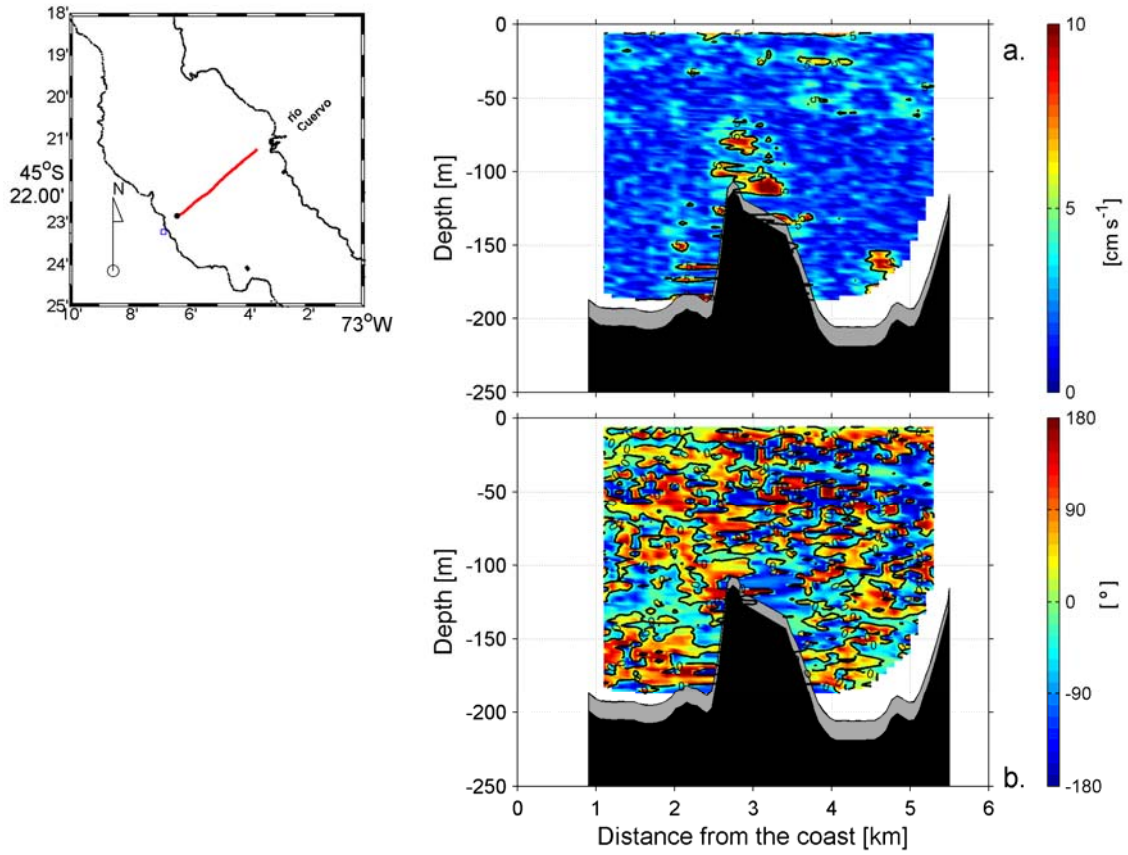


Figure 21: (a) Amplitude and (b) Phase of the cross-fjord component, during the study of the Aysen Fjord.

