RAFOS Float Trajectories from the Labrador Sea Water Level in the Iceland Basin 1997–2003

A Data Inventory Compiled by:

Matthias Lankhorst   Martina Nielsen   Walter Zenk

Third Edition

August 29, 2017

Matthias Lankhorst *
Scripps Institution of Oceanography
9500 Gilman Drive, Mail Code 0230
La Jolla, CA 92039-0230
USA

* *corresponding author*

Martina Nielsen and Walter Zenk
GEOMAR Helmholtz Centre for Ocean Research Kiel
Physical Oceanography
Düsternbrooker Weg 20
24105 Kiel
Germany

Contents

Preface to the Third Edition

This data inventory, *RAFOS Float Trajectories from the Labrador Sea Water Level in the Iceland Basin 1997–2003*, was initially presented as an internet publication on the pages of the *Institut für Meereskunde* (IfM) at the University of Kiel, Germany. By the time the second edition was published in July 2004, the institute had become the *Leibniz Institute for Marine Sciences* (IFM-GEOMAR), and it has since been restructured again and is now the *GEOMAR |Helmholtz Centre for Ocean Research Kiel*. The original websites did not survive these transitions, nor were the underlying data available from a permanent archive. To correct this situation, the data were submitted to the PANGAEA data center[1] in 2017, and this report collects the material from the original internet publications for future reference and is meant to accompany the data. Scientific analyses and further descriptions of the data, including some of the material presented here, are already available in the literature [Lankhorst and Zenk, 2006, Kanzow and Zenk, 2014].

[1]https://www.pangaea.de

1 Abstract

The overall objective of the subproject A3 of SFB 460 (1996–2003)[2] was to observe the water mass transformation in the eastern basin of the subpolar gyre with direct methods including RAFOS floats. Our floats populated the 1500 m depth range of the Iceland Basin occupied by low-salinity Labrador Sea Water and higher-salinity Overflow Water. The first water mass reaches the Basin through the Charlie-Gibbs Fracture Zone. Its source region is in the Labrador Sea where it is generated on a yearly basis by deep-reaching wintertime convection. The second intermediate water mass of the eastern basin enters the region as Iceland Scotland Overflow Water with its perpetual source in the Norwegian Seas. At the southeastern margin of our region of interest remainders of Mediterranean Water mix with the other two characteristic water masses. A smaller number of floats was deployed in the lower deep water of the Iceland Basin at nominally 2600 m depth.

Data for the presented gallery of intermediate float trajectories were collected between summer 1997 and summer 2003. We have tracked 57 RAFOS floats. These neutrally buoyant in-situ drifters were launched during six research cruises. Their average underwater missions exceeded one year. The Lagrangian experiment lasted until 2003 when all four sound sources were completely recovered. The data set comprises also trajectories from float parks. These ensembles of floats enable repeated Lagrangian time series with identical initial conditions allowing estimates of the representativeness of individual trajectories.

2 The SFB RAFOS Float Program in the Iceland Basin

In 1997 the Institut für Meereskunde (later IFM-GEOMAR) started its RAFOS float program in the northern North Atlantic. It covers the region north of 50° N and east of the Mid-Atlantic Ridge up to the southern approaches to Iceland (Fig. 2). In contrast to the open boundary to the south, the deep Iceland Basin is closed to the north. The Iceland Scotland Ridge acts as a natural barrier for water mass exchanges between the open North East Atlantic and the Norwegian Sea.

On its eastern margin the upper levels of the water column host warm and salty waters from the northernmost extension of the subtropical gyre. Separated by the irregularly meandering flow of the North Atlantic Current and its Subpolar Front, the western side of the Basin is dominated by the fresher subpolar regime [Rossby et al., 2000].

Not only does one find pronounced water mass exchanges across the Subpolar Front, but also between contributing water masses at intermediate levels (1000–1800 m). The primary water mass there originates from the Labrador Sea where it has been formed convectively during previous winters. The conventional spreading picture, confirmed by a snapshot of the total CFC inventory in the subpolar gyre in the year 1997 [Rhein et al., 2002], suggests this freshly ventilated

[2] SFB (Sonderforschungsbereich) stands for an accelerated research initiative comprising intensive observations and modelling efforts of fluctuations in the thermohaline circulation in the subpolar gyre of the North Atlantic.

low-salinity water to enter the eastern basins through the Charlie-Gibbs Fracture Zone (Fig. 3). The latter constitutes a natural gap in the Mid-Atlantic Ridge near 53° N. Supporting results from PALACE floats underlining the choke point character of the Fracture Zone are presented by Fischer and Schott [2002].

A second source of mid-depth waters emanates from the warm and salty Mediterranean outflow in the Gulf of Cadiz. How far northward this water mass can invade the Rockall Through and the Iceland Basinstill remains an open question [Bower et al., 2000]. Finally, Iceland Scotland Overflow Water at its northern end adds salt to the Labrador Sea Water layer. Further mixing components at intermediate depths arise from adjacent strata, i. e. Subpolar Mode Water from above and Lower Deep Water from below. The resulting horizontal distribution of salinity and temperature at 1500 m depth is displayed in Figure 3. The plot was drawn from hydrographic surveys taken between 1997 and 1998.

The main goal of our effort comprises the circulation and its fluctuations of water masses at the intermediate levels of the Iceland Basin. For our studies in this melting pot of water masses we have chosen conventional isobaric RAFOS floats [Zenk et al., 2000].

Our Lagrangian observations started in the summer of 1997. Three RAFOS sources were

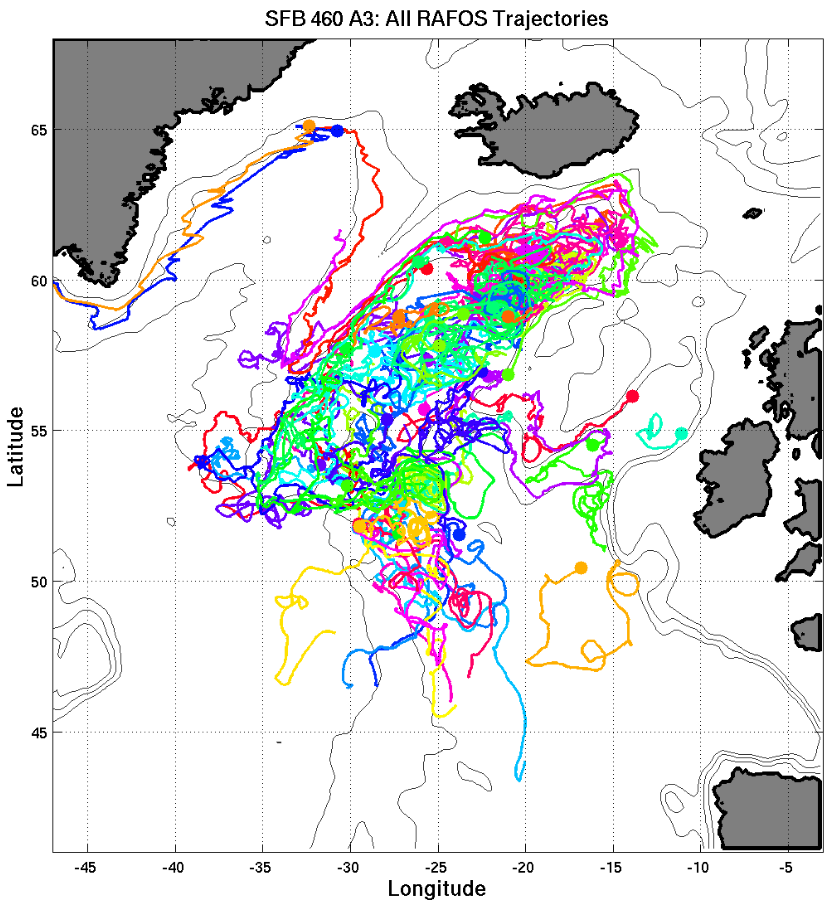


Figure 1: "Spaghetti plot" showing all trajectories superimposed.

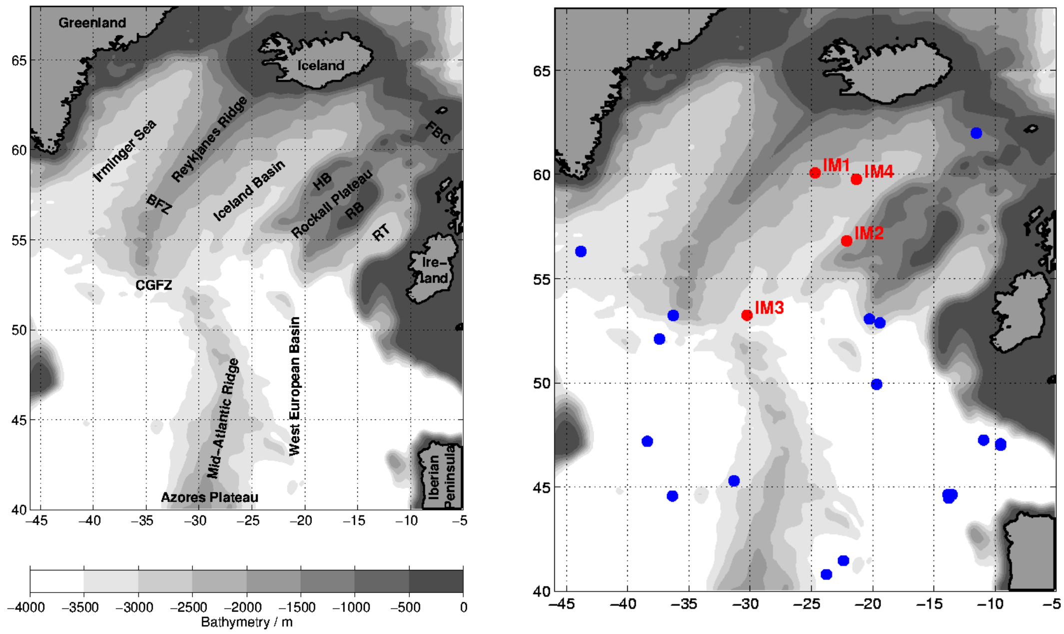


Figure 2: *Left:* Topographic chart of the Northeastern Atlantic. Abbreviations are: BFZ Bight Fracture Zone, CGFZ Charlie-Gibbs Fracture Zone, FBC Faeroe Bank Channel, HB Hatton Bank, RB Rockall Bank, RT Rockall Trough. *Right:* Positions of sound sources used for tracking the floats. Red symbols refer to sources operated by IfM Kiel as part of the SFB 460 A3. The other sources (blue, approximate positions only) belong to different institutes in France and the USA. Note that most of the sources were not in the water for the entire duration of the experiment, however, IM1-3 were.

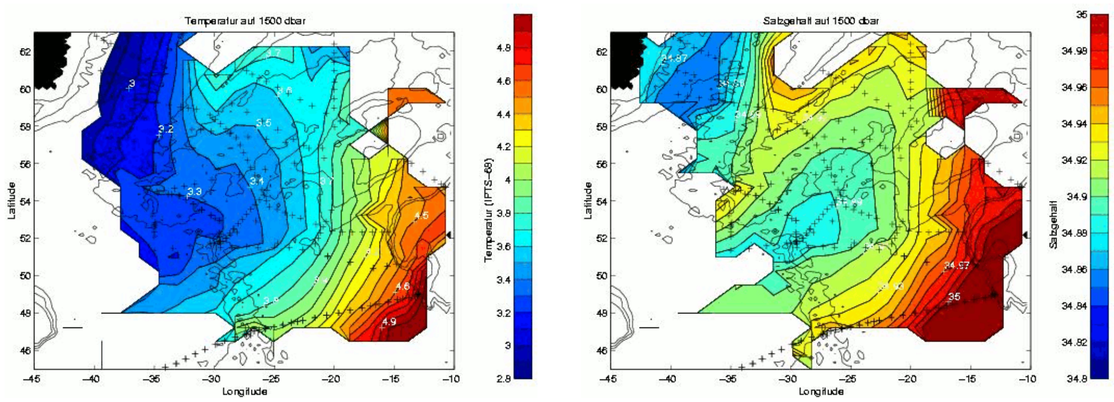


Figure 3: Horizontal temperature in °C *(left)* and salinity *(right)* distribution at the level of the Labrador Sea Water (1500 m) in the eastern basins of the North Atlantic. Note the pronounced penetration of this cold and low-salinity water mass across the Mid-Atlantic Ridge at 53°N (Charlie-Gibbs Fracture Zone). On the southeastern side the Labrador Sea Water tongue encounters warm and much more saline Mediterranean Water originating from the Gulf of Cadiz.

Table 1: Details on RAFOS sound sources supplied by IfM Kiel in the Iceland Basin.

Mooring		Signal Time	Launch Position		Launch Time	Maintenance	Recovery Time
Code	IfM No.	UTC	Latitude	Longitude	dd/mm/yyyy	dd/mm/yyyy	dd/mm/yyyy
IM1	V384	1:00	60.0733°N	24.7192°W	21.05.1997	29.06.1999	13.08.2003
IM2	V385	0:30	56.8117°N	22.1333°W	24.05.1997	none	12.08.2003
IM3	V388	1:30	53.2417°N	30.2667°W	29.05.1997	10.08.1998	09.08.2003
IM4	V432	2:00	59.7667°N	21.3067°W	11.08.2002	none	12.08.2003

Table 2: Inventory of cruises to the Iceland Basin in the frame of SFB460 of Kiel University.

Ship Cruise	Duration dd.mm. – dd.mm.yyyy	No. of floats launched	Comments
METEOR 39/2	14.05. – 08.06.1997	17	
POSEIDON 242	02.08. – 21.08.1998	20	
POSEIDON 244	14.09. – 04.10.1998	2	
METEOR 45/2	11.06. – 08.07.1999	8	
POSEIDON 261	27.06. – 17.07.2000	10	
METEOR 50/4	18.07. – 12.08.2001	8	
POSEIDON 293/1	07.07. – 14.07.2002	3	
METEOR 59/2	23.07. – 29.08.2003	0	sound source recoveries only
POSEIDON 301	09.08. – 21.08.2003	0	sound source recoveries only

moored in the central Iceland Basin (Tab. 1). The sources were part of the present internationally coordinated RAFOS array of the NE Atlantic. It dates back to 1990 when the Institut für Meereskunde in Kiel started its first RAFOS observations in the Iberian Basin [Käse and Zenk, 1996]. More information of the array's evolution during the EUROFLOAT campaign and the other experiments like AMUSE, ARCANE etc. can be found on a web site maintained by Thierry Reynaud from Ifremer, Brest.

Jointly with similar instrumentation from the American Atlantic Circulation and Climate Experiment (ACCE), the French ARCANE project and the terminated EUROFLOAT initiative, these sound sources reflect the backbone for our eddy-resolving observations of circulation patterns at roughly 1500 m depth (Fig. 2).

At the main entrance for Labrador Sea Water east of Charlie-Gibbs Fracture Zone delayed releases by multiples of three months were arranged by the newly developed float park concept [Zenk et al., 2000]. A "park" consists of a number of dual release RAFOS floats. Their first release block keeps the instruments temporarily moored on the sea bed. The second block achieves the conventional release of a drop weight at the end of the mission.

Figs. 4 and 5 show logistical details and some integral results of our observations with floats in the Iceland Basin. Different launch events in Figs. 4 and 5 and according to Table 2 are denoted by different symbols. The shown displacement vectors connect launch and surface positions of individual floats. Note the general alignment of displacement vectors with the main axis of Maury Channel, i. e. the deep trough on the eastern side of the Iceland Basin. They seem

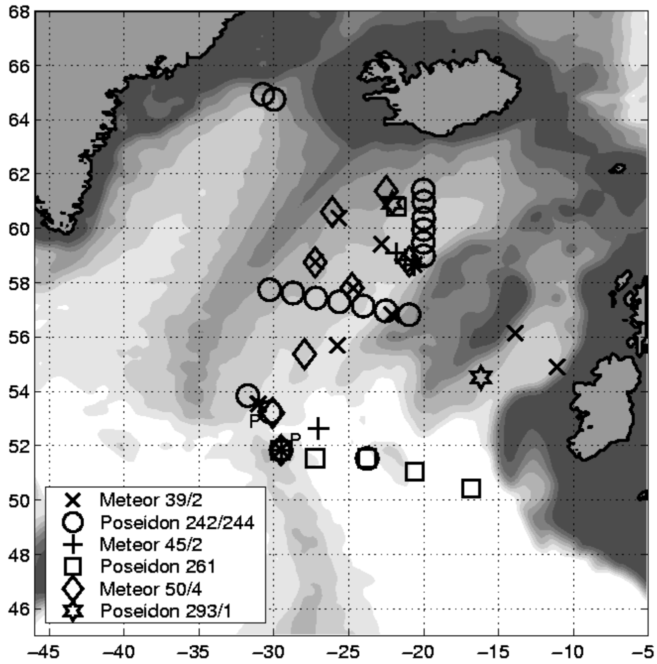


Figure 4: All launch sites of IfM RAFOS floats in the subpolar gyre of the North Atlantic. Different launch cruises are denoted by different symbols.

to be antiparallel with a preferred south-westerly direction on the eastern side of the Reykjanes Ridge. At the southern end of our area under investigation a southward export of water is suggested by the vectors. The region represents an extension of the EUROFLOAT launch sites. The study of this area was terminated in 1998. It focused on the frontal exchange at mid depth between the Mediterranean and Labrador Sea Waters in the eastern limb of the subtropical gyre [Speer et al., 1999]. The analyses of the successively available float data revealed the paramount role of the bottom topography. The Bright Fracture Zone was identified as a major export region for Overflow Water between the Iceland and Irminger Basins.

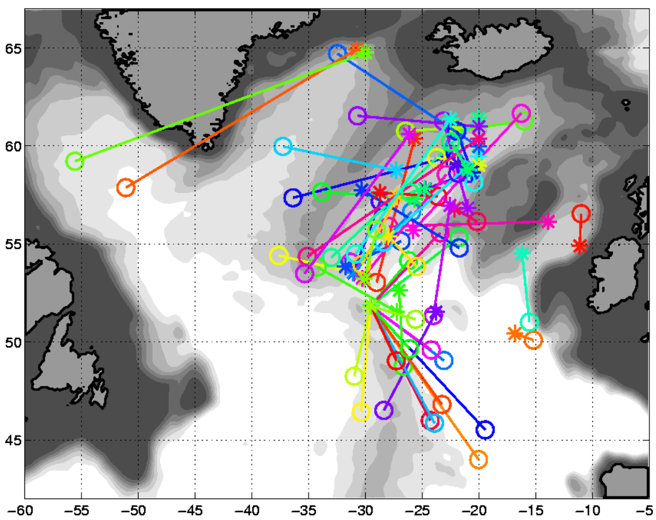


Figure 5: Displacement vectors of IfM RAFOS floats (final status: July 2004). Please note that the arrows represent drifts of different durations according to table 3 (launch-to-surface vectors).

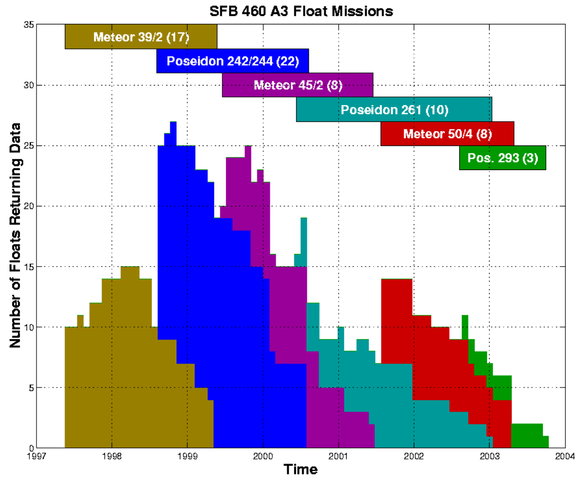


Figure 6: Step diagram of float missions color-coded by launch cruises. The numbers in the text explanations (top part) refer to the total numbers of floats launched, while the plot shows only instruments that returned trajectory data. Note how the latter increases due to parked floats after the ships' visits, e.g. in the winter of 1997/98 for the M39/2 floats.

3 Instrumentation, Implementation, Performance

With the beginning of the SFB project the IfM float group changed its strategy. Until early 1997 we had built and ballasted all RAFOS floats ourselves. Originally the design had been imported from the University of Rhode Island [URI, Rossby et al., 1986]. Due to various reasons we switched to commercial float sources.

We bought floats from SeaScan, Inc., Falmouth, MA, USA. This manufacturer had built the official WOCE float, a derivative of the original design from URI. During our experiment SeaScan introduced a newly designed RAFOS circuit with a number of individual electronic modules. This design called DLD2 is supposed to be more flexible for adaptation to customers' demands. During the SFB project we have closely cooperated with SeaScan resulting in the field-tested low-cost dual release float [Zenk et al., 2000]. For further information on the WOCE float type the reader is referred to the literature [Rossby et al., 1986, Boebel et al., 1999, Hunt et al., 1998]. Table 3 contains columns indicating the different float types that operated in the Iceland Basin project of SFB 460.

Table 3 contains summaries of launch and surface data. It also displays nominal depths. The vast majority of floats were ballasted for the level of the Labrador Sea Water (1500 m). Only a minority of floats were tuned for greater depths (2600 m) in order to take Lagrangian records of the Iceland Scotland Overflow Water in the Maury Channel.

In total, 68 floats were launched. 29 instruments surfaced on time, eight did not show up, one float as deaf. Although RAFOS floats are true expendable instruments, a few floats were recovered with a great deal of chance and luck. They are especially marked in Table 3. They partly were recycled, renumbered and were again on mission after July 2000. It was of greater interest to the manufacturer to inspect his instruments after year-long successful missions in the Iceland Basin. Technical improvements could be inferred from returned floats.

Temperature and pressure records are based exclusively on the manufacturer's calibration data. In case of temperature we have to rely on standard curves supplied by Yellow Springs Instrument Company. We estimate their intrinsic accuracy to be of O($\pm$ 0.1)°C. Pressure sensors by Data Instruments as used in WOCE type floats are calibrated to ±1% at 2000 psi [Hunt et al., 1998]. The new DLD2 type applies pressure sensors by Druck Corporation with improved accuracies. In respect to tracking errors we refer to Richardson and Wooding [1999] who used comparable instruments. They estimate a random error of circa 8 km in radial directions which "is probably smaller than this". A systematic distance error of O(4 ± 1.4) km was calculated as a more likely number.

Table 3: Mission parameters.

Float ID	Start Time	Start Position	End Time	End Position	Mission Length (d)	Mission Delay (d)	Target Pressure (dbar)	Comments
301	2000/07/11	60.785°N 21.822°W	2002/01/01	61.273°N 16.006°W	540		1500	Recycled, ex 404. T and p sensors uncalibrated.
302	2000/06/29	50.424°N 16.831°W	2001/12/16	50.091°N 15.196°W	536		1500	Recycled, ex 405. T and p sensors uncalibrated. Returned 4 days too early (low batt.).
303	2000/09/30	51.825°N 29.553°W	2002/03/23	45.511°N 19.434°W	540	90	1500	Recycled, ex 412. T and p sensors uncalibrated. No sound signals heard, no trajectory calculated.
304	2000/12/29	51.828°N 29.542°W	2002/06/21	43.994°N 20.010°W	540	180	1500	Recycled, ex 413. T and p sensors uncalibrated.
305	2001/03/28	51.830°N 29.529°W	2002/09/18	54.144°N 26.176°W	540	270	1500	Recycled, ex 414. T and p sensors uncalibrated.
306	2001/06/26	51.831°N 29.514°W	2002/12/17	45.993°N 24.275°W	540	360	1500	Recycled, ex 416. T and p sensors uncalibrated.
307	2002/08/09	54.504°N 16.178°W	2003/09/30	51.007°N 15.550°W	418		1500	Parts recycled from 477.
308	2002/08/12	60.928°N 22.098°W	2003/09/30	60.754°N 26.448°W	415		1500	Parts recycled from 480.
309	2002/08/13	61.608°N 22.805°W					1500	Parts recycled from 501 (Clivar/MOVE project). Instrument lost.
401	1997/05/25	53.531°N 31.027°W	1998/07/18	57.175°N 28.685°W	420		1500	
402	1997/05/25	51.846°N 29.534°W	1999/05/14	49.049°N 23.076°W	720		1500	
403	1997/05/18	54.898°N 11.097°W	1998/05/12	56.543°N 10.983°W	360		1500	Sound signals temporarily not heard (blocked by topography), gaps in trajectory.
404	1997/05/22	57.795°N 24.707°W	1998/05/16	58.606°N 20.871°W	360		1500	Recovered and recycled to 301.
405	1997/05/19	58.667°N 20.640°W	1998/08/11	60.017°N 22.134°W	450		1500	Recovered and recycled to 302.
406	1997/05/22	58.762°N 27.230°W					1500	Instrument lost.
407	1997/05/21	60.380°N 25.657°W	1998/11/11	53.033°N 29.003°W	540		1500	
408	1997/05/18	56.143°N 13.895°W	1998/11/08	55.890°N 27.922°W	540		1500	
409	1997/05/23	56.807°N 22.138°W	1999/02/11	56.141°N 20.155°W	630		1500	

Table 3: Mission parameters.

Float ID	Start Time	Start Position	End Time	End Position	Mission Length (d)	Mission Delay (d)	Target Pressure (dbar)	Comments
410	1997/05/23	55.692°N 25.763°W	1999/02/11	61.659°N 16.261°W	630		1500	
411	1997/05/20	59.410°N 22.822°W	1999/05/09	57.352°N 36.361°W	720		1500	
412	1997/07/27	53.539°N 31.043°W	1998/07/21	54.406°N 37.623°W	360	60	1500	Recovered and recycled to 303.
413	1997/09/25	53.532°N 31.036°W	1998/07/21	54.067°N 31.296°W	300	120	1500	Recovered and recycled to 304.
414	1997/11/24	53.532°N 31.036°W	1998/07/21	56.640°N 25.915°W	240	180	1500	Recovered and recycled to 305.
415	1997/09/01	51.835°N 29.523°W	1999/05/23	55.333°N 21.743°W	630	90	1500	
416	1997/11/29	51.836°N 29.523°W	1999/05/22	55.564°N 23.390°W	540	180	1500	Recovered and recycled to 306.
417	1998/02/20	51.838°N 29.527°W	1999/04/05	49.587°N 24.184°W	410	270	1500	Returned 40 days too early (low batt.).
462	1998/08/07	51.835°N 29.522°W					1500	Instrument lost.
463	1998/08/11	53.841°N 31.741°W	2000/02/01	55.142°N 26.844°W	540		1500	
464	1998/08/11	53.241°N 30.262°W	2000/02/01	58.530°N 22.872°W	540		1500	
465	1998/08/16	57.300°N 25.635°W	2000/02/06	57.654°N 33.819°W	540		1500	
466	1998/08/16	57.137°N 24.031°W					1500	Instrument lost.
467	1998/08/18	59.484°N 20.019°W	2000/02/08	58.143°N 20.436°W	540		1500	
468	1998/08/19	61.414°N 20.021°W	2000/02/09	54.307°N 32.988°W	540		1500	
469	1998/08/13	57.744°N 30.290°W	1999/11/05	54.791°N 21.718°W	450		1500	
472	1998/08/16	56.823°N 20.973°W	1999/11/08	61.263°N 23.112°W	450		1500	
473	1998/08/15	57.619°N 28.727°W	2000/08/03	57.417°N 23.593°W	720		1500	
474	1998/08/15	57.433°N 27.192°W	2000/08/03	53.951°N 30.292°W	720		1500	Argos ID temporarily de-activated, re-activated 7 days after returning time. No data lost.
475	1998/08/17	58.990°N 20.003°W	2000/08/05	59.403°N 23.718°W	720		1500	
476	1998/08/18	59.958°N 20.014°W	2000/08/06	64.705°N 32.443°W	720		1500	
477	1998/08/18	60.368°N 20.002°W	2000/08/06	54.356°N 35.099°W	720		1500	Status byte 'low batt.', no data missing. Recovered and recycled to 307.
478	1998/08/18	60.985°N 19.999°W	2000/08/06	61.535°N 30.680°W	720		1500	

Table 3: Mission parameters.

Float ID	Start Time	Start Position	End Time	End Position	Mission Length (d)	Mission Delay (d)	Target Pressure (dbar)	Comments
479	1998/08/20	64.934°N 30.741°W	2000/08/08	57.871°N 51.086°W	720		1500	Mission programming (start time) erroneous, Argos ID temporarily deactivated, re-activated 3 days after returning time. No data lost. Gaps in trajectory due to distance to sound sources.
480	1998/08/16	56.966°N 22.535°W	2000/02/06	51.344°N 23.994°W	540		1500	Recovered and recycled to 308.
481	1998/08/15	51.531°N 23.771°W	1999/10/28	46.504°N 28.358°W	440		1500	
482	1998/08/20	64.750°N 30.000°W	1999/08/14	59.219°N 55.574°W	360		1500	Mission programming (start time) erroneous, no data lost. Gaps in trajectory due to distance to sound sources.
483	1998/10/06	51.835°N 29.520°W	1999/12/29	46.424°N 30.357°W	450	60	1500	
484	1998/12/05	51.836°N 29.518°W	2000/02/27	48.253°N 30.975°W	450	120	1500	
485	1999/02/03	51.835°N 29.522°W				180	1500	Instrument lost.
486	1999/06/25	52.634°N 27.023°W	2000/09/16	48.761°N 26.658°W	450		2600	Pressure sensor erroneous.
487	1999/06/28	58.654°N 20.608°W	2001/06/16	60.753°N 21.927°W	720		2600	Minor gaps in trajectory (grounded, poor sound signals)
488	1999/06/28	58.857°N 21.222°W	2001/06/16	55.091°N 28.380°W	720		2600	Minor gaps in trajectory (grounded, poor sound signals)
489	1999/06/28	59.078°N 21.836°W	2000/10/01	58.609°N 21.855°W	462		2600	Returned 138 days early ('high pressure'). Pressure sensor error?
490	1999/06/20	51.834°N 29.517°W	2001/02/08	46.808°N 23.247°W	600		1500	Pressure sensor erroneous.
491	1999/08/19	51.834°N 29.518°W	2001/02/08	45.858°N 23.898°W	540	60	1500	Pressure sensor erroneous.
492	1999/10/18	51.835°N 29.518°W	2001/06/08	49.042°N 27.266°W	600	120	1500	Pressure sensor erroneous.
493	1999/12/17	51.835°N 29.519°W	2000/09/24	49.650°N 26.107°W	283	180	1500	Returned 257 days early ('high pressure'). Pressure sensor error?
513	2000/06/30	51.049°N 20.579°W					1500	Instrument lost. (Corrosion problem vacuum valve?)
514	2000/07/01	51.540°N 23.763°W					1500	Instrument lost. (Corrosion problem vacuum valve?)
515	2000/07/02	51.536°N 27.241°W	2003/01/15	53.814°N 34.220°W	928		1500	Returned 2 days early ('high pressure', corrosion problem vacuum valve?). 'Clock address failure'-bit set. Still: longest successful record!

Table 3: Mission parameters.

Float ID	Start Time	Start Position	End Time	End Position	Mission Length (d)	Mission Delay (d)	Target Pressure (dbar)	Comments
516	2000/07/03	51.825°N 29.553°W	2001/12/24	51.156°N 25.576°W	540		1500	'Clock address failure'-bit set, no data missing.
532	2001/07/15	58.783°N 20.967°W	2003/04/29	60.195°N 22.486°W	654		2600	Temporarily grounded, sound signals poorly received.
533	2001/07/15	57.800°N 24.793°W	2003/04/29	57.608°N 26.026°W	654		2600	Temporarily grounded, sound signals poorly received.
534	2001/07/15	61.371°N 22.493°W	2002/09/29	54.490°N 30.854°W	442		1500	
535	2001/07/15	55.372°N 27.951°W	2003/04/29	53.843°N 25.486°W	654		2600	
536	2001/07/23	60.601°N 26.102°W	2002/10/07	53.486°N 35.342°W	442		1500	
537	2001/07/23	58.748°N 27.250°W	2002/10/07	59.973°N 37.249°W	442		1500	Sound signals poorly received (blocked by topography).
538	2001/07/15	53.204°N 30.084°W	2003/04/29	55.722°N 29.013°W	654		2600	
539	2001/07/15	52.059°N 29.663°W					2600	Instrument lost.

4 Results

Fig. 7 displays all trajectories of the SFB program that we collected from its subprogram A3. One has to add a few PALACE trajectories [Fischer and Schott, 2002] to obtain the complete set from IfM Kiel. The colour spaghetti plot contains all float identification numbers according to Table 3. The subsequent float track gallery provides graphical information on displacements in two-daily resolution together with time series of the observed zonal (U) and meridional (V) current components and of pressure and temperature records.

Table 4: Basic statistics inferred from float trajectories.

Float ID	Pressure [dbar] Mean Min. Max.	Temperature [°C] Mean Min. Max.	Horizontal Velocity [cm/s] Mean Min. Max.	Mission Length [d]	Displacement [km]	Displacement Velocity [cm/s]
301	1977.0 1739.1 2014.2	3.754 3.488 3.961	10.16 0.04 33.50	540	319.0	0.68
302	1502.0 1419.6 1563.6	4.572 4.124 5.682	4.66 0.09 12.53	536	122.3	0.26
303				540	1022.2	2.19
304	1628.3 1603.8 1784.0	3.596 3.380 3.974	4.20 0.28 9.83	540	1123.4	2.41
305	1528.3 1518.1 1539.3	3.858 3.668 4.025	5.92 0.12 19.21	540	342.0	0.73
306	1522.1 1508.6 1535.1	3.850 3.608 4.136	3.28 0.10 9.33	540	753.8	1.62
307	1605.6 1580.3 1622.3	3.879 3.443 4.186	7.21 0.30 22.57	418	391.4	1.08
308	1579.8 1481.9 1613.9	3.575 2.455 4.090	10.31 0.33 40.36	415	237.3	0.66
309						

Table 4: Basic statistics inferred from float trajectories.

Float ID	Pressure [dbar] Mean Min. Max.	Temperature [°C] Mean Min. Max.	Horizontal Velocity [cm/s] Mean Min. Max.	Mission Length [d]	Displacement [km]	Displacement Velocity [cm/s]
401	1450.1 1429.6 1464.1	3.032 2.935 3.149	5.27 0.32 17.60	420	431.9	1.19
402	1461.0 1444.0 1473.8	3.879 3.441 4.362	3.55 0.08 13.48	720	553.9	0.89
403	1472.2 1444.4 1503.8	4.912 4.090 5.715	2.46 0.67 18.16	360	183.3	0.59
404	1483.5 1473.6 1496.9	3.783 3.595 4.159	9.89 0.29 49.46	360	242.9	0.78
405	1493.5 1483.7 1511.3	4.020 3.683 4.528	7.90 0.38 29.90	450	172.8	0.44
406						
407	1462.1 1449.8 1475.9	3.344 3.075 3.699	6.96 0.19 30.91	540	843.1	1.81
408	1374.0 1245.4 1454.3	4.283 3.395 5.657	5.37 0.08 21.08	540	873.8	1.87
409	1481.2 1466.0 1499.4	3.849 3.419 4.369	5.22 0.17 22.43	630	142.9	0.26
410	1455.5 1442.2 1484.1	3.894 3.503 5.018	9.14 0.23 45.56	630	861.8	1.58
411	1527.6 1371.8 1557.4	3.515 3.182 3.882	5.05 0.08 23.13	720	823.0	1.32
412	1507.2 1495.4 1518.9	3.246 3.122 3.361	4.88 0.17 18.10	360	442.2	1.42
413	1506.7 1496.6 1514.5	3.276 3.217 3.424	4.17 0.32 11.32	300	61.9	0.24
414	1551.4 1537.8 1567.6	3.484 3.369 3.746	5.93 0.17 24.92	240	475.8	2.29
415	1466.4 1442.0 1486.9	3.539 3.327 3.963	5.81 0.13 24.58	630	645.2	1.19
416	1527.2 1510.8 1537.3	3.524 3.290 3.691	5.33 0.35 19.33	540	579.4	1.24
417	1530.3 1510.4 1556.7	3.873 3.517 4.162	4.48 0.22 19.39	410	452.7	1.28
462						
463	1517.5 1412.0 1575.2	3.184 3.056 3.415	8.06 0.38 27.67	540	348.7	0.75
464	1530.6 1511.7 1555.1	3.244 3.073 3.770	6.42 0.07 26.49	540	747.9	1.60
465	1559.1 1392.9 1601.7	3.485 3.148 3.824	10.39 0.17 34.58	540	492.2	1.06
466						
467	1554.5 1539.0 1573.5	3.866 3.573 4.186	6.85 0.50 24.99	540	151.3	0.32
468	1467.8 1372.4 1537.1	3.800 2.994 4.394	9.34 0.08 62.07	540	1100.3	2.36
469	1490.8 1459.5 1528.0	3.406 3.258 3.697	7.85 0.39 27.56	450	624.0	1.61
472	1454.5 1291.0 1507.5	3.934 2.086 4.664	8.65 0.08 67.81	450	509.5	1.31
473	1560.5 1547.1 1583.9	3.584 3.385 3.899	7.21 0.18 24.64	720	308.4	0.50
474	1485.5 1457.7 1533.1	3.355 3.159 3.636	6.16 0.36 44.33	720	433.8	0.70
475	1467.7 1297.1 1586.7	3.929 3.393 4.538	9.12 0.45 28.44	720	217.2	0.35
476	1483.7 1361.5 1573.2	3.703 3.408 4.155	7.23 0.04 29.93	720	831.2	1.34
477	1507.4 1454.6 1561.5	3.576 3.326 3.962	6.86 0.15 24.21	720	1124.3	1.81
478	1451.7 1284.1 1543.2	3.666 2.472 4.479	8.00 0.08 44.96	720	575.8	0.93
479	1599.4 1384.1 1627.5	3.074 0.927 3.720	9.90 0.25 60.12	720	1332.2	2.14
480	1600.1 1583.1 1613.1	3.390 3.217 3.678	5.67 0.23 20.79	540	633.0	1.36
481	1672.0 1649.2 1706.8	3.444 3.310 3.700	2.57 0.11 7.30	440	651.7	1.71
482				360	1462.3	4.70
483	1528.1 1505.8 1542.1	3.510 3.205 3.736	4.03 0.10 12.71	450	604.9	1.56
484	1588.5 1575.1 1598.3	3.349 3.141 3.576	4.22 0.09 14.59	450	411.9	1.06

Table 4: Basic statistics inferred from float trajectories.

Float ID	Pressure [dbar] Mean Min. Max.	Temperature [°C] Mean Min. Max.	Horizontal Velocity [cm/s] Mean Min. Max.	Mission Length [d]	Displacement [km]	Displacement Velocity [cm/s]
485						
486	2590.0 2463.7 2866.9	3.100 3.003 3.190	3.95 0.21 36.63	450	431.6	1.11
487	2567.6 2299.4 2846.9	2.951 2.267 3.269	11.21 0.29 44.46	720	245.3	0.39
488	2546.8 2168.8 2746.2	2.876 2.398 3.207	6.98 0.05 29.41	720	603.9	0.97
489	2605.6 2496.2 2988.0	2.904 2.420 3.152	11.89 0.54 35.81	462	52.2	0.13
490	1518.3 1492.2 1560.6	3.672 3.238 4.367	4.39 0.19 10.23	600	720.8	1.39
491	1548.3 1501.8 1695.6	3.642 3.164 4.166	3.74 0.15 10.26	540	781.7	1.68
492	1692.1 1624.0 1859.1	3.433 3.187 3.727	3.71 0.10 11.75	600	349.4	0.67
493	1754.0 1637.9 1994.7	3.418 3.228 3.668	3.96 0.23 8.93	283	342.1	1.40
513						
514						
515	1697.7 1476.8 1969.8	3.210 3.109 3.484	4.44 0.04 18.24	928	535.5	0.67
516	1602.8 1582.0 1619.8	3.408 3.211 3.646	5.02 0.14 14.67	540	286.0	0.61
532	2590.0 2359.7 2769.2	2.575 2.294 2.883	0.67 0.00 9.35	654	179.3	0.32
533	2717.8 2438.2 2779.6	2.719 2.492 3.049	3.56 0.26 33.18	654	76.6	0.14
534	1599.5 1566.3 1621.5	3.321 3.120 3.646	6.84 0.61 24.34	442	911.0	2.39
535	2644.7 2593.0 2670.2	2.920 2.739 3.095	5.49 0.12 22.65	654	233.1	0.41
536	1578.2 1552.4 1595.2	3.408 3.187 3.648	6.03 0.45 22.13	442	968.8	2.54
537	1552.2 1537.5 1565.5	3.502 3.343 3.734	6.61 0.29 21.65	442	584.2	1.53
538	2728.7 2688.3 2746.0	2.933 2.785 3.056	5.17 0.11 33.26	654	288.7	0.51
539						

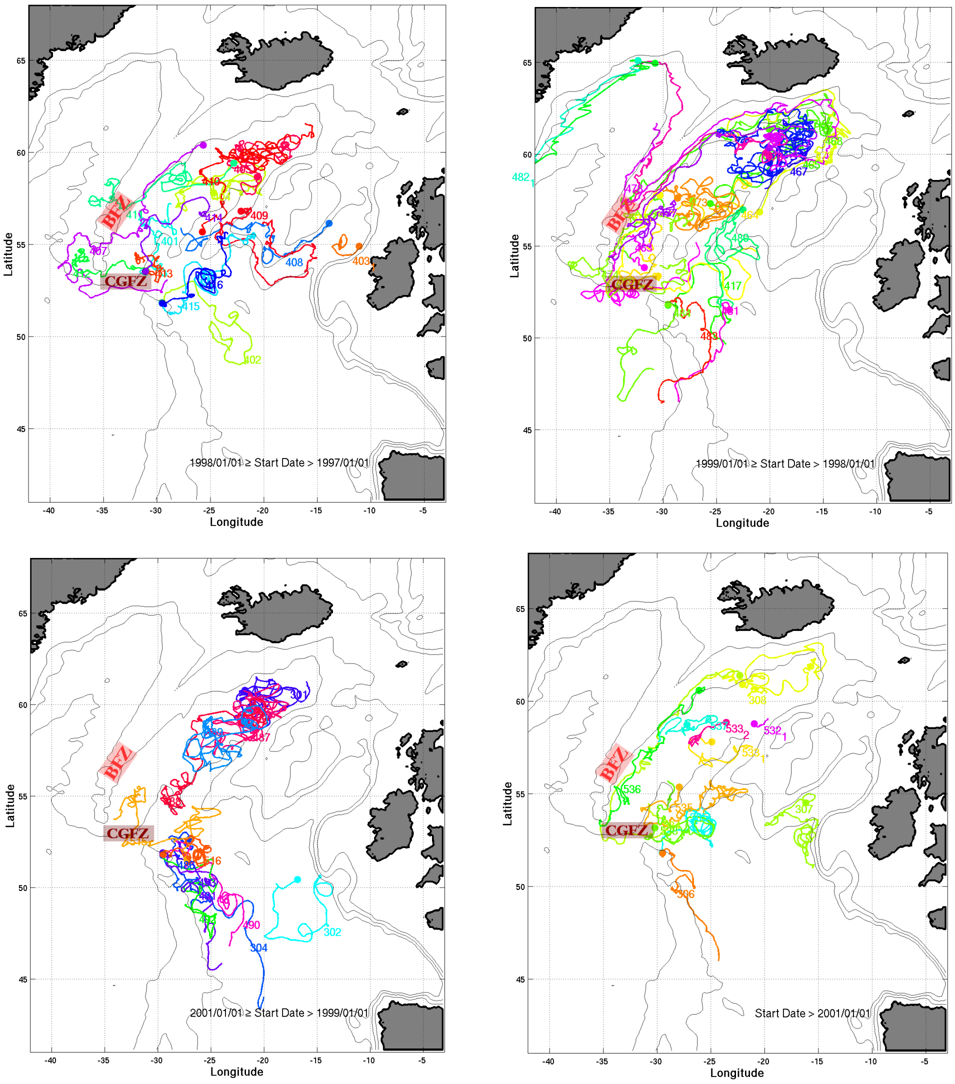
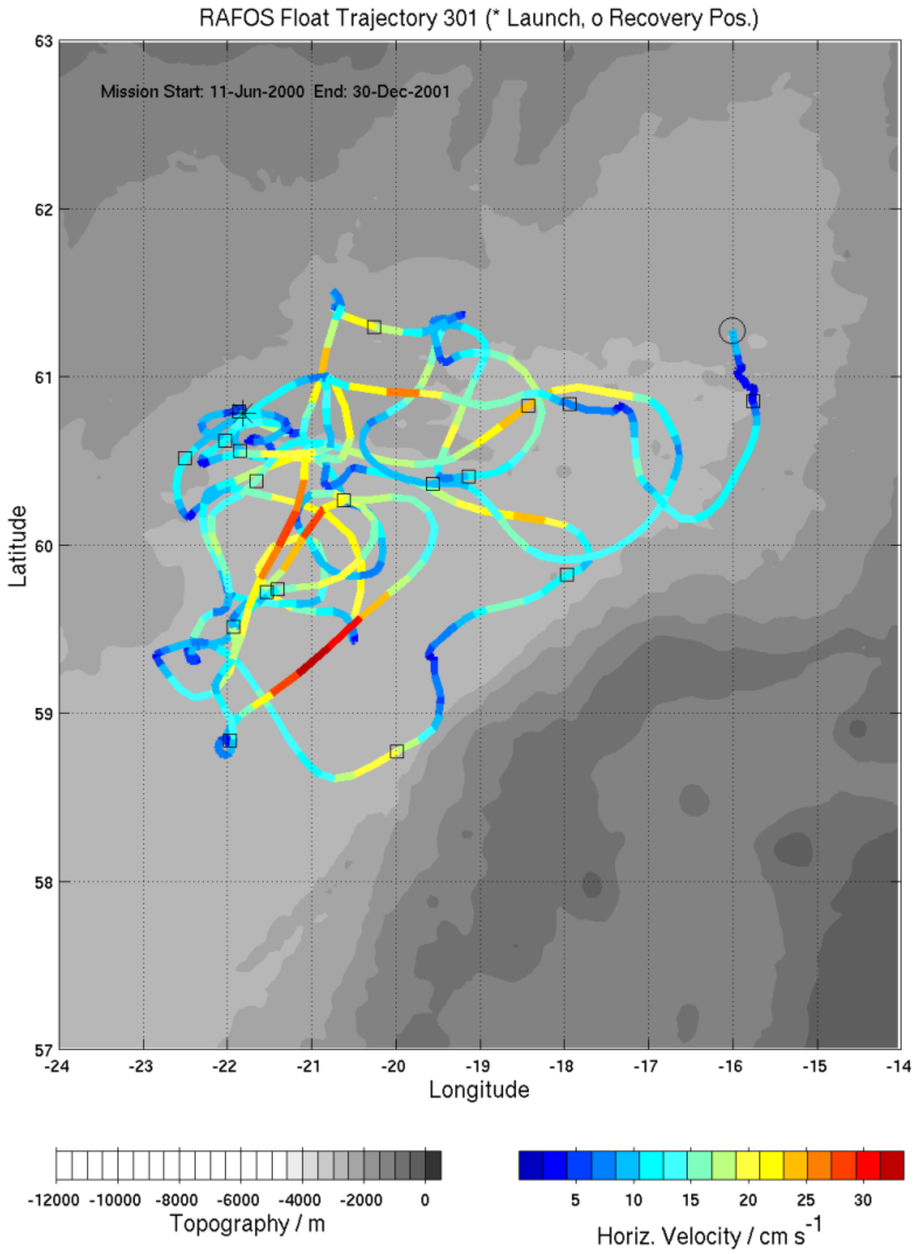
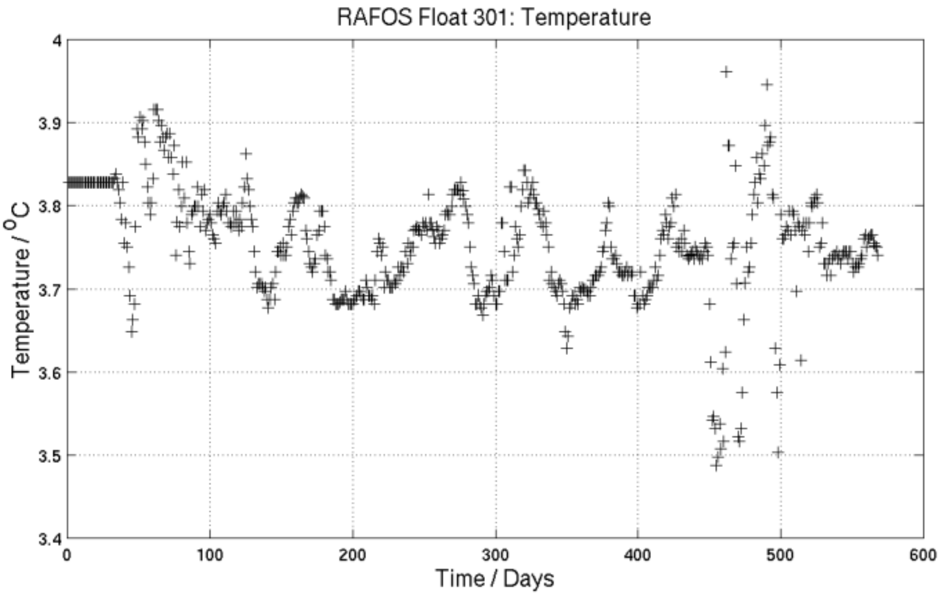
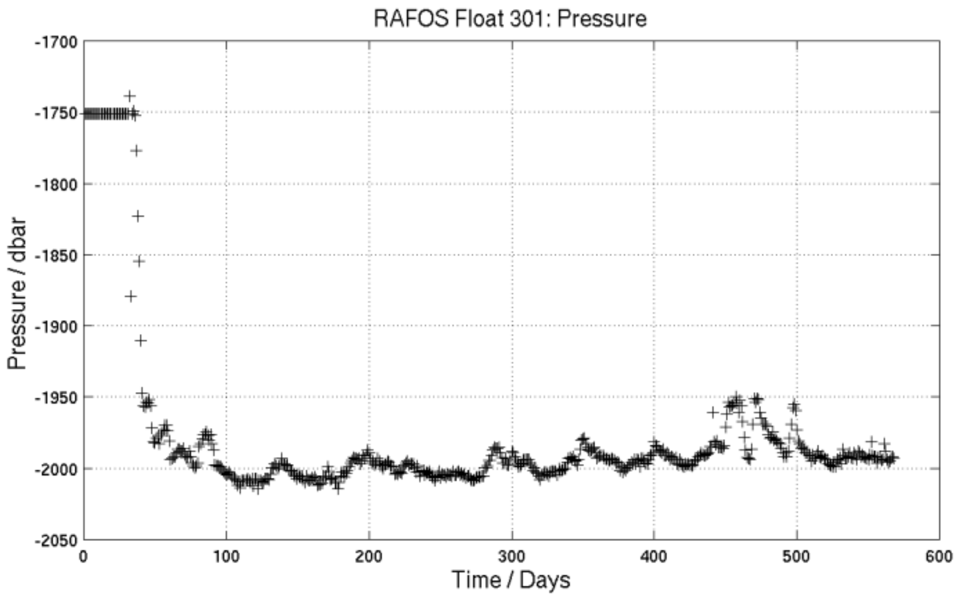


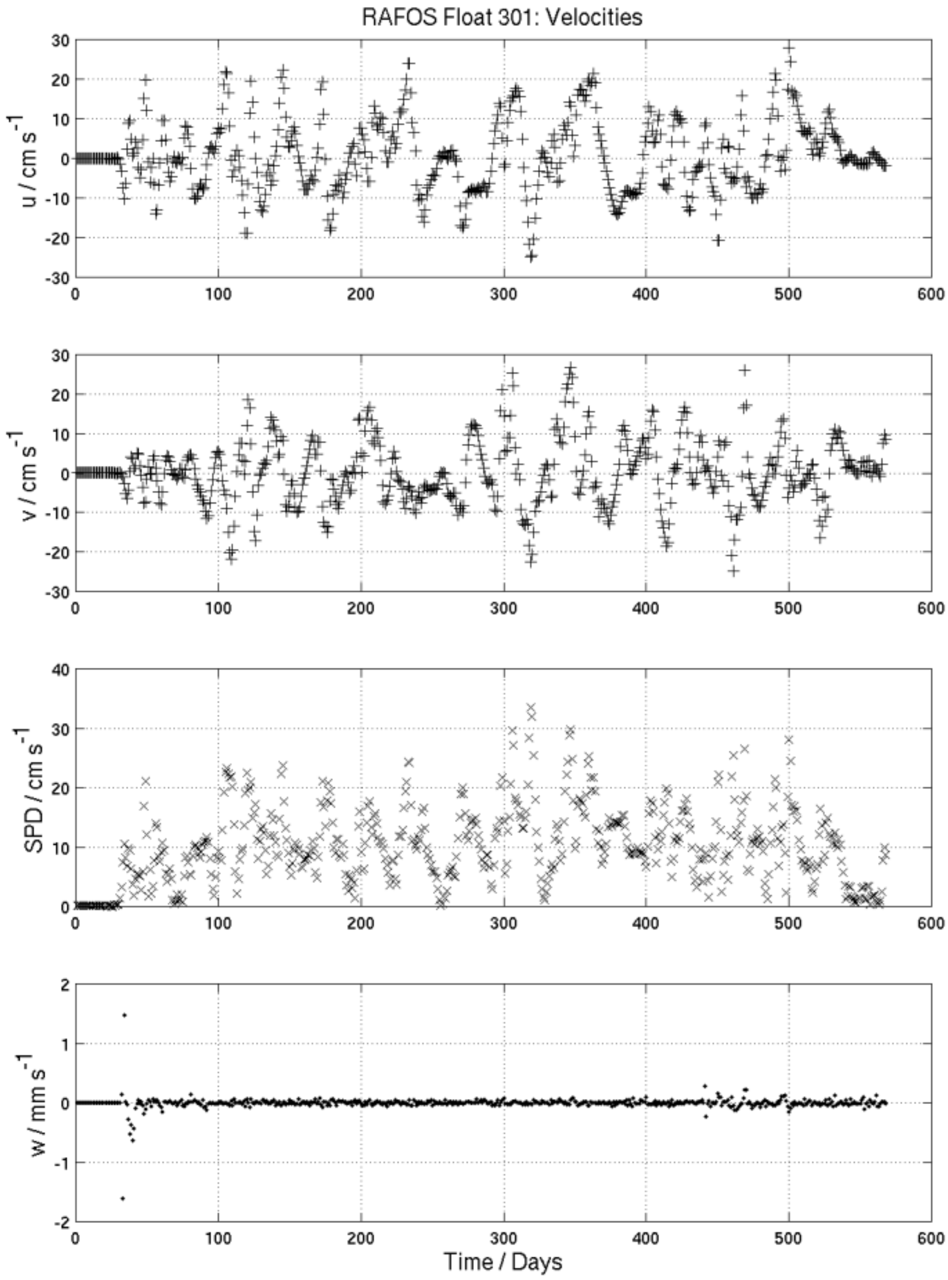
Figure 7: Trajectories from all RAFOS floats of SFB 460 A3. Float ID numbers are indicated in the plots. The original internet presentation allowed the user to click on the plots to view data from individual floats. This function is now provided inside the PANGAEA data portal. Launch positions are indicated by big dots, bathymetry by lines at depths of 1000, 2000, and 3000 m.