CROSS-FJORD
Semidiurnal harmonic

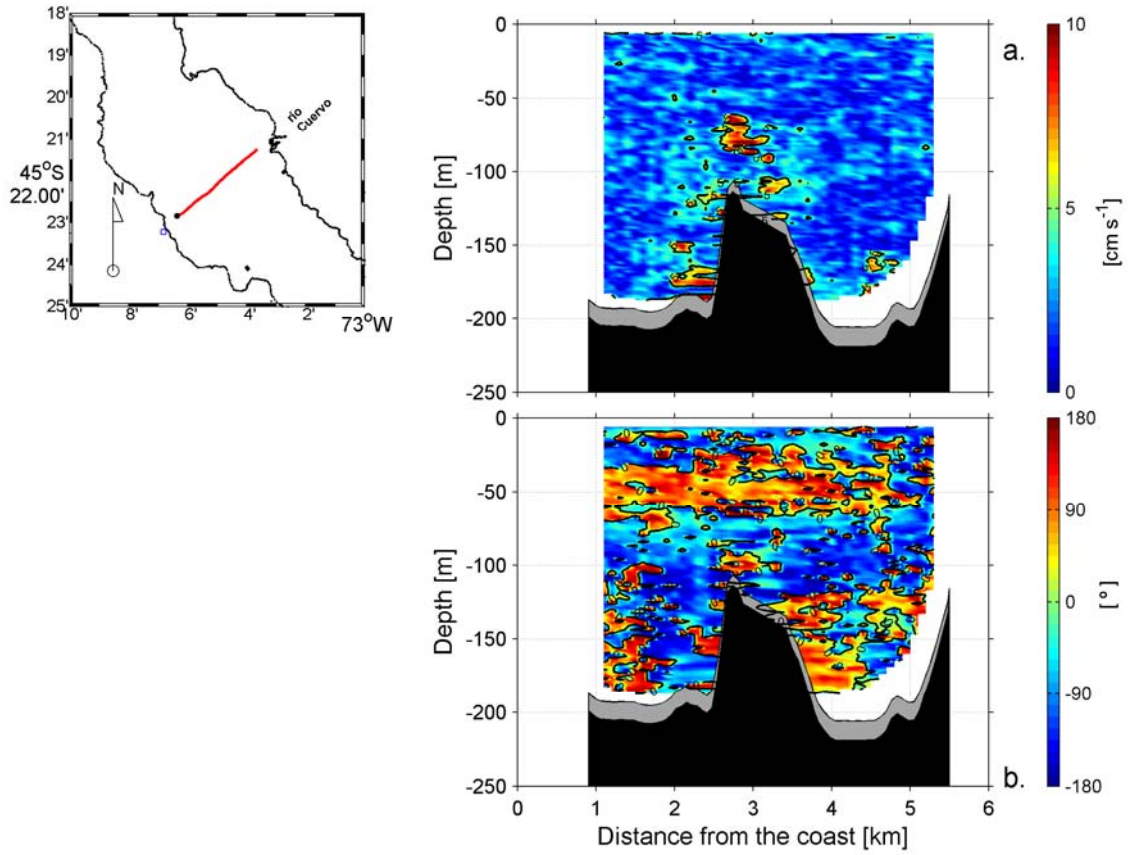


Figure 22: (a) Amplitude and (b) Phase of the cross-fjord component, during the study of the Aysen Fjord.