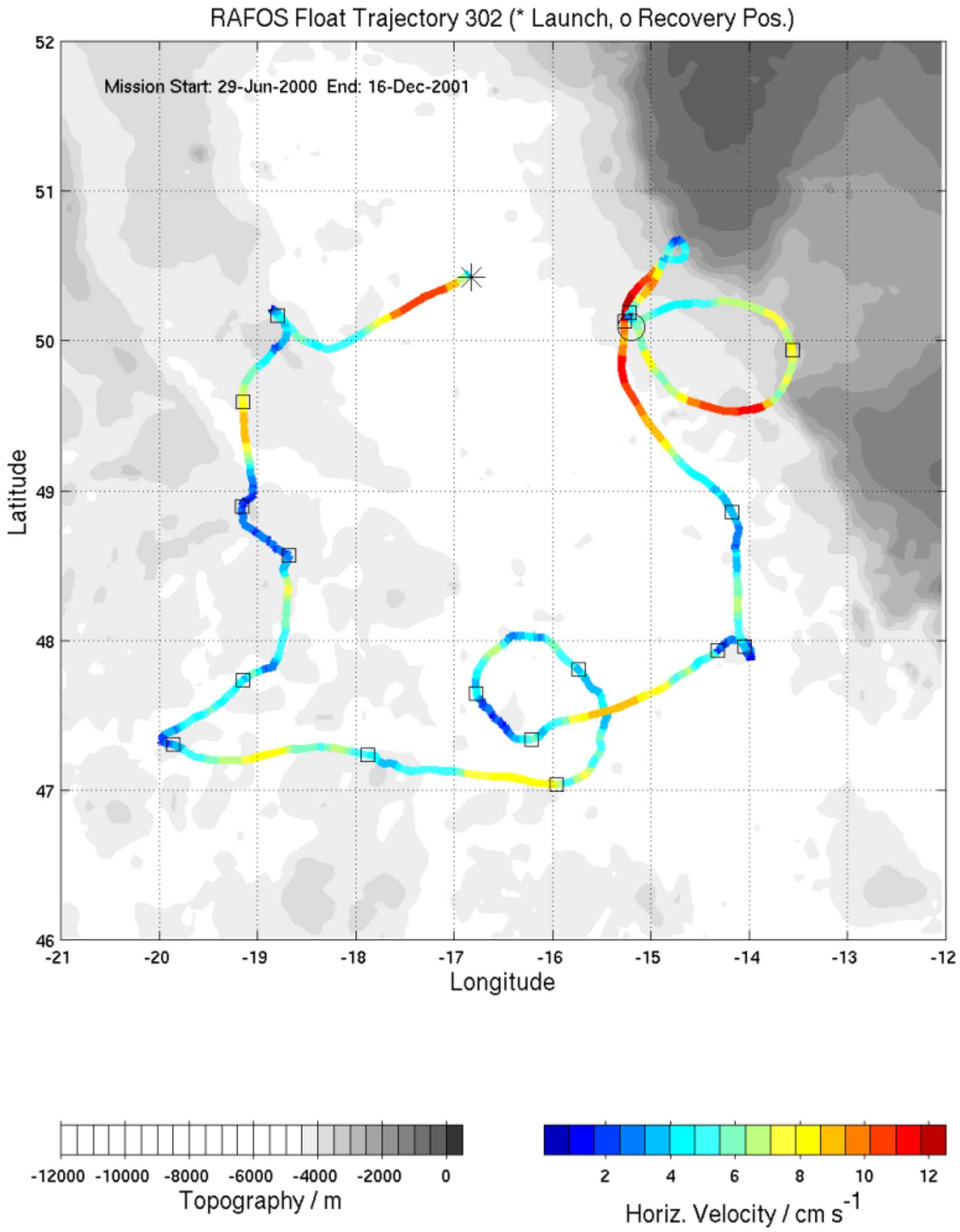
5 Data Plots from Individual Floats



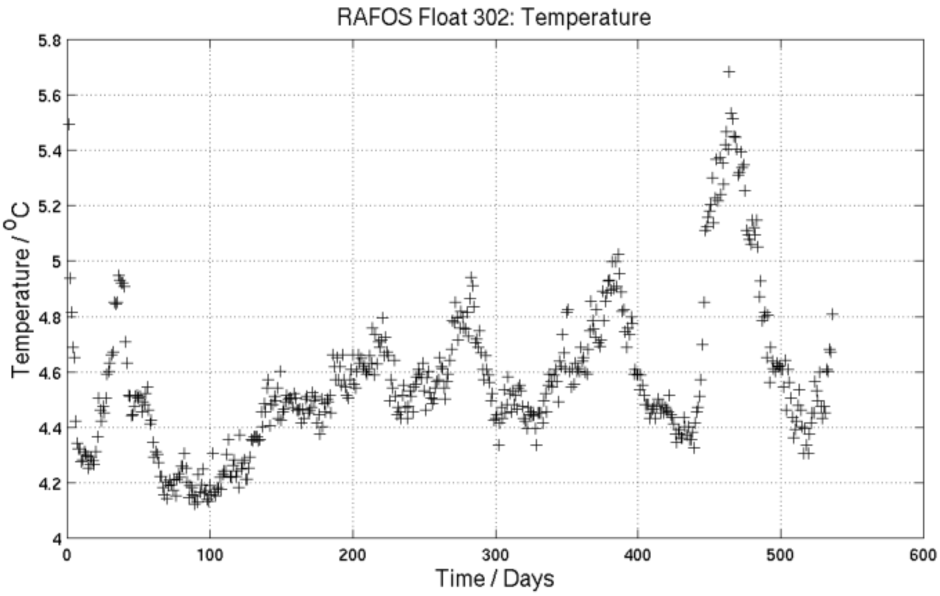

RAFOS Float 301: Temperature
Temperature / °C
Time / Days
4
3.9
3.8
3.7
3.6
3.5
3.4
0
100
200
300
400
500
600

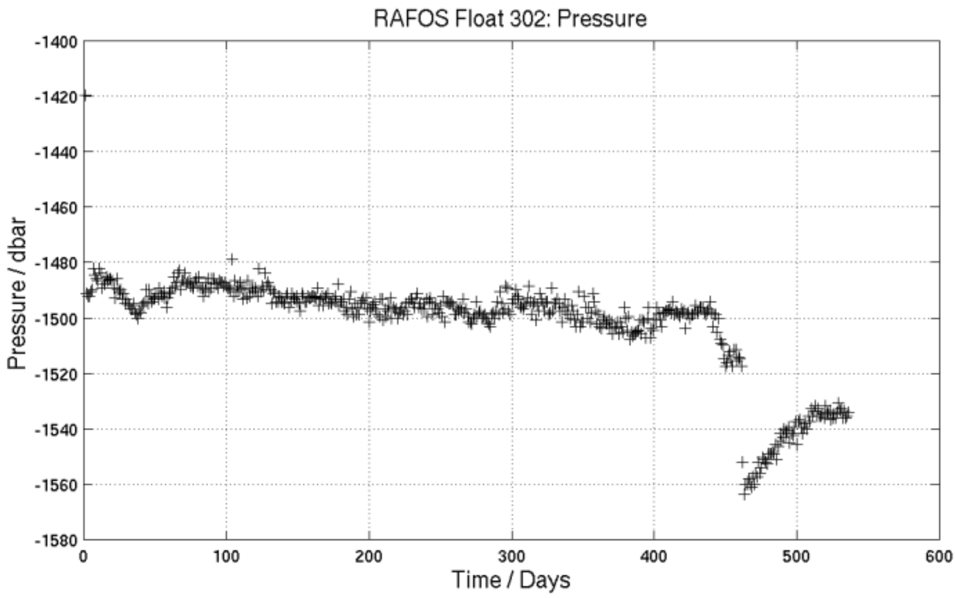

RAFOS Float 301: Pressure
Pressure / dbar
Time / Days
-1700
-1750
-1800
-1850
-1900
-1950
-2000
-2050
0
100
200
300
400
500
600

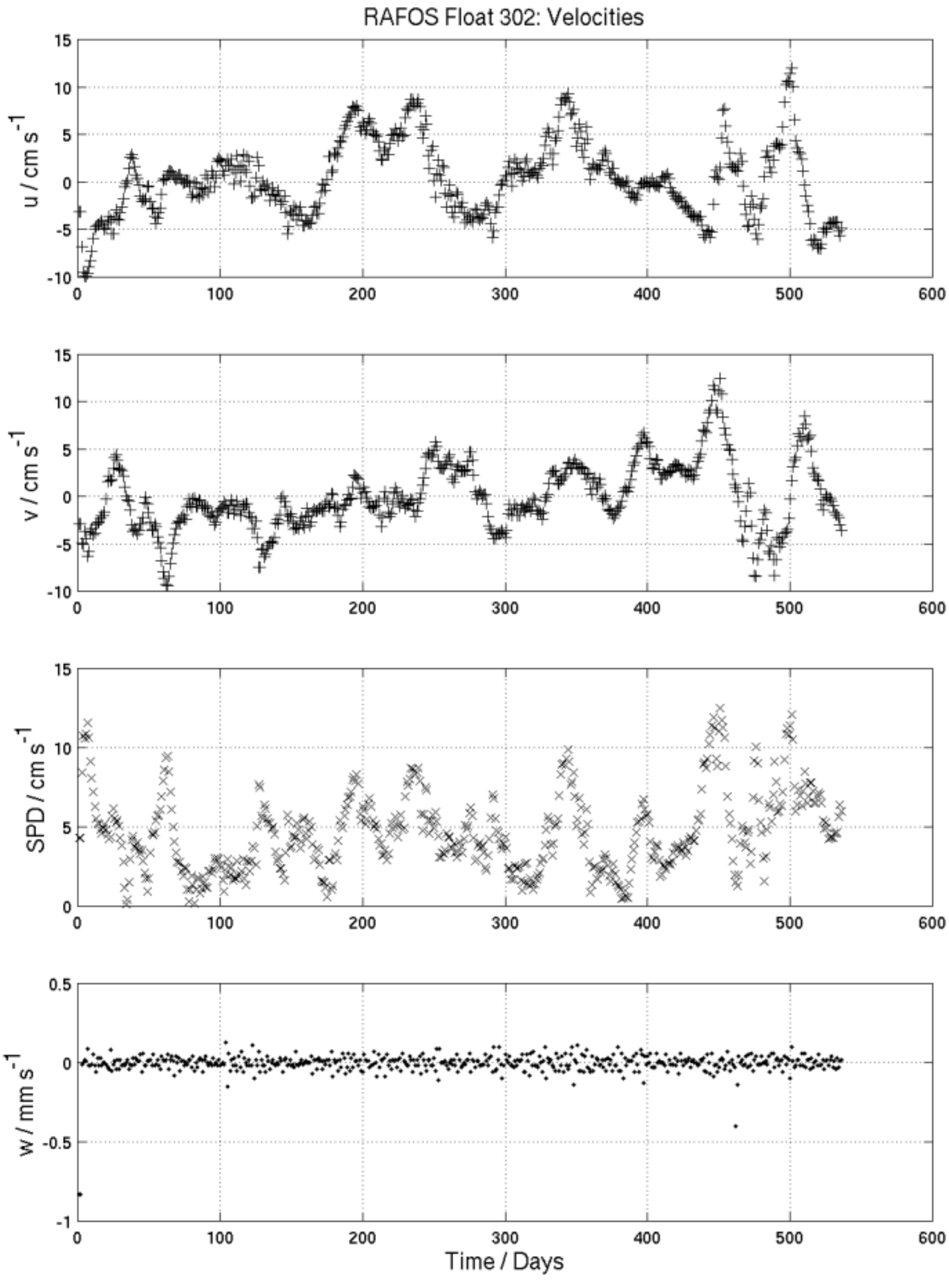

RAFOS Float 301: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

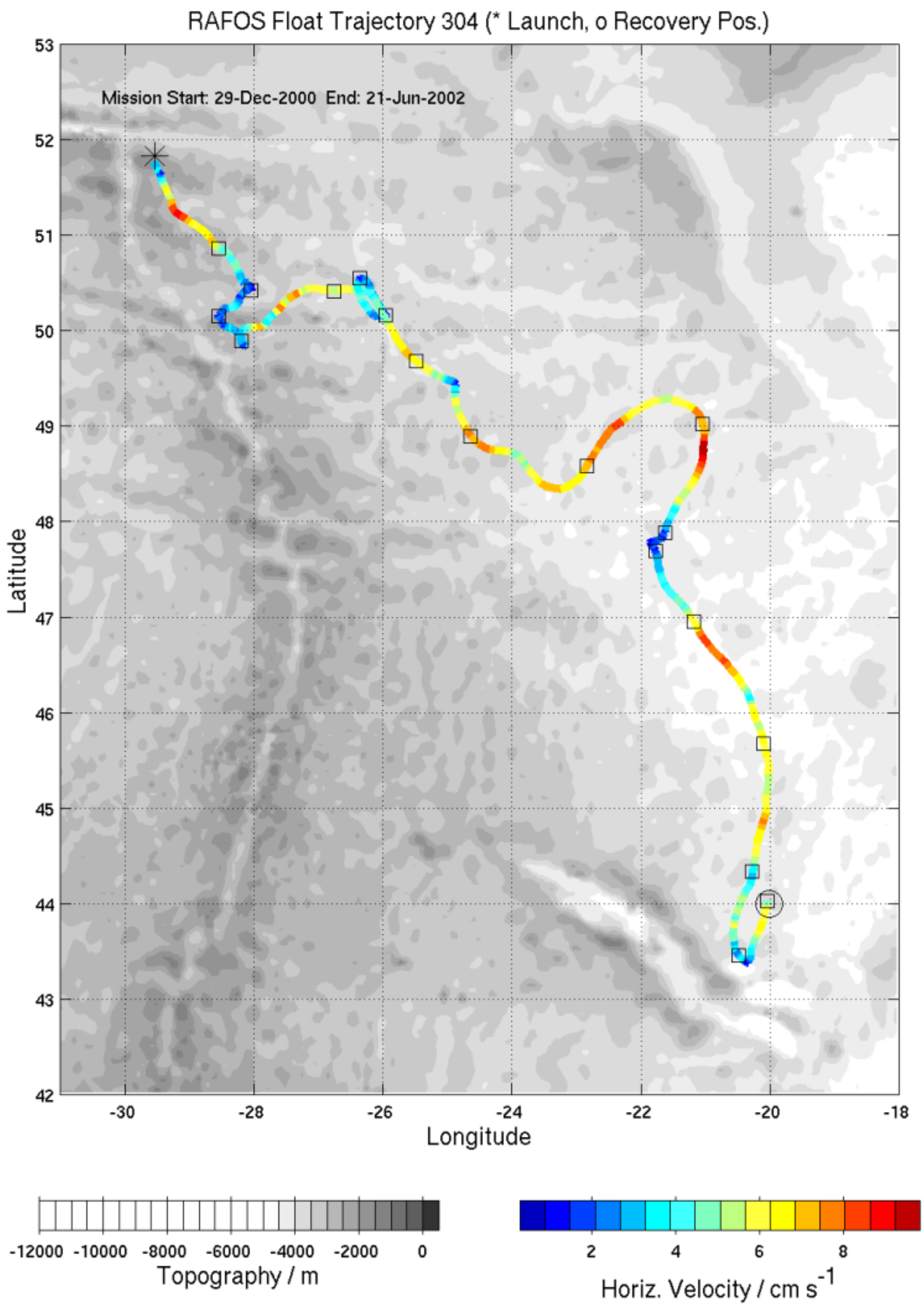


RAFOS Float Trajectory 302 (* Launch, o Recovery Pos.)
Mission Start: 29-Jun-2000 End: 16-Dec-2001
Latitude
Longitude
52
51
50
49
48
47
46
-21
-20
-19
-18
-17
-16
-15
-14
-13
-12
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
2 4 6 8 10 12
Horiz. Velocity / cm s-1

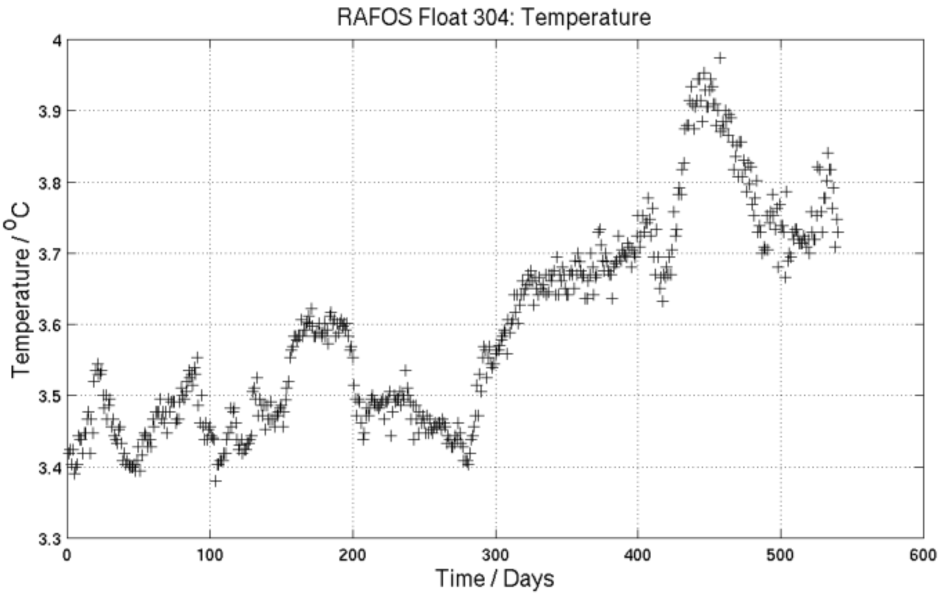

RAFOS Float 302: Temperature
Temperature / ^oC
Time / Days
5.8
5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
4
0
100
200
300
400
500
600

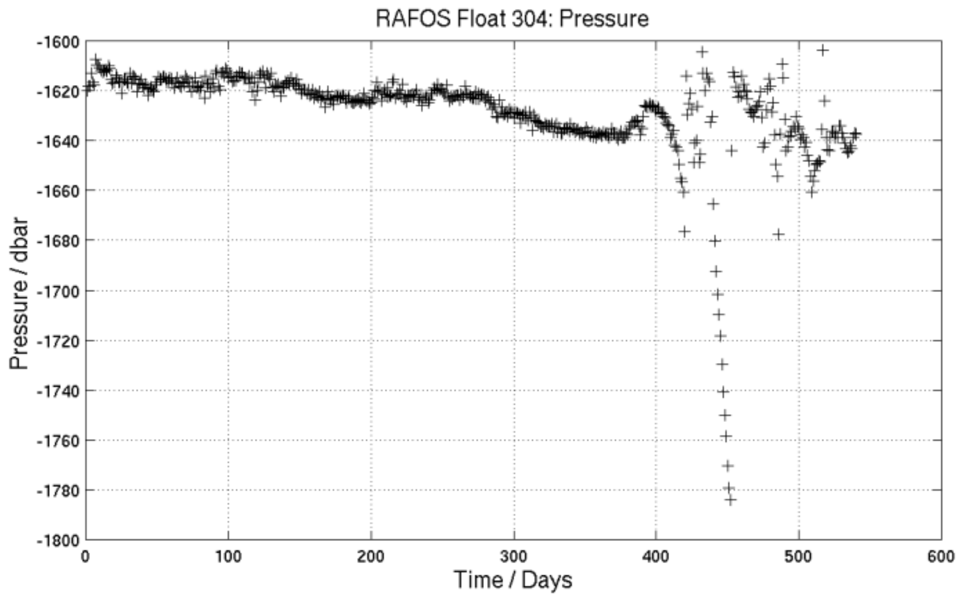

RAFOS Float 302: Pressure
Pressure / dbar
Time / Days
-1400
-1420
-1440
-1460
-1480
-1500
-1520
-1540
-1560
-1580
0
100
200
300
400
500
600

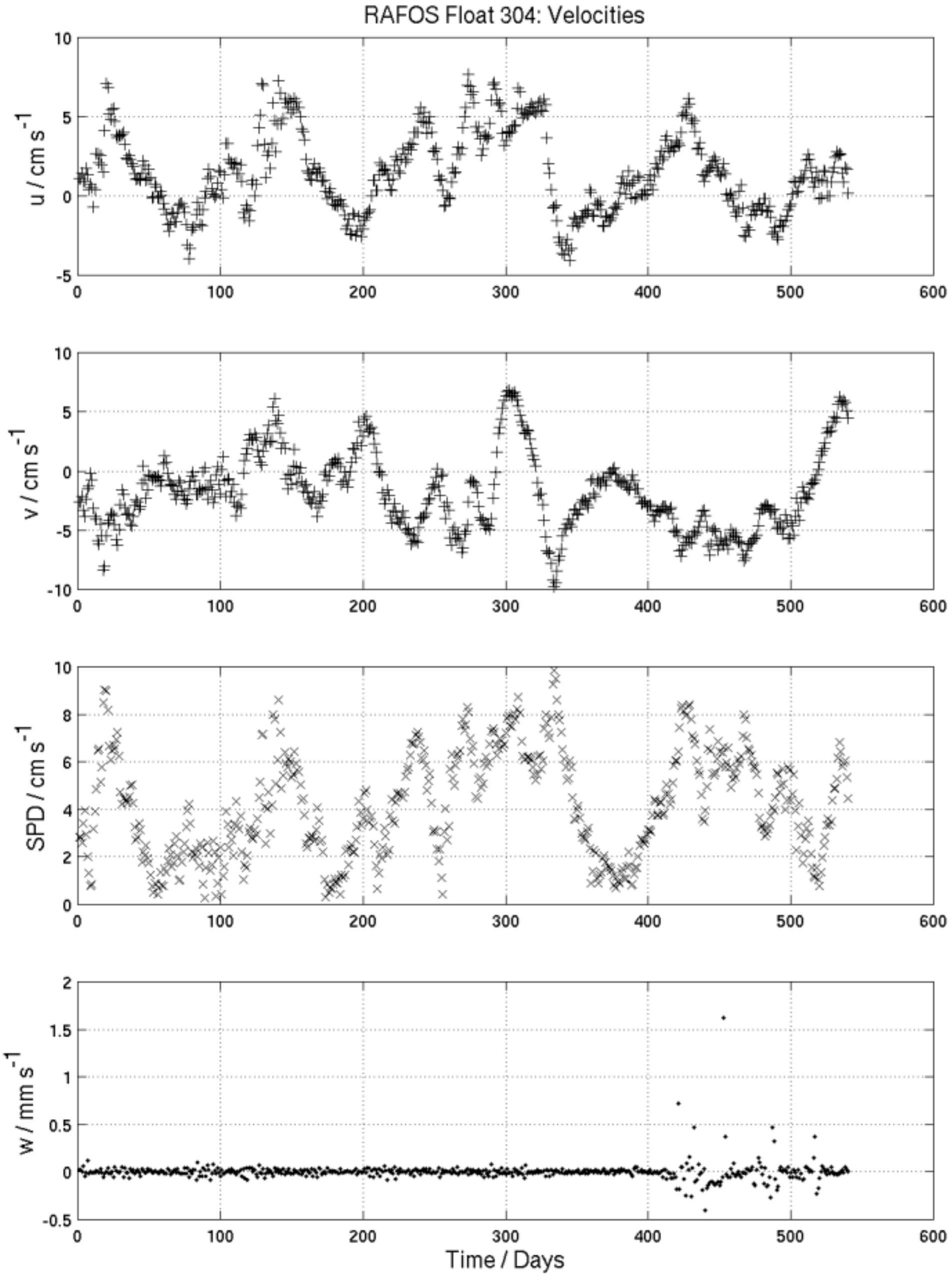

RAFOS Float 302: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days



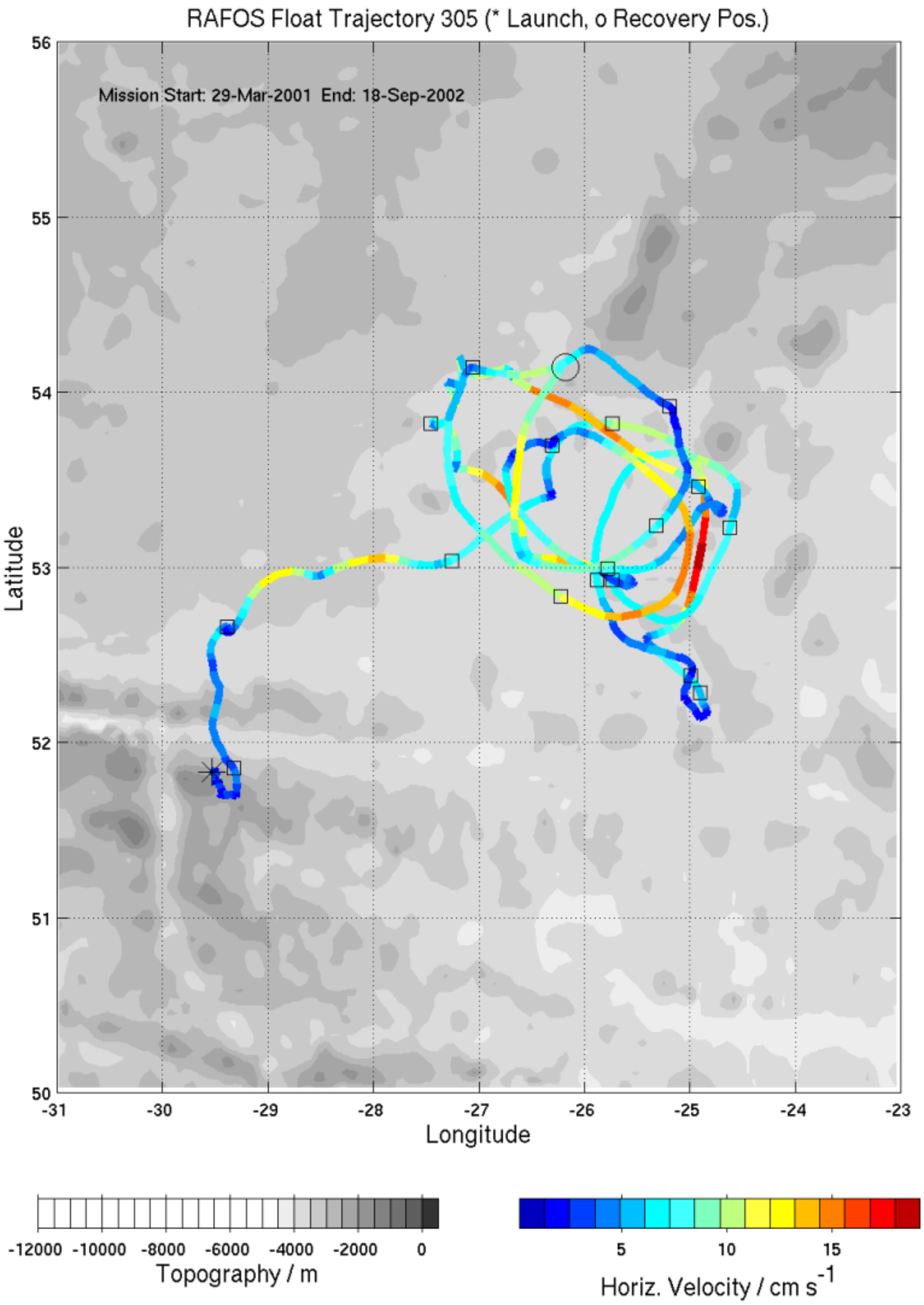
RAFOS Float Trajectory 304 (* Launch, o Recovery Pos.)
Mission Start: 29-Dec-2000 End: 21-Jun-2002
Latitude
Longitude
53
52
51
50
49
48
47
46
45
44
43
42
-30
-28
-26
-24
-22
-20
-18
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
2 4 6 8
Horiz. Velocity / cm s-1

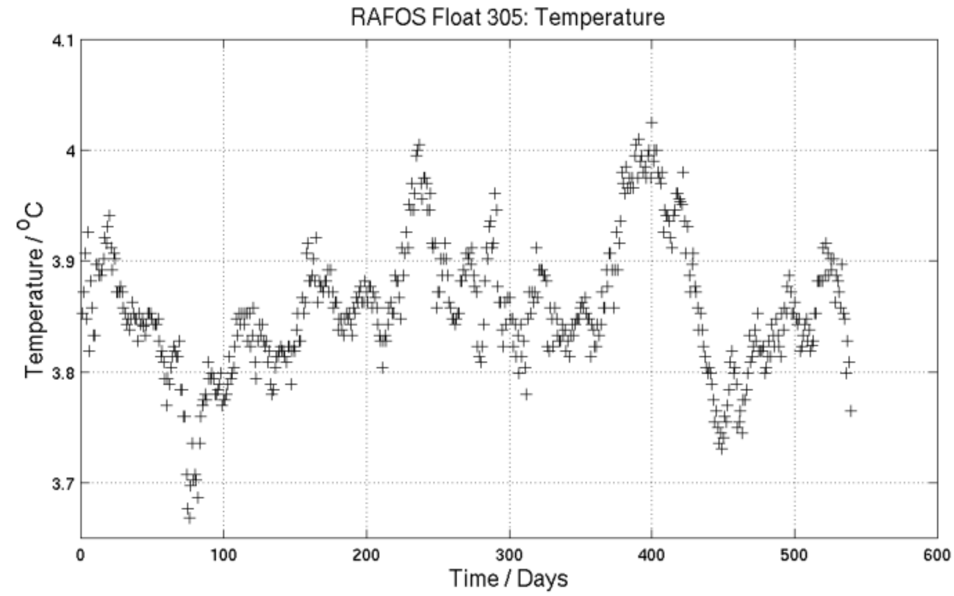

RAFOS Float 304: Temperature
Temperature / ^{o}C
Time / Days
4
3.9
3.8
3.7
3.6
3.5
3.4
3.3
0
100
200
300
400
500
600

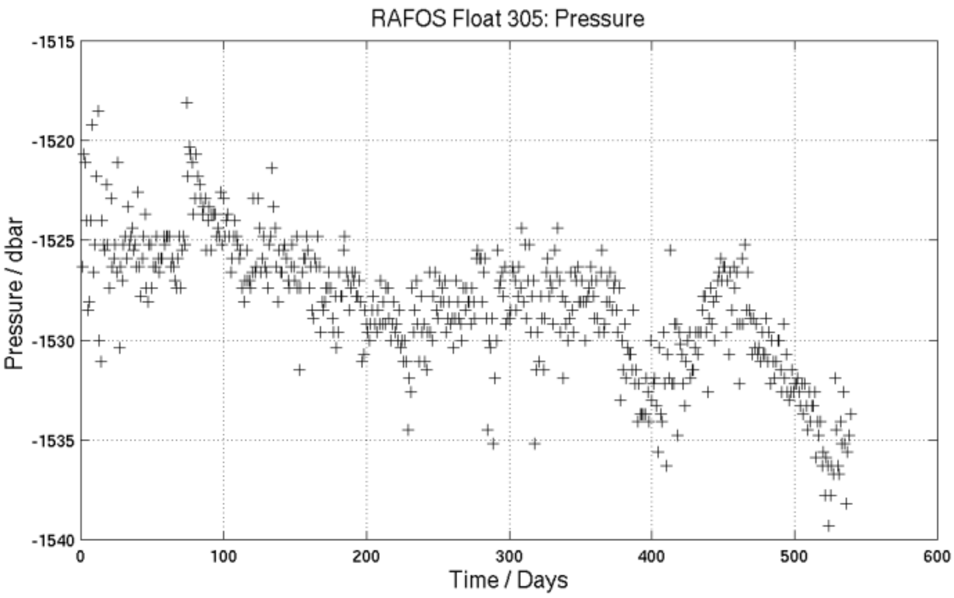

RAFOS Float 304: Pressure
Pressure / dbar
Time / Days
-1600
-1620
-1640
-1660
-1680
-1700
-1720
-1740
-1760
-1780
-1800
0
100
200
300
400
500
600

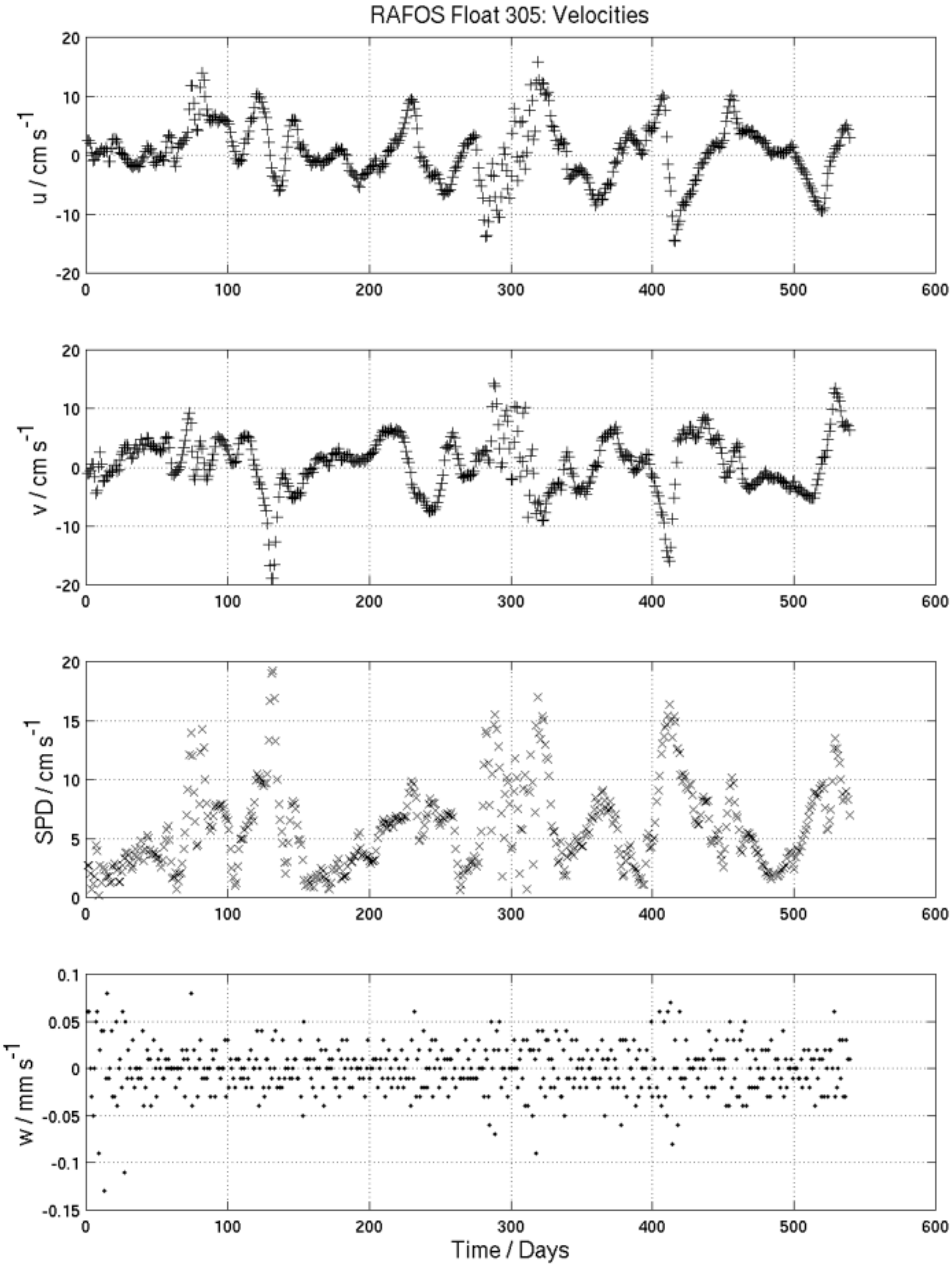


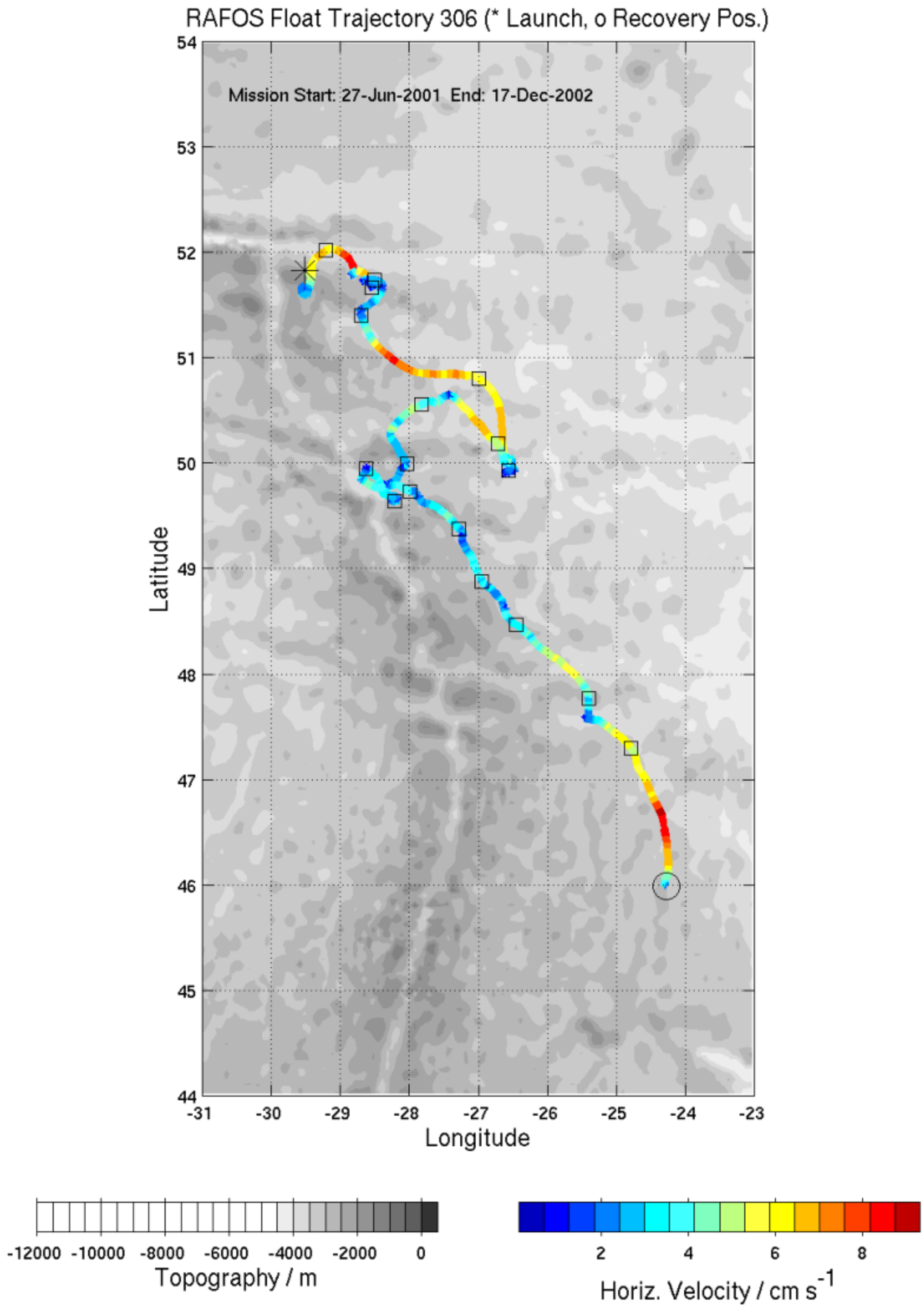
RAFOS Float 304: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

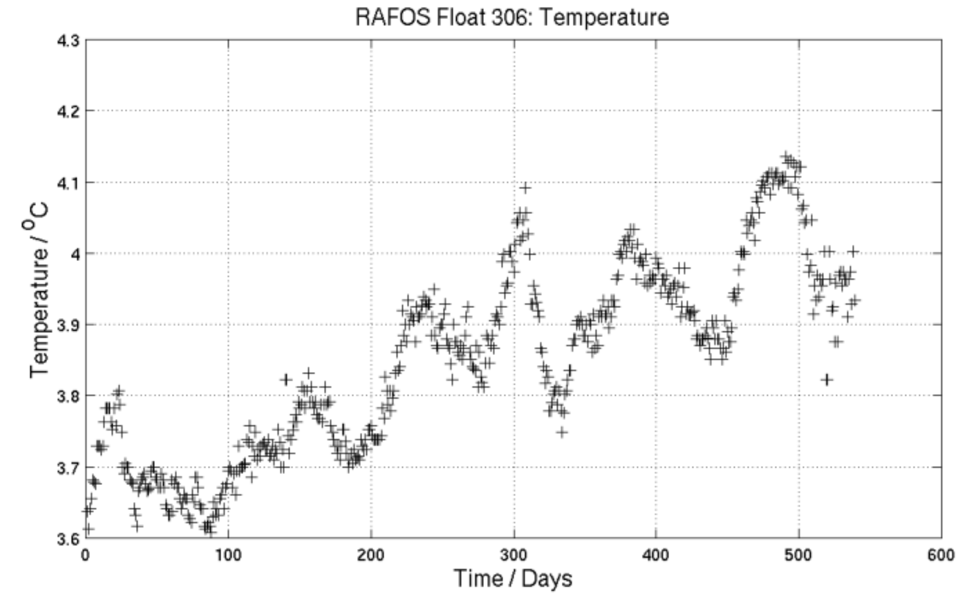

RAFOS Float Trajectory 305 (* Launch, o Recovery Pos.)
Mission Start: 29-Mar-2001 End: 18-Sep-2002
Latitude
56
55
54
53
52
51
50
-31
-30
-29
-28
-27
-26
-25
-24
-23
Longitude
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5 10 15
Horiz. Velocity / cm s^-1

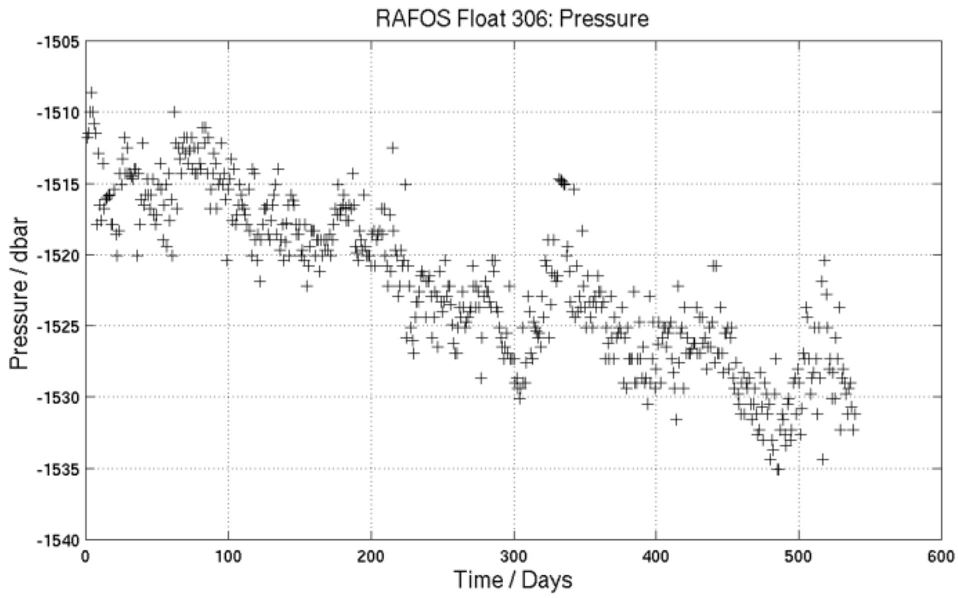

RAFOS Float 305: Temperature
Temperature / ^{o}C
4.1
4
3.9
3.8
3.7
0
100
200
300
400
500
600
Time / Days

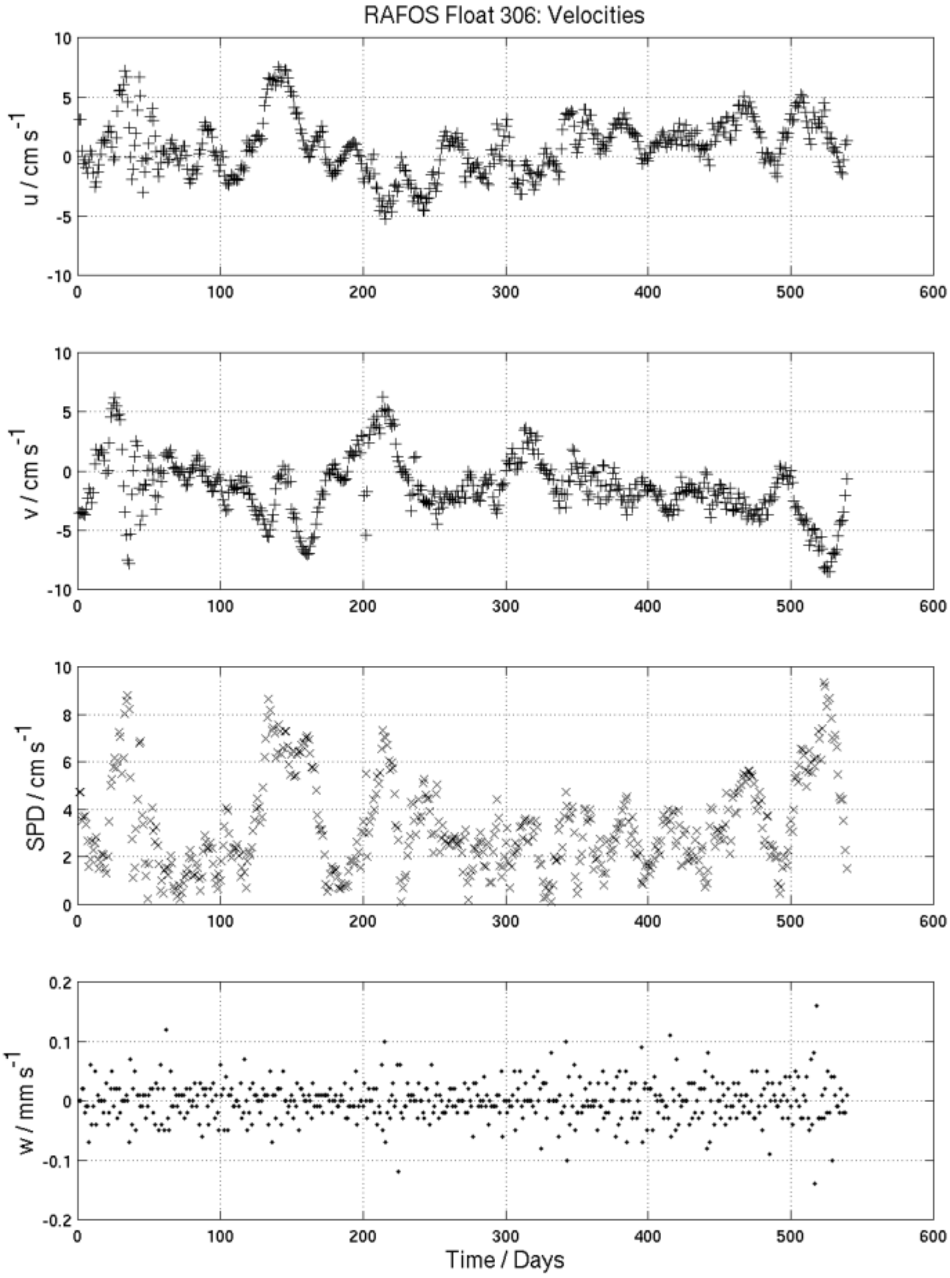

RAFOS Float 305: Pressure
Pressure / dbar
-1515
-1520
-1525
-1530
-1535
-1540
0
100
200
300
400
500
600
Time / Days

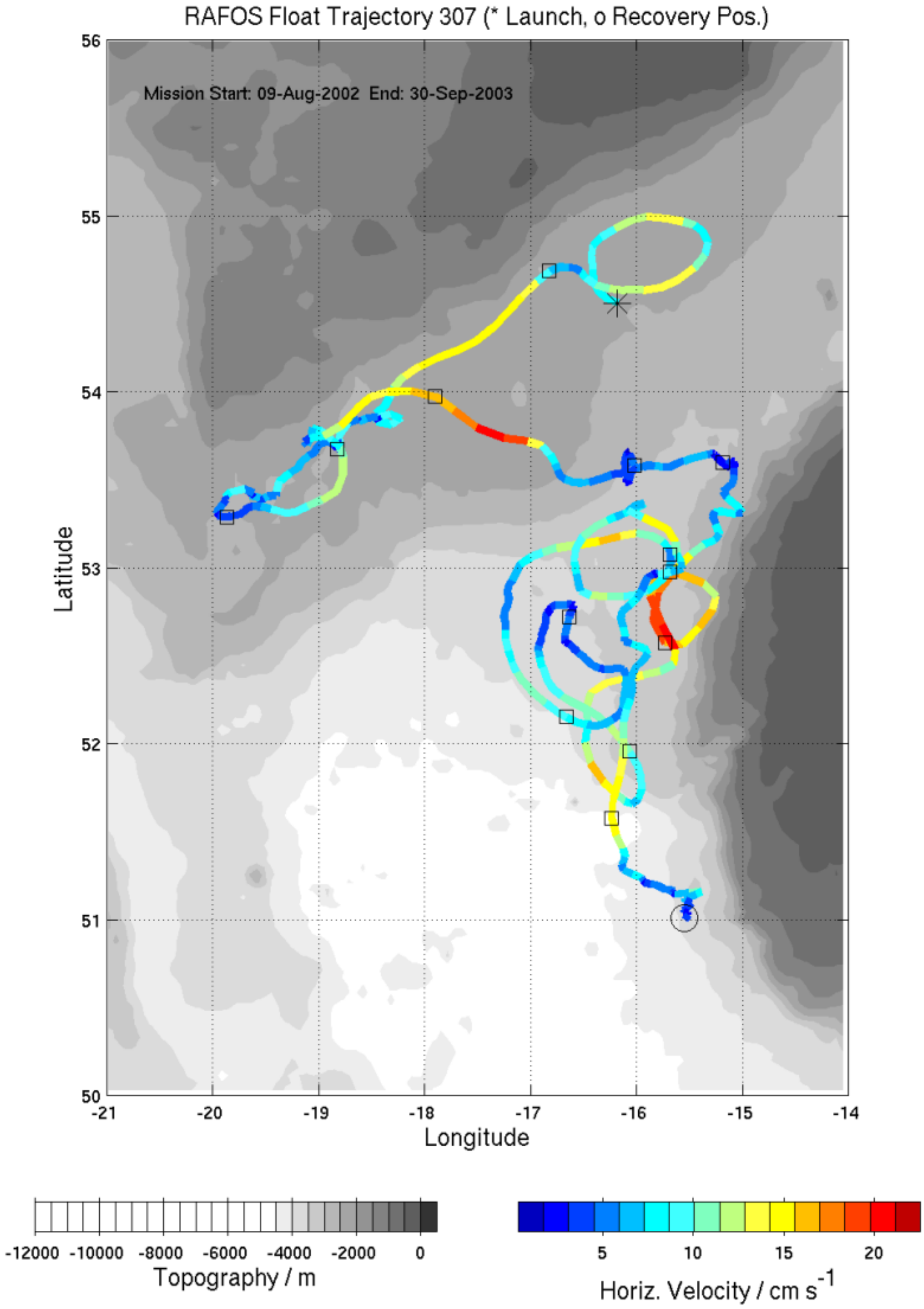

RAFOS Float 305: Velocities
u / cm s^{-1}
v / cm s^{-1}
SPD / cm s^{-1}
w / mm s^{-1}
Time / Days
0
100
200
300
400
500
600
20
10
0
-10
-20
15
5
0.1
0.05
-0.05
-0.1
-0.15


RAFOS Float Trajectory 306 (* Launch, o Recovery Pos.)
Mission Start: 27-Jun-2001 End: 17-Dec-2002
Latitude
Longitude
54
53
52
51
50
49
48
47
46
45
44
-31
-30
-29
-28
-27
-26
-25
-24
-23
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
2 4 6 8
Horiz. Velocity / cm s-1

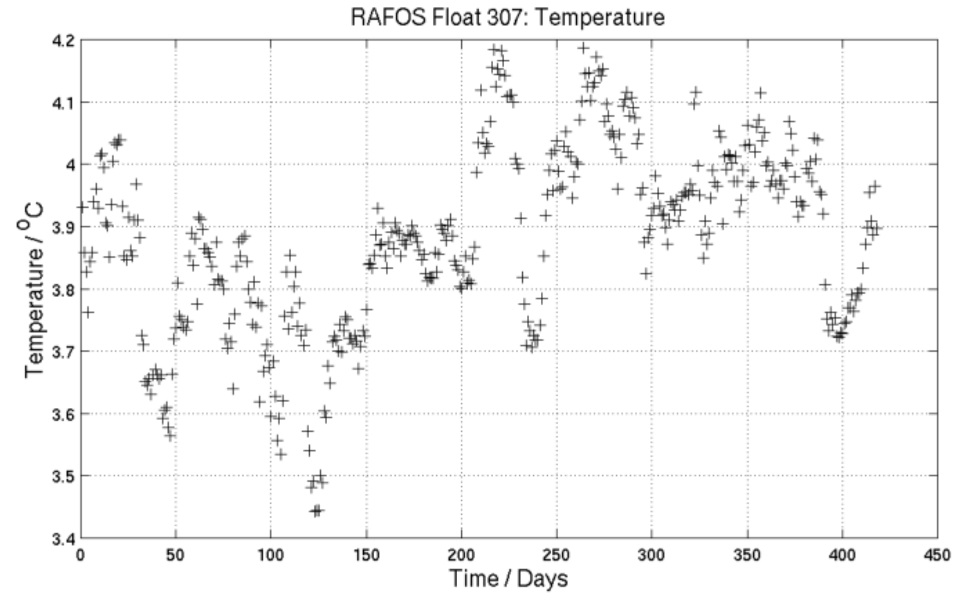

RAFOS Float 306: Temperature
Temperature / ^{o}C
Time / Days
4.3
4.2
4.1
4
3.9
3.8
3.7
3.6
0
100
200
300
400
500
600

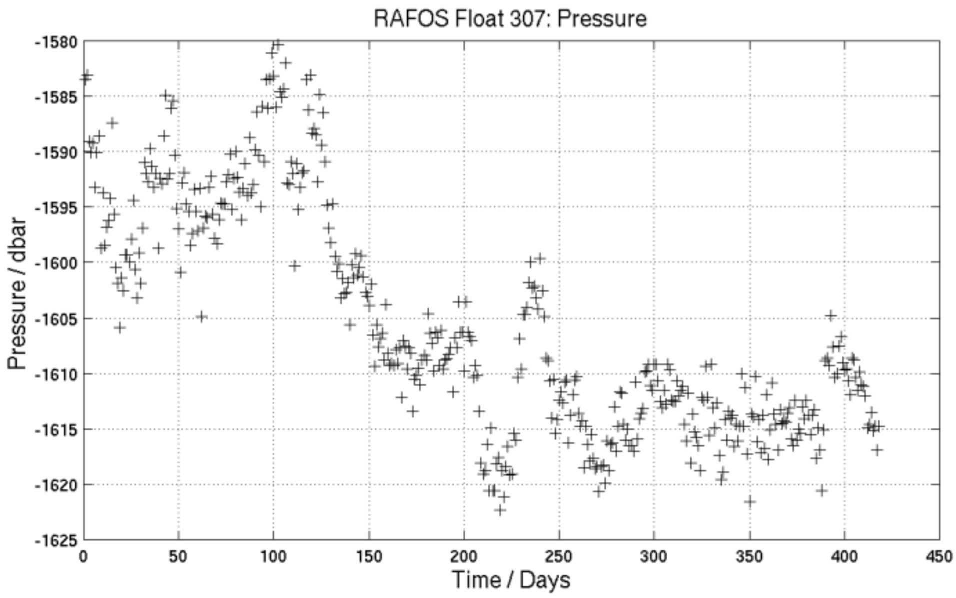

RAFOS Float 306: Pressure
Pressure / dbar
Time / Days
-1505
-1510
-1515
-1520
-1525
-1530
-1535
-1540
0
100
200
300
400
500
600

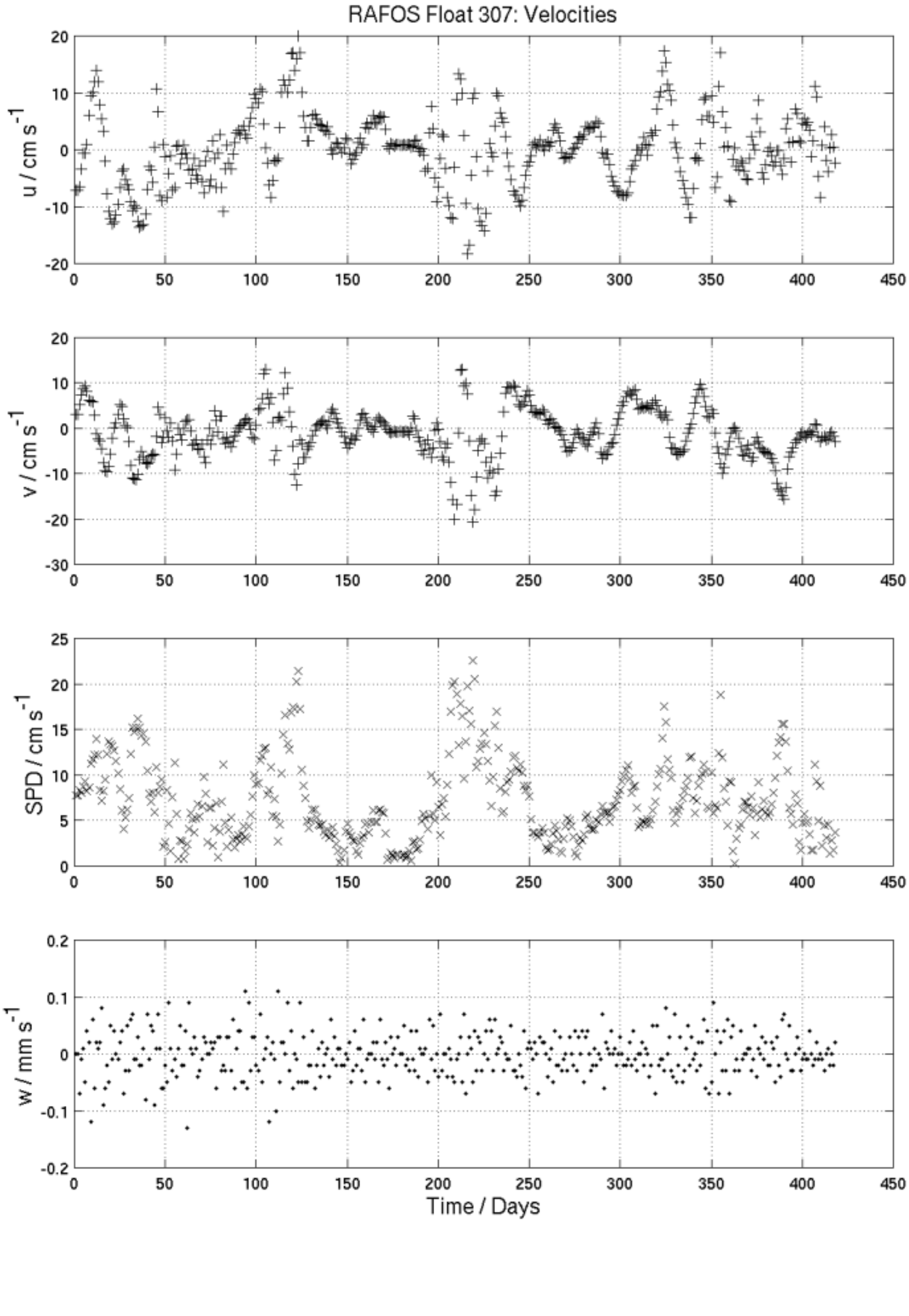

RAFOS Float 306: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

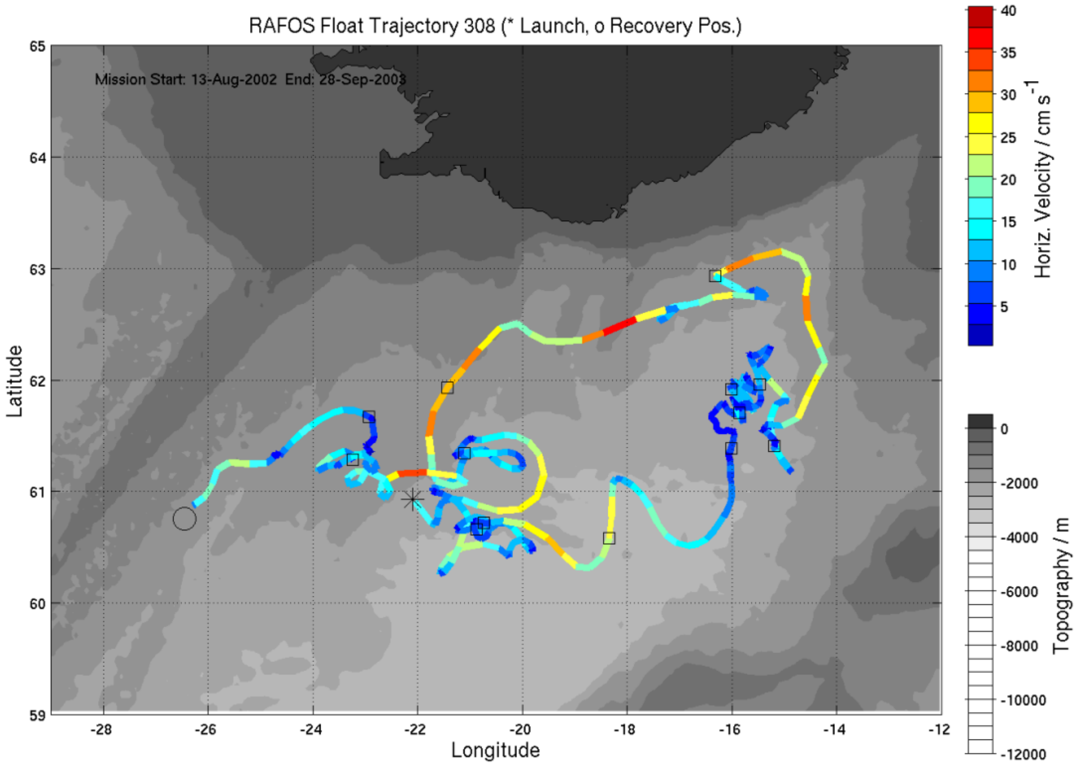


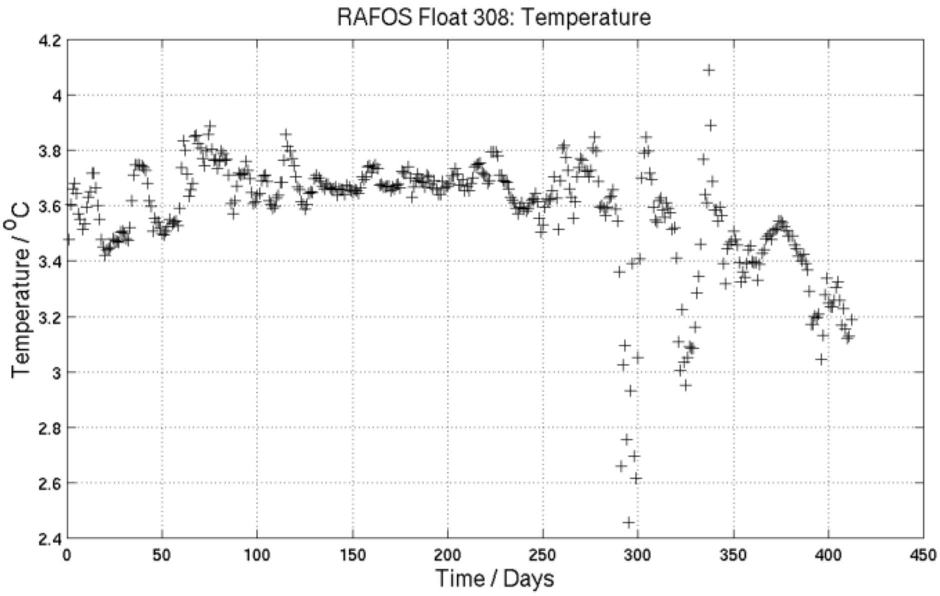
RAFOS Float Trajectory 307 (* Launch, o Recovery Pos.)
Mission Start: 09-Aug-2002 End: 30-Sep-2003
Latitude
Longitude
56
55
54
53
52
51
50
-21
-20
-19
-18
-17
-16
-15
-14
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5 10 15 20
Horiz. Velocity / cm s-1

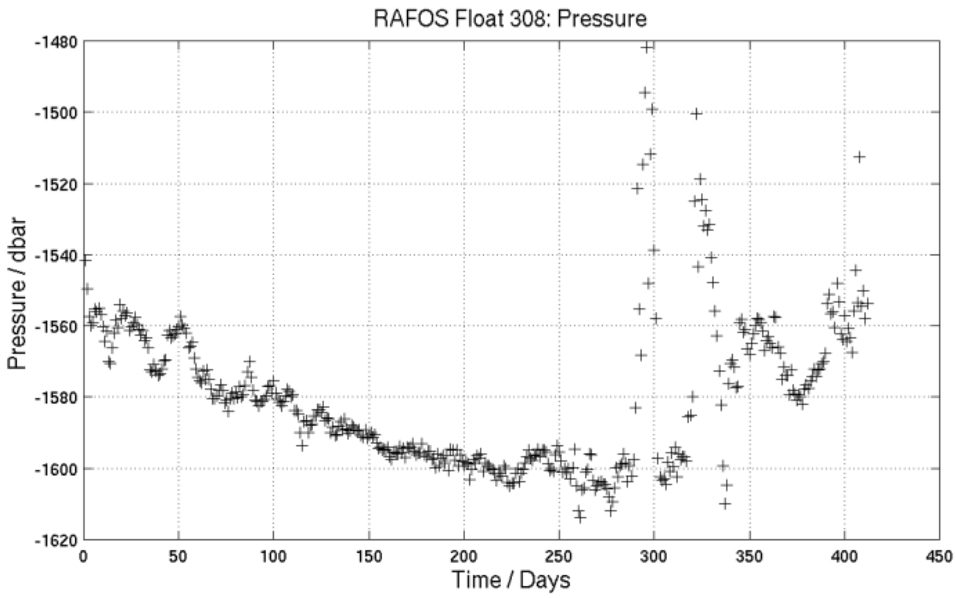

RAFOS Float 307: Temperature
Temperature / ^{o}C
Time / Days
4.2
4.1
4
3.9
3.8
3.7
3.6
3.5
3.4
0
50
100
150
200
250
300
350
400
450

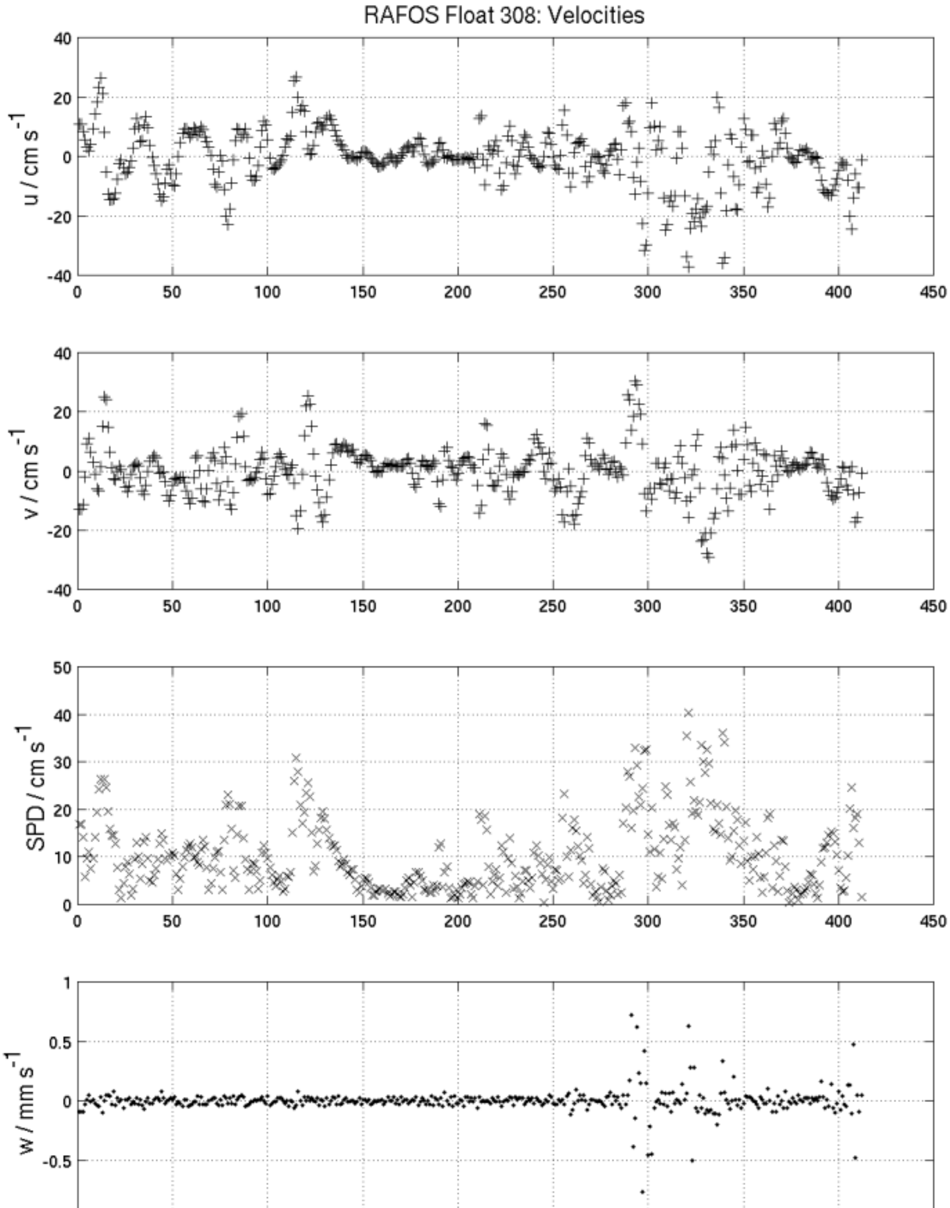

RAFOS Float 307: Pressure
Pressure / dbar
Time / Days
-1580
-1585
-1590
-1595
-1600
-1605
-1610
-1615
-1620
-1625
0
50
100
150
200
250
300
350
400
450

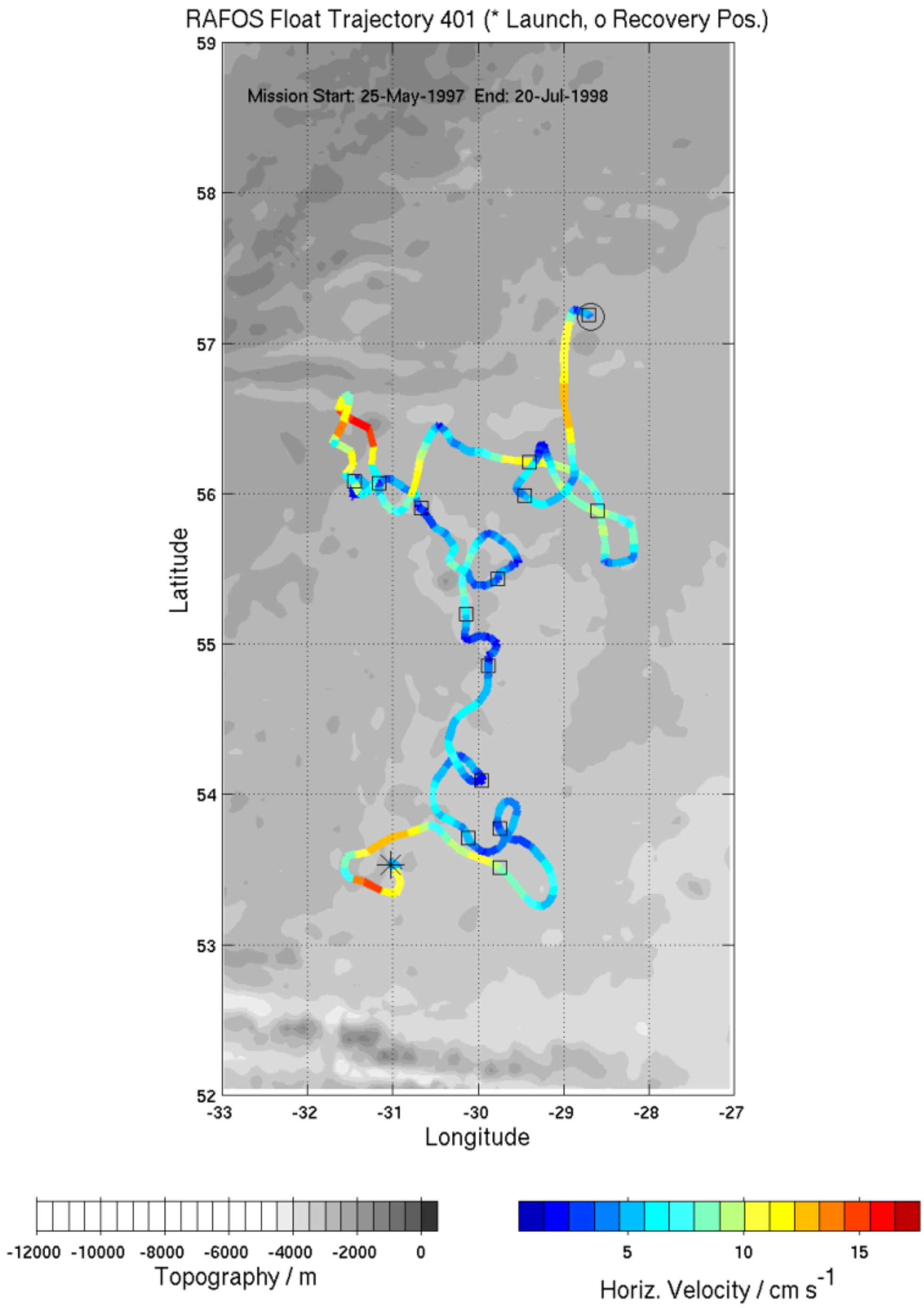

RAFOS Float 307: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days


RAFOS Float Trajectory 308 (* Launch, o Recovery Pos.)
Mission Start: 13-Aug-2002 End: 28-Sep-2003
Latitude
Longitude
65
64
63
62
61
60
59
-28
-26
-24
-22
-20
-18
-16
-14
-12
Horiz. Velocity / cm s⁻¹
40
35
30
25
20
15
10
5
Topography / m
0
-2000
-4000
-6000
-8000
-10000
-12000

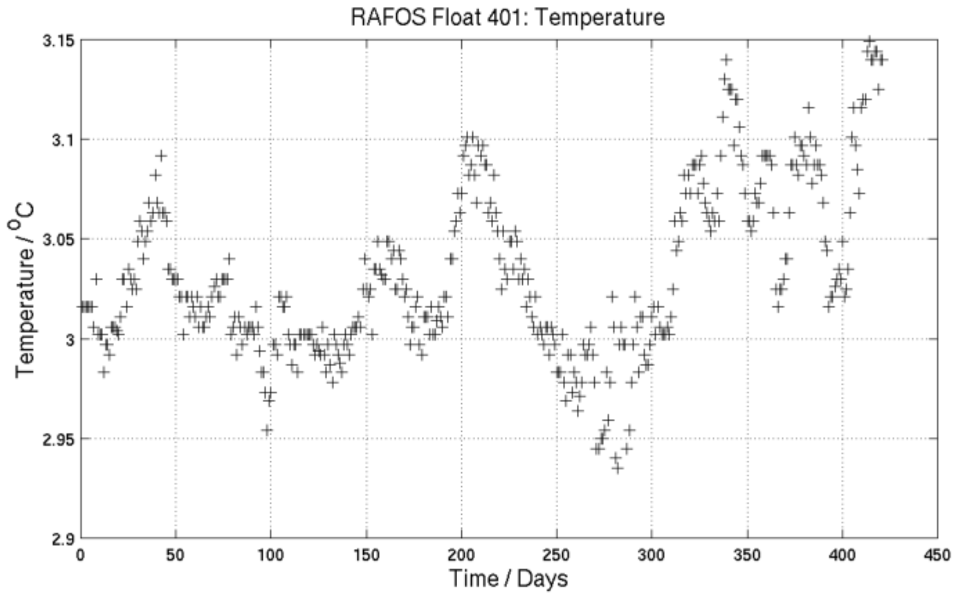

RAFOS Float 308: Temperature
Temperature / ^oC
Time / Days
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
0
50
100
150
200
250
300
350
400
450

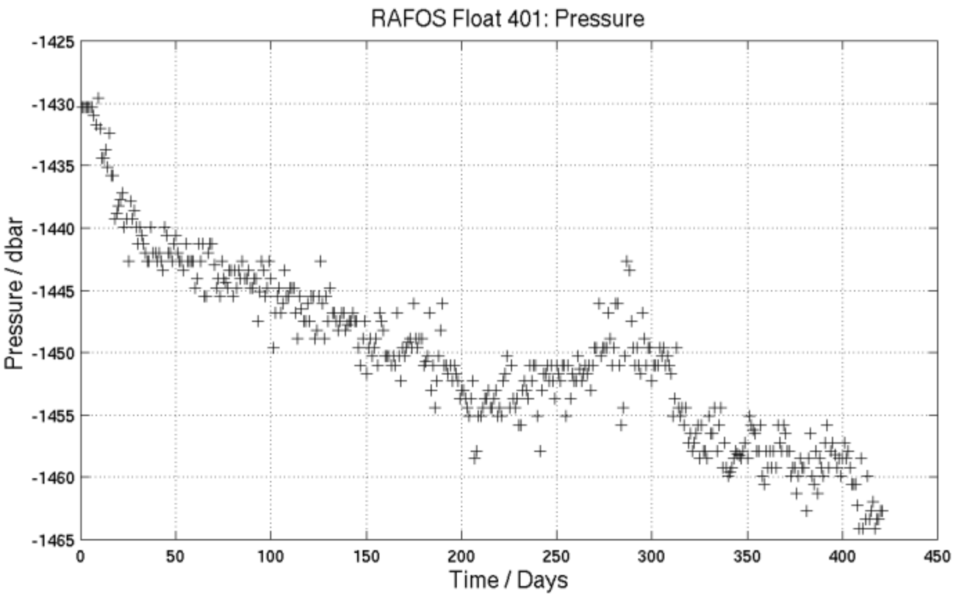

RAFOS Float 308: Pressure
Pressure / dbar
Time / Days
-1480
-1500
-1520
-1540
-1560
-1580
-1600
-1620
0
50
100
150
200
250
300
350
400
450

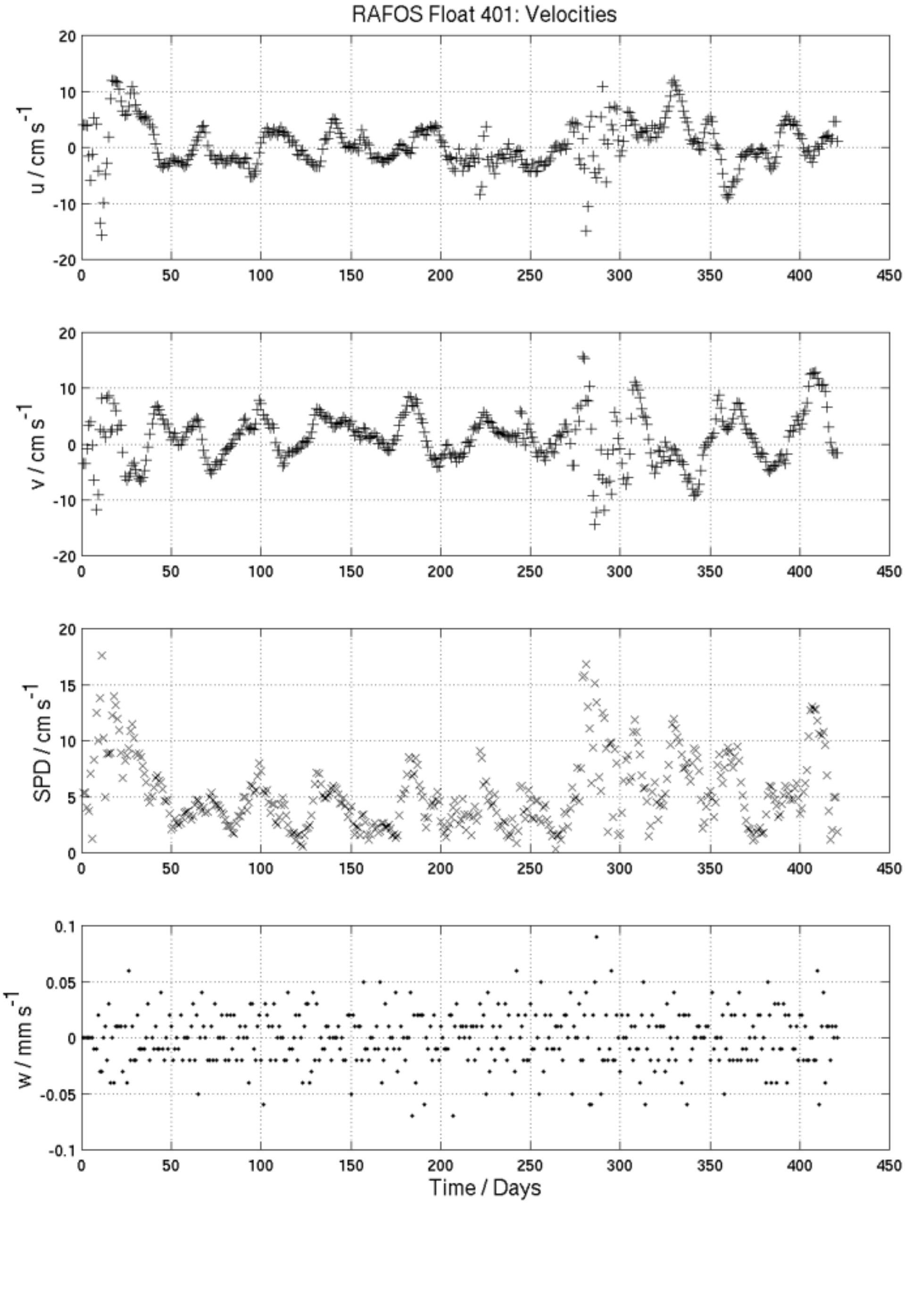

RAFOS Float 308: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days



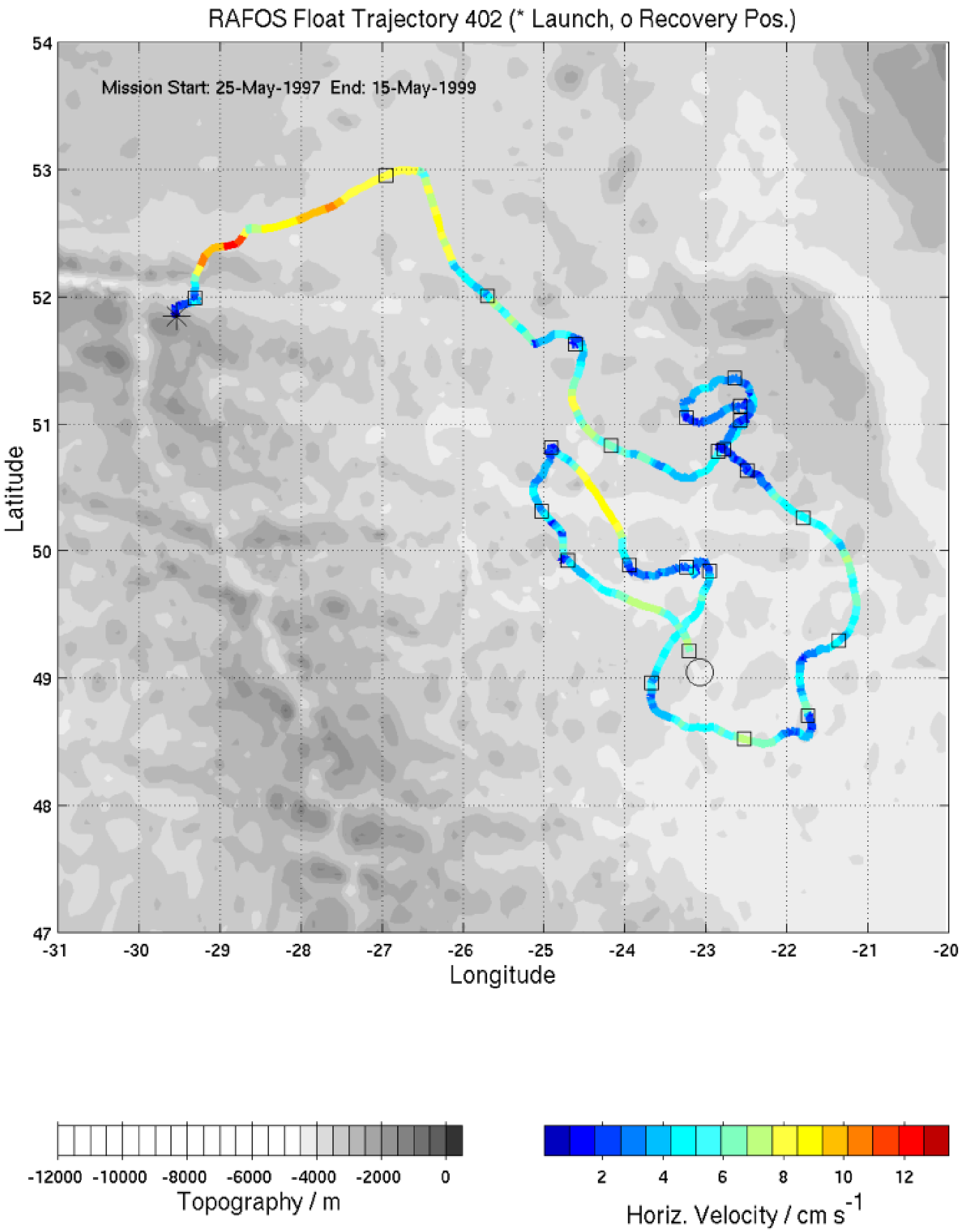
RAFOS Float Trajectory 401 (* Launch, o Recovery Pos.)
Mission Start: 25-May-1997 End: 20-Jul-1998
Latitude
Longitude
Topography / m
Horiz. Velocity / cm s-1


RAFOS Float 401: Temperature
Temperature / ^{o}C
Time / Days
3.15
3.1
3.05
3
2.95
2.9
0
50
100
150
200
250
300
350
400
450

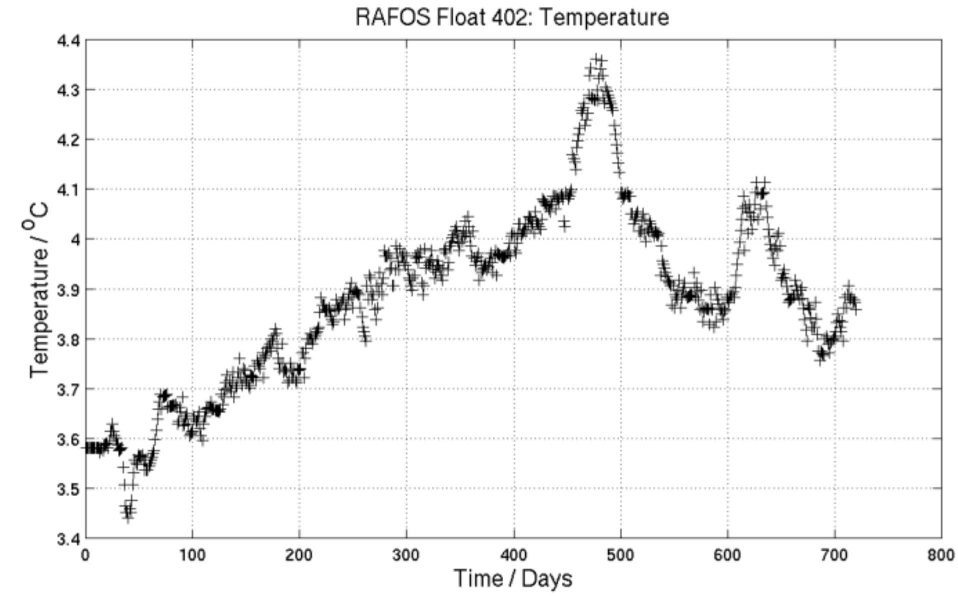

RAFOS Float 401: Pressure
Pressure / dbar
Time / Days
-1425
-1430
-1435
-1440
-1445
-1450
-1455
-1460
-1465
0
50
100
150
200
250
300
350
400
450

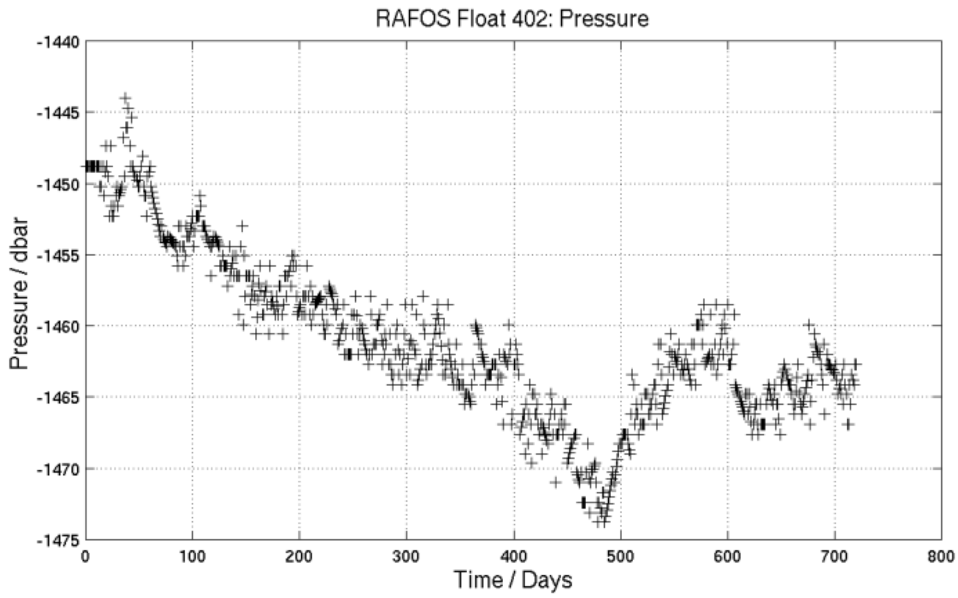


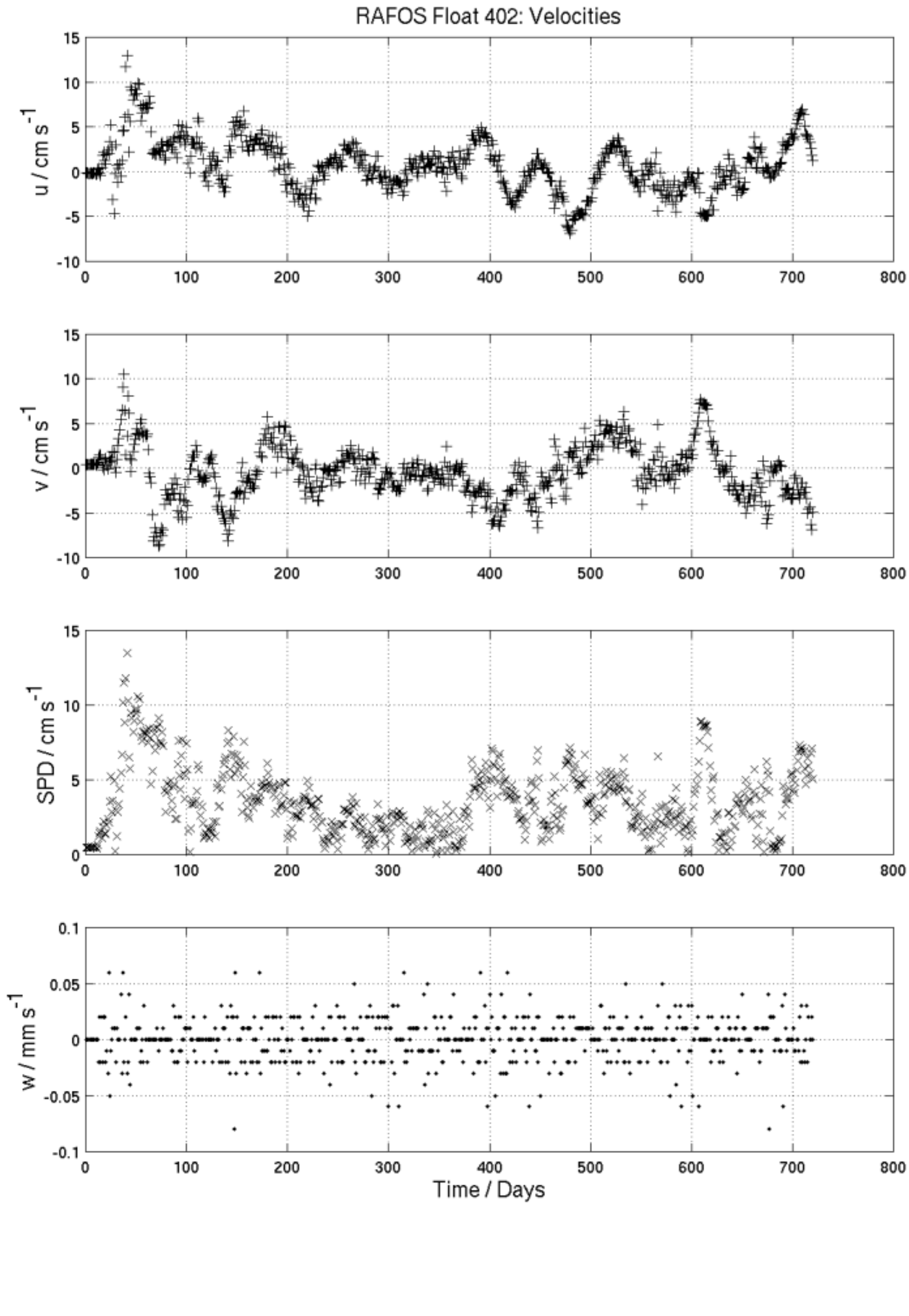
RAFOS Float 401: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

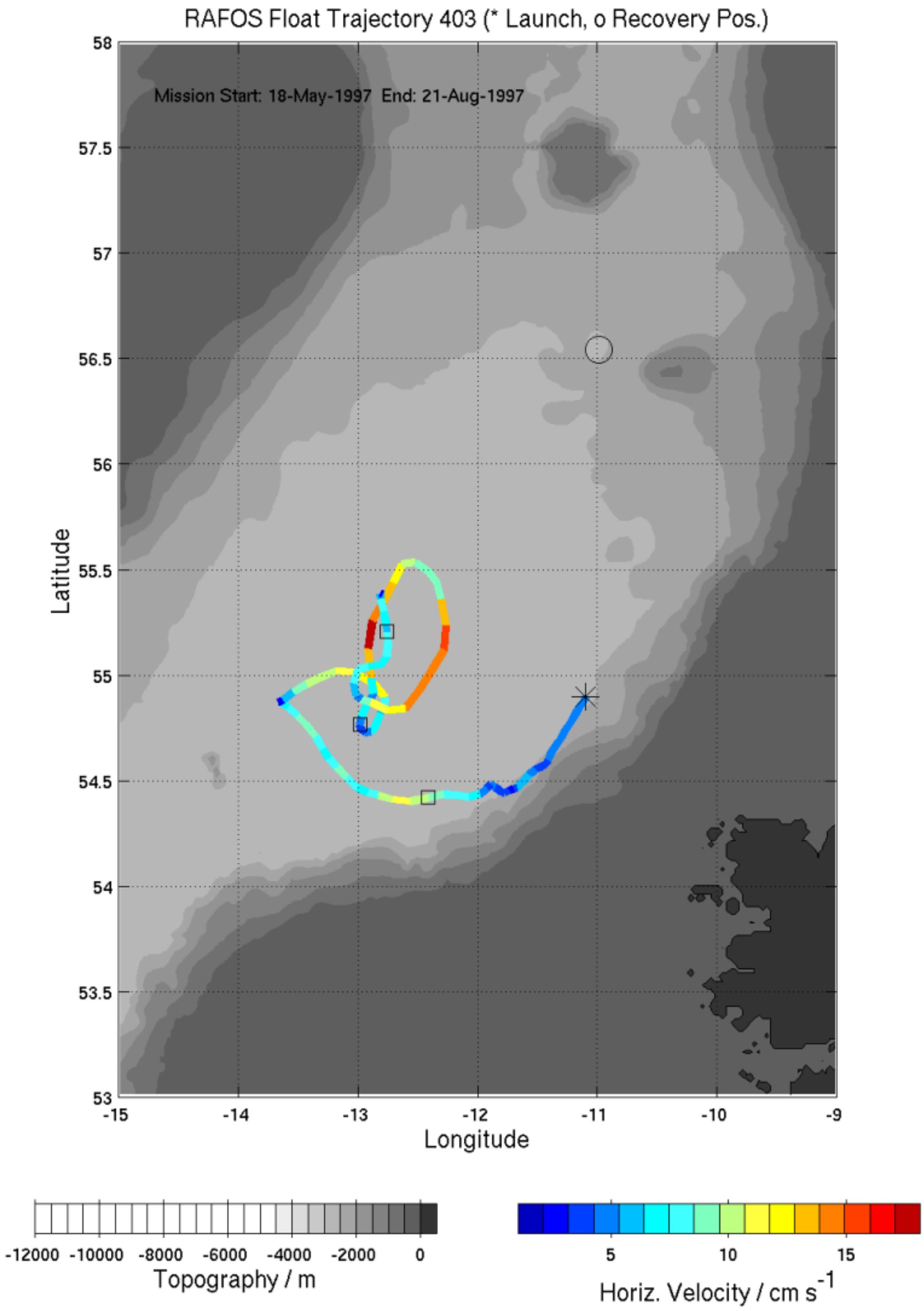


RAFOS Float Trajectory 402 (* Launch, o Recovery Pos.)
Mission Start: 25-May-1997 End: 15-May-1999
Latitude
Longitude
54
53
52
51
50
49
48
47
-31
-30
-29
-28
-27
-26
-25
-24
-23
-22
-21
-20
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
2 4 6 8 10 12
Horiz. Velocity / cm s-1

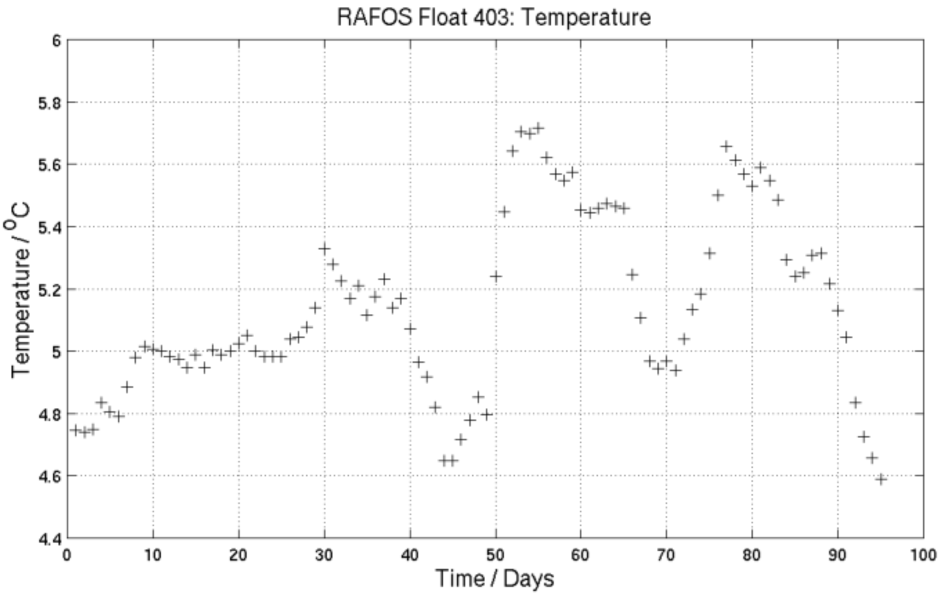

RAFOS Float 402: Temperature
Temperature / ^{o}C
Time / Days
4.4
4.3
4.2
4.1
4
3.9
3.8
3.7
3.6
3.5
3.4
0
100
200
300
400
500
600
700
800

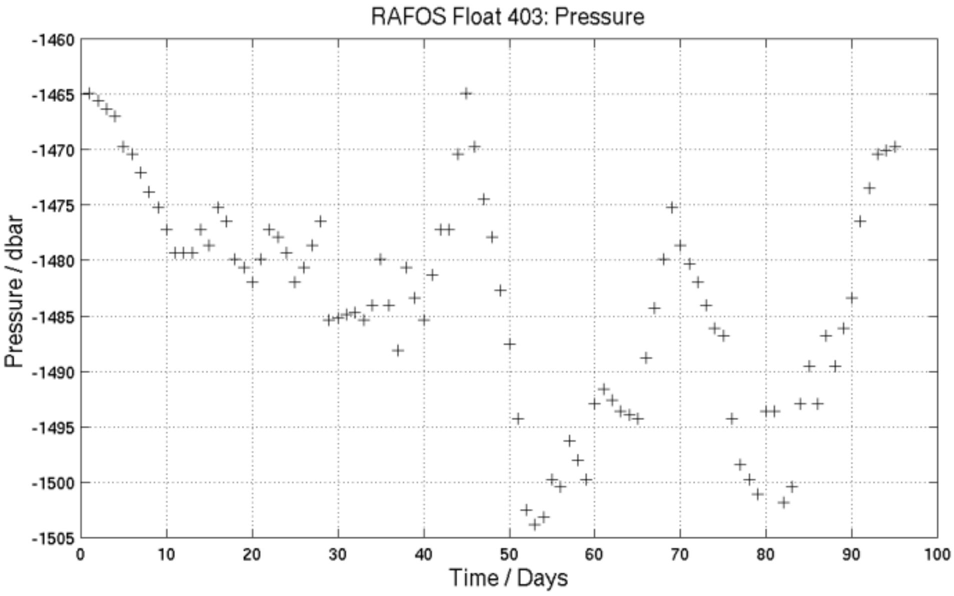

RAFOS Float 402: Pressure
Pressure / dbar
Time / Days
-1440
-1445
-1450
-1455
-1460
-1465
-1470
-1475
0
100
200
300
400
500
600
700
800