RESIDUAL CURRENTS

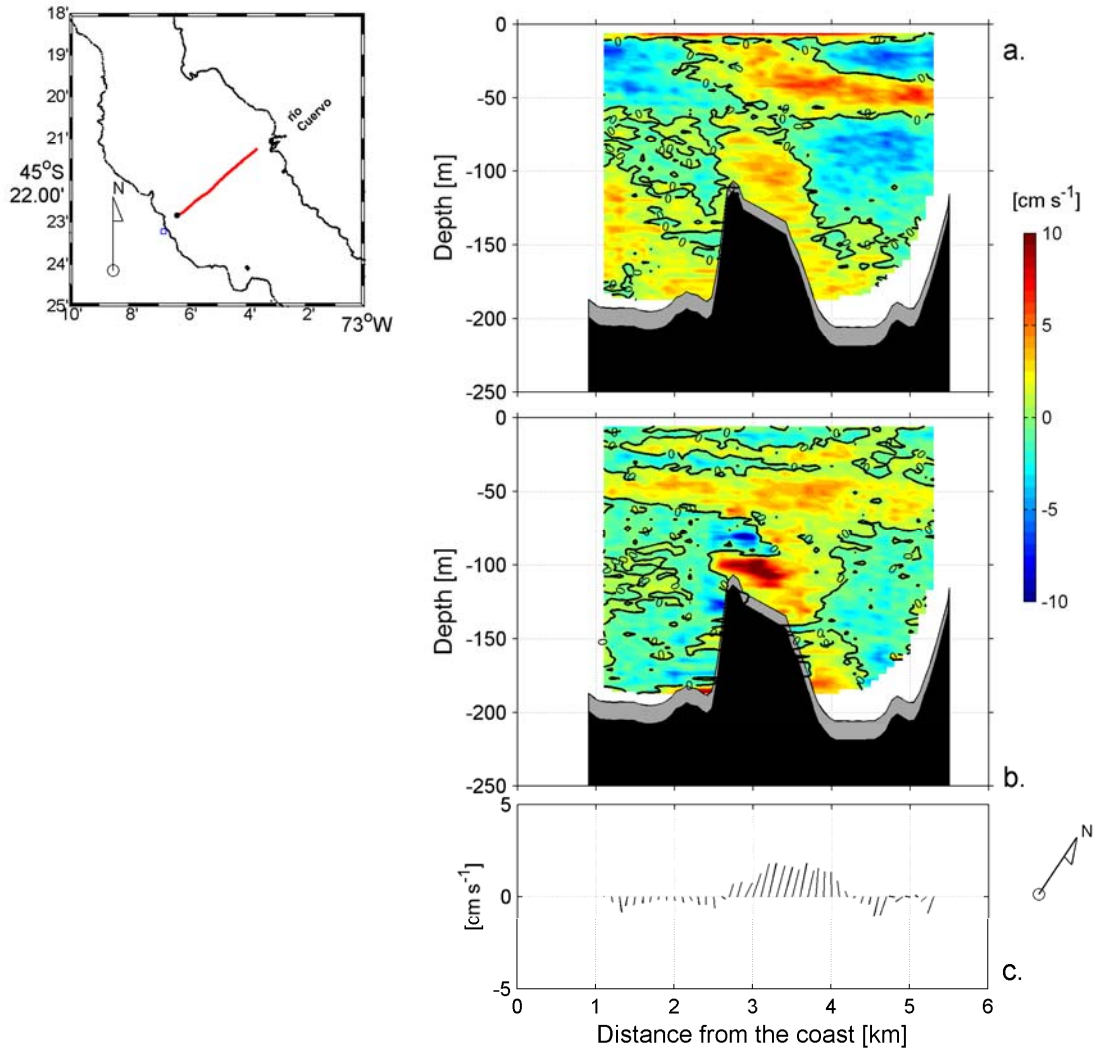


Figure 23: (a) Along-fjord and (b) Cross-fjord residual currents and (c) sticks diagram of residual currents, during the study of the Aysen Fjord. Note that positive (negative) values in Along-fjord component indicate currents through the mouth (head) of the fjord.

GOODNESS OF FIT

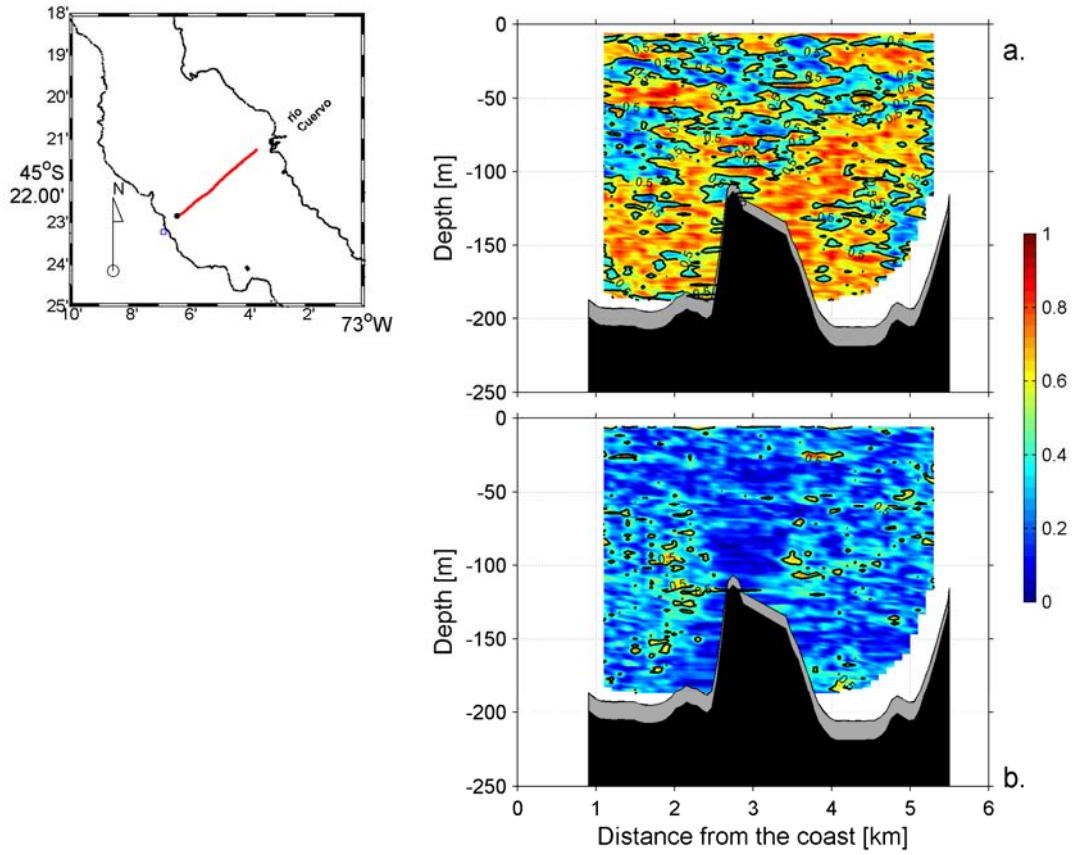


Figure 24: (a) Along-fjord and (b) Cross-fjord components goodness of fit, during the study of the Aysen Fjord.