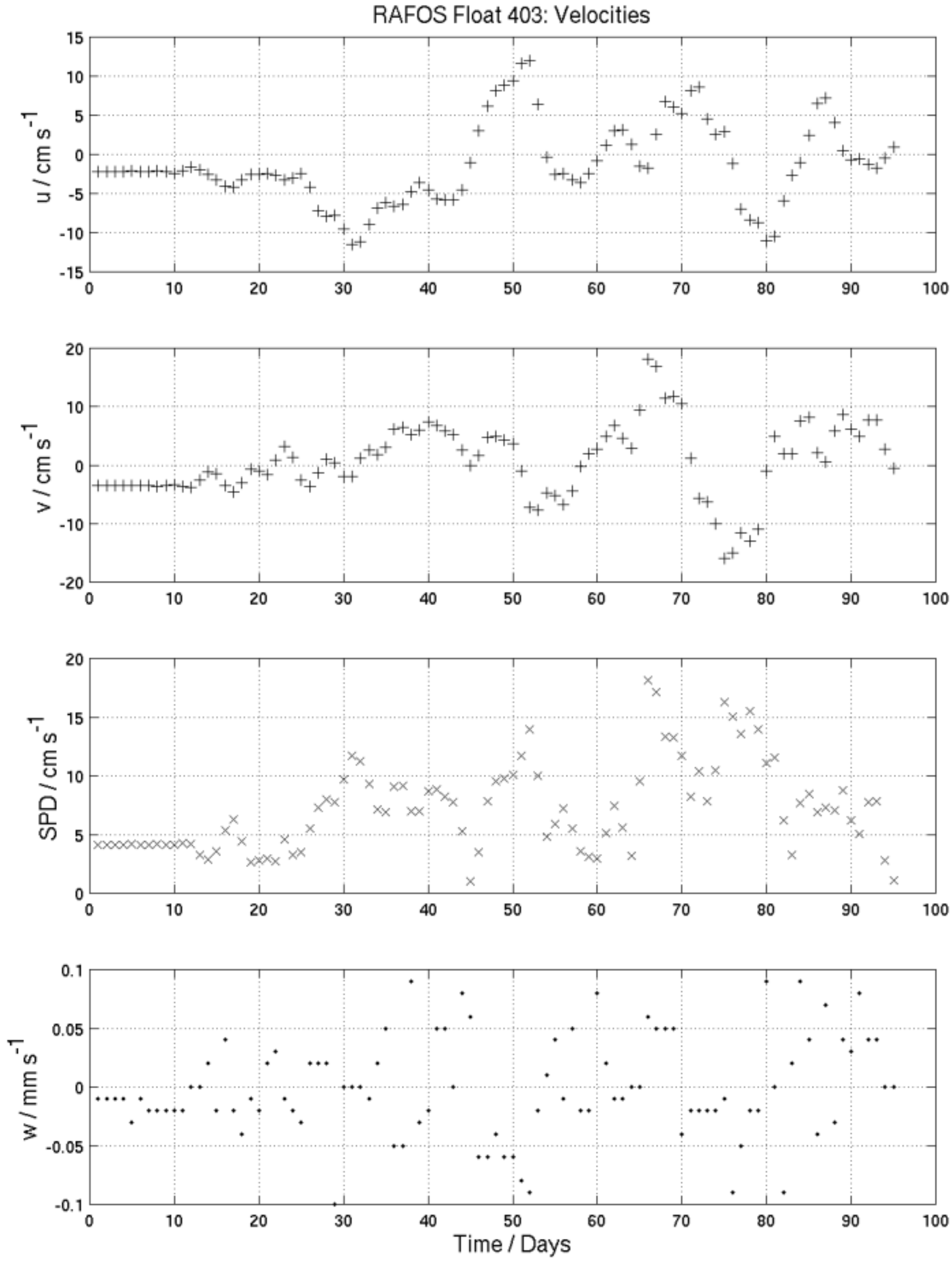

RAFOS Float 402: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

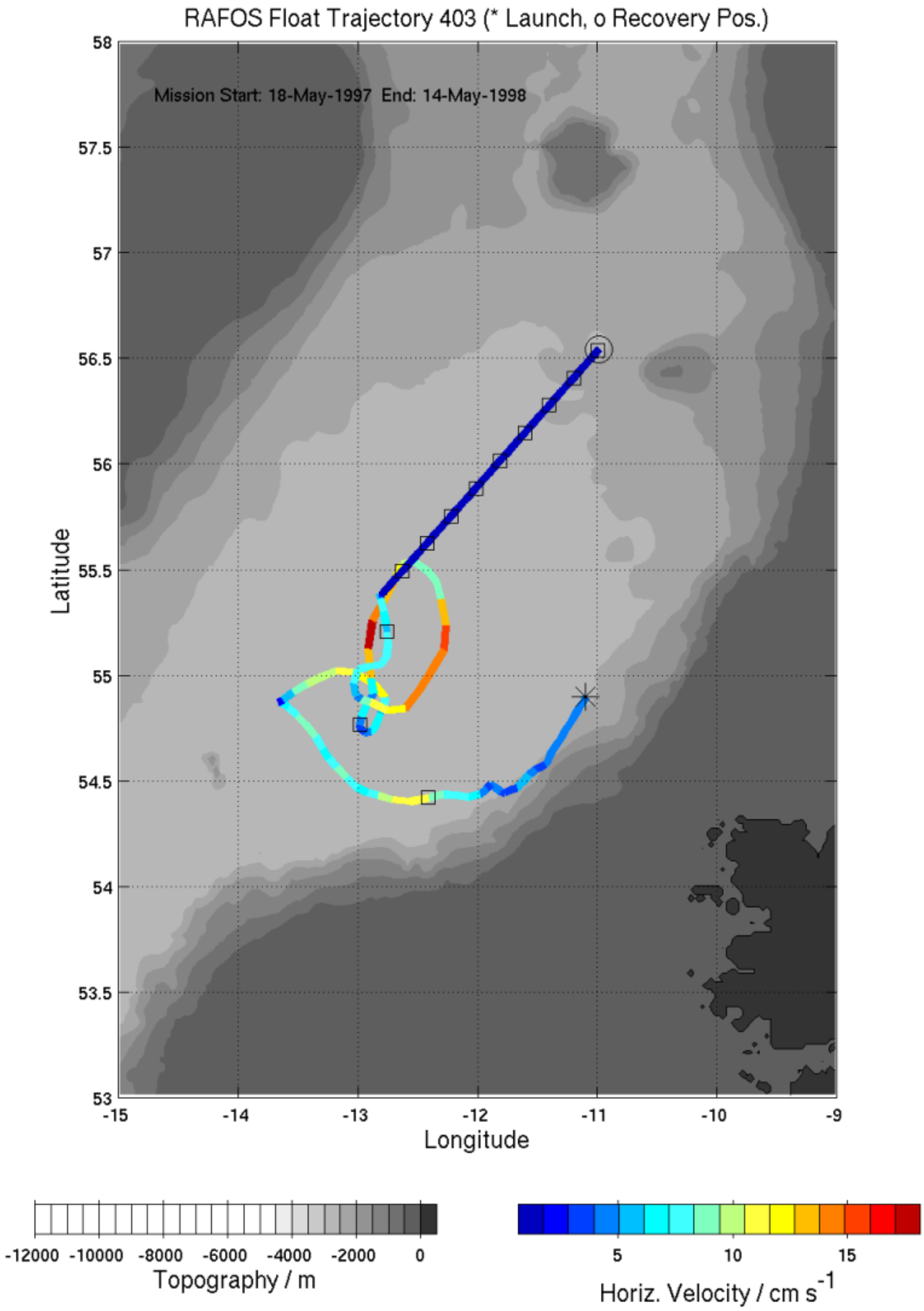


RAFOS Float Trajectory 403 (* Launch, o Recovery Pos.)
Mission Start: 18-May-1997 End: 21-Aug-1997
Latitude
Longitude
58
57.5
57
56.5
56
55.5
55
54.5
54
53.5
53
-15
-14
-13
-12
-11
-10
-9
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5 10 15
Horiz. Velocity / cm s-1

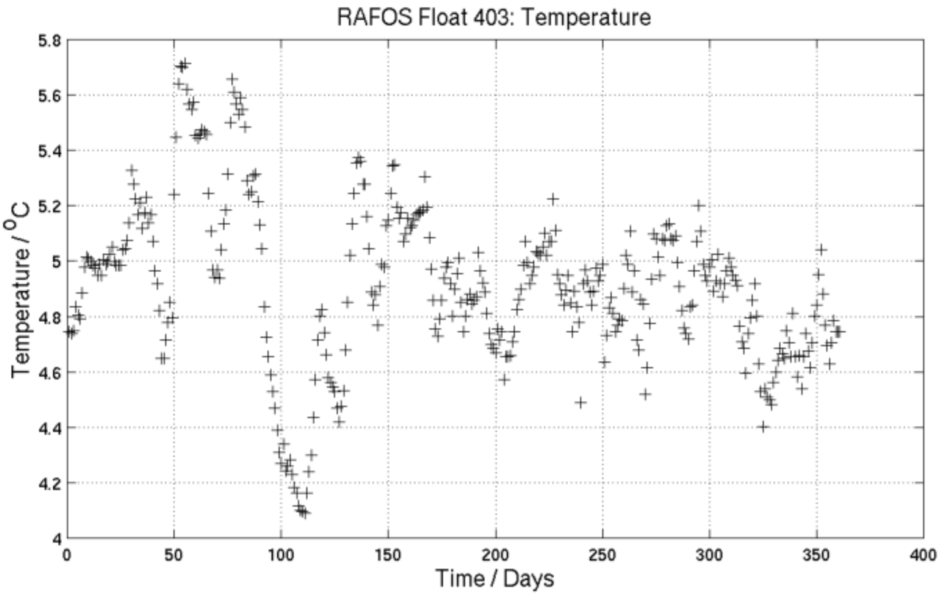

RAFOS Float 403: Temperature
Temperature / ^oC
Time / Days
6
5.8
5.6
5.4
5.2
5
4.8
4.6
4.4
0
10
20
30
40
50
60
70
80
90
100

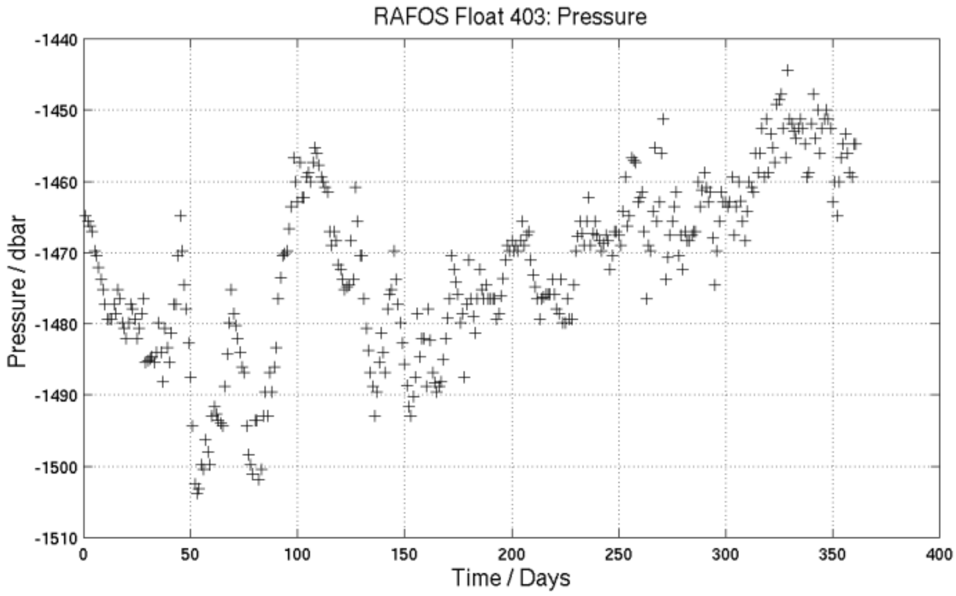

RAFOS Float 403: Pressure
Pressure / dbar
Time / Days
-1460
-1465
-1470
-1475
-1480
-1485
-1490
-1495
-1500
-1505
0
10
20
30
40
50
60
70
80
90
100

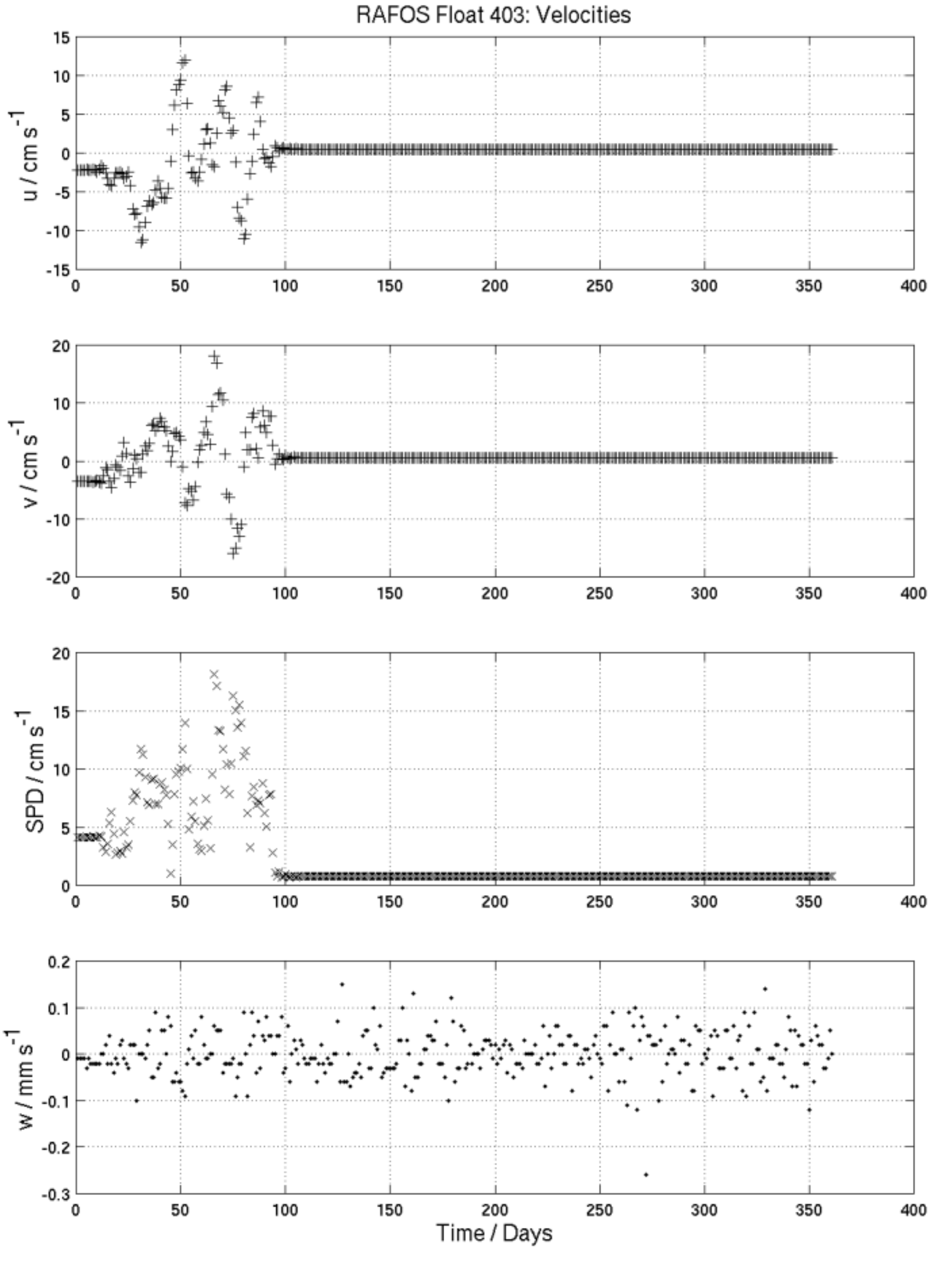

RAFOS Float 403: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days



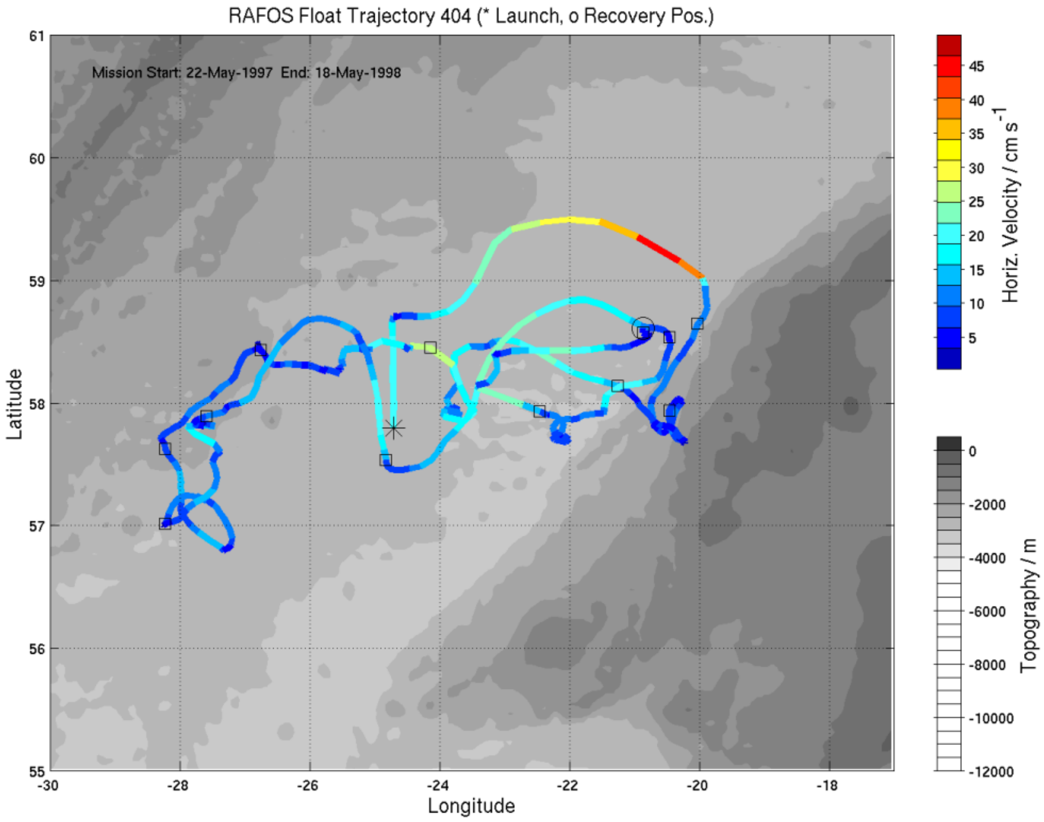
RAFOS Float Trajectory 403 (* Launch, o Recovery Pos.)
Mission Start: 18-May-1997 End: 14-May-1998
58
57.5
57
56.5
56
55.5
55
54.5
54
53.5
53
Latitude
-15
-14
-13
-12
-11
-10
-9
Longitude
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5 10 15
Horiz. Velocity / cm s-1


RAFOS Float 403: Temperature
Temperature / °C
Time / Days
5.8
5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
4
0
50
100
150
200
250
300
350
400

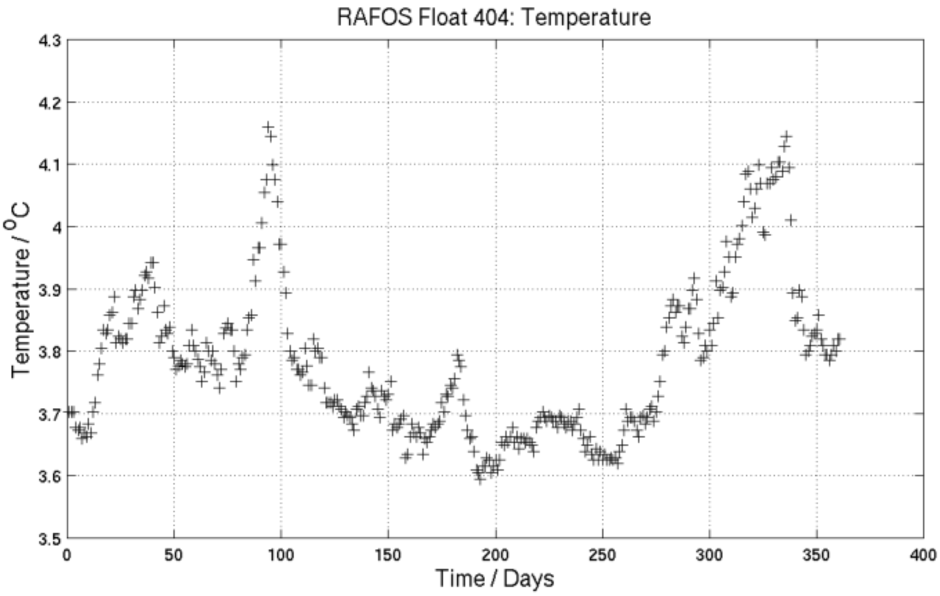

RAFOS Float 403: Pressure
Pressure / dbar
Time / Days
-1440
-1450
-1460
-1470
-1480
-1490
-1500
-1510
0
50
100
150
200
250
300
350
400

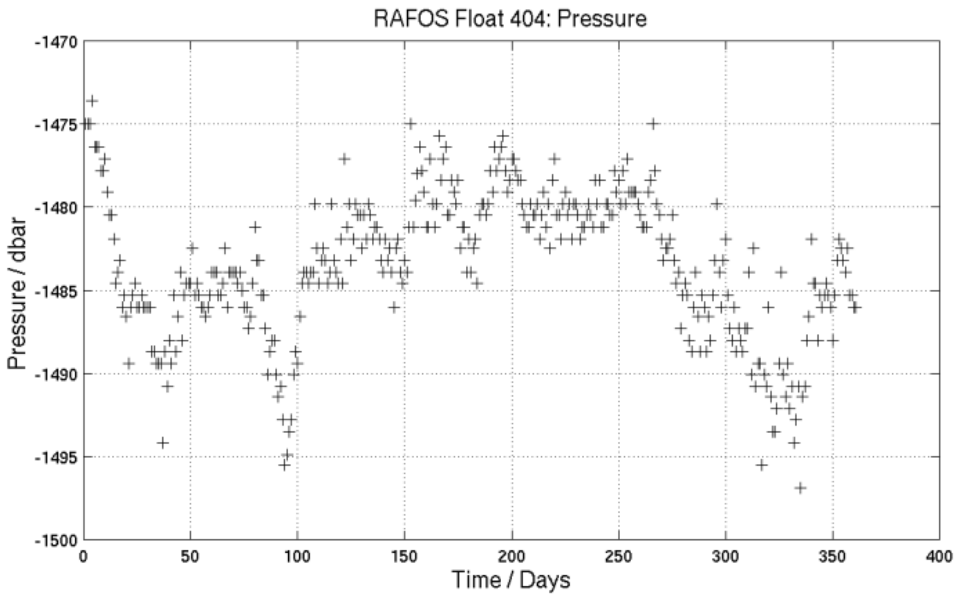


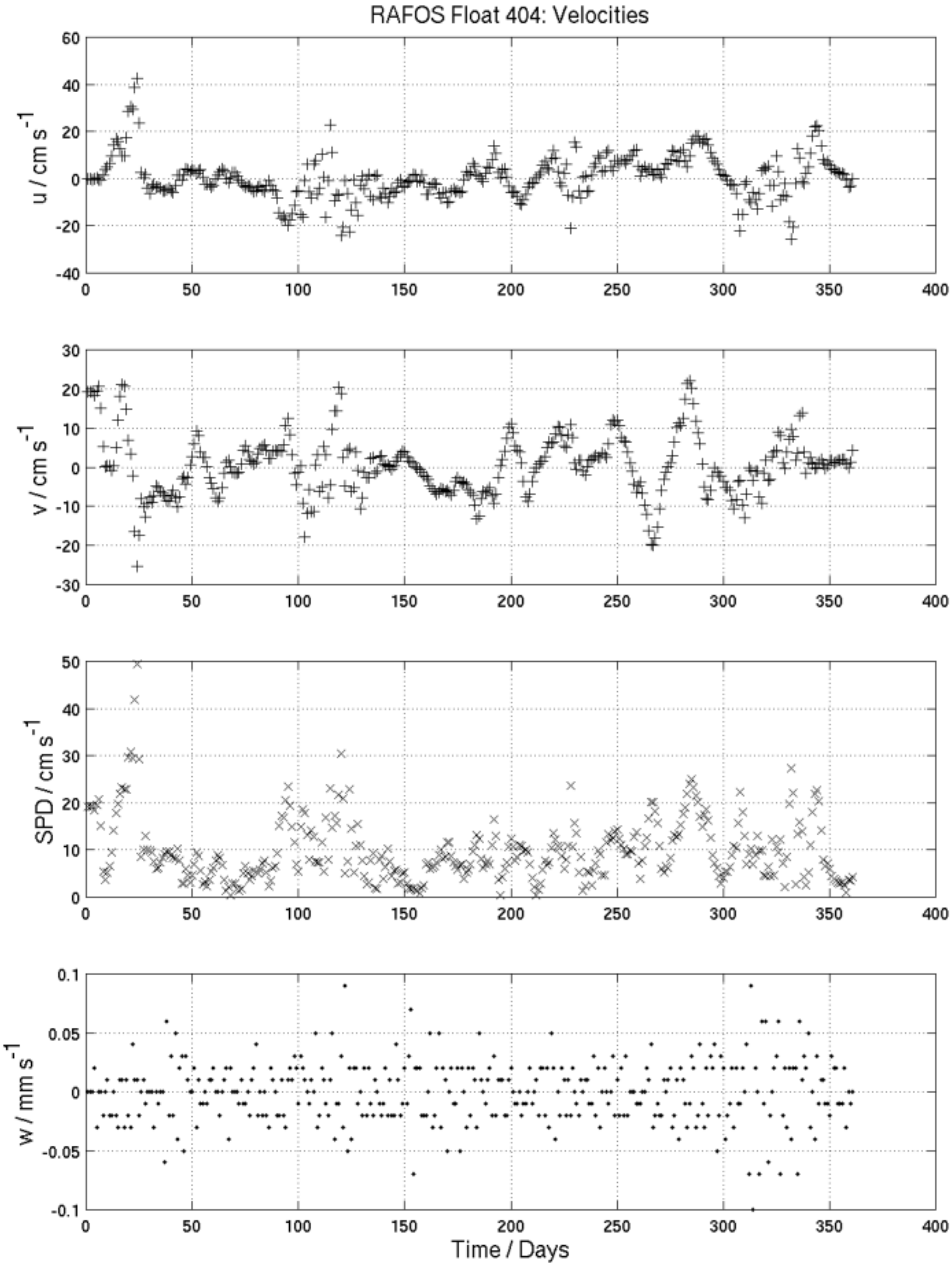
RAFOS Float 403: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

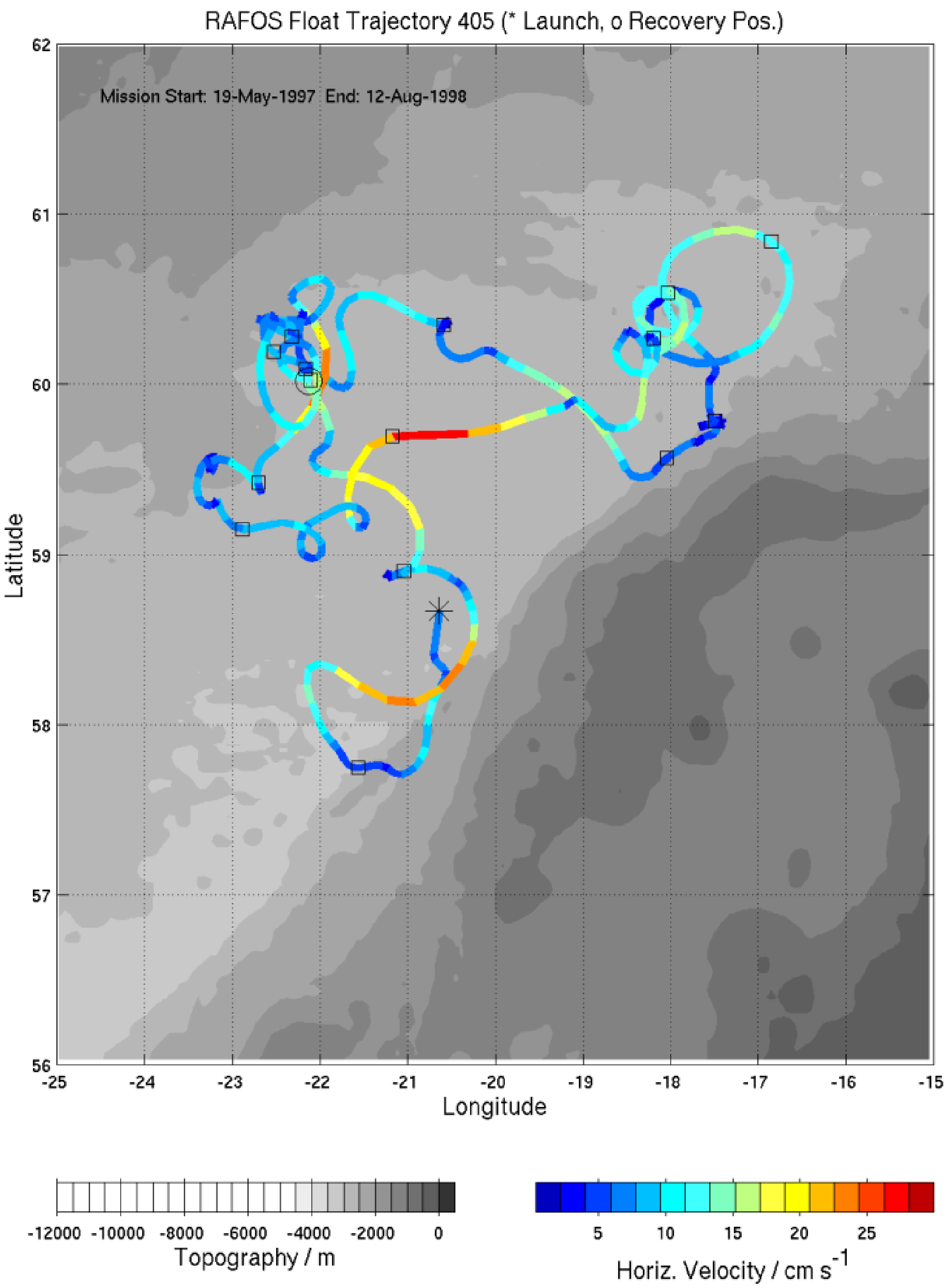


RAFOS Float Trajectory 404 (* Launch, o Recovery Pos.)
Mission Start: 22-May-1997 End: 18-May-1998
Latitude
Longitude
Horiz. Velocity / cm s^{-1}
Topography / m

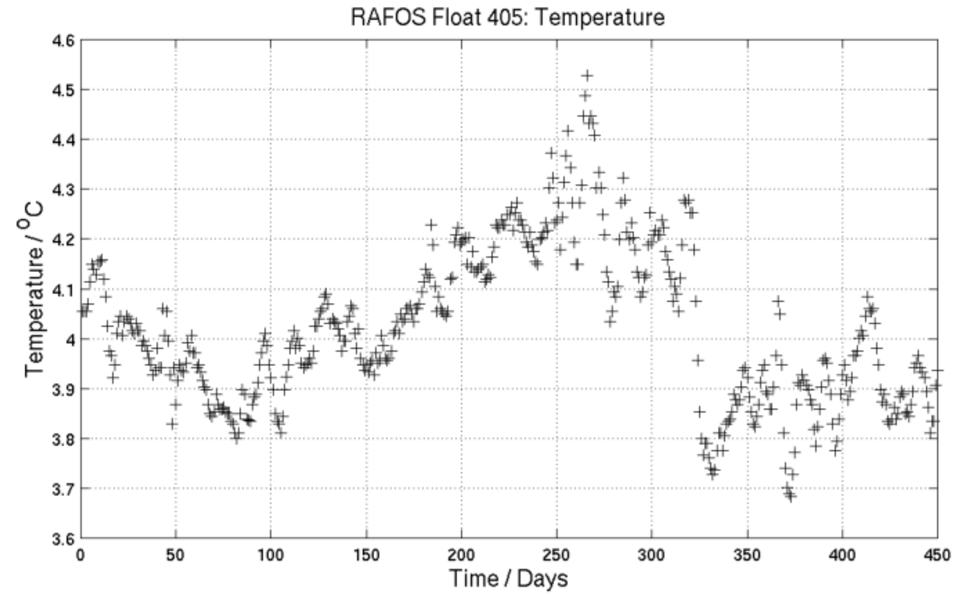

RAFOS Float 404: Temperature
Temperature / ^{o}C
Time / Days
4.3
4.2
4.1
4
3.9
3.8
3.7
3.6
3.5
0
50
100
150
200
250
300
350
400

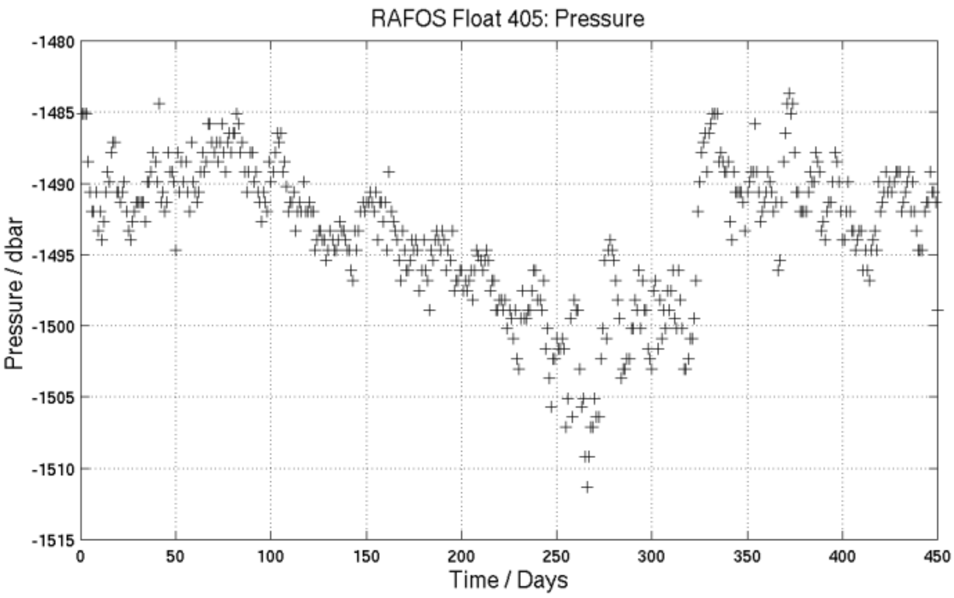

RAFOS Float 404: Pressure
Pressure / dbar
Time / Days
-1470
-1475
-1480
-1485
-1490
-1495
-1500
0
50
100
150
200
250
300
350
400

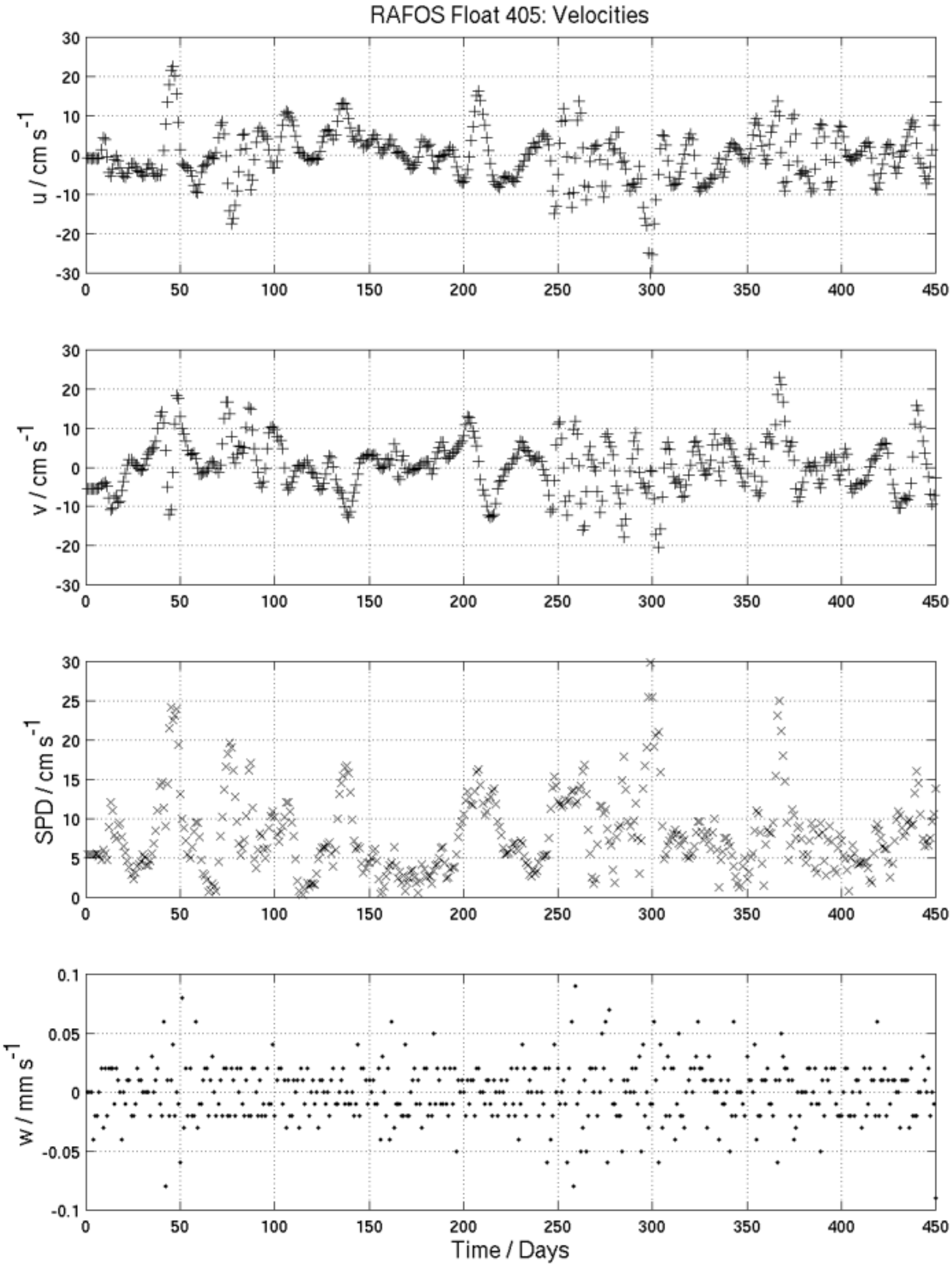

RAFOS Float 404: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

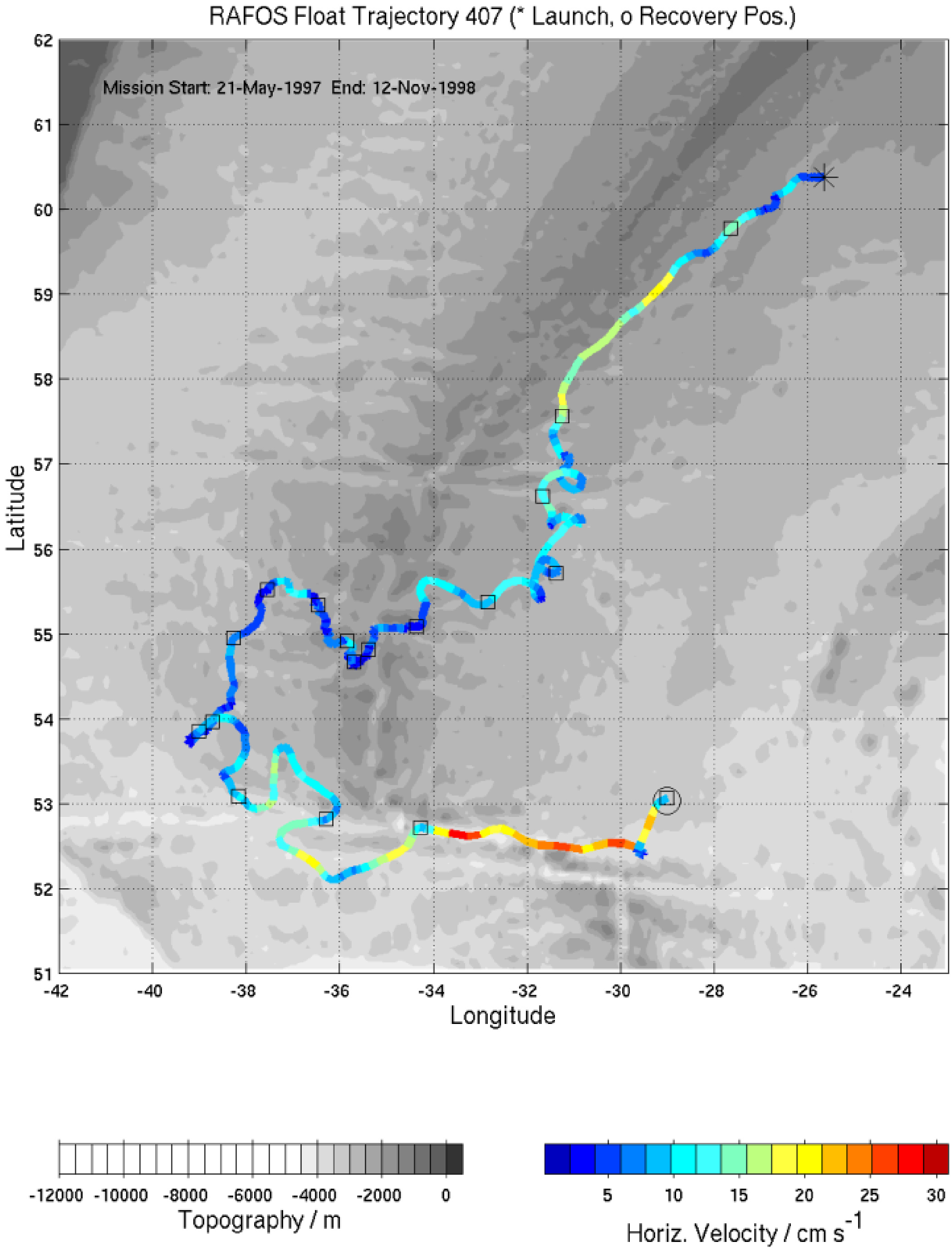


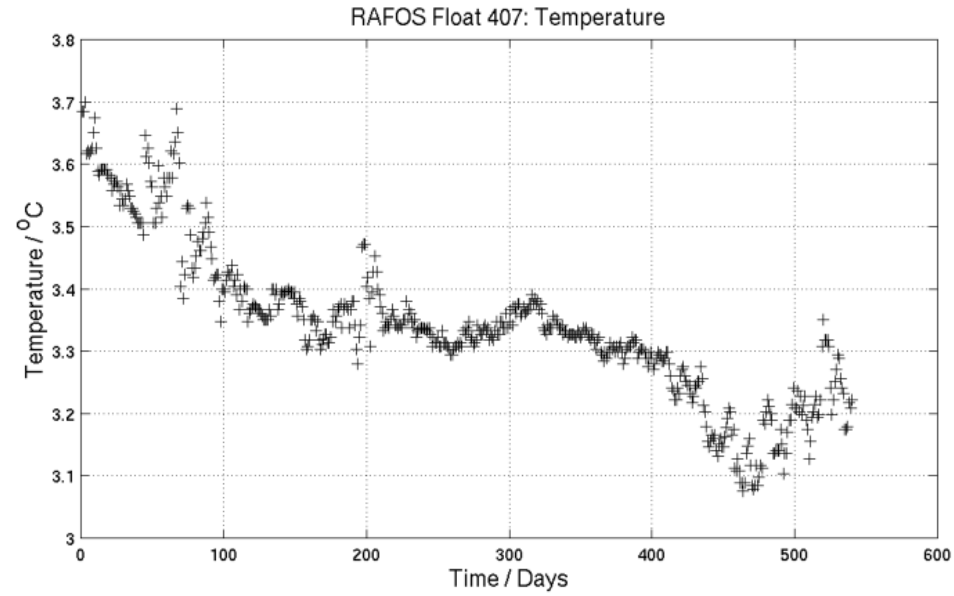
RAFOS Float Trajectory 405 (* Launch, o Recovery Pos.)
Mission Start: 19-May-1997 End: 12-Aug-1998
Latitude
Longitude
Topography / m
Horiz. Velocity / cm s-1

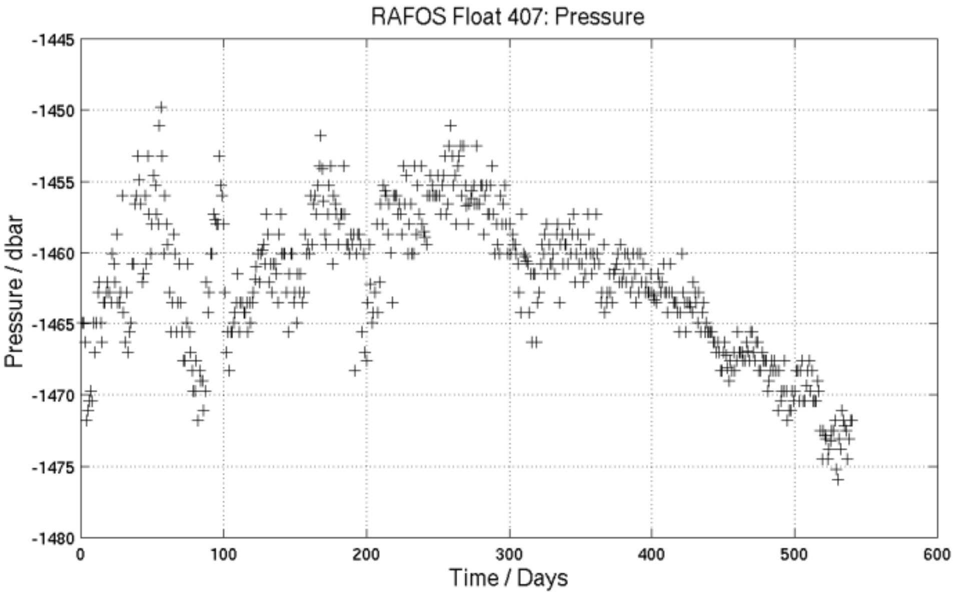

RAFOS Float 405: Temperature
Temperature / ^oC
Time / Days
4.6
4.5
4.4
4.3
4.2
4.1
4
3.9
3.8
3.7
3.6
0
50
100
150
200
250
300
350
400
450

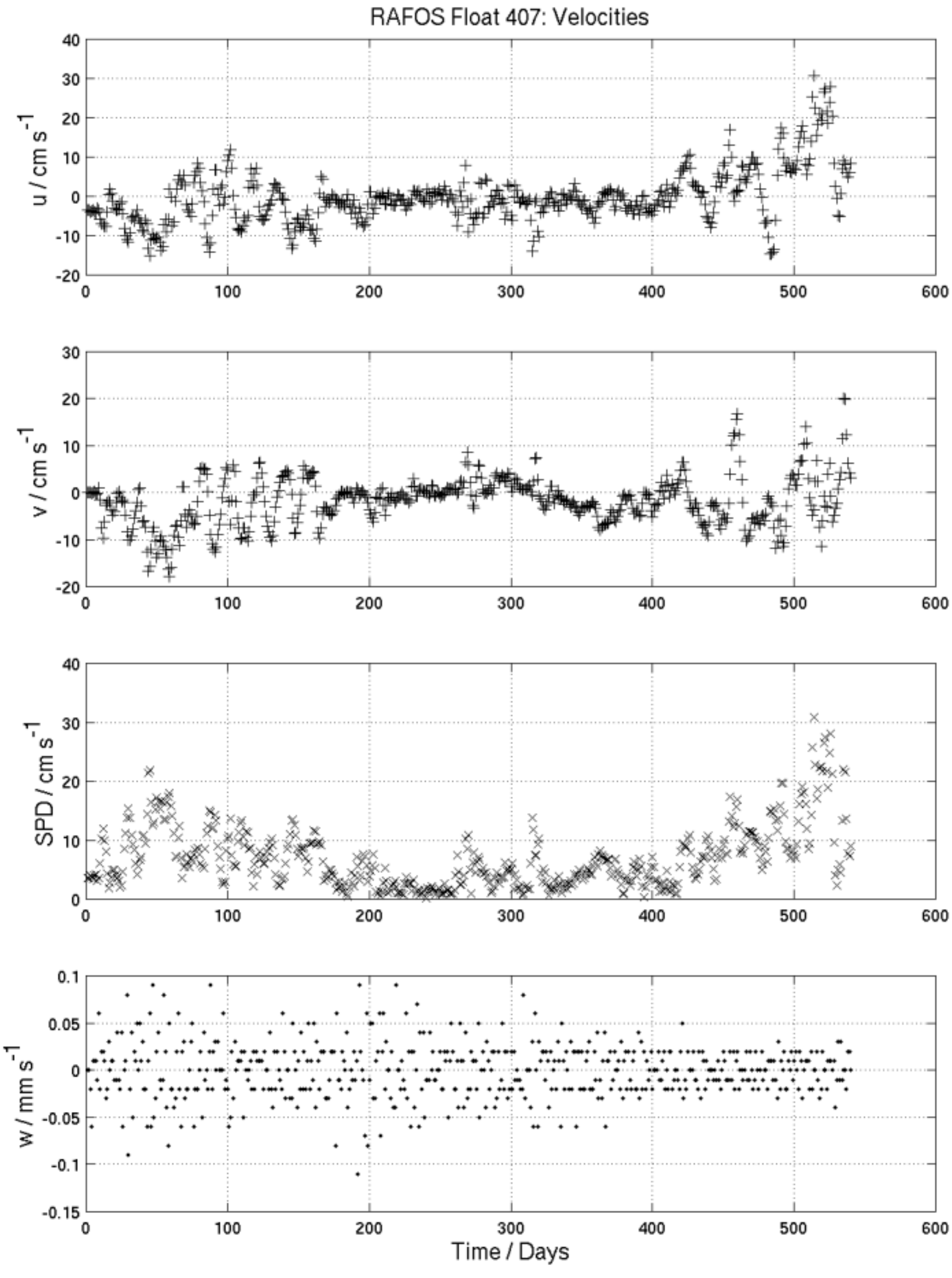

RAFOS Float 405: Pressure
Pressure / dbar
Time / Days
-1480
-1485
-1490
-1495
-1500
-1505
-1510
-1515
0
50
100
150
200
250
300
350
400
450

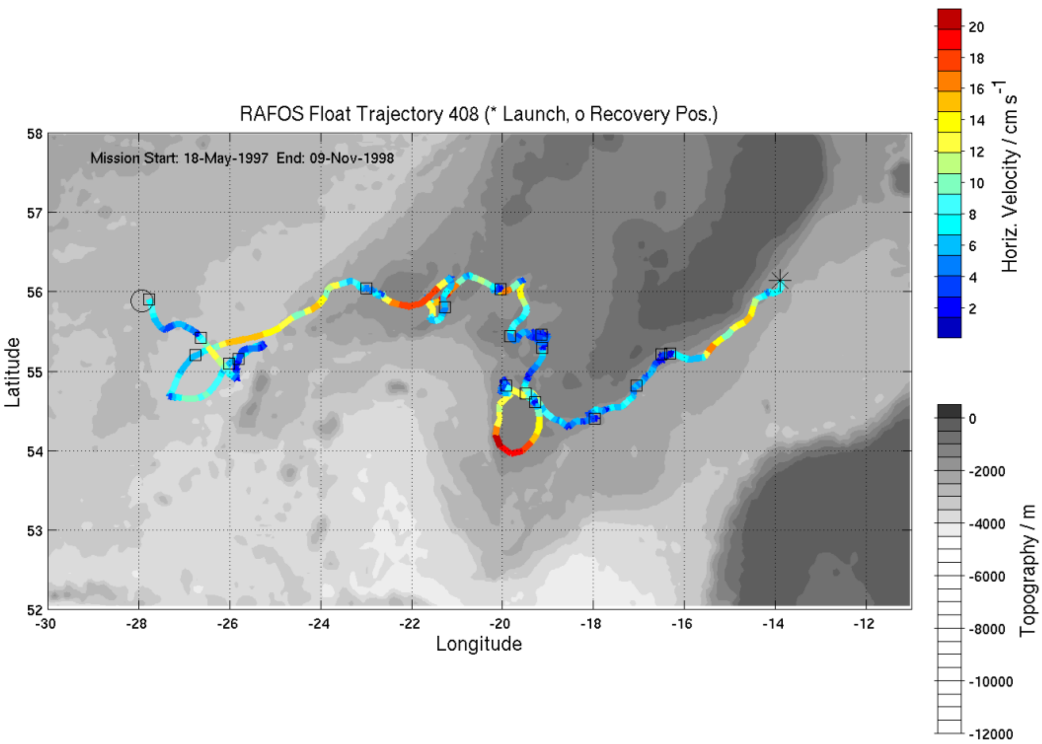

RAFOS Float 405: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days


RAFOS Float Trajectory 407 (* Launch, o Recovery Pos.)
Mission Start: 21-May-1997 End: 12-Nov-1998
Latitude
Longitude
62
61
60
59
58
57
56
55
54
53
52
51
-42
-40
-38
-36
-34
-32
-30
-28
-26
-24
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5 10 15 20 25 30
Horiz. Velocity / cm s-1

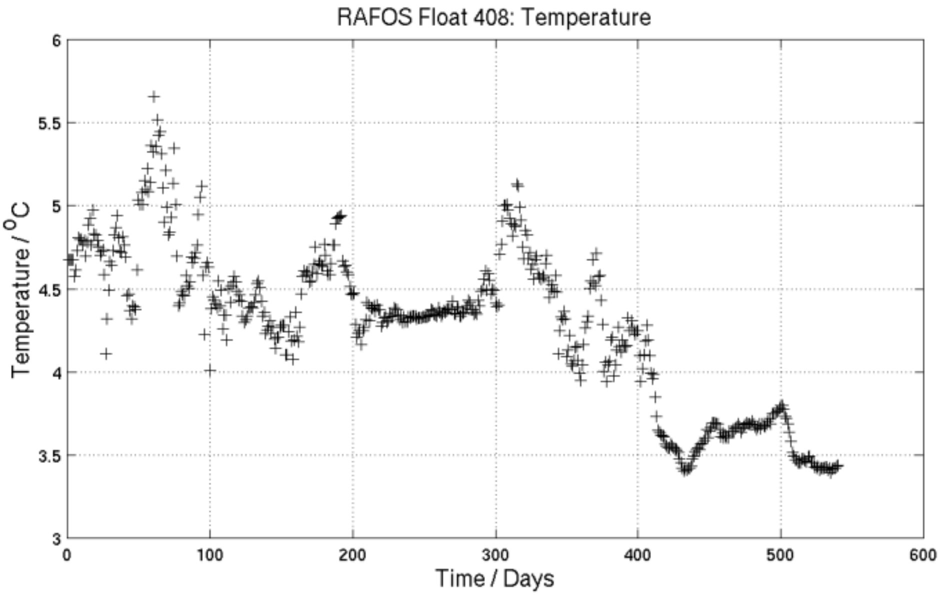

RAFOS Float 407: Temperature
Temperature / ^{o}C
Time / Days
3.8
3.7
3.6
3.5
3.4
3.3
3.2
3.1
3
0
100
200
300
400
500
600

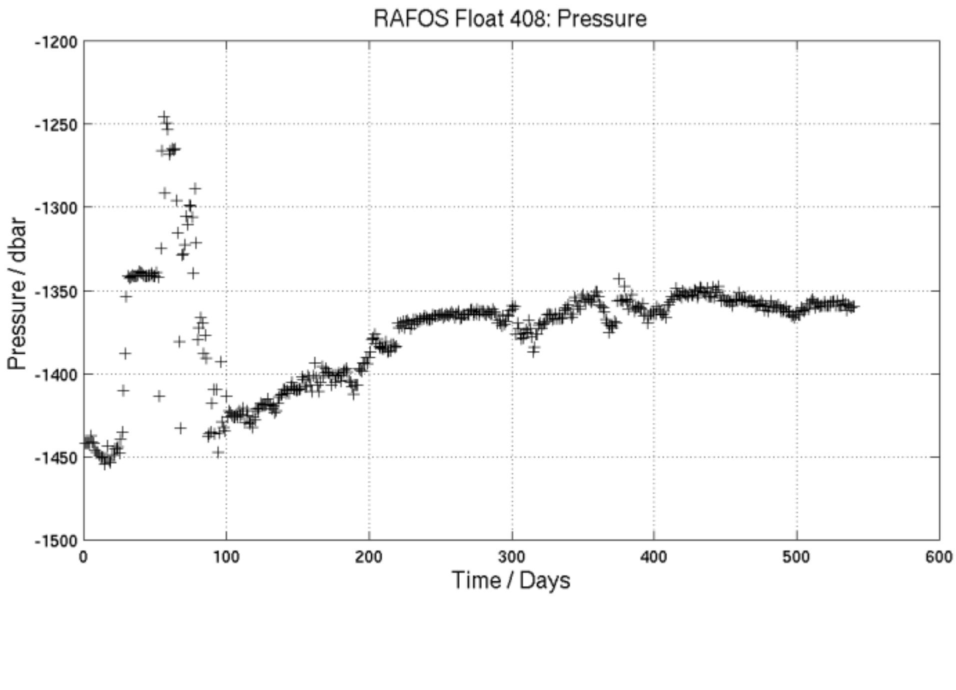

RAFOS Float 407: Pressure
Pressure / dbar
Time / Days
-1445
-1450
-1455
-1460
-1465
-1470
-1475
-1480
0
100
200
300
400
500
600

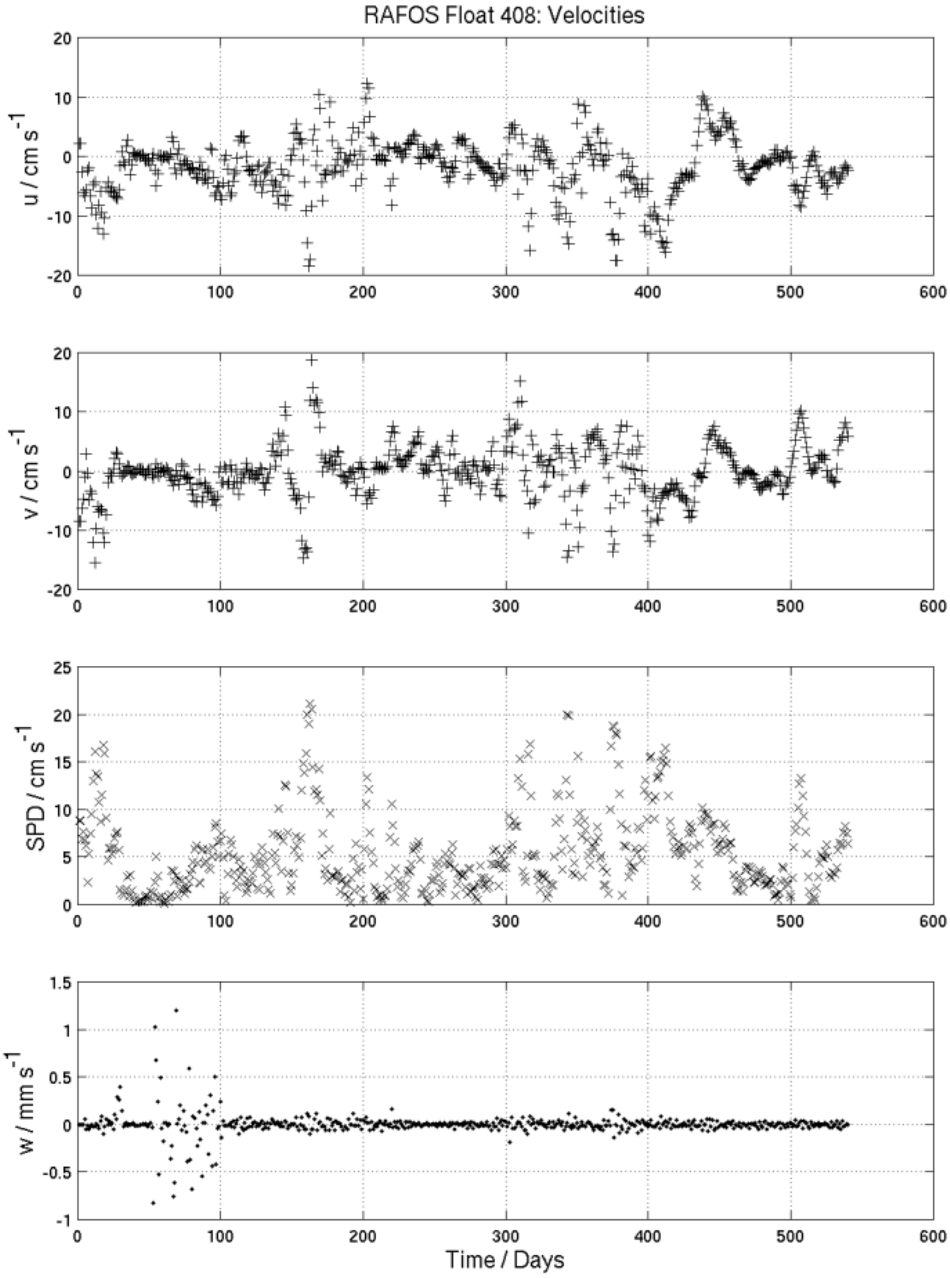

RAFOS Float 407: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

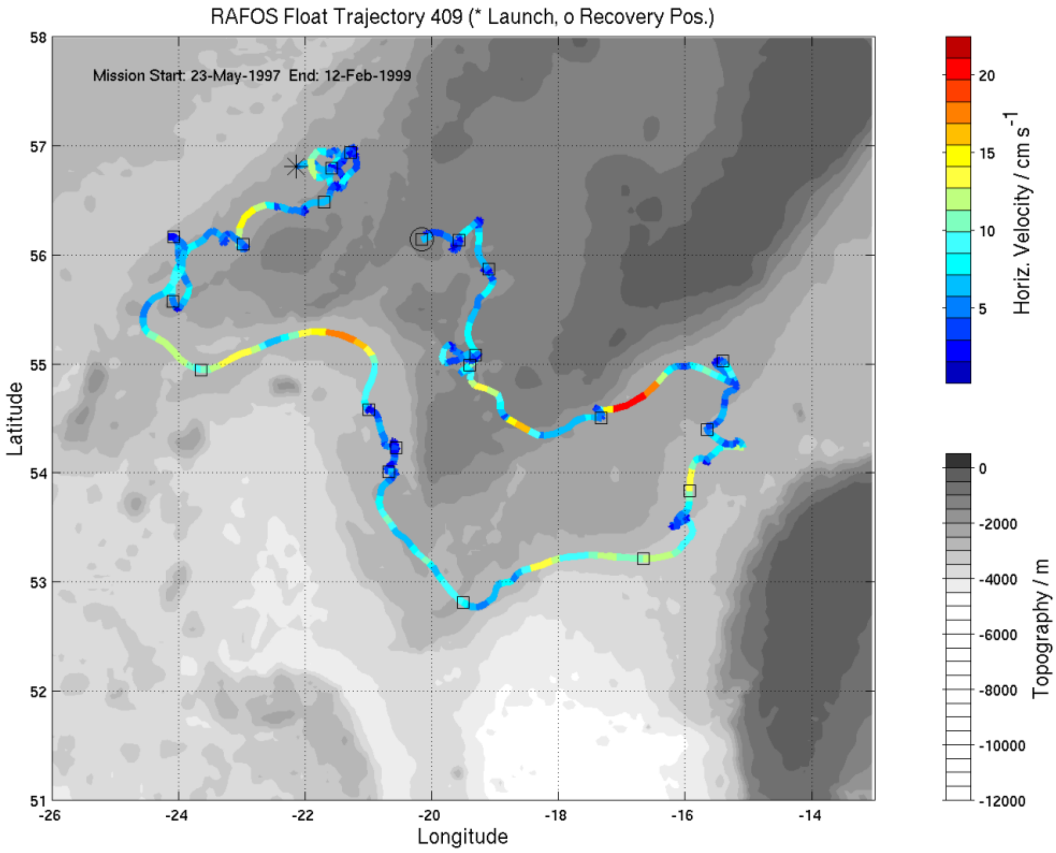


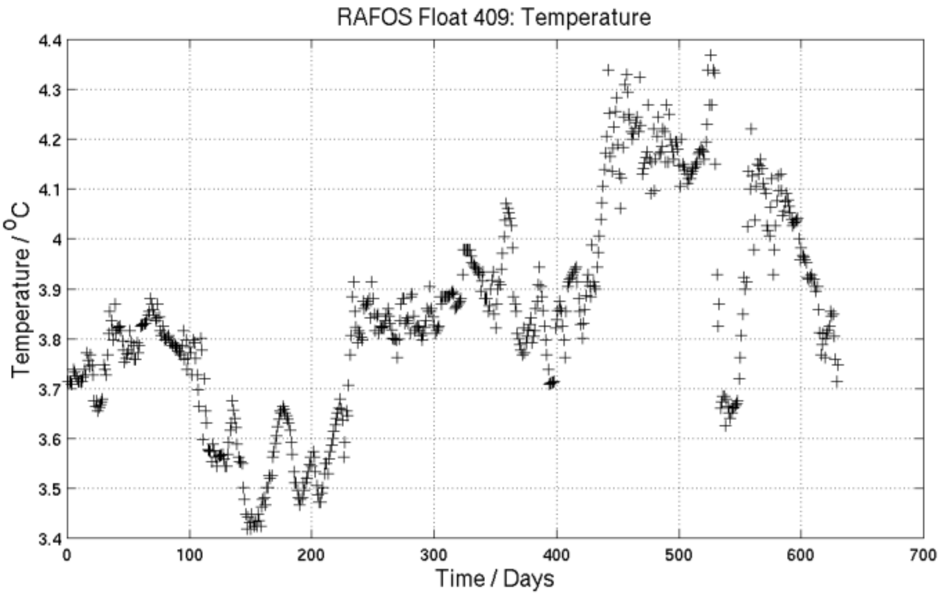
RAFOS Float Trajectory 408 (* Launch, o Recovery Pos.)
Mission Start: 18-May-1997 End: 09-Nov-1998
Latitude
Longitude
58
57
56
55
54
53
52
-30
-28
-26
-24
-22
-20
-18
-16
-14
-12
Horiz. Velocity / cm s^{-1}
20
18
16
14
12
10
8
6
4
2
Topography / m
0
-2000
-4000
-6000
-8000
-10000
-12000

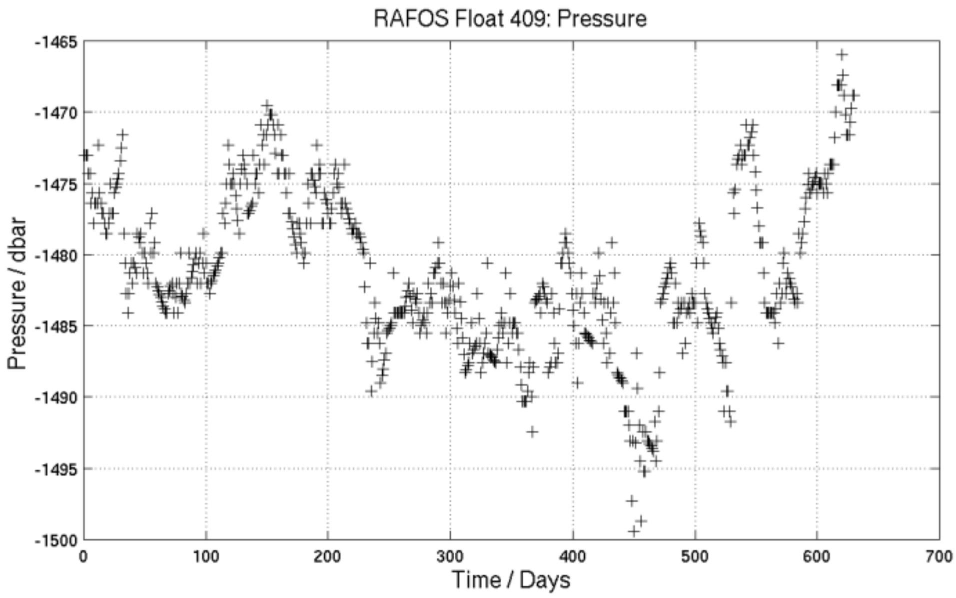

RAFOS Float 408: Temperature
Temperature / °C
Time / Days
6
5.5
5
4.5
4
3.5
3
0
100
200
300
400
500
600

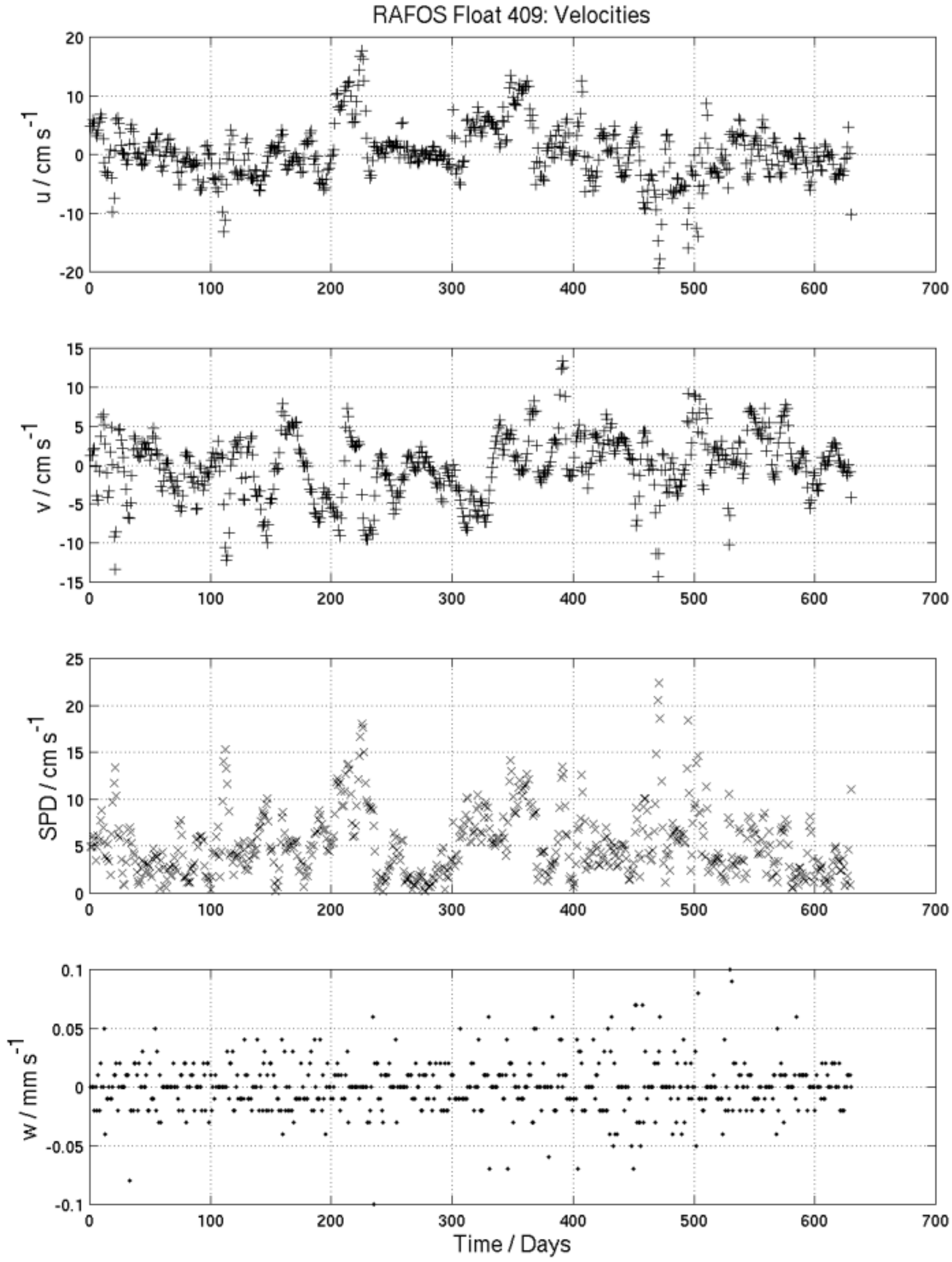

RAFOS Float 408: Pressure
Pressure / dbar
Time / Days
-1200
-1250
-1300
-1350
-1400
-1450
-1500
0
100
200
300
400
500
600


RAFOS Float 408: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

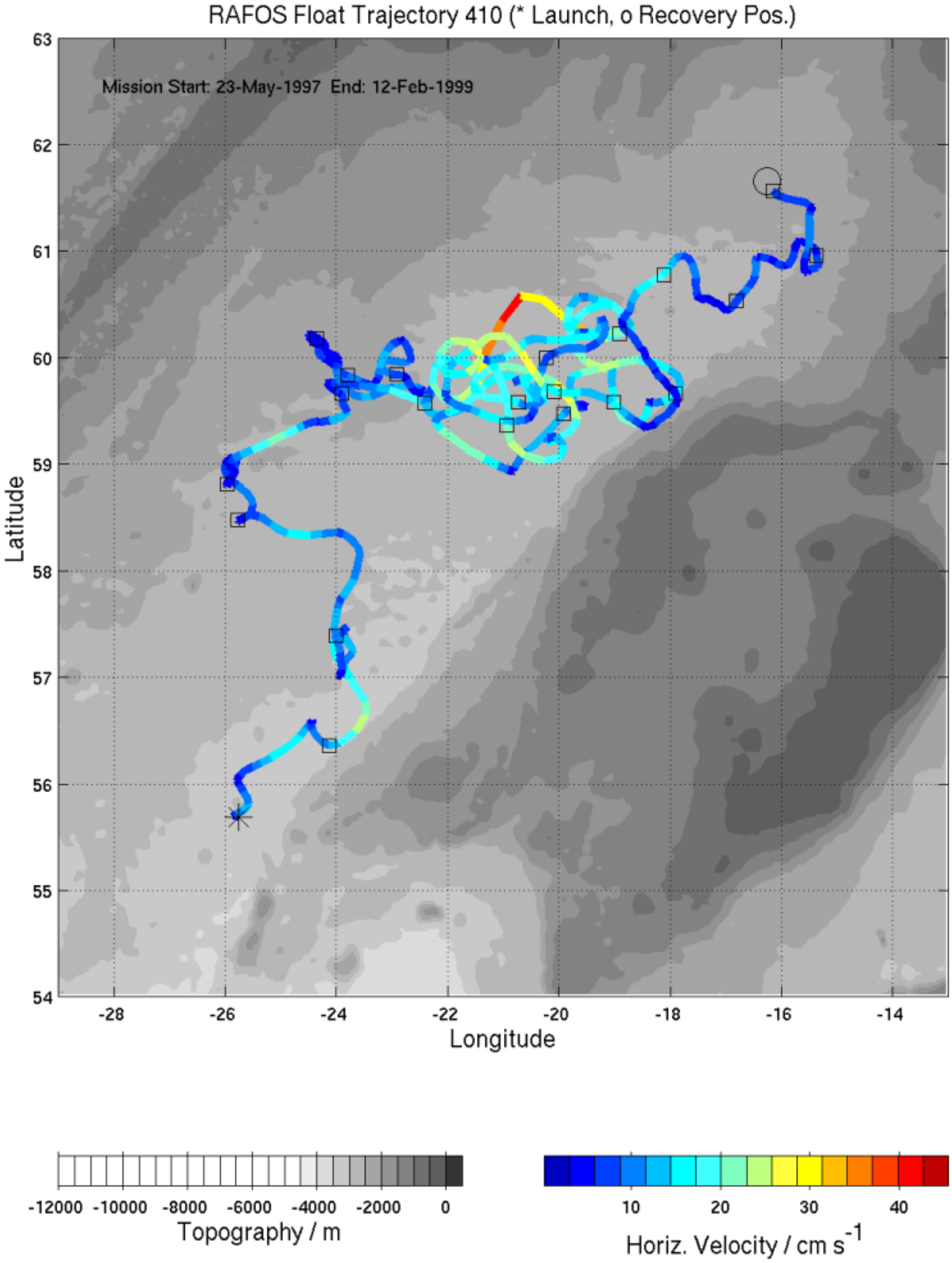

RAFOS Float Trajectory 409 (* Launch, o Recovery Pos.)
Mission Start: 23-May-1997 End: 12-Feb-1999
Latitude
Longitude
Horiz. Velocity / cm s-1
Topography / m

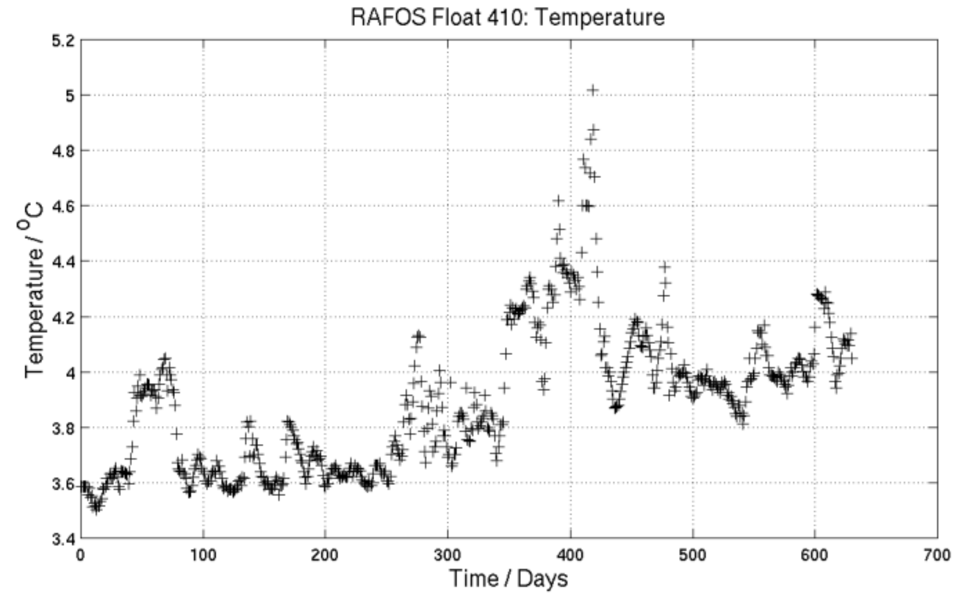

RAFOS Float 409: Temperature
Temperature / ^{o}C
Time / Days
4.4
4.3
4.2
4.1
4
3.9
3.8
3.7
3.6
3.5
3.4
0
100
200
300
400
500
600
700

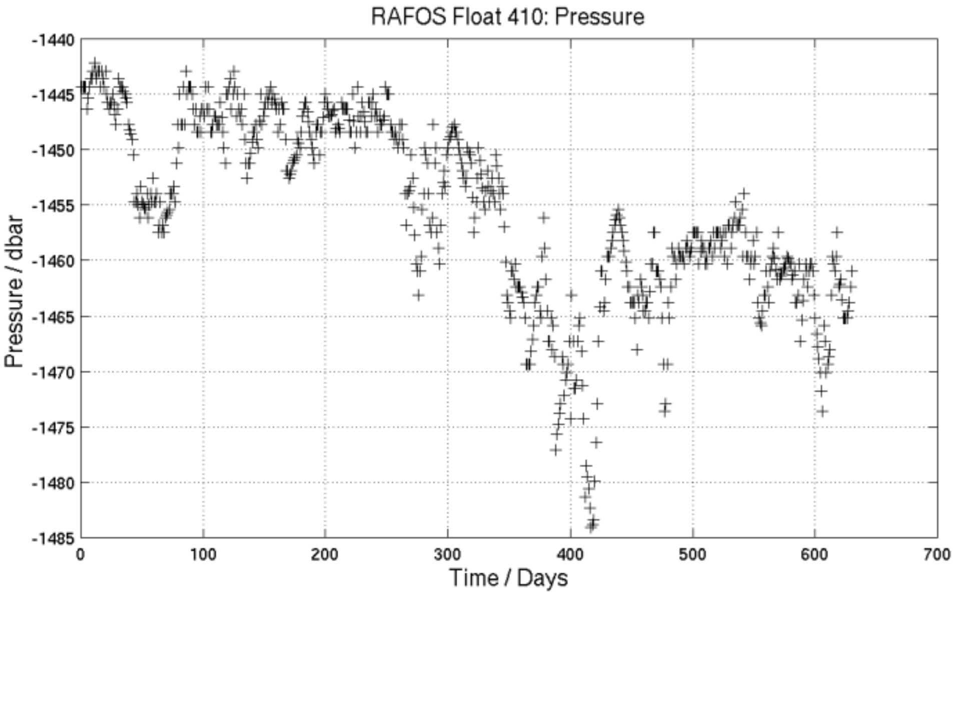

RAFOS Float 409: Pressure
Pressure / dbar
Time / Days
-1465
-1470
-1475
-1480
-1485
-1490
-1495
-1500
0
100
200
300
400
500
600
700

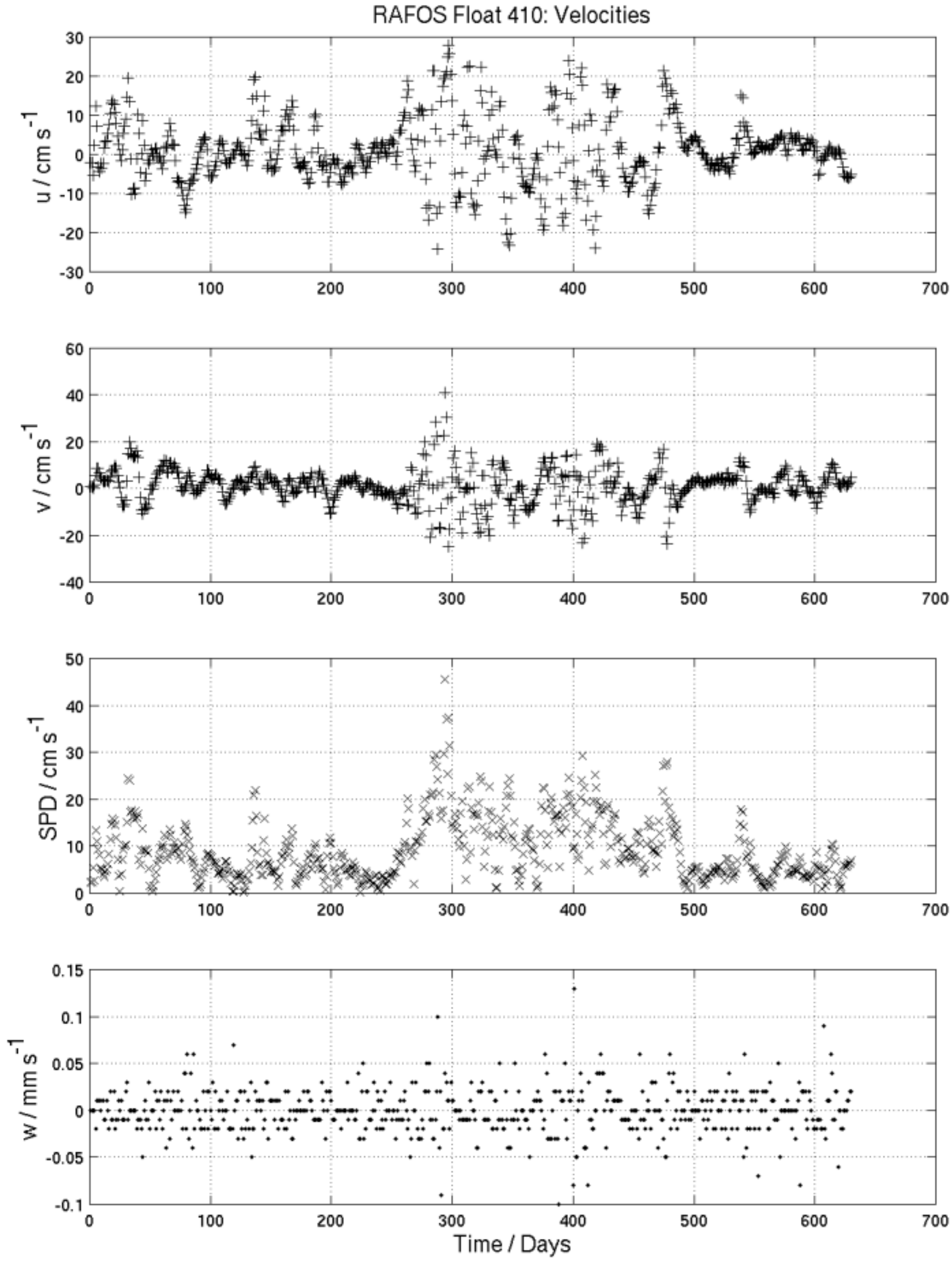


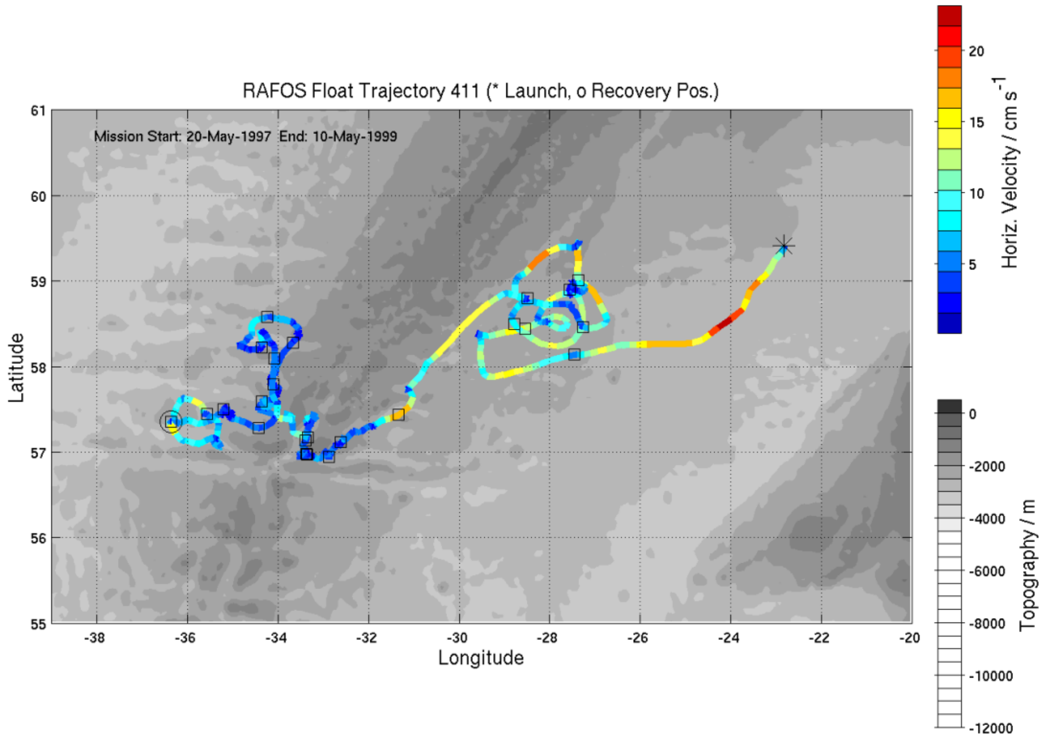
RAFOS Float 409: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

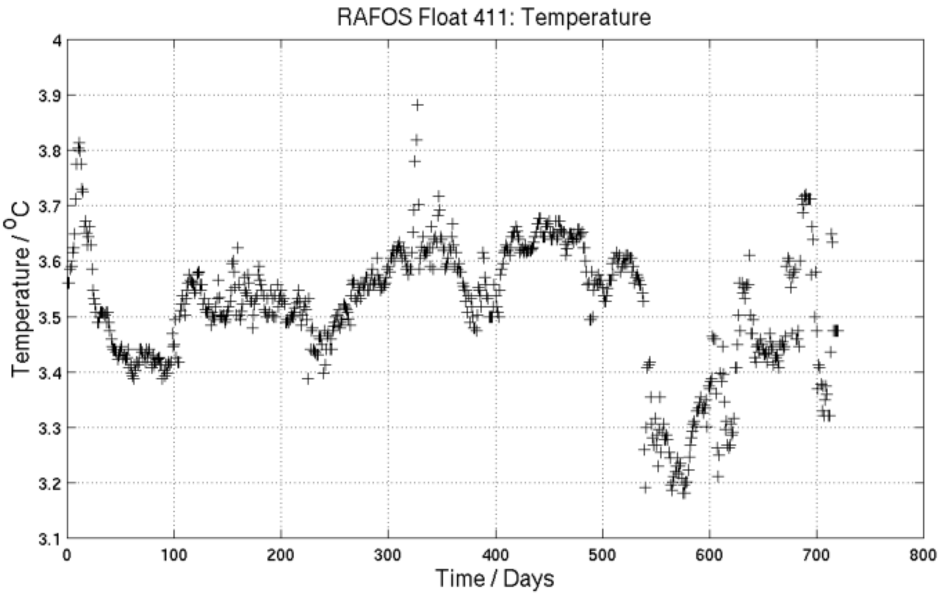

RAFOS Float Trajectory 410 (* Launch, o Recovery Pos.)
Mission Start: 23-May-1997 End: 12-Feb-1999
Latitude
Longitude
63
62
61
60
59
58
57
56
55
54
-28
-26
-24
-22
-20
-18
-16
-14
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
10 20 30 40
Horiz. Velocity / cm s-1

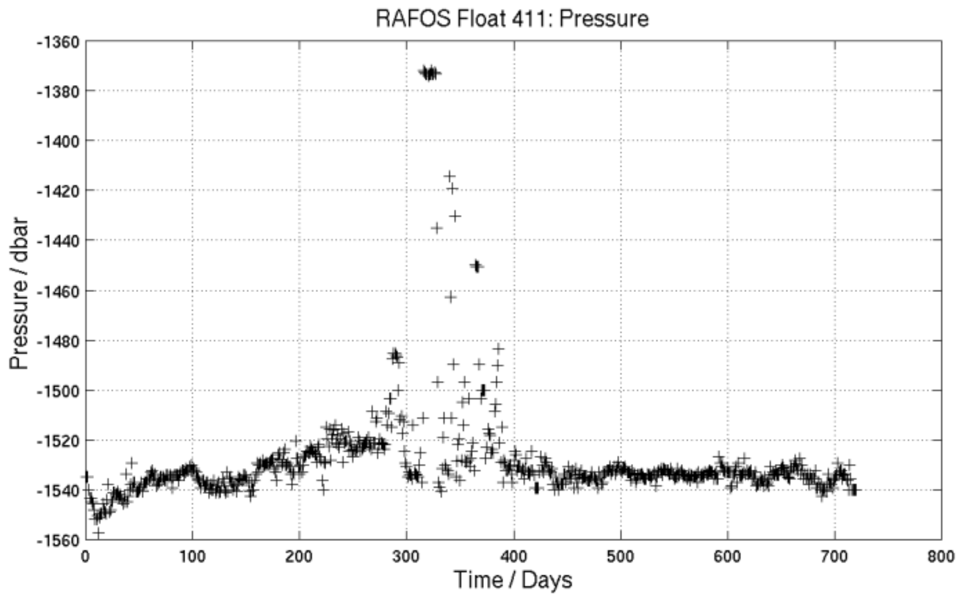

RAFOS Float 410: Temperature
Temperature / ^{o}C
Time / Days
5.2
5
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
0
100
200
300
400
500
600
700

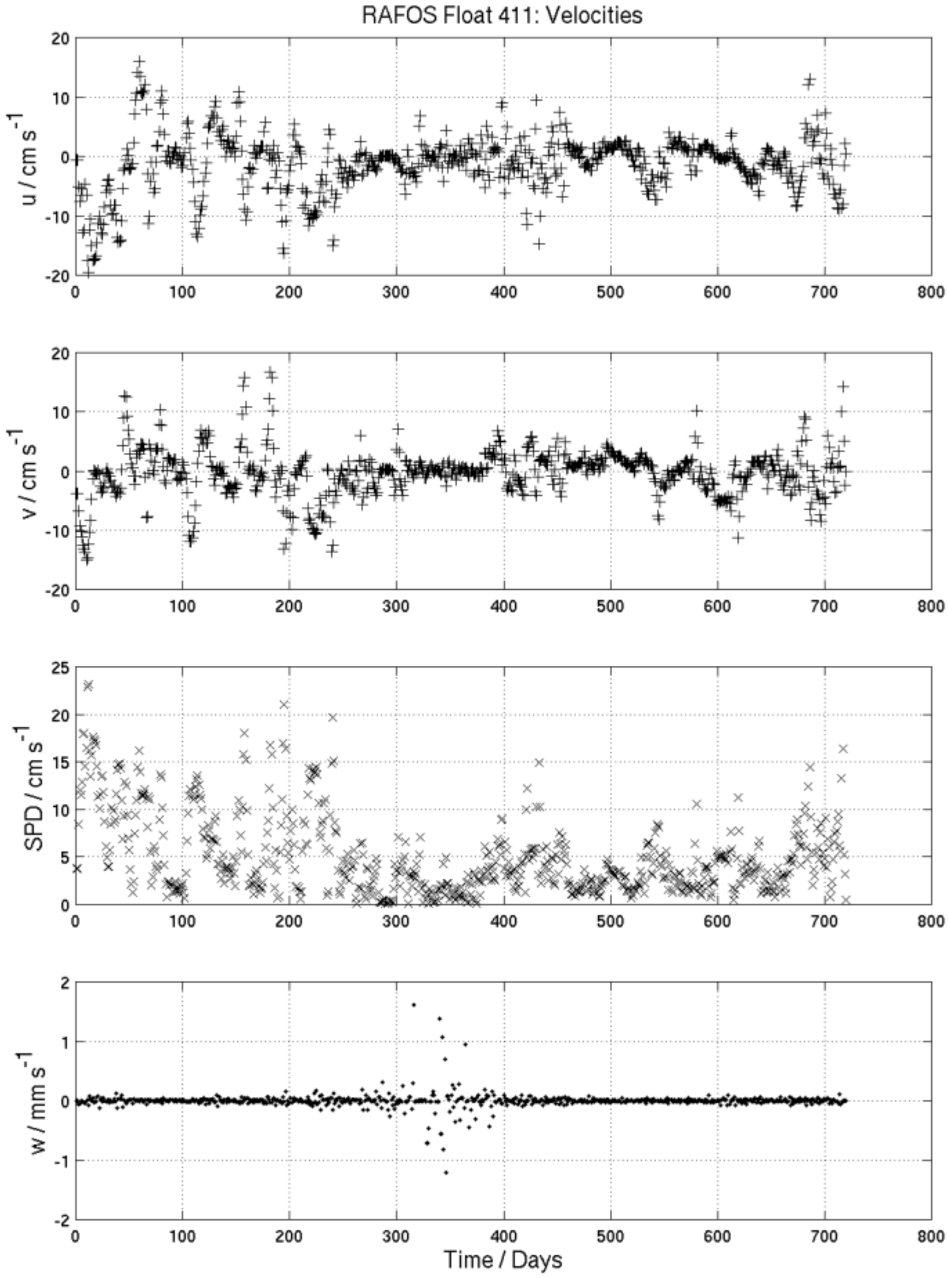

RAFOS Float 410: Pressure
Pressure / dbar
Time / Days
-1440
-1445
-1450
-1455
-1460
-1465
-1470
-1475
-1480
-1485
0
100
200
300
400
500
600
700


RAFOS Float 410: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days
0
100
200
300
400
500
600
700

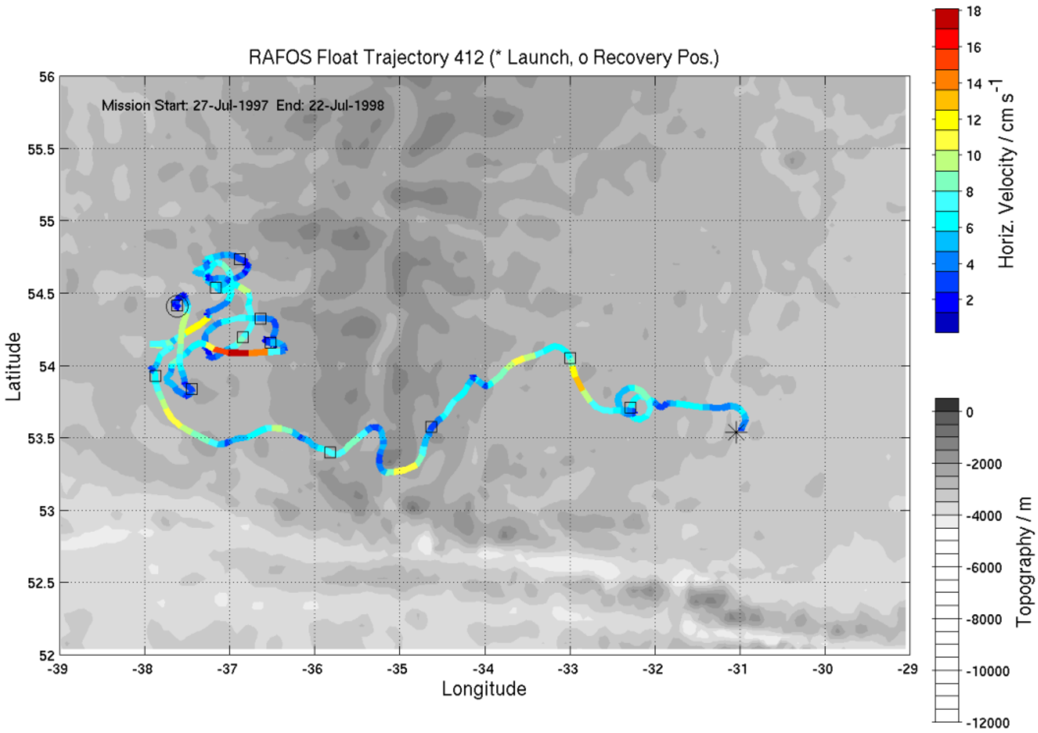

RAFOS Float Trajectory 411 (* Launch, o Recovery Pos.)
Mission Start: 20-May-1997 End: 10-May-1999
Latitude
Longitude
61
60
59
58
57
56
55
-38
-36
-34
-32
-30
-28
-26
-24
-22
-20
Horiz. Velocity / cm s^{-1}
20
15
10
5
Topography / m
0
-2000
-4000
-6000
-8000
-10000
-12000


RAFOS Float 411: Temperature
Temperature / ^oC
Time / Days
4
3.9
3.8
3.7
3.6
3.5
3.4
3.3
3.2
3.1
0
100
200
300
400
500
600
700
800

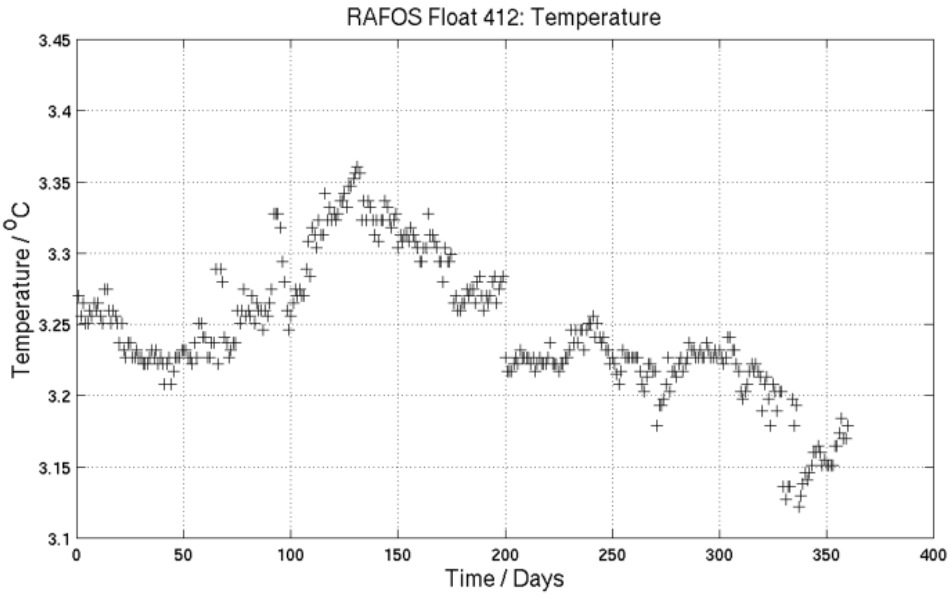

RAFOS Float 411: Pressure
Pressure / dbar
Time / Days
-1360
-1380
-1400
-1420
-1440
-1460
-1480
-1500
-1520
-1540
-1560
0
100
200
300
400
500
600
700
800

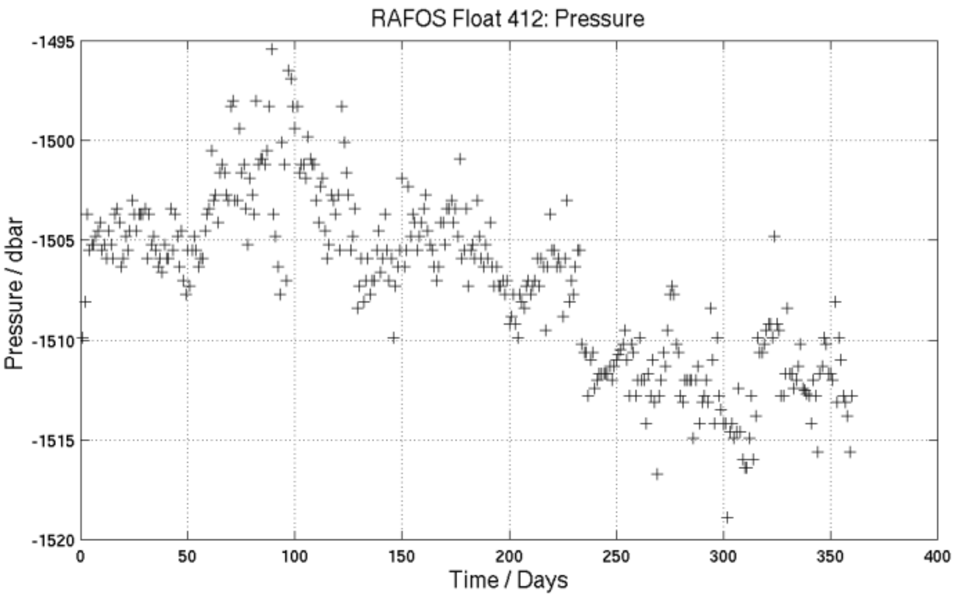


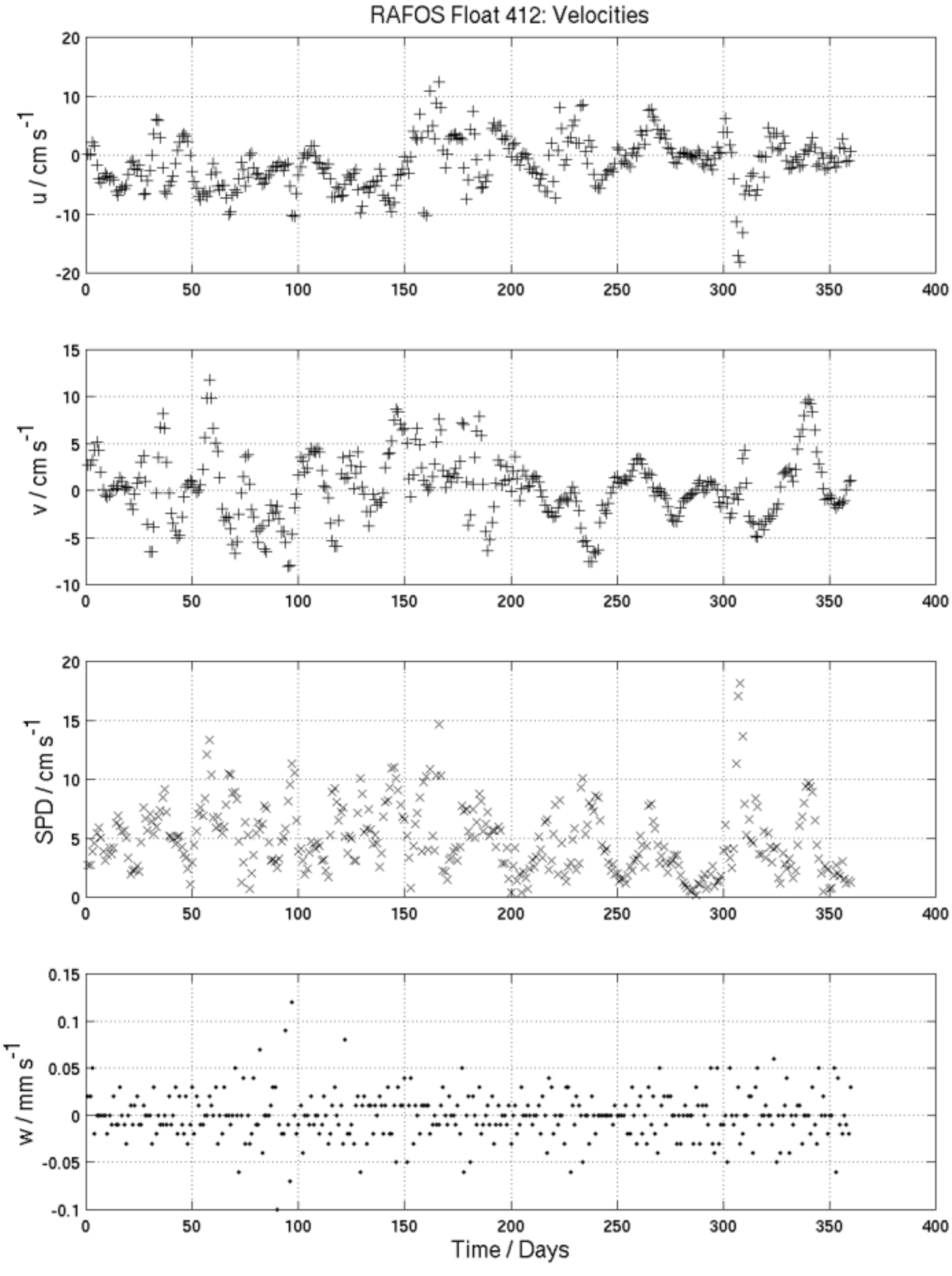
RAFOS Float 411: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days



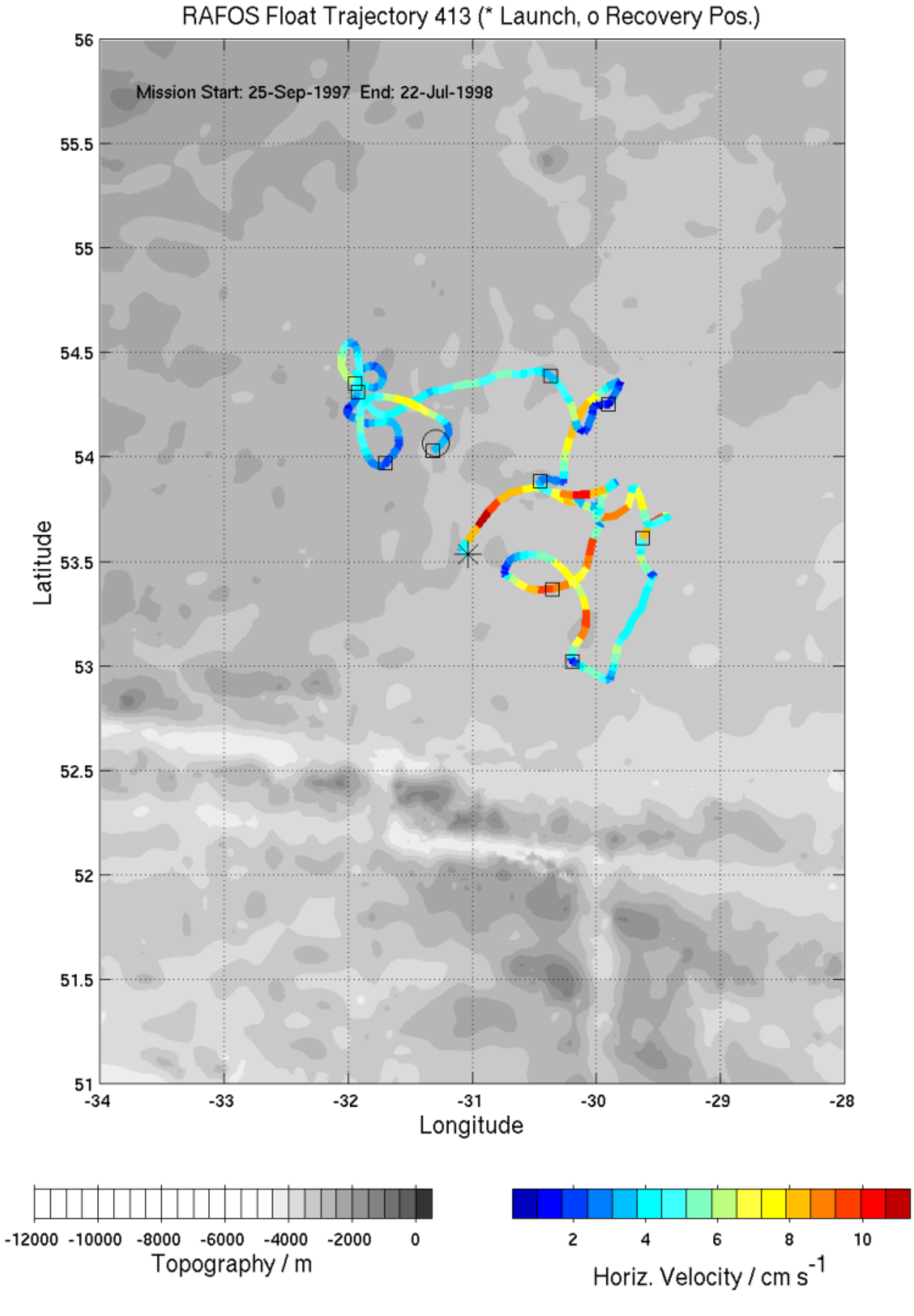
RAFOS Float Trajectory 412 (* Launch, o Recovery Pos.)
Mission Start: 27-Jul-1997 End: 22-Jul-1998
Latitude
Longitude
Horiz. Velocity / cm s-1
Topography / m


RAFOS Float 412: Temperature
Temperature / °C
Time / Days
3.45
3.4
3.35
3.3
3.25
3.2
3.15
3.1
0
50
100
150
200
250
300
350
400

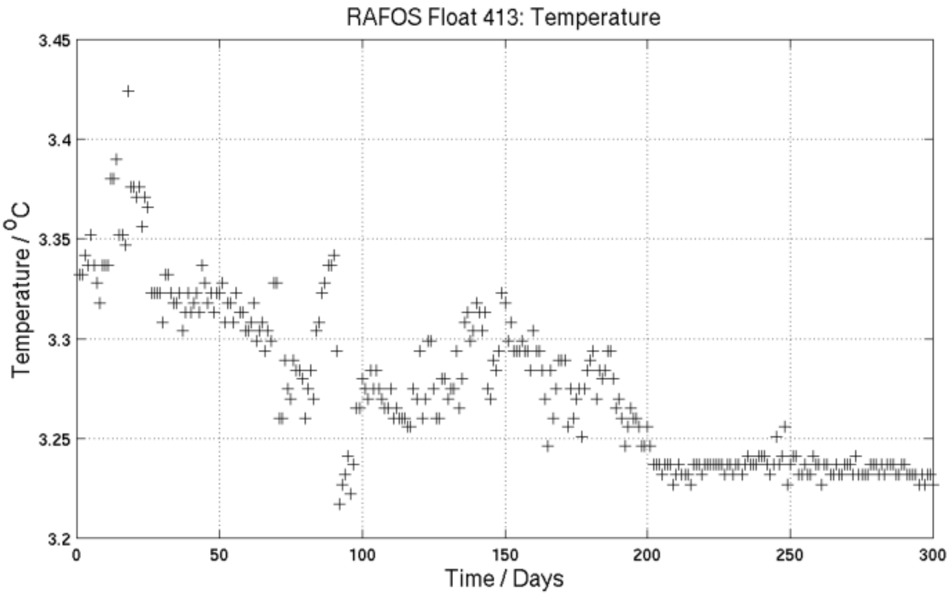

RAFOS Float 412: Pressure
Pressure / dbar
Time / Days
-1495
-1500
-1505
-1510
-1515
-1520
0
50
100
150
200
250
300
350
400



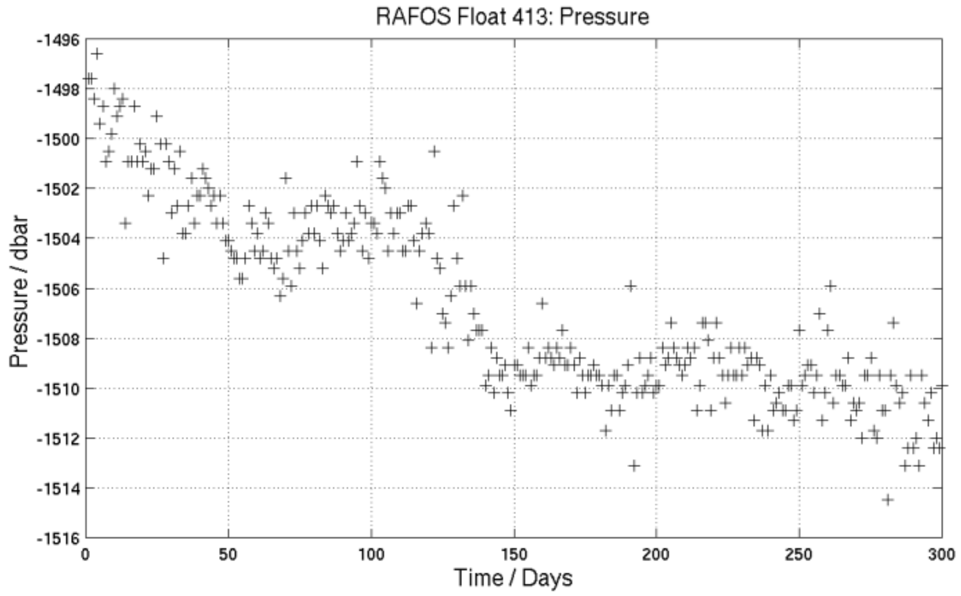
RAFOS Float 412: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days



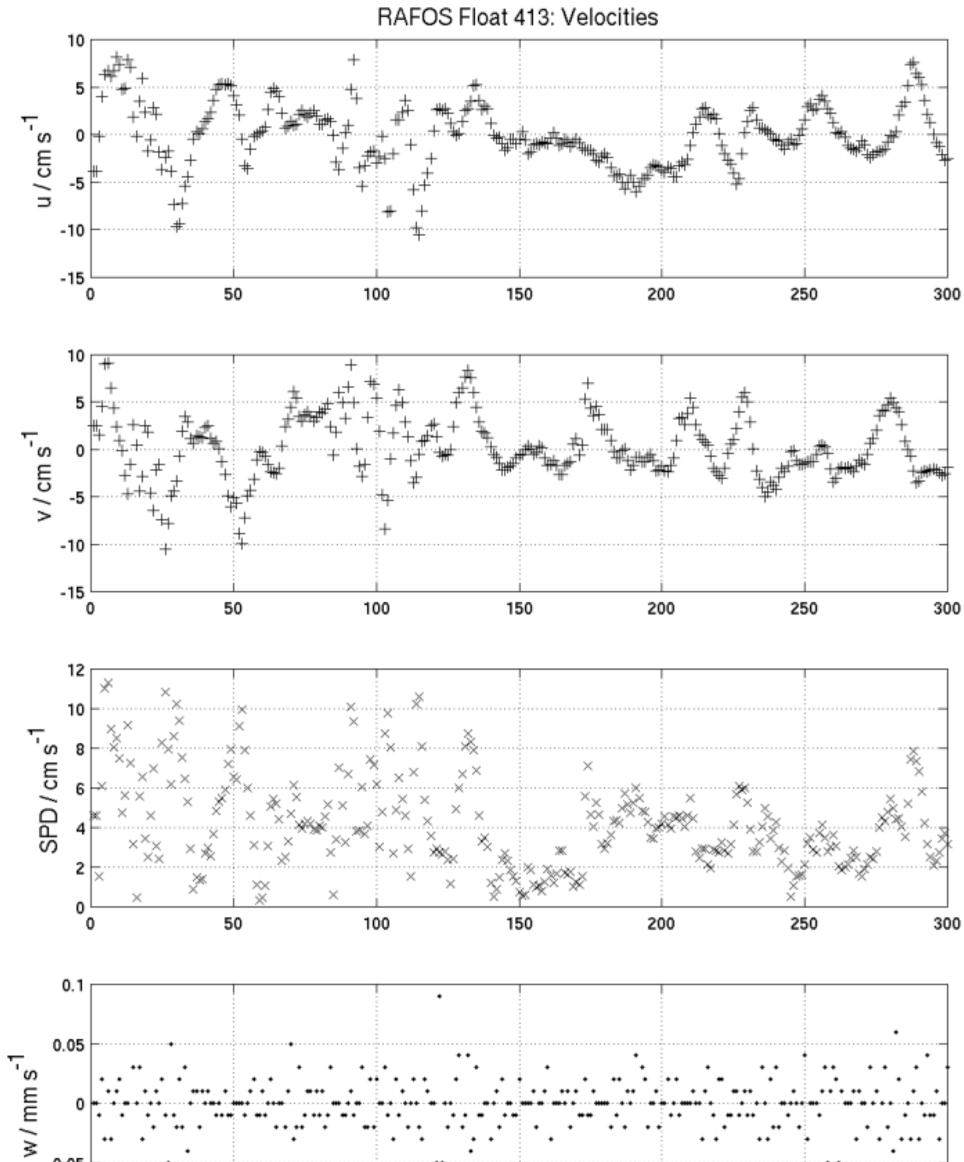
RAFOS Float Trajectory 413 (* Launch, o Recovery Pos.)
Mission Start: 25-Sep-1997 End: 22-Jul-1998
56
55.5
55
54.5
54
53.5
53
52.5
52
51.5
51
Latitude
-34
-33
-32
-31
-30
-29
-28
Longitude
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
2 4 6 8 10
Horiz. Velocity / cm s-1



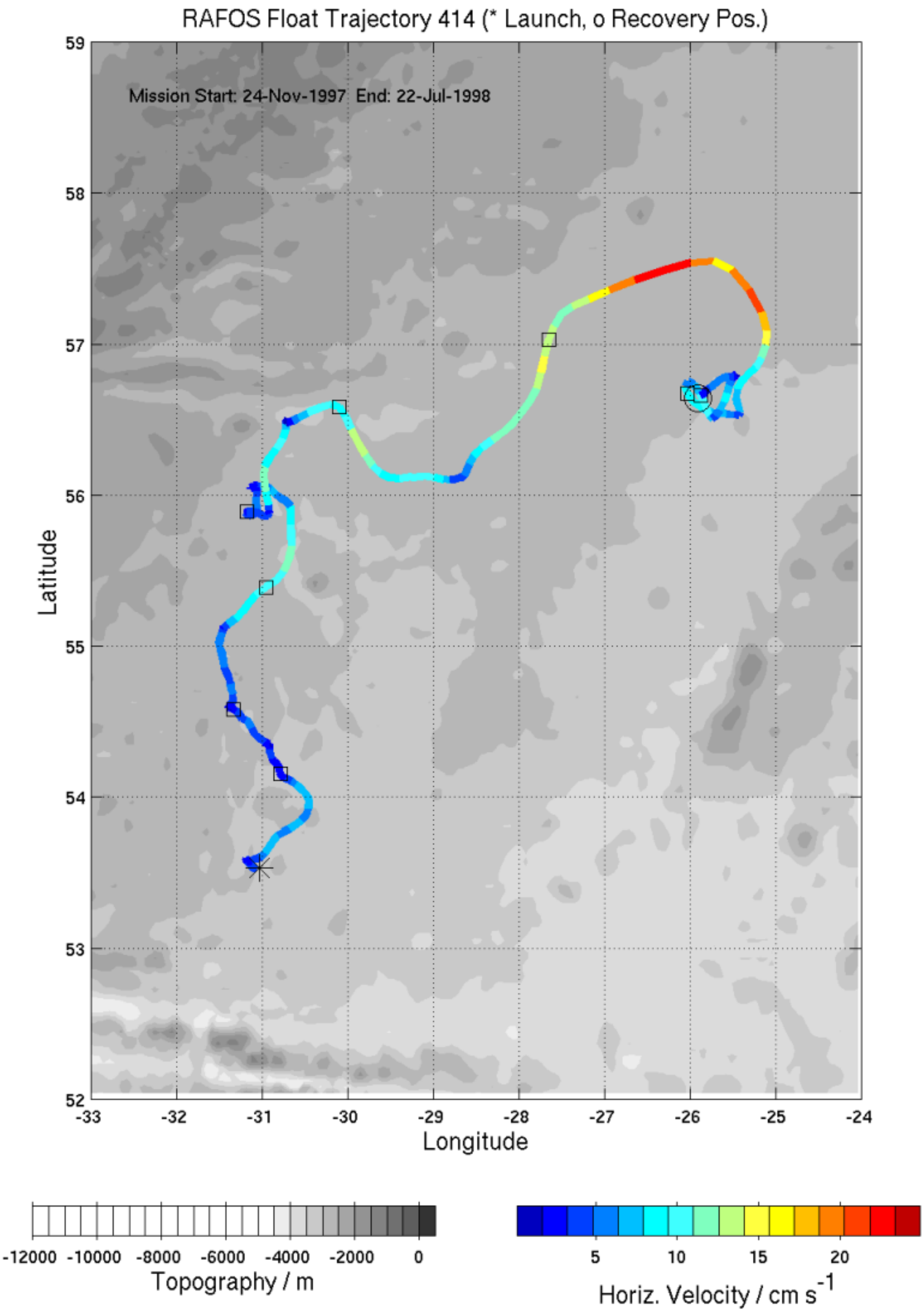
RAFOS Float 413: Temperature
Temperature / ^{o}C
Time / Days

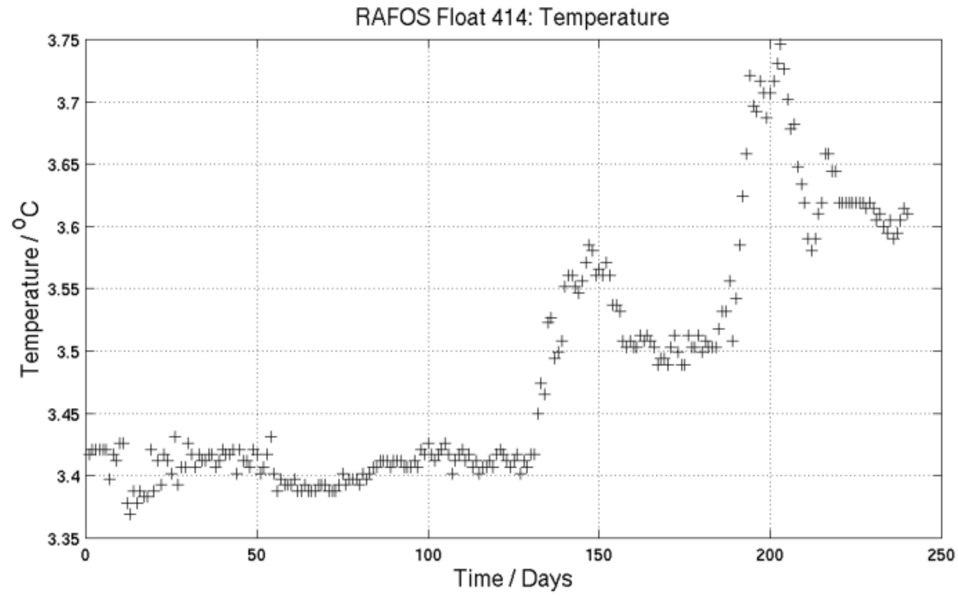


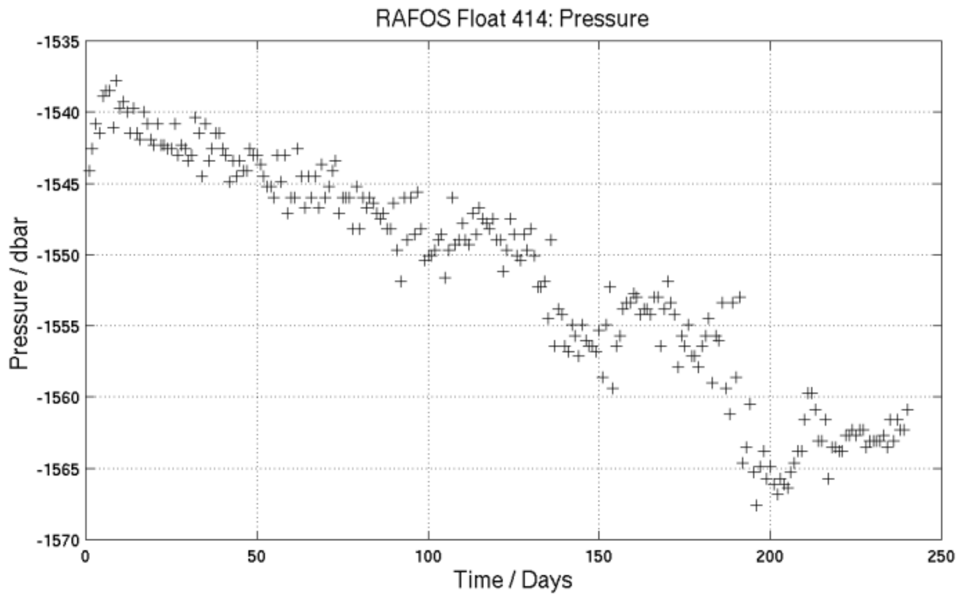
RAFOS Float 413: Pressure
Pressure / dbar
Time / Days

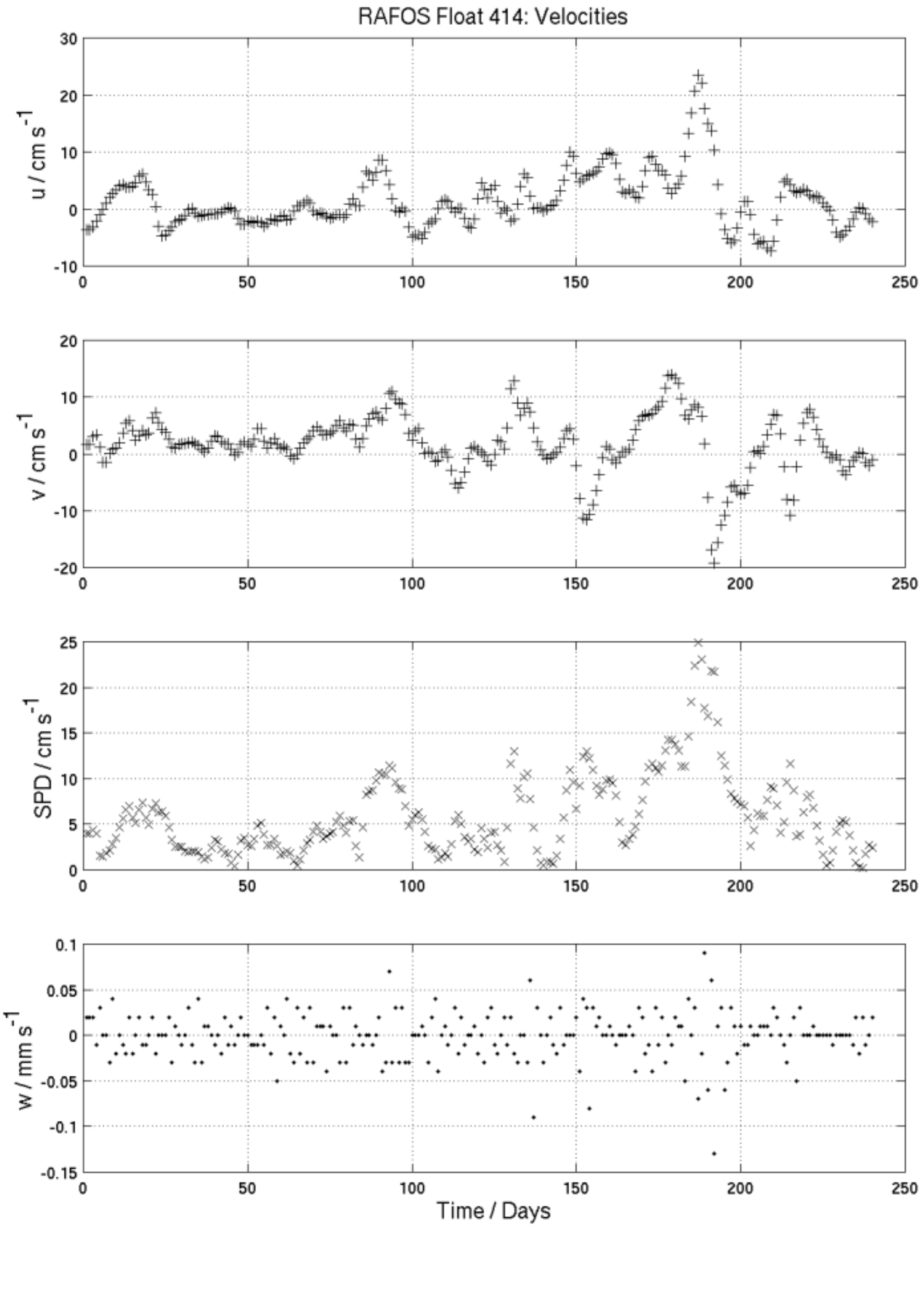


RAFOS Float 413: Velocities
u / cm s^{-1}
v / cm s^{-1}
SPD / cm s^{-1}
w / mm s^{-1}
Time / Days

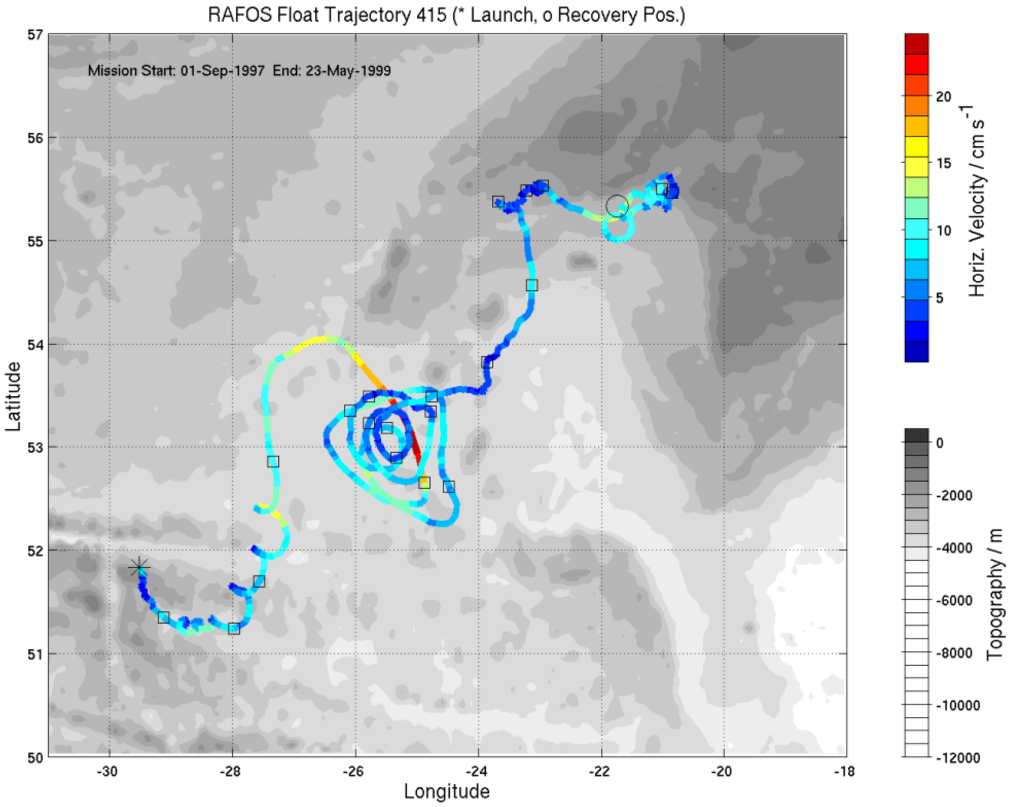

RAFOS Float Trajectory 414 (* Launch, o Recovery Pos.)
Mission Start: 24-Nov-1997 End: 22-Jul-1998
Latitude
Longitude
59
58
57
56
55
54
53
52
-33
-32
-31
-30
-29
-28
-27
-26
-25
-24
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5 10 15 20
Horiz. Velocity / cm s-1


RAFOS Float 414: Temperature
Temperature / ^{o}C
Time / Days
3.75
3.7
3.65
3.6
3.55
3.5
3.45
3.4
3.35
0
50
100
150
200
250

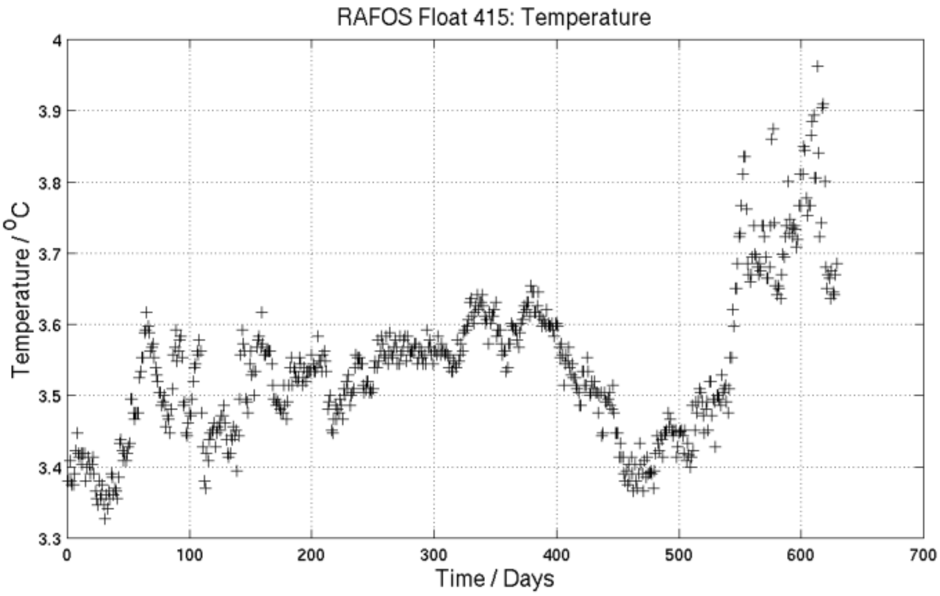

RAFOS Float 414: Pressure
Pressure / dbar
Time / Days
-1535
-1540
-1545
-1550
-1555
-1560
-1565
-1570
0
50
100
150
200
250

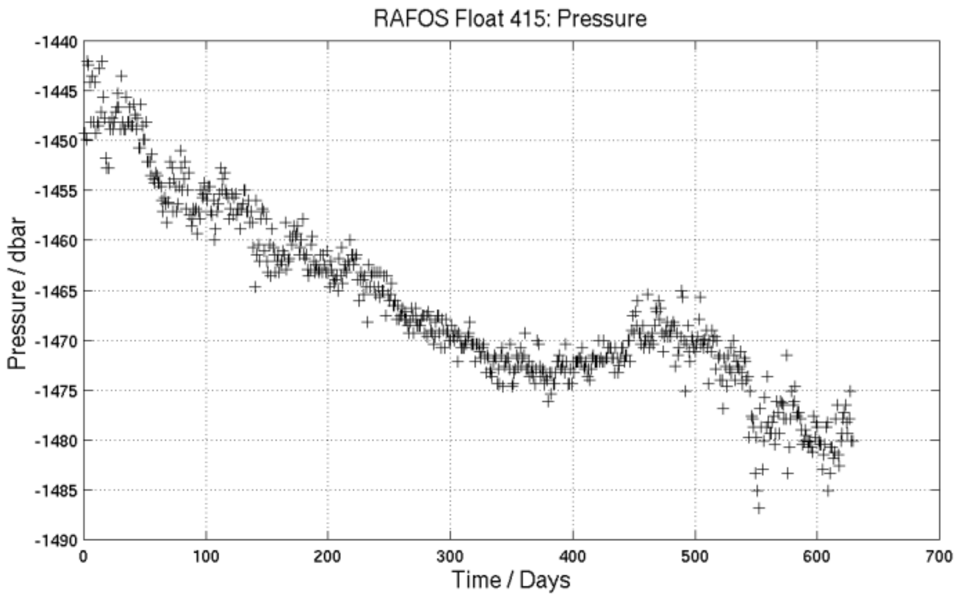


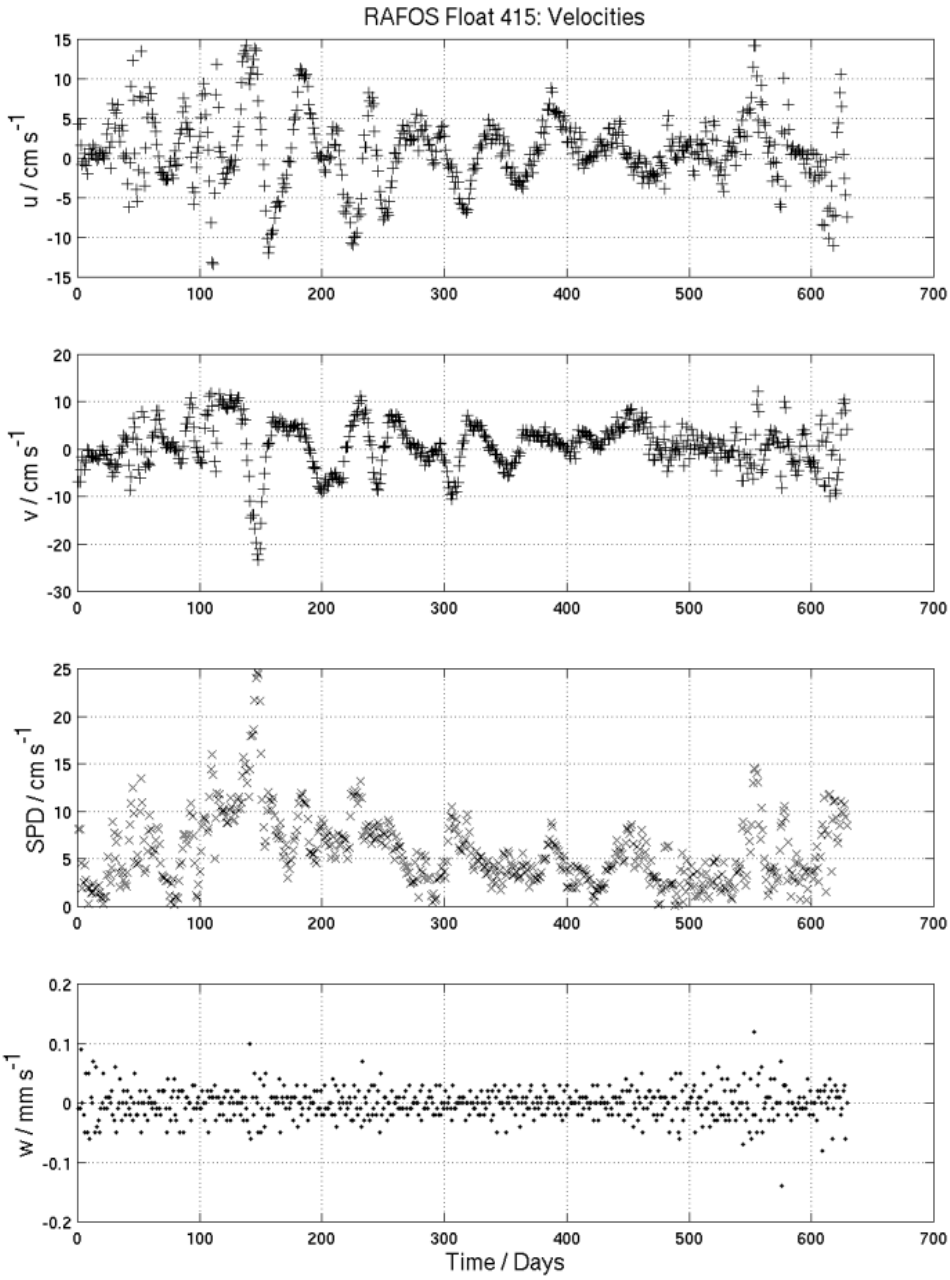
RAFOS Float 414: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

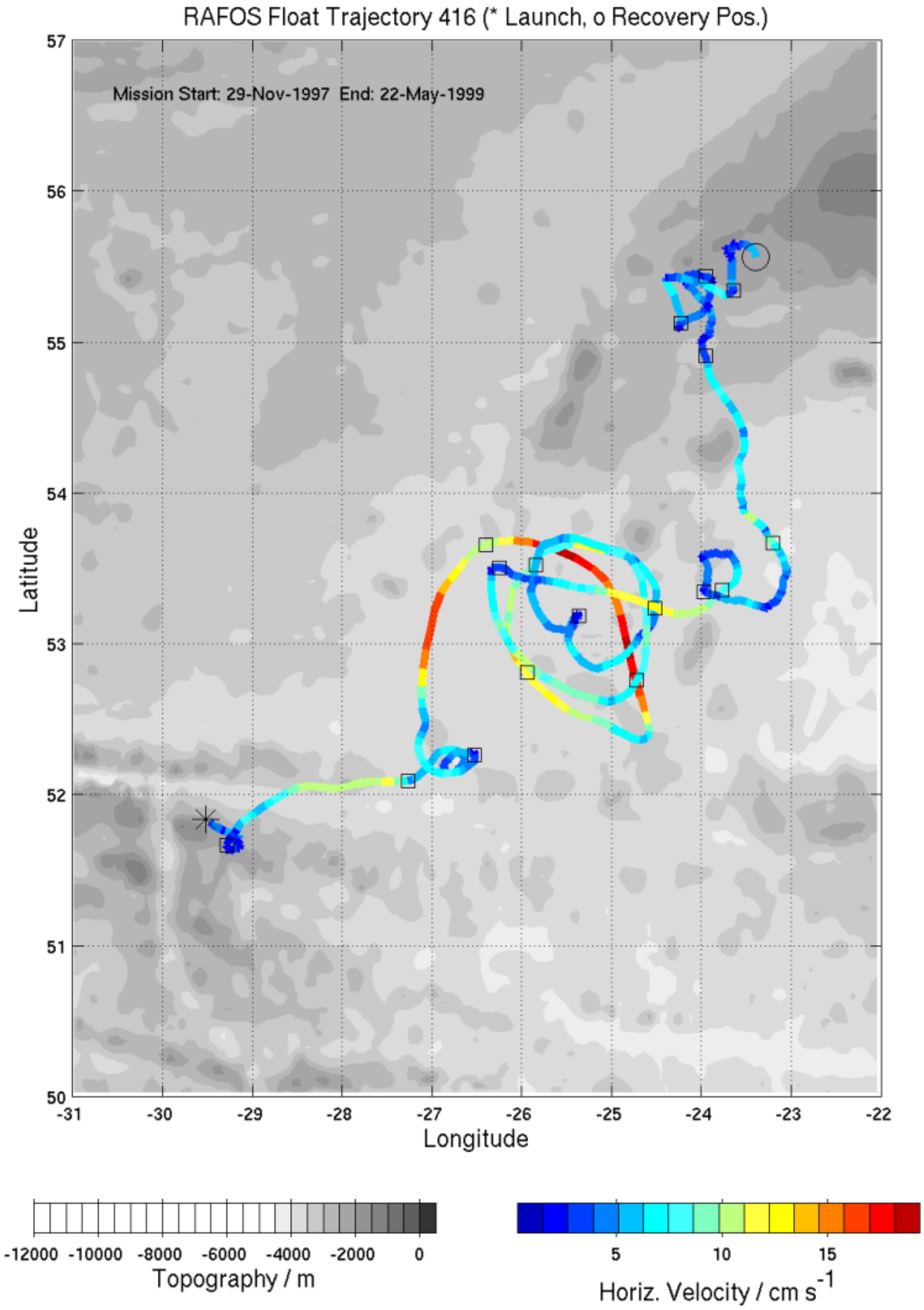


RAFOS Float Trajectory 415 (* Launch, o Recovery Pos.)
Mission Start: 01-Sep-1997 End: 23-May-1999
Latitude
Longitude
Horiz. Velocity / cm s^{-1}
Topography / m

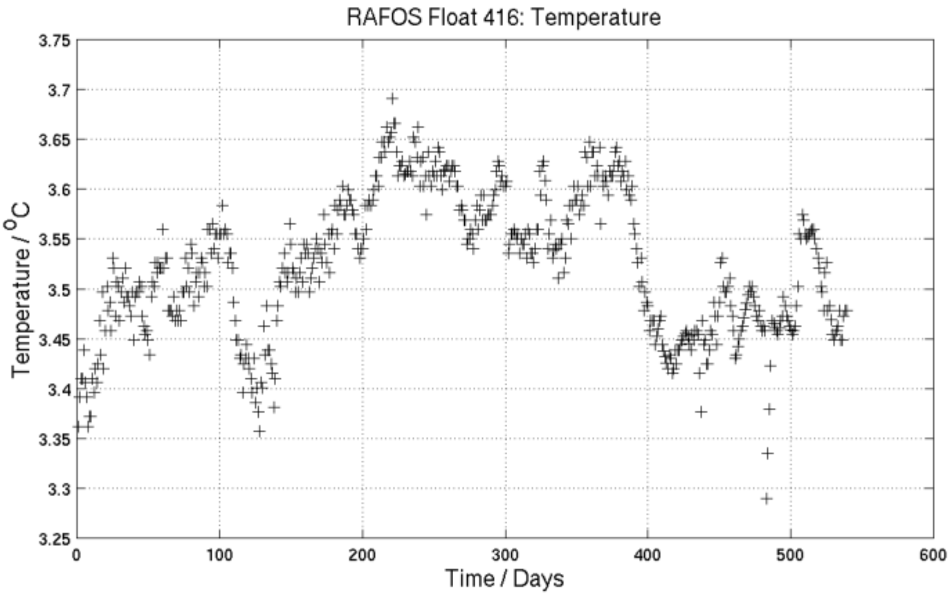

RAFOS Float 415: Temperature
Temperature / ^oC
Time / Days
4
3.9
3.8
3.7
3.6
3.5
3.4
3.3
0
100
200
300
400
500
600
700

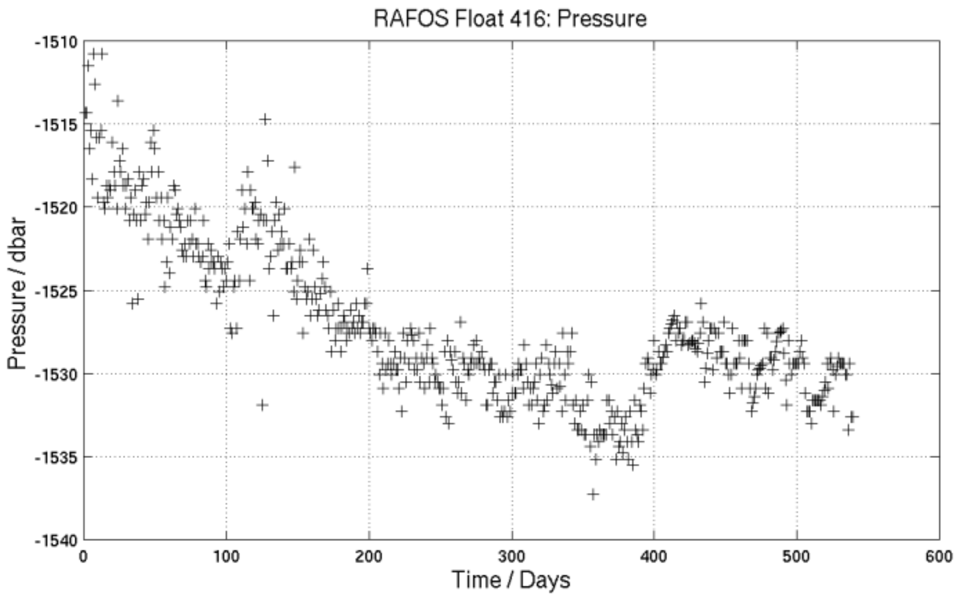

RAFOS Float 415: Pressure
Pressure / dbar
Time / Days
-1440
-1445
-1450
-1455
-1460
-1465
-1470
-1475
-1480
-1485
-1490
0
100
200
300
400
500
600
700

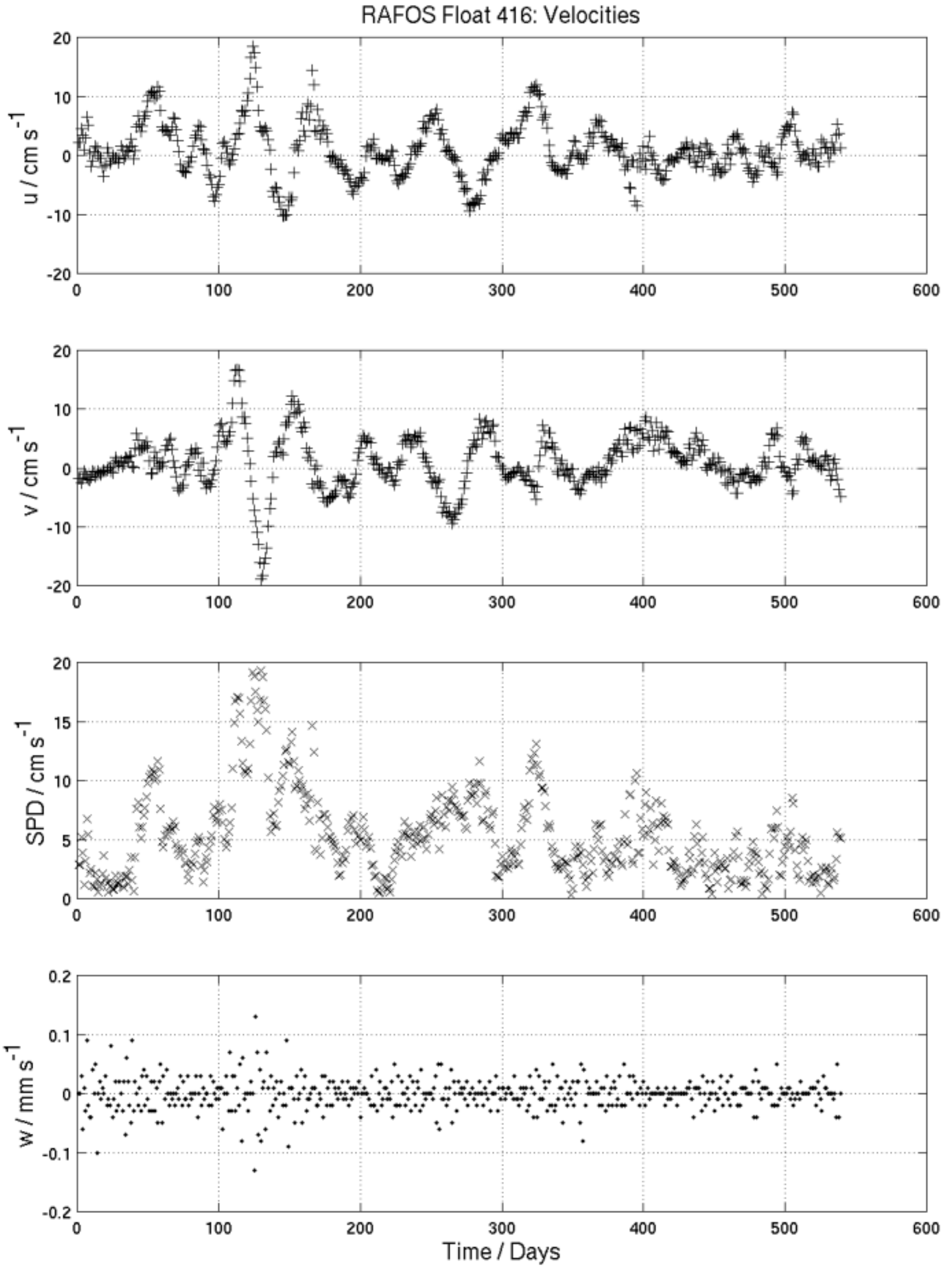

RAFOS Float 415: Velocities
u / cm s^{-1}
v / cm s^{-1}
SPD / cm s^{-1}
w / mm s^{-1}
Time / Days

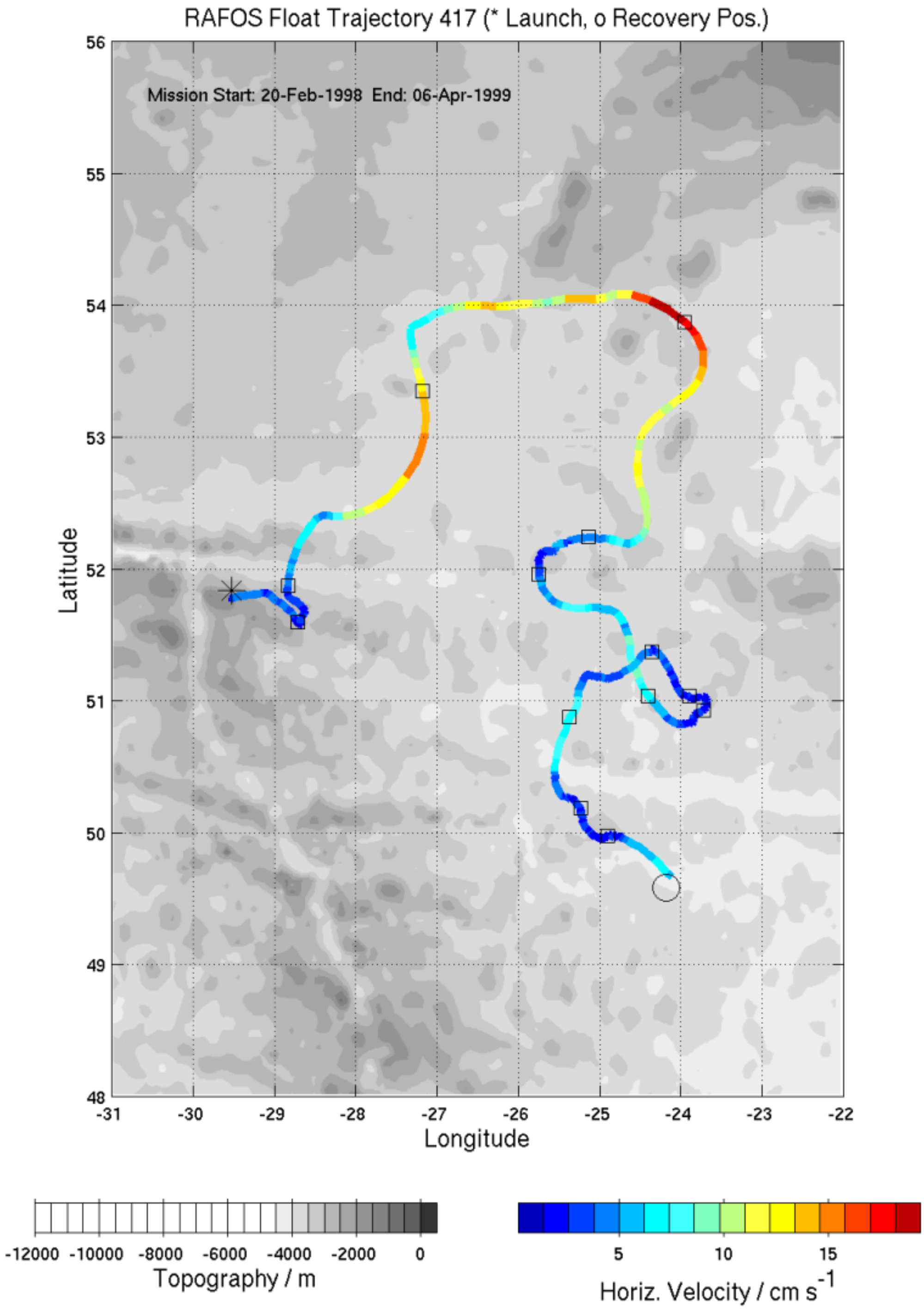


RAFOS Float Trajectory 416 (* Launch, o Recovery Pos.)
Mission Start: 29-Nov-1997 End: 22-May-1999
Latitude
Longitude
57
56
55
54
53
52
51
50
-31
-30
-29
-28
-27
-26
-25
-24
-23
-22
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5 10 15
Horiz. Velocity / cm s-1

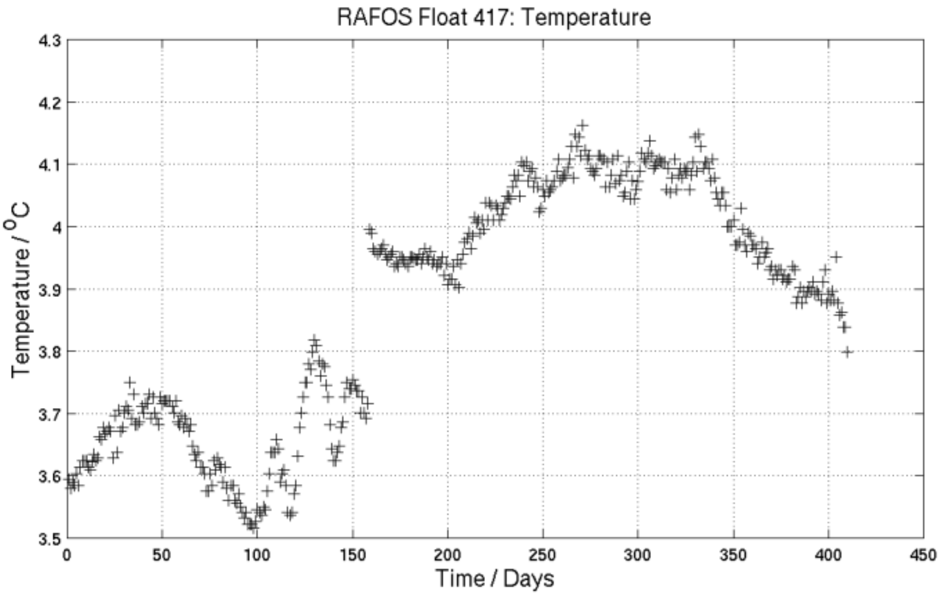

RAFOS Float 416: Temperature
Temperature / ^{o}C
Time / Days
3.75
3.7
3.65
3.6
3.55
3.5
3.45
3.4
3.35
3.3
3.25
0
100
200
300
400
500
600


RAFOS Float 416: Pressure
Pressure / dbar
Time / Days
-1510
-1515
-1520
-1525
-1530
-1535
-1540
0
100
200
300
400
500
600

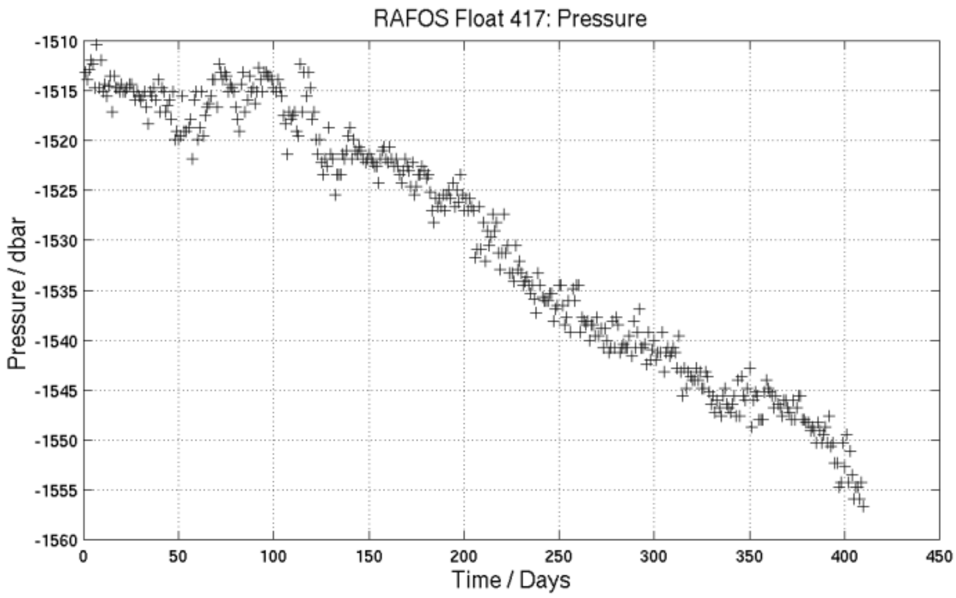

RAFOS Float 416: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days



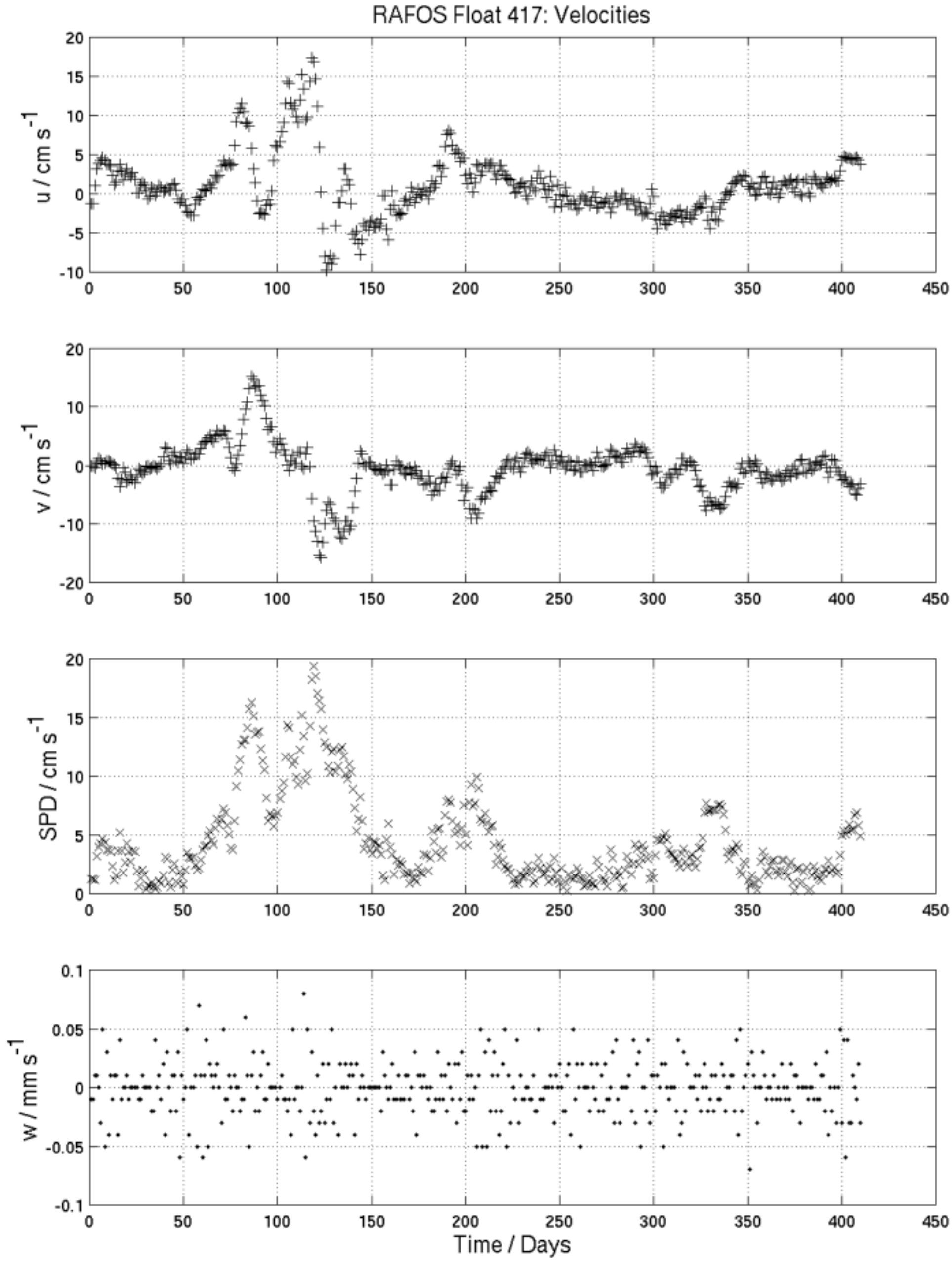
RAFOS Float Trajectory 417 (* Launch, o Recovery Pos.)
Mission Start: 20-Feb-1998 End: 06-Apr-1999
56
55
54
53
52
51
50
49
48
Latitude
-31
-30
-29
-28
-27
-26
-25
-24
-23
-22
Longitude
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5 10 15
Horiz. Velocity / cm s-1



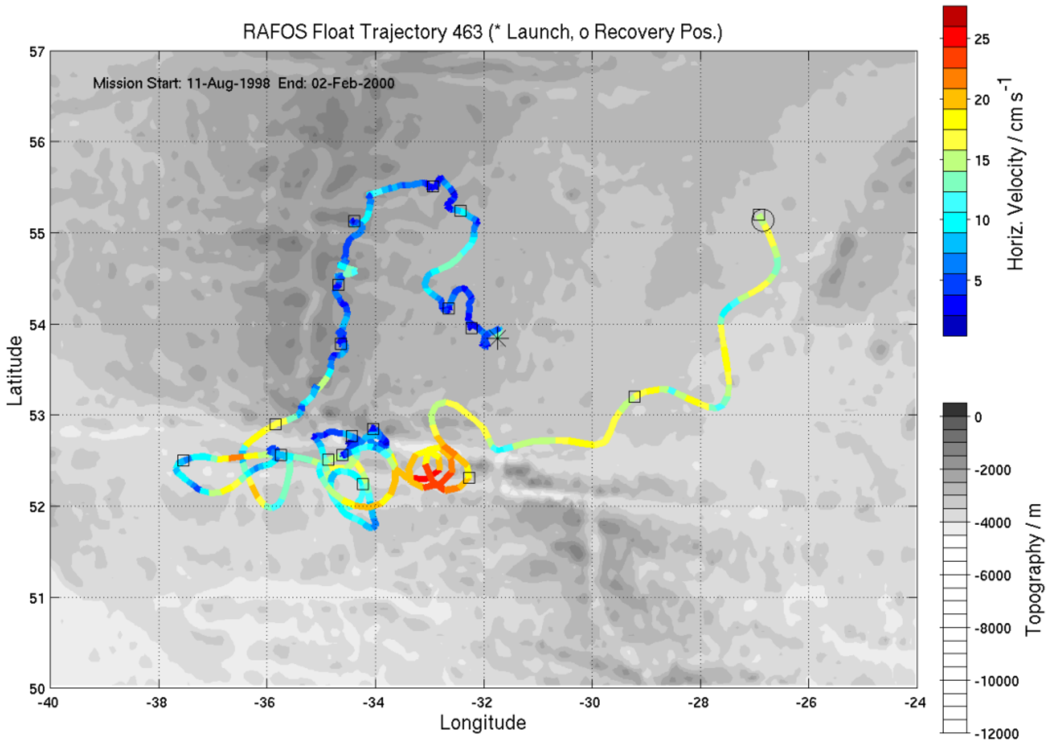
RAFOS Float 417: Temperature
Temperature / °C
Time / Days
4.3
4.2
4.1
4
3.9
3.8
3.7
3.6
3.5
0
50
100
150
200
250
300
350
400
450

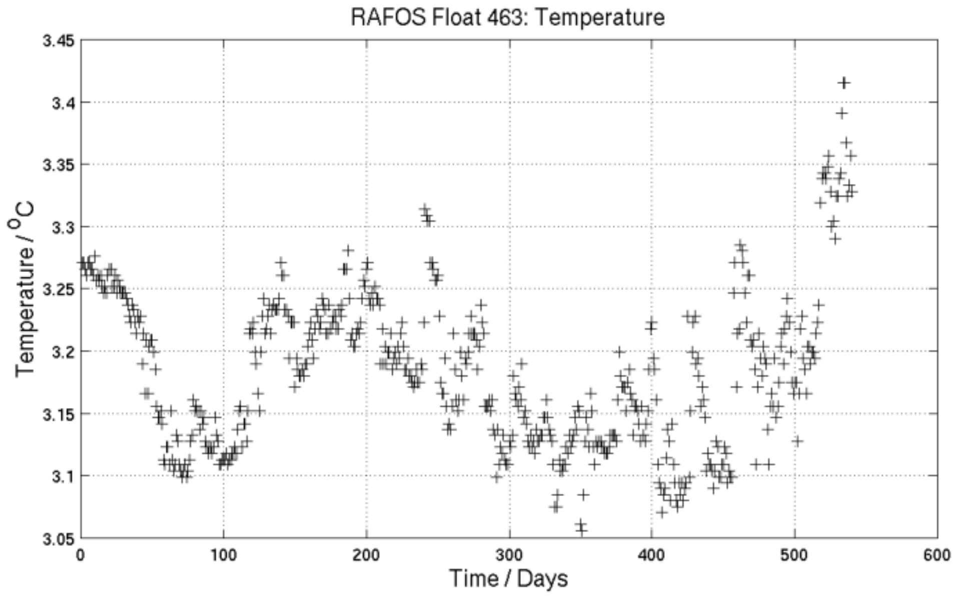


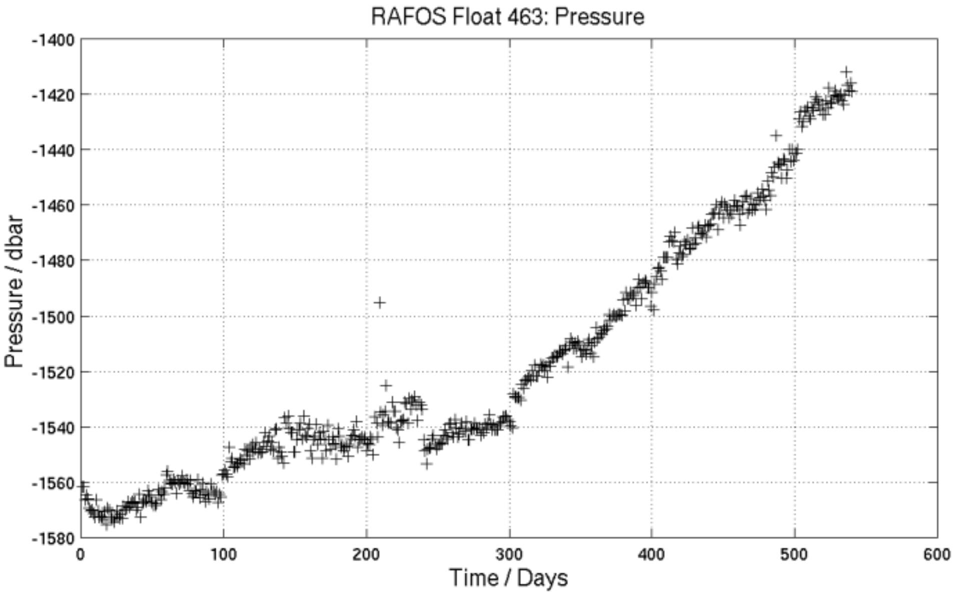
RAFOS Float 417: Pressure
Pressure / dbar
Time / Days
-1510
-1515
-1520
-1525
-1530
-1535
-1540
-1545
-1550
-1555
-1560
0
50
100
150
200
250
300
350
400
450

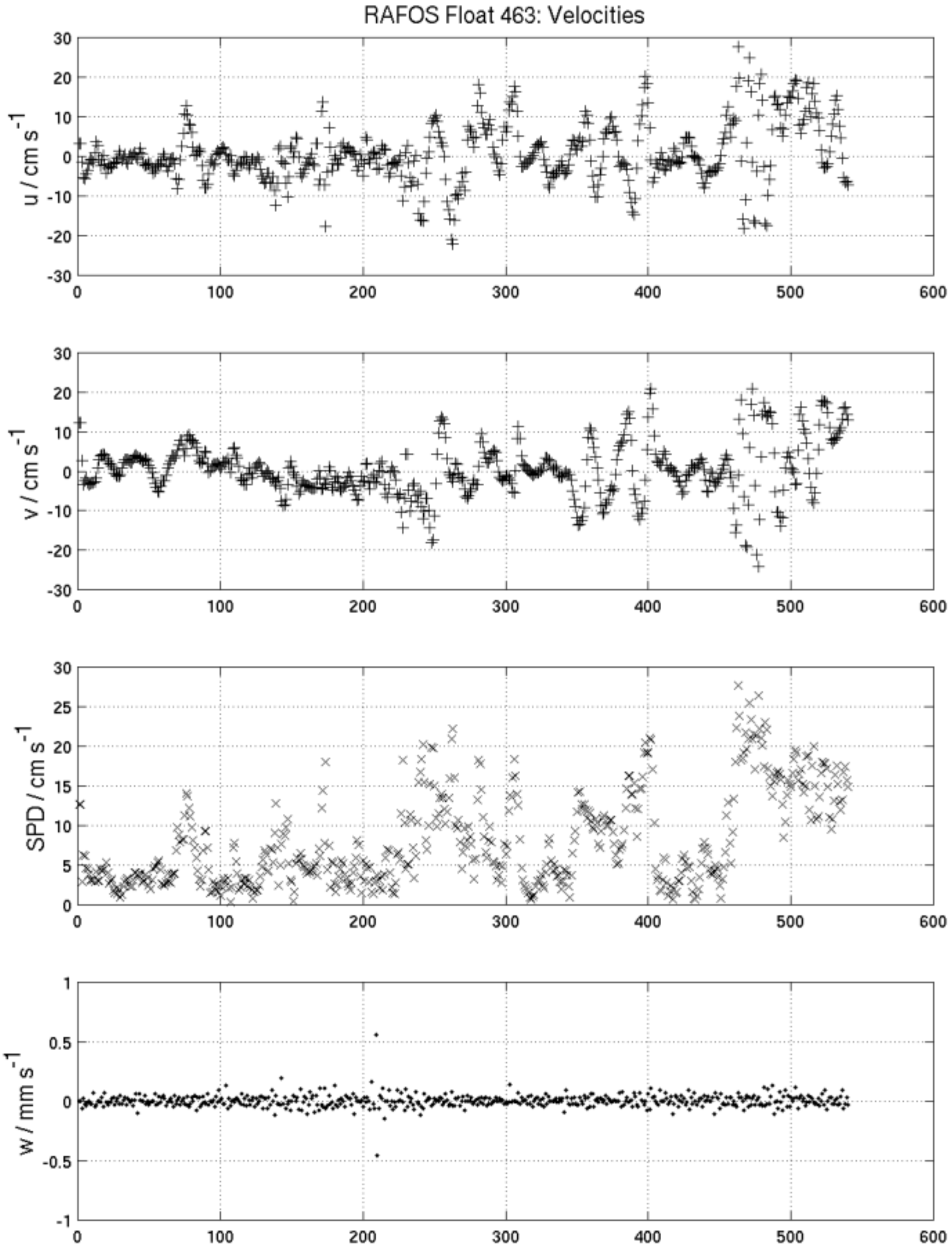


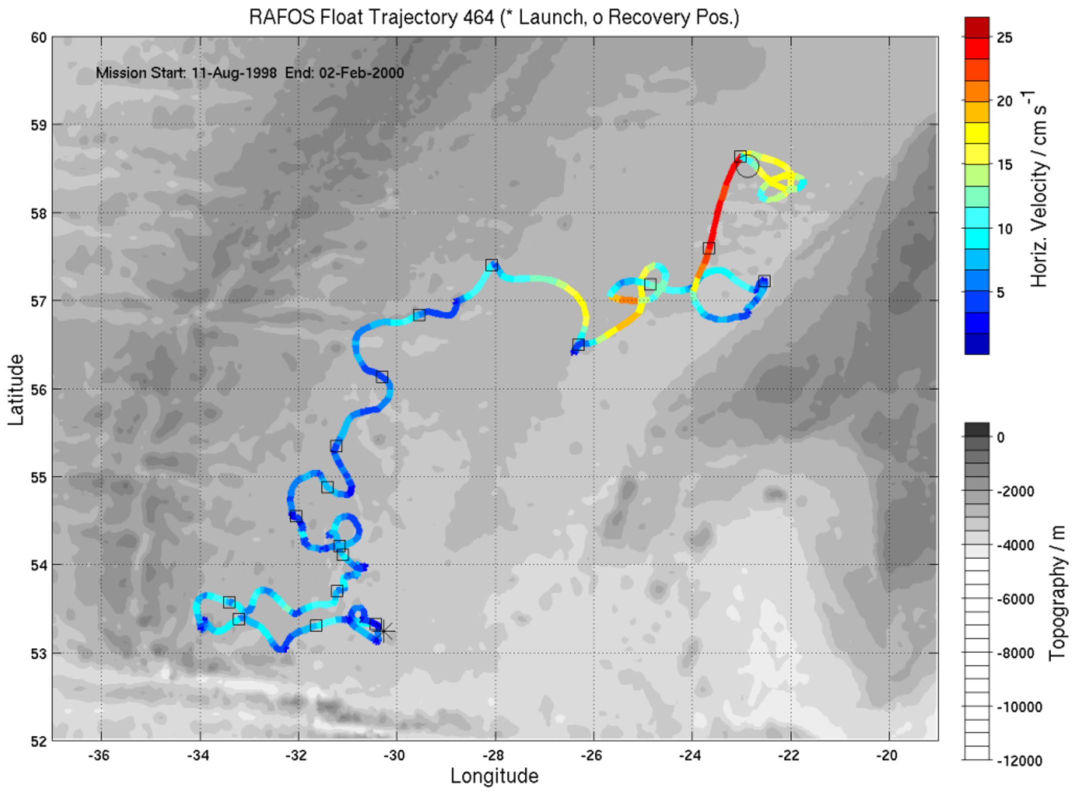
RAFOS Float 417: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

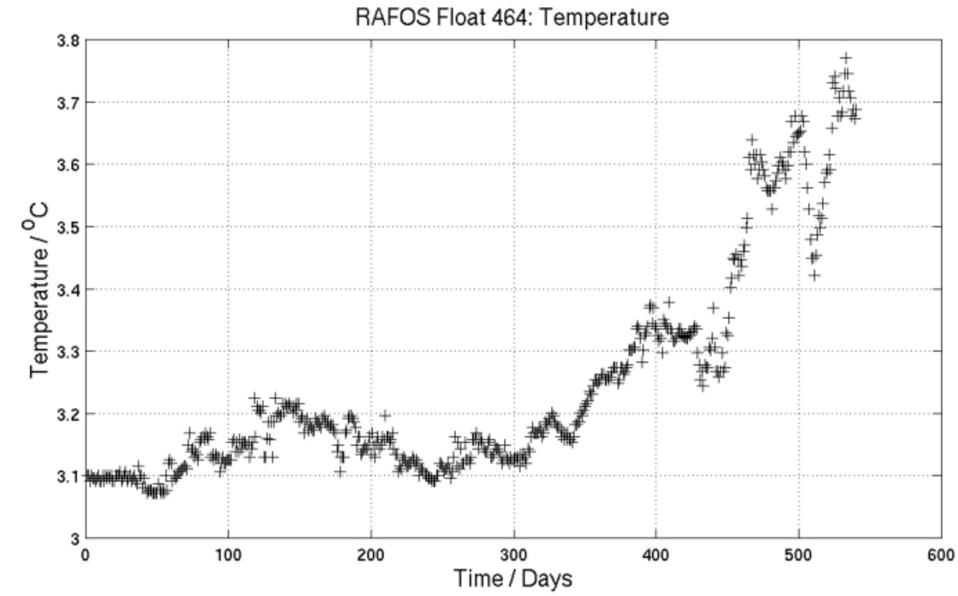

RAFOS Float Trajectory 463 (* Launch, o Recovery Pos.)
Mission Start: 11-Aug-1998 End: 02-Feb-2000
Latitude
Longitude
Horiz. Velocity / cm s^{-1}
Topography / m

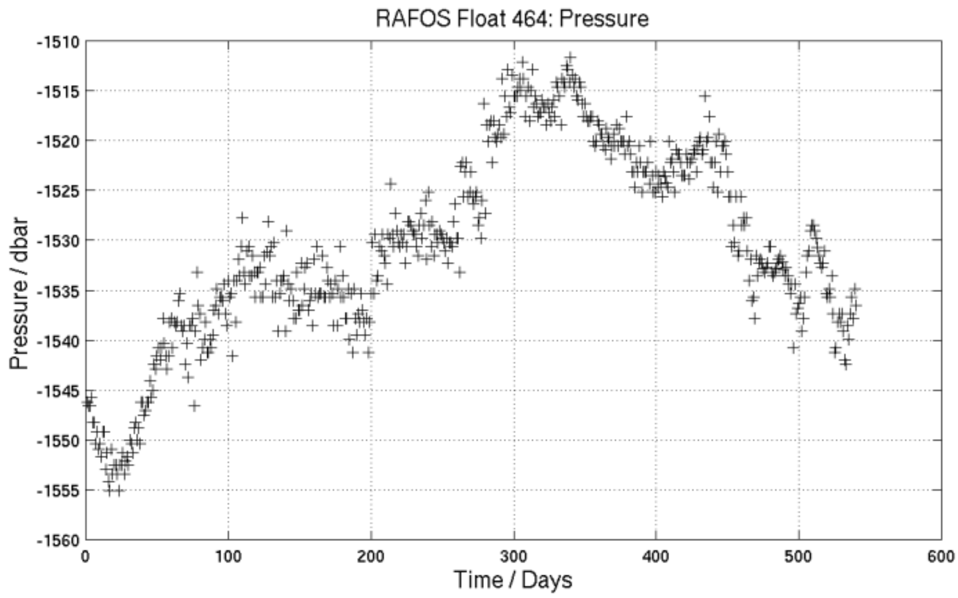

RAFOS Float 463: Temperature
Temperature / °C
3.45
3.4
3.35
3.3
3.25
3.2
3.15
3.1
3.05
0
100
200
300
400
500
600
Time / Days

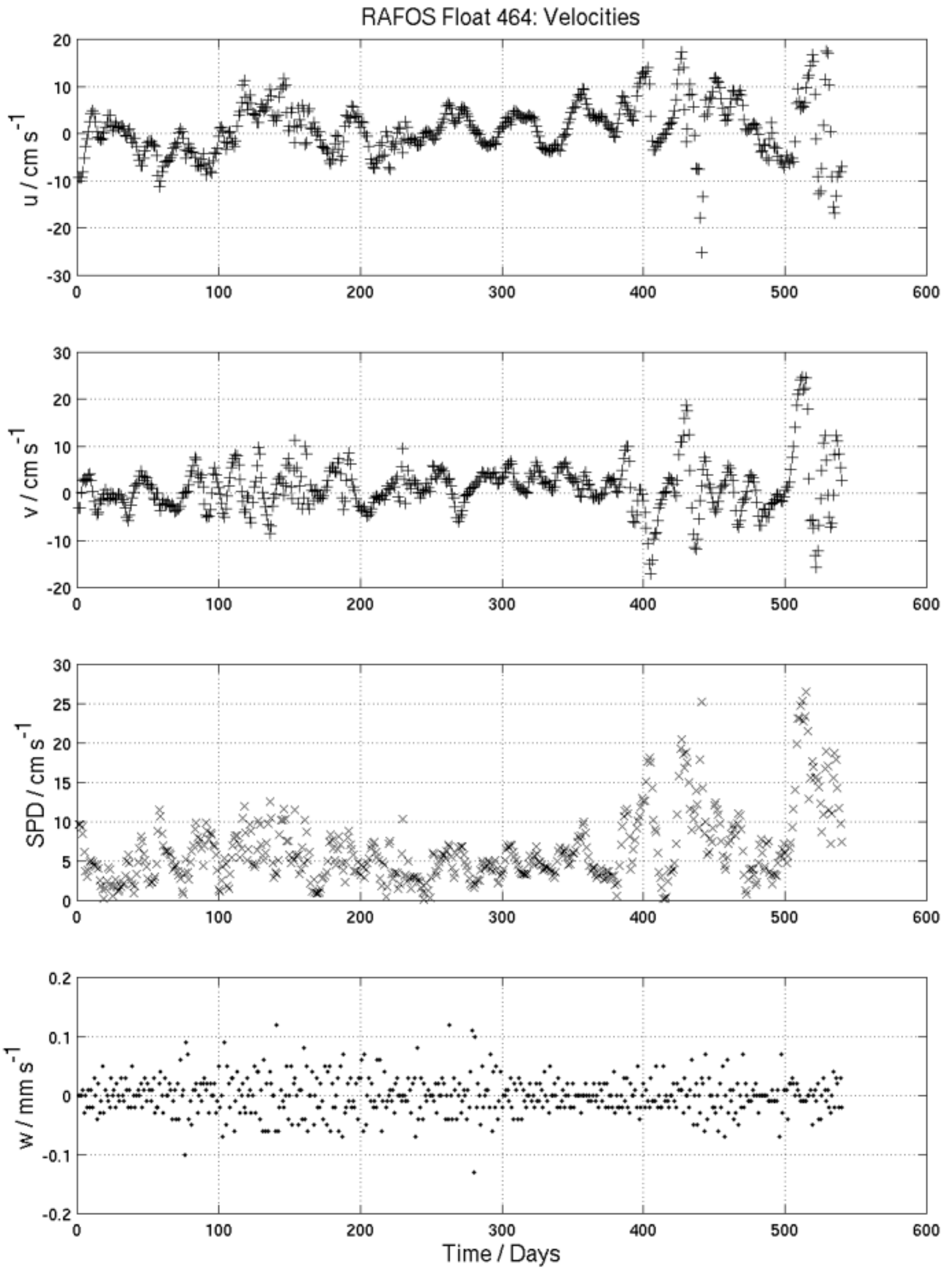

RAFOS Float 463: Pressure
Pressure / dbar
-1400
-1420
-1440
-1460
-1480
-1500
-1520
-1540
-1560
-1580
0
100
200
300
400
500
600
Time / Days

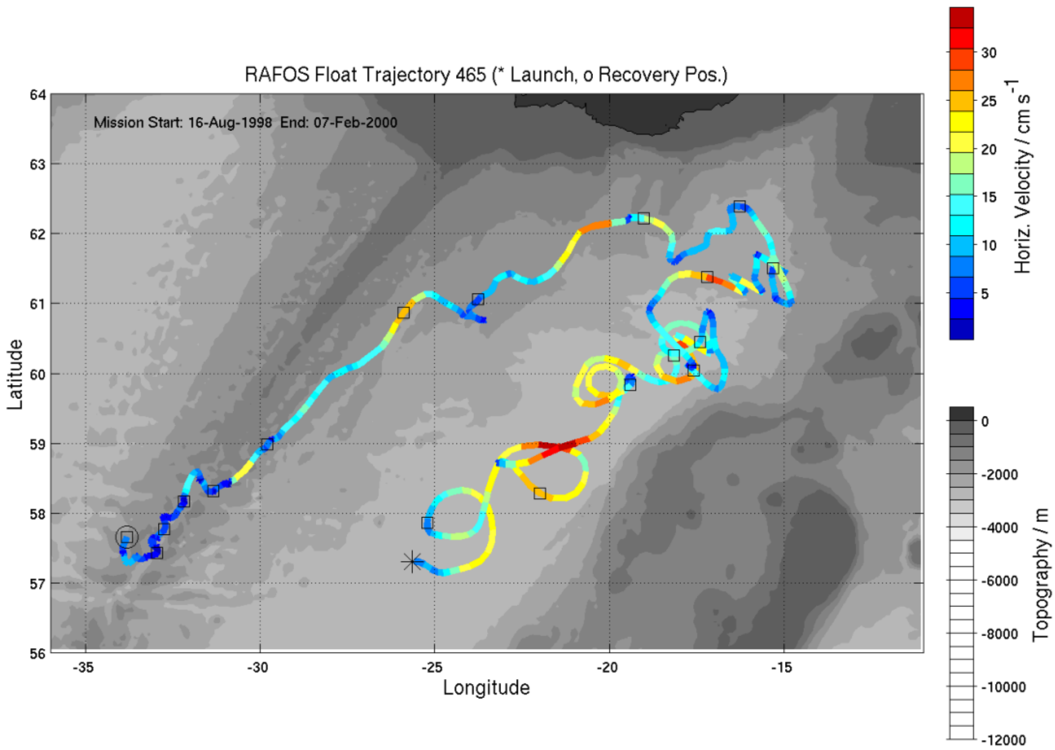

RAFOS Float 463: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days


RAFOS Float Trajectory 464 (* Launch, o Recovery Pos.)
Mission Start: 11-Aug-1998 End: 02-Feb-2000
Latitude
Longitude
Horiz. Velocity / cm s^{-1}
Topography / m

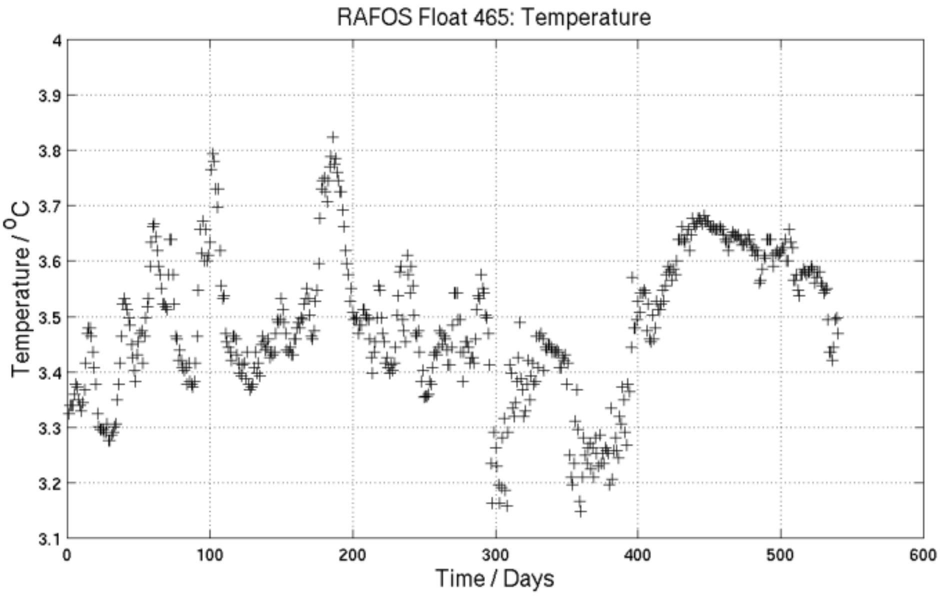

RAFOS Float 464: Temperature
Temperature / ^{o}C
Time / Days
3.8
3.7
3.6
3.5
3.4
3.3
3.2
3.1
3
0
100
200
300
400
500
600


RAFOS Float 464: Pressure
Pressure / dbar
Time / Days
-1510
-1515
-1520
-1525
-1530
-1535
-1540
-1545
-1550
-1555
-1560
0
100
200
300
400
500
600

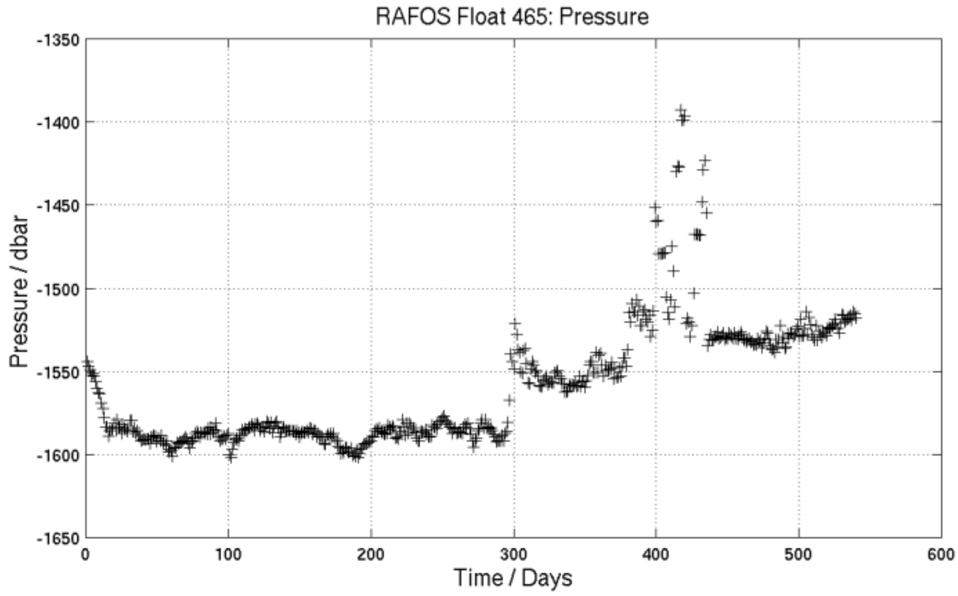

RAFOS Float 464: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days



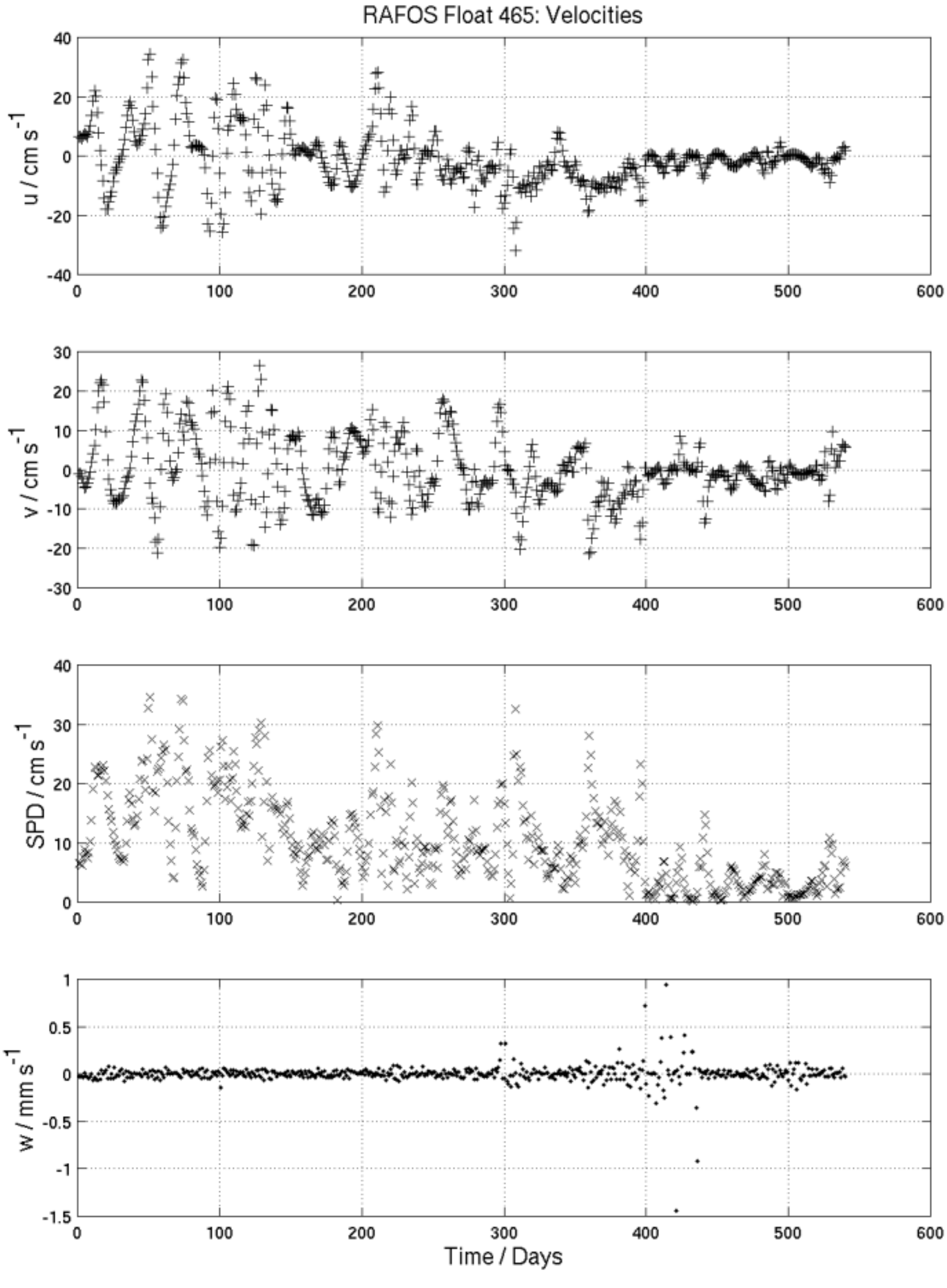
RAFOS Float Trajectory 465 (* Launch, o Recovery Pos.)
Mission Start: 16-Aug-1998 End: 07-Feb-2000
Latitude
Longitude
Horiz. Velocity / cm s^{-1}
Topography / m



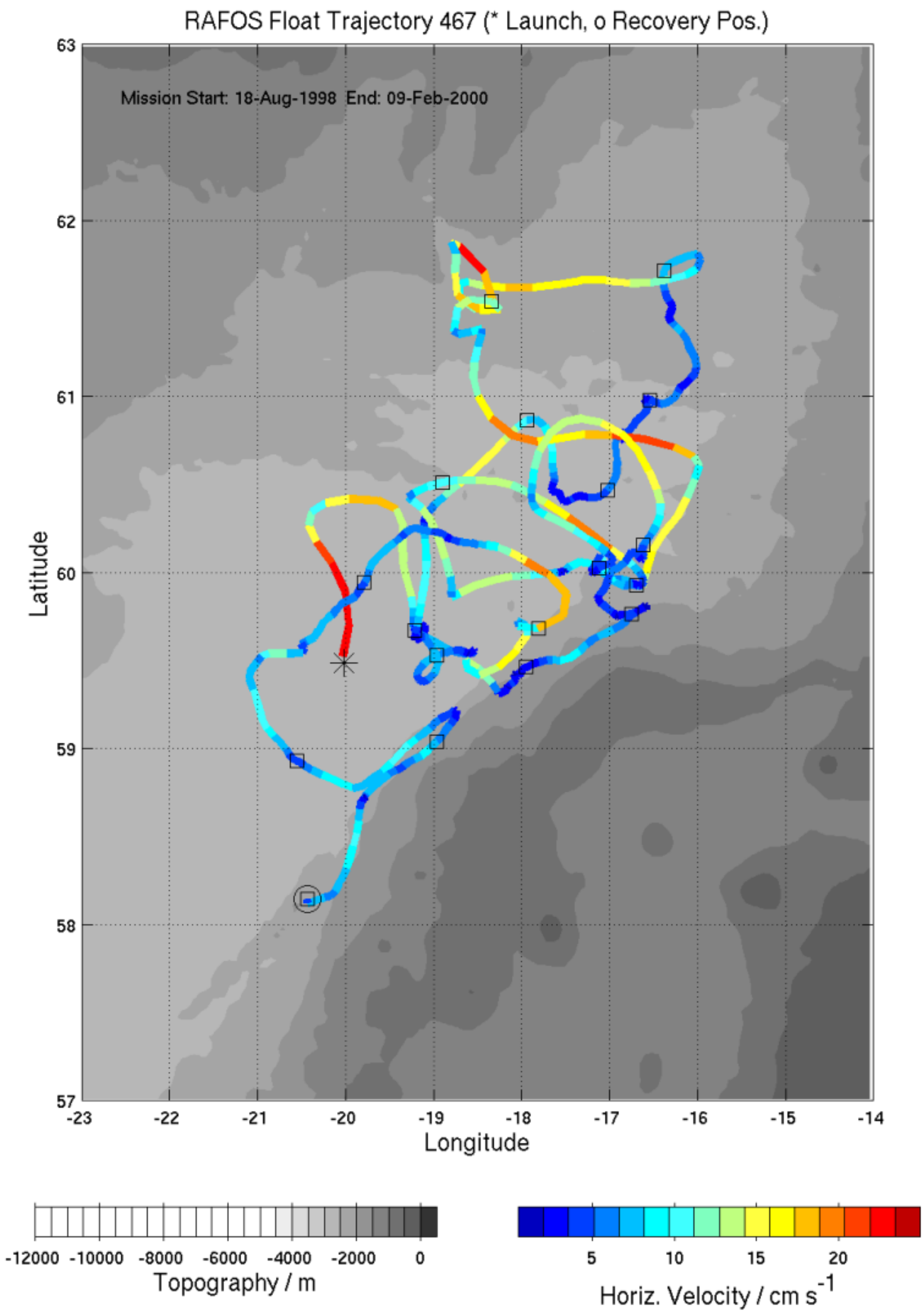
RAFOS Float 465: Temperature
Temperature / ^{o}C
Time / Days
4
3.9
3.8
3.7
3.6
3.5
3.4
3.3
3.2
3.1
0
100
200
300
400
500
600

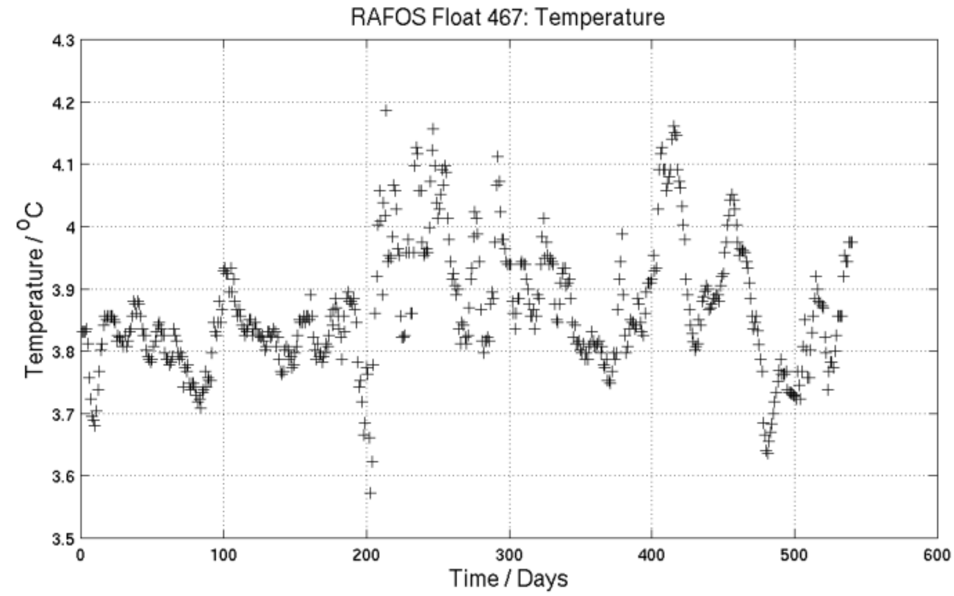


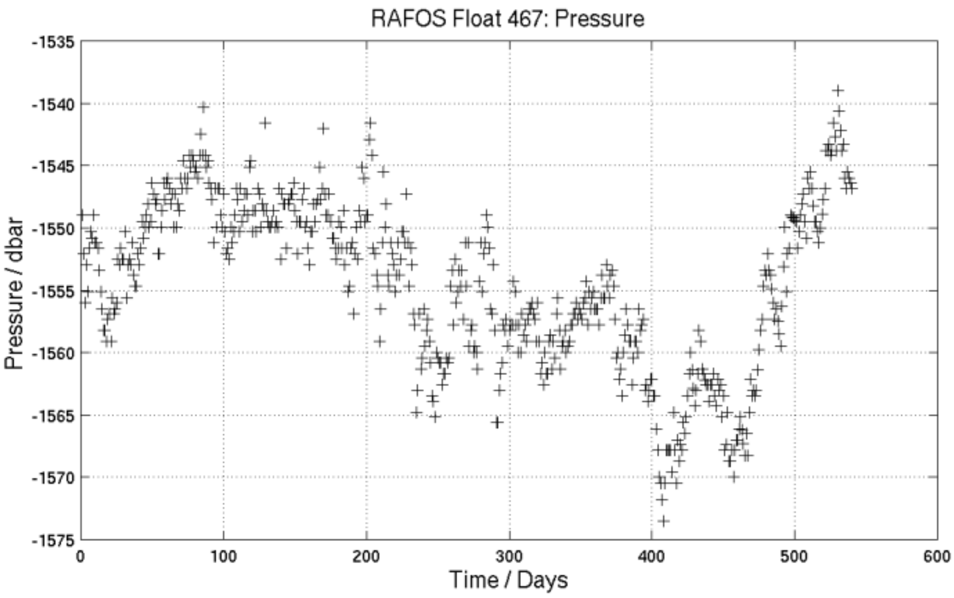
RAFOS Float 465: Pressure
Pressure / dbar
Time / Days
-1350
-1400
-1450
-1500
-1550
-1600
-1650
0
100
200
300
400
500
600

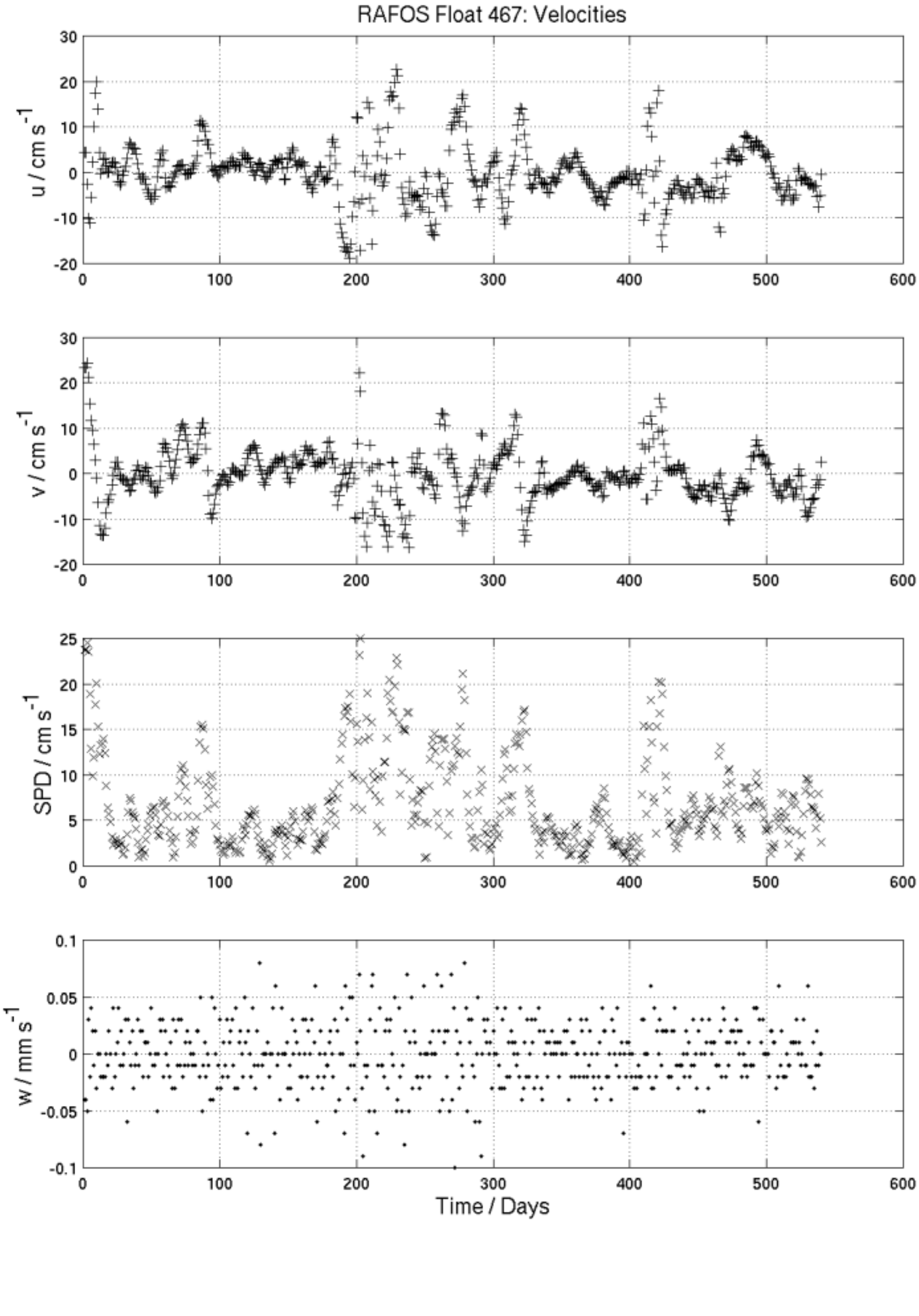


RAFOS Float 465: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

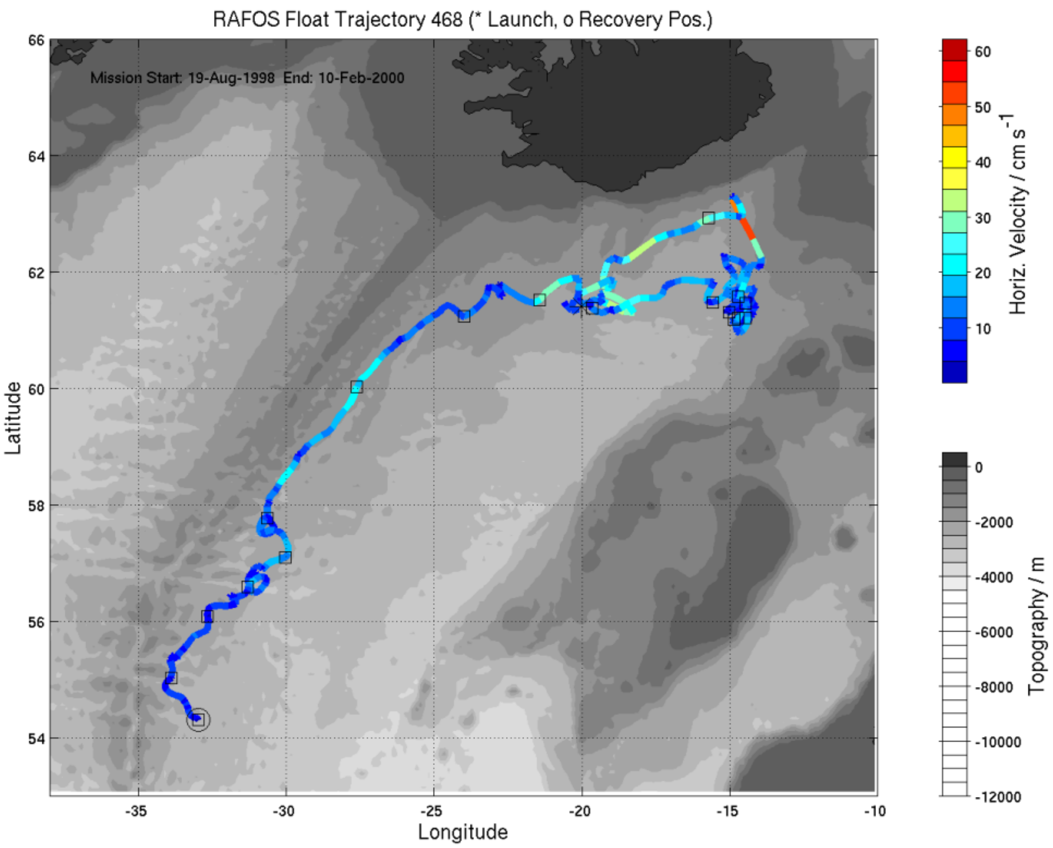

RAFOS Float Trajectory 467 (* Launch, o Recovery Pos.)
Mission Start: 18-Aug-1998 End: 09-Feb-2000
Latitude
Longitude
63
62
61
60
59
58
57
-23
-22
-21
-20
-19
-18
-17
-16
-15
-14
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5 10 15 20
Horiz. Velocity / cm s-1

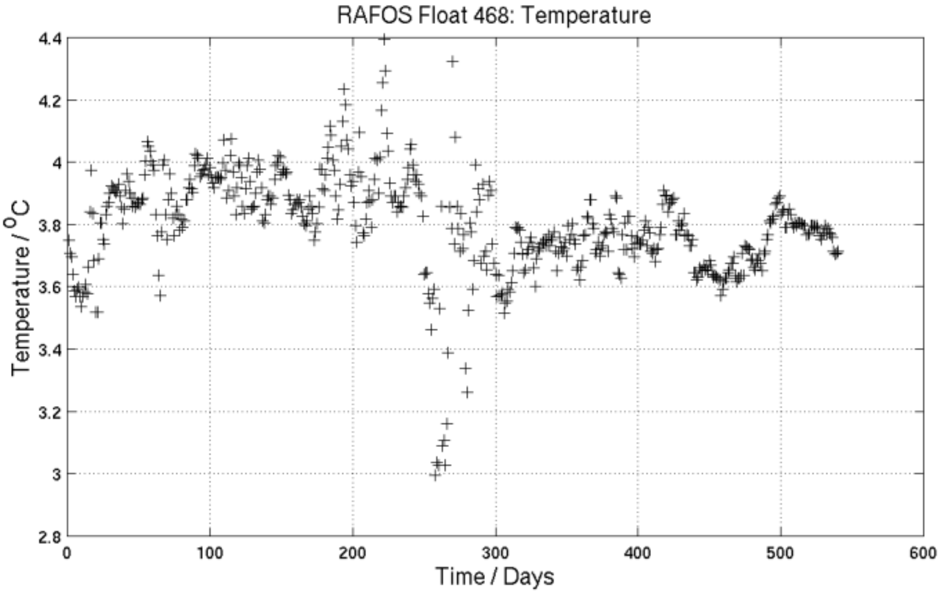

RAFOS Float 467: Temperature
Temperature / ^{o}C
Time / Days
4.3
4.2
4.1
4
3.9
3.8
3.7
3.6
3.5
0
100
200
300
400
500
600

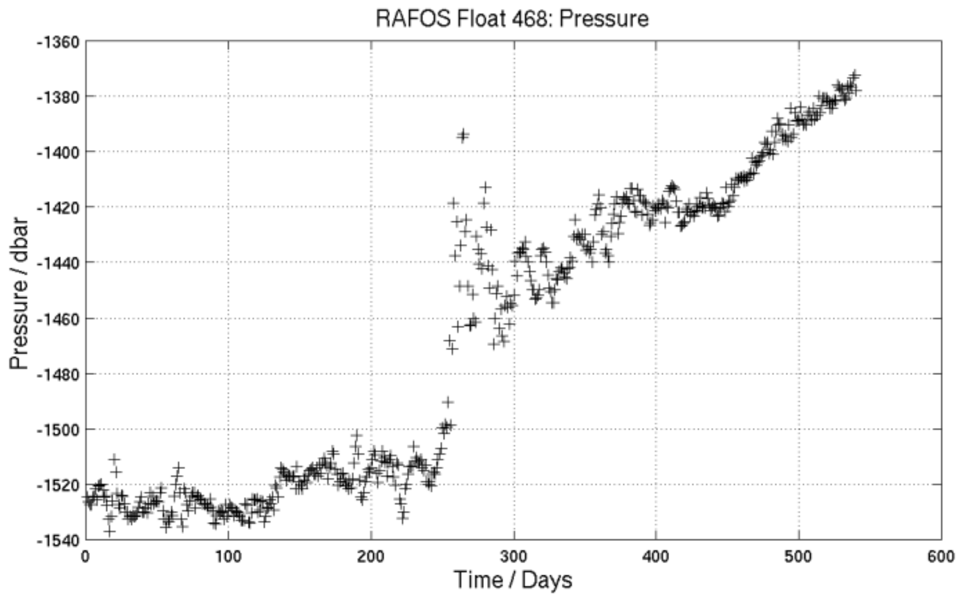

RAFOS Float 467: Pressure
Pressure / dbar
Time / Days
-1535
-1540
-1545
-1550
-1555
-1560
-1565
-1570
-1575
0
100
200
300
400
500
600

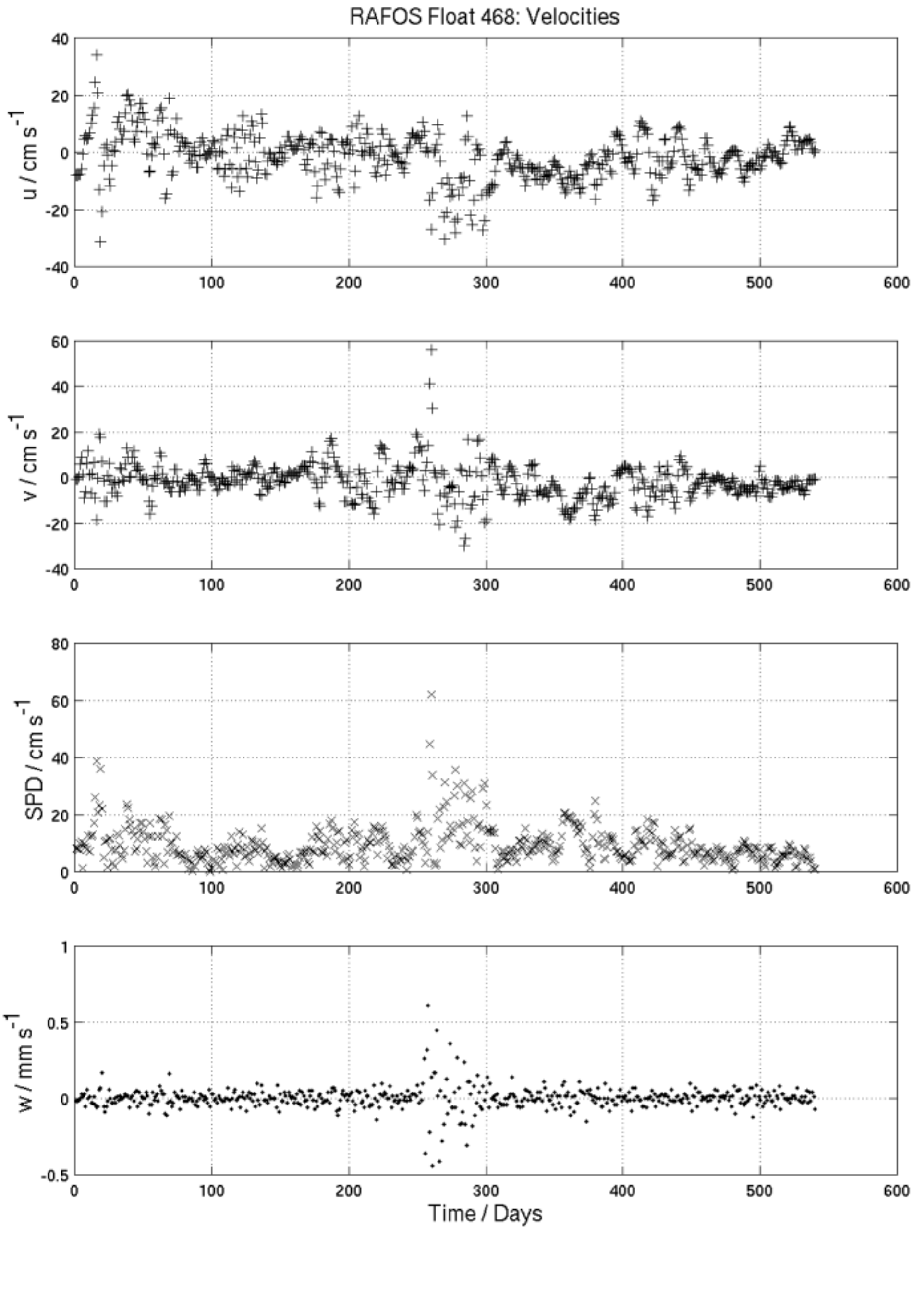


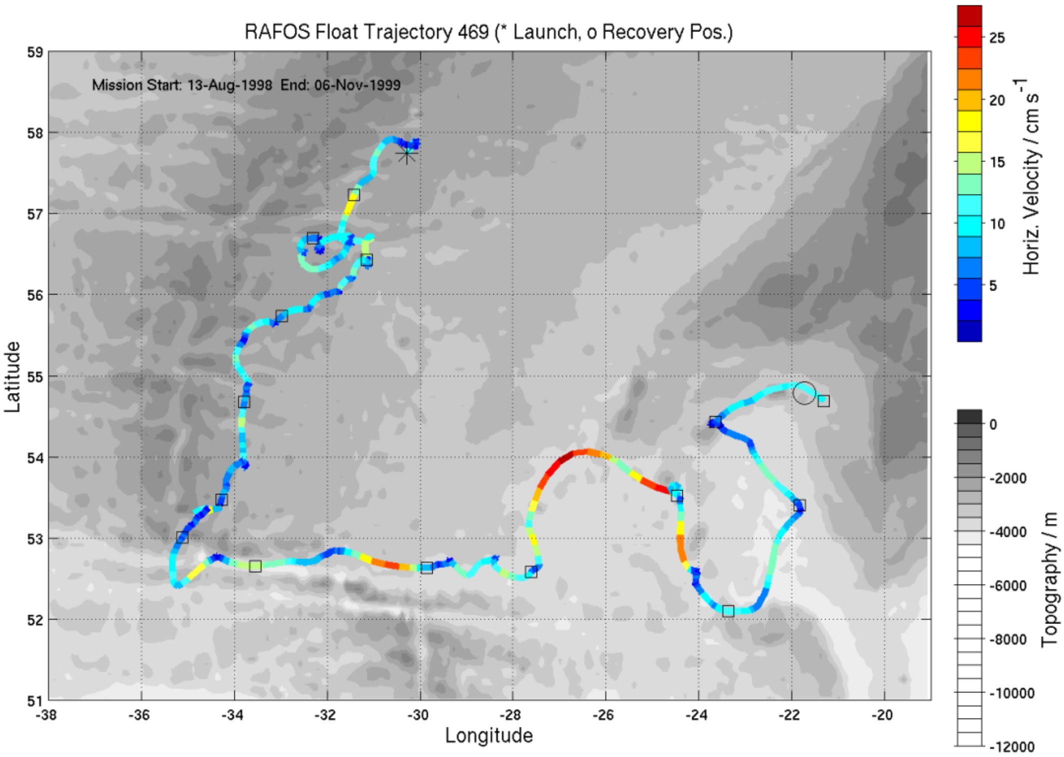
RAFOS Float 467: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

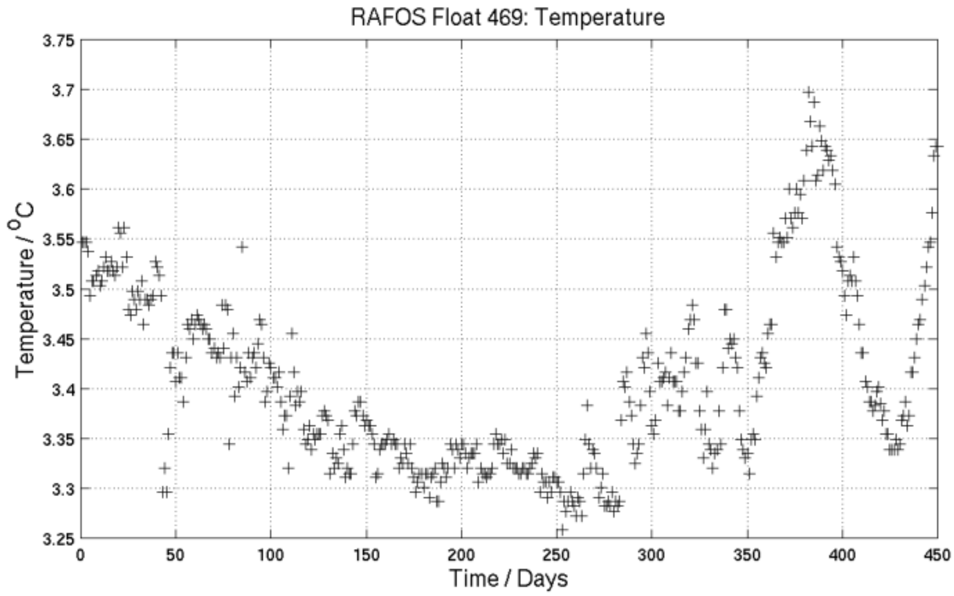

RAFOS Float Trajectory 468 (* Launch, o Recovery Pos.)
Mission Start: 19-Aug-1998 End: 10-Feb-2000
Latitude
Longitude
Horiz. Velocity / cm s^{-1}
Topography / m

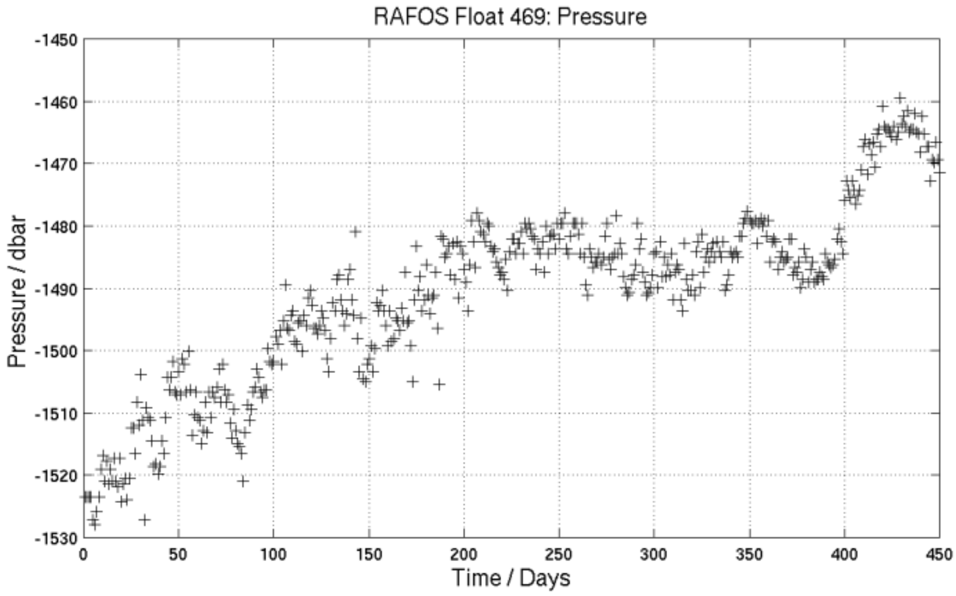

RAFOS Float 468: Temperature
Temperature / ^{o}C
Time / Days
4.4
4.2
4
3.8
3.6
3.4
3.2
3
2.8
0
100
200
300
400
500
600

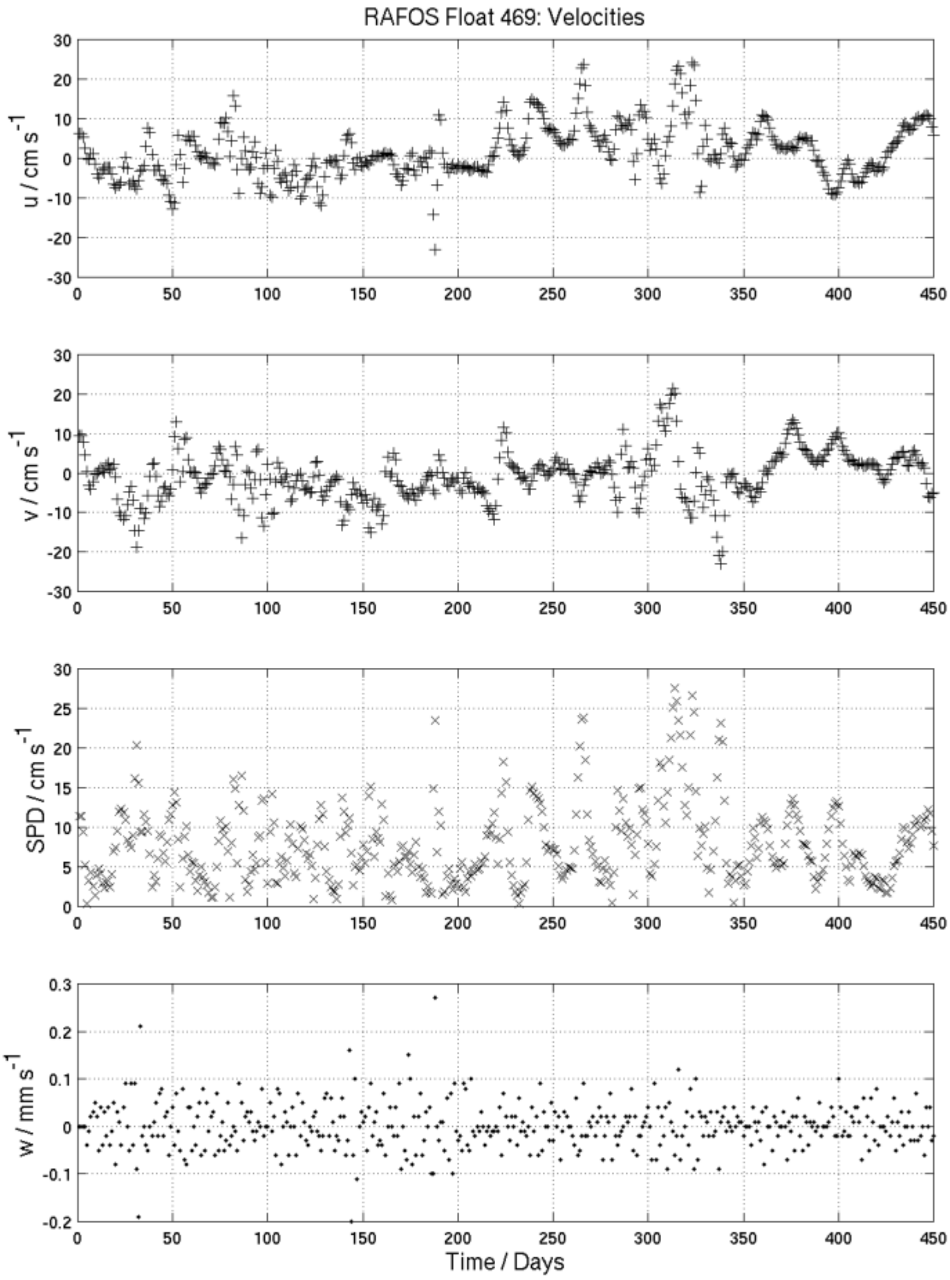

RAFOS Float 468: Pressure
Pressure / dbar
Time / Days
-1360
-1380
-1400
-1420
-1440
-1460
-1480
-1500
-1520
-1540
0
100
200
300
400
500
600


RAFOS Float 468: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

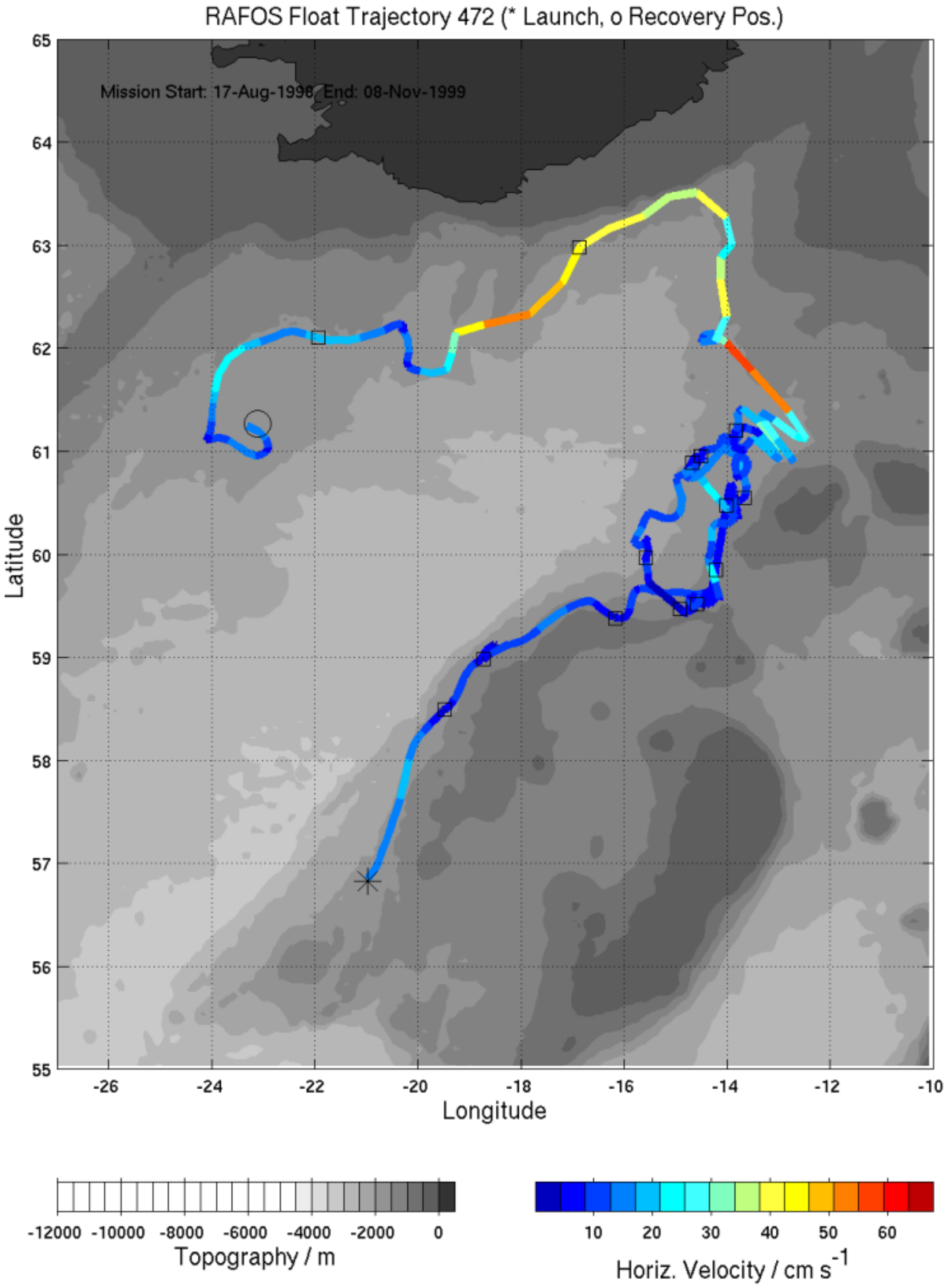

RAFOS Float Trajectory 469 (* Launch, o Recovery Pos.)
Mission Start: 13-Aug-1998 End: 06-Nov-1999
Latitude
Longitude
Horiz. Velocity / cm s^{-1}
Topography / m


RAFOS Float 469: Temperature
Temperature / ^{o}C
Time / Days
3.75
3.7
3.65
3.6
3.55
3.5
3.45
3.4
3.35
3.3
3.25
0
50
100
150
200
250
300
350
400
450

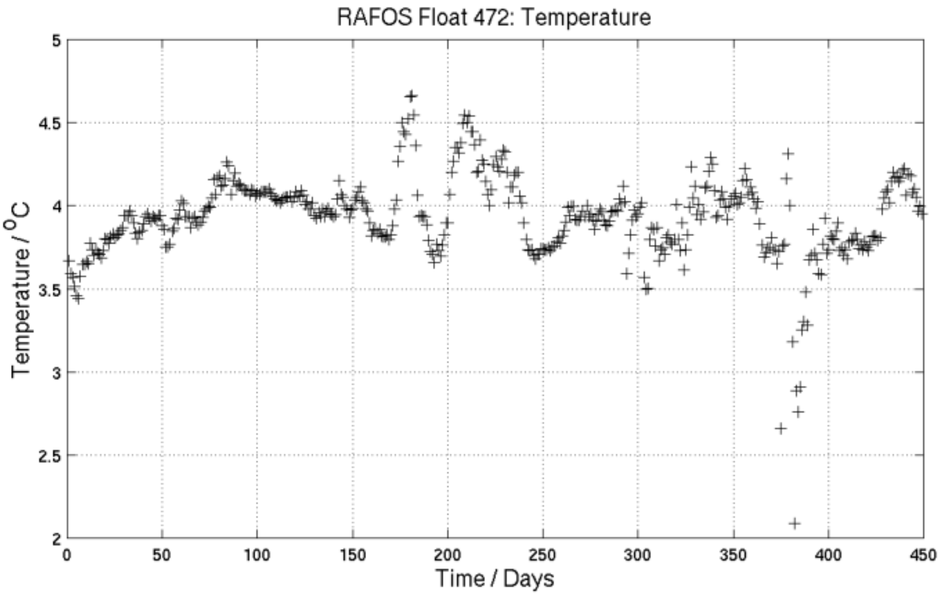

RAFOS Float 469: Pressure
Pressure / dbar
Time / Days
-1450
-1460
-1470
-1480
-1490
-1500
-1510
-1520
-1530
0
50
100
150
200
250
300
350
400
450

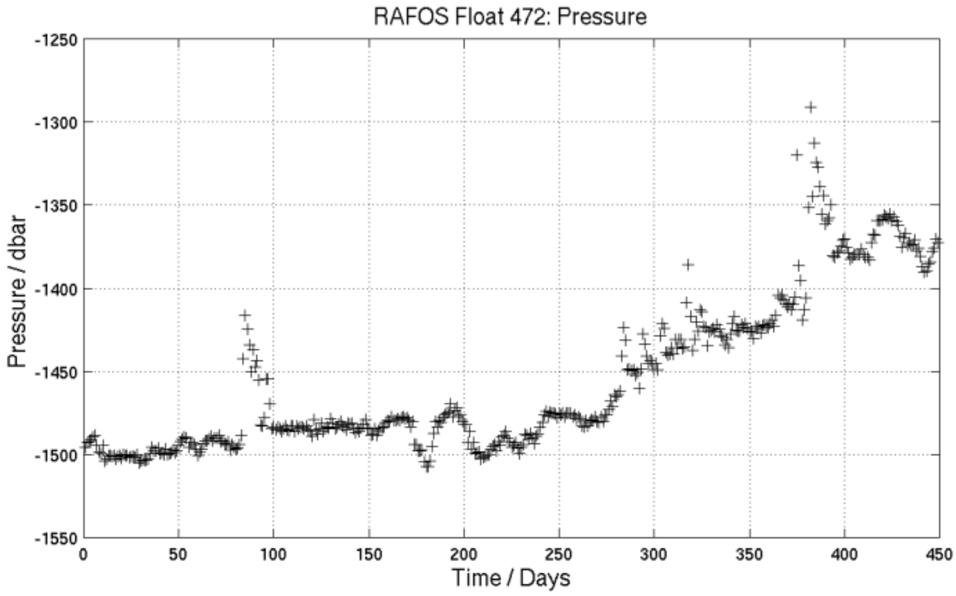


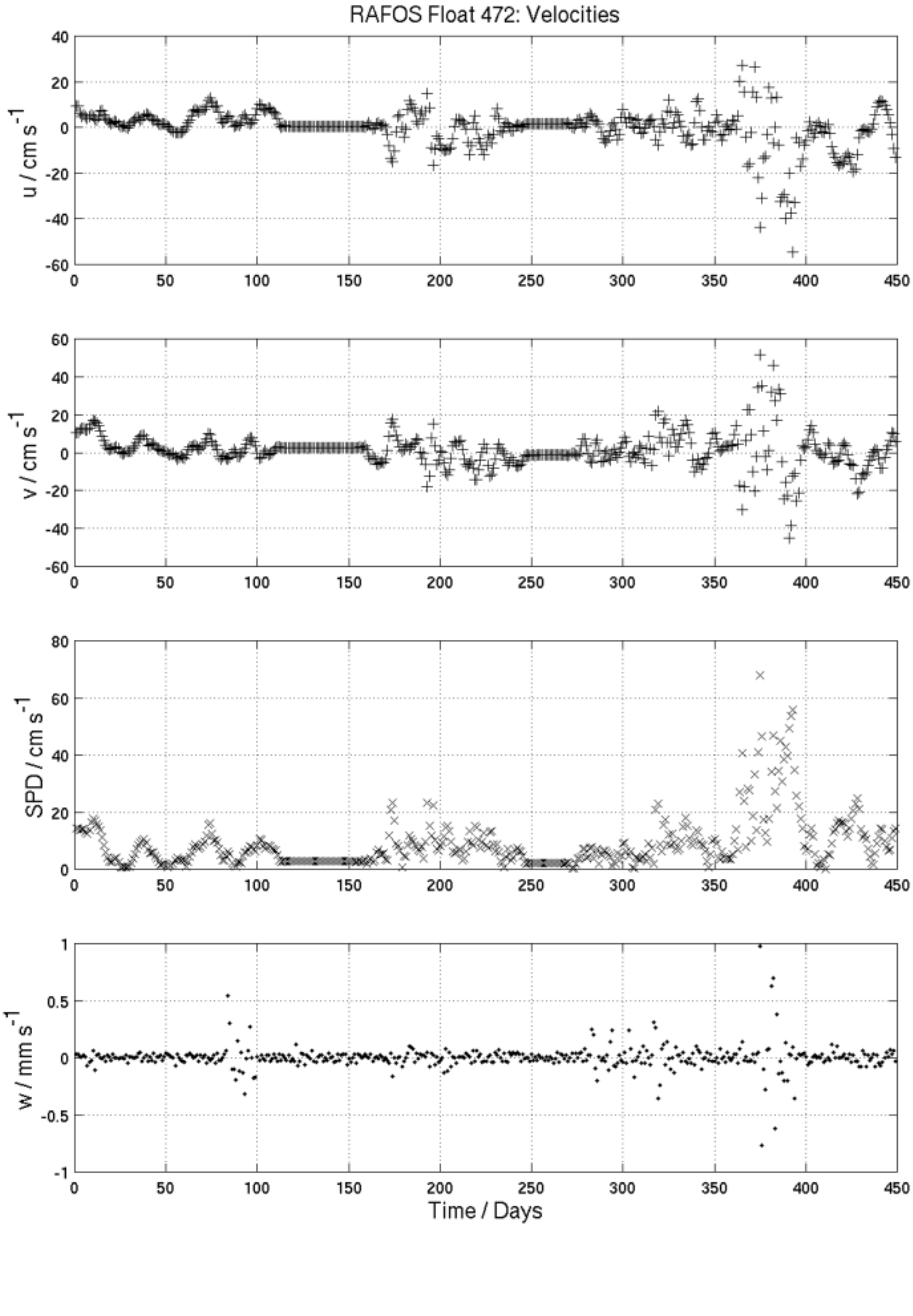
RAFOS Float 469: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

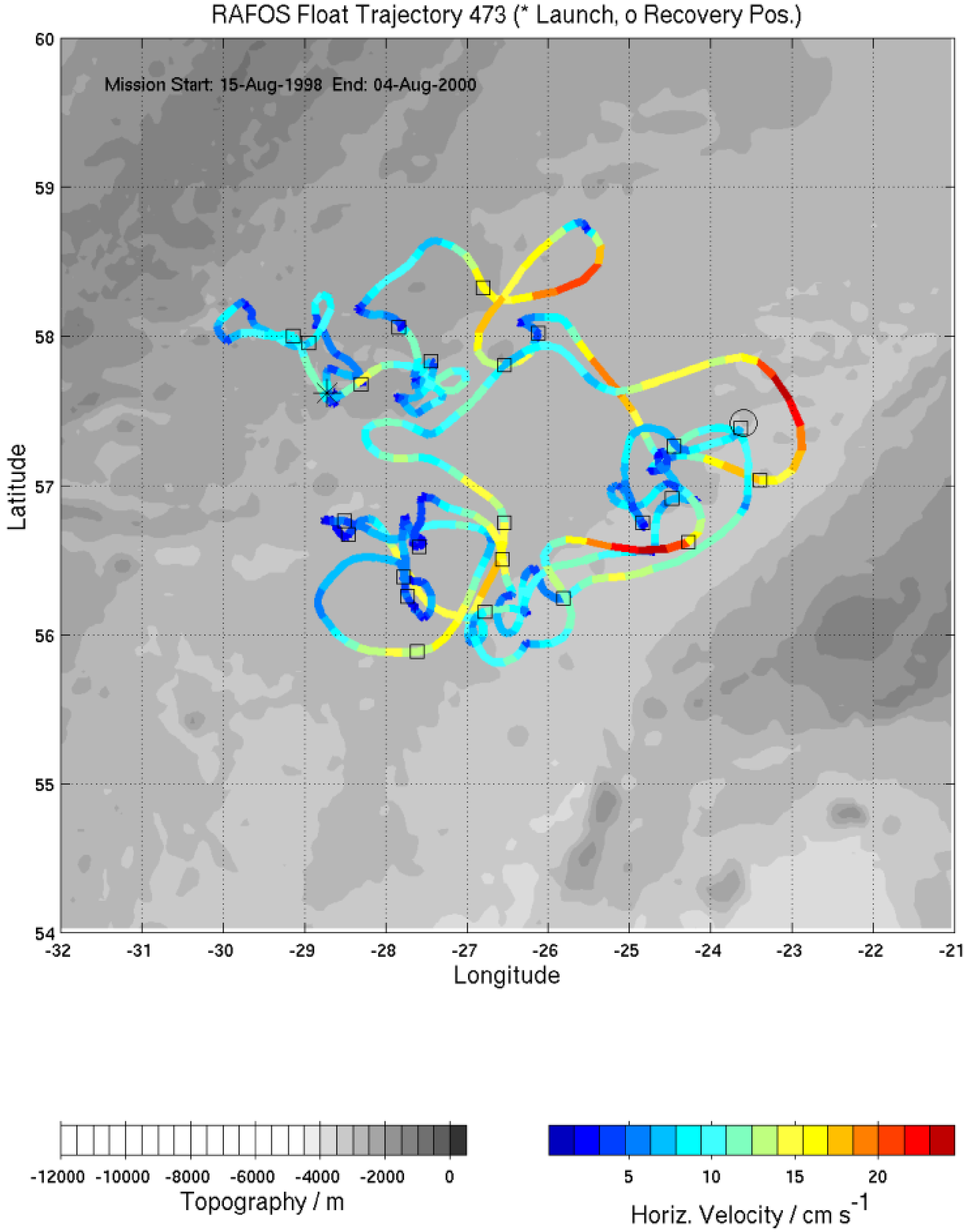


RAFOS Float Trajectory 472 (* Launch, o Recovery Pos.)
Mission Start: 17-Aug-1998, End: 08-Nov-1999
Latitude
Longitude
65
64
63
62
61
60
59
58
57
56
55
-26
-24
-22
-20
-18
-16
-14
-12
-10
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
10 20 30 40 50 60
Horiz. Velocity / cm s^{-1}

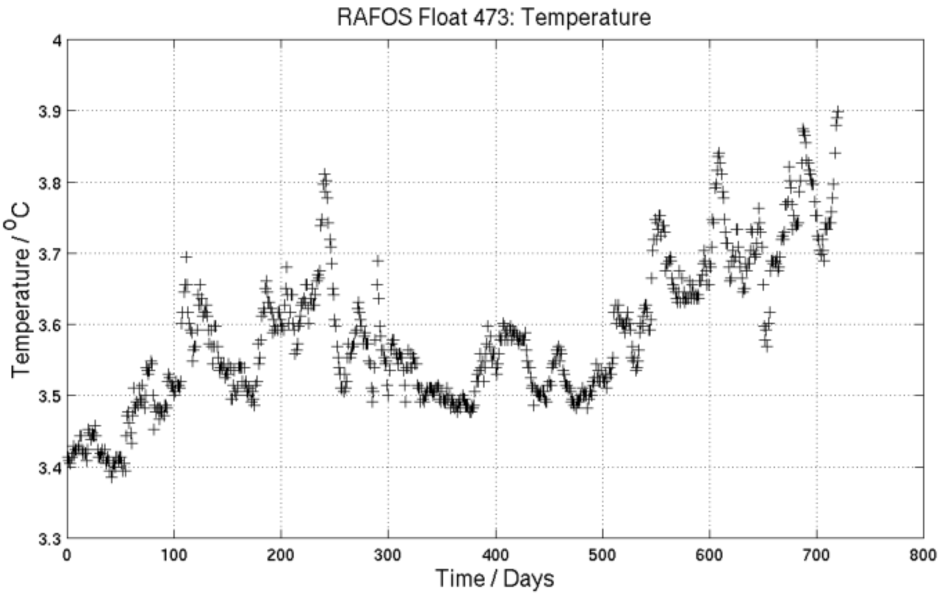

RAFOS Float 472: Temperature
Temperature / ^oC
Time / Days
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
400
450

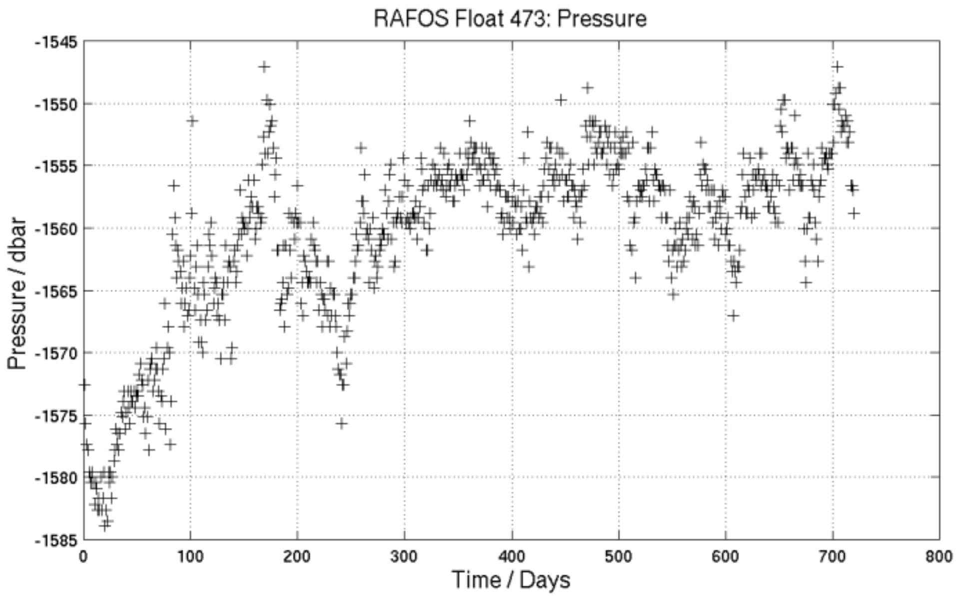

RAFOS Float 472: Pressure
Pressure / dbar
Time / Days
-1250
-1300
-1350
-1400
-1450
-1500
-1550
0
50
100
150
200
250
300
350
400
450

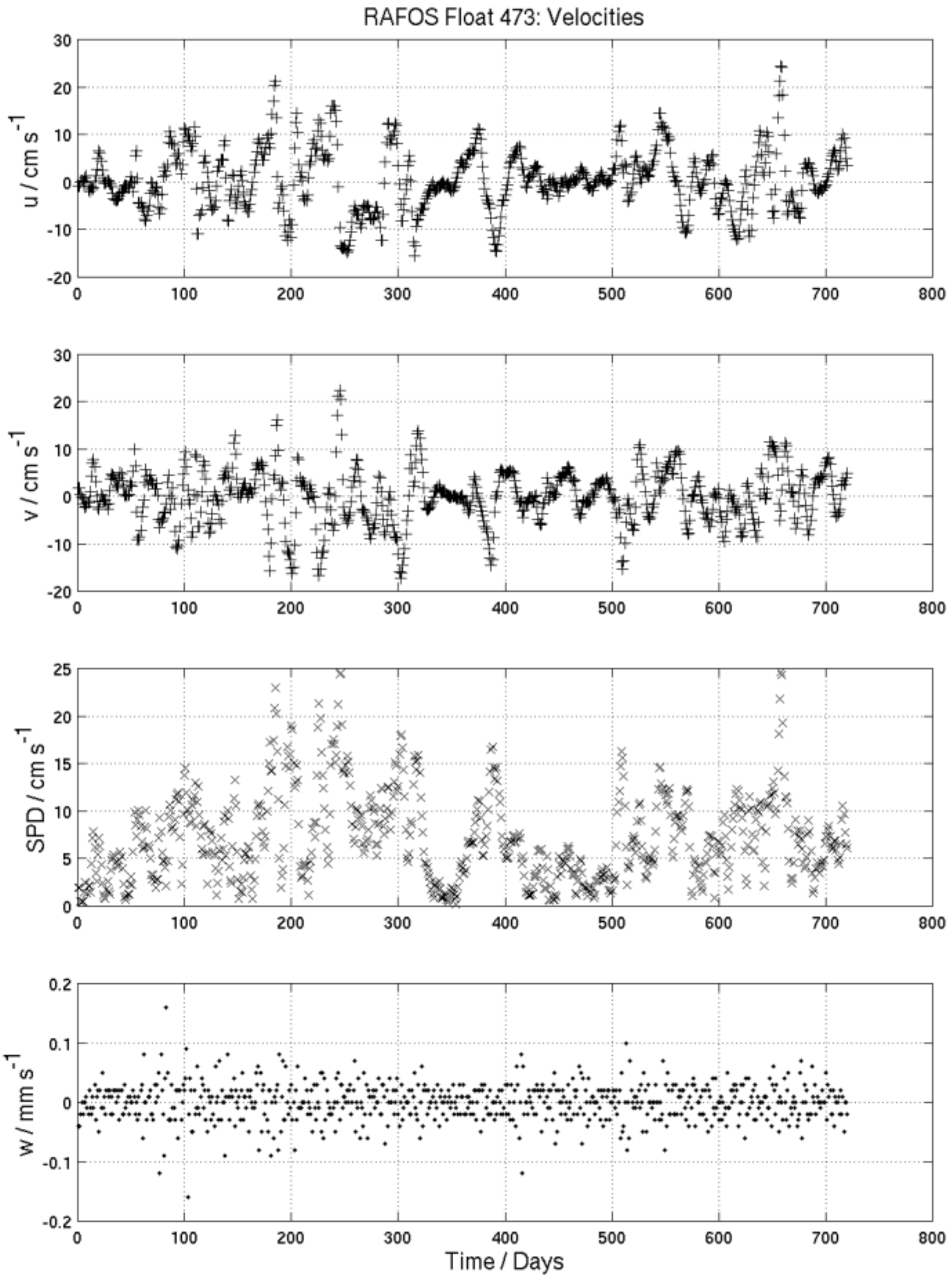

RAFOS Float 472: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days
0
50
100
150
200
250
300
350
400
450

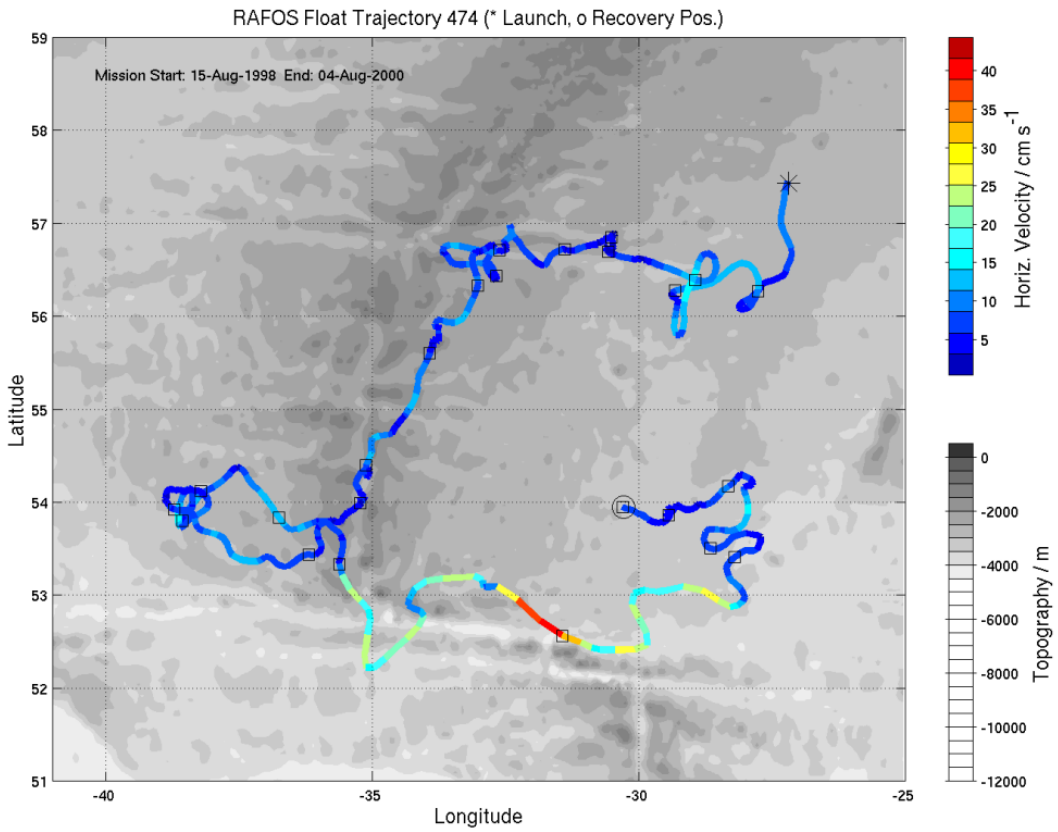


RAFOS Float Trajectory 473 (* Launch, o Recovery Pos.)
Mission Start: 15-Aug-1998 End: 04-Aug-2000
Latitude
Longitude
60
59
58
57
56
55
54
-32
-31
-30
-29
-28
-27
-26
-25
-24
-23
-22
-21
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5 10 15 20
Horiz. Velocity / cm s^{-1}

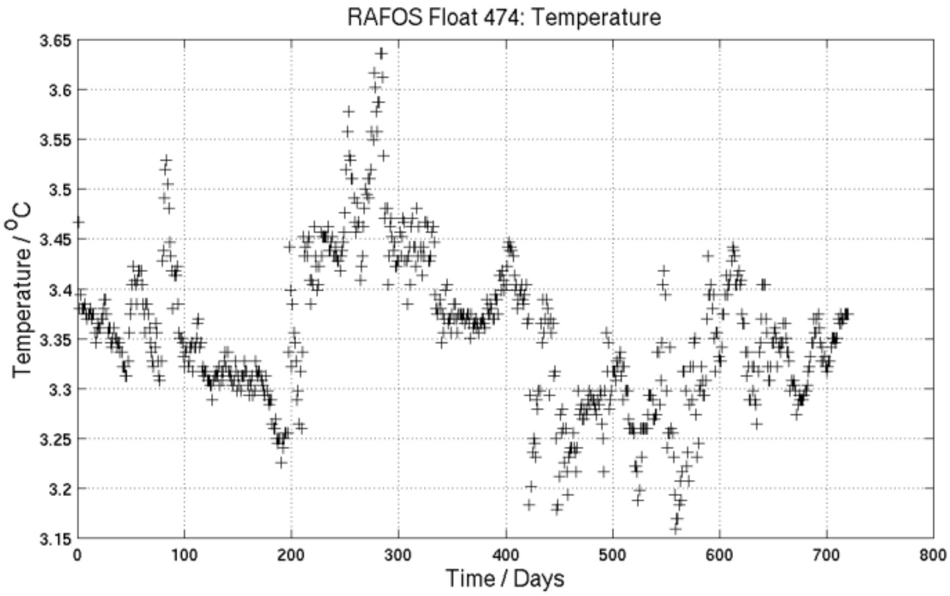

RAFOS Float 473: Temperature
Temperature / ^{o}C
Time / Days
4
3.9
3.8
3.7
3.6
3.5
3.4
3.3
0
100
200
300
400
500
600
700
800

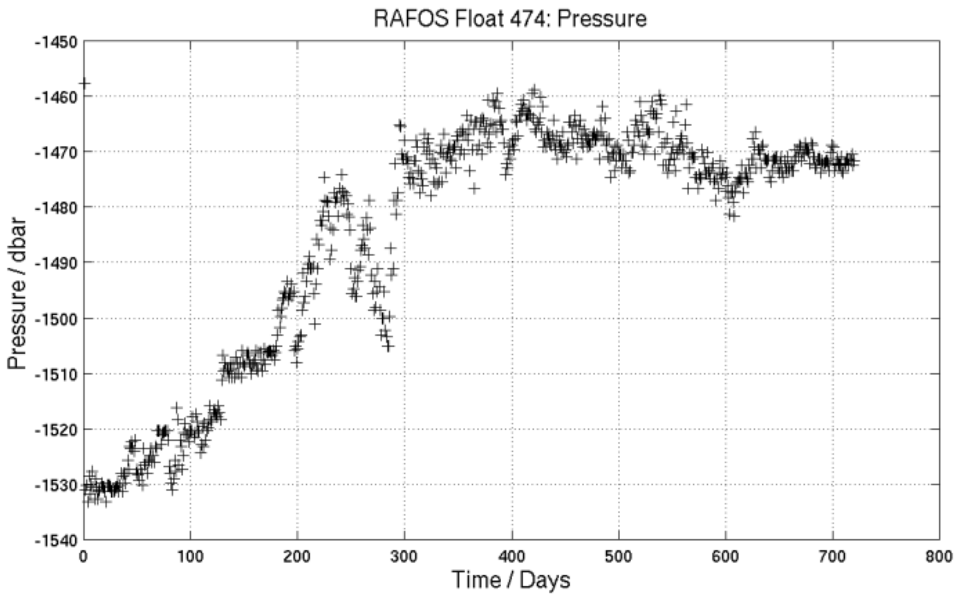

RAFOS Float 473: Pressure
Pressure / dbar
Time / Days
-1545
-1550
-1555
-1560
-1565
-1570
-1575
-1580
-1585
0
100
200
300
400
500
600
700
800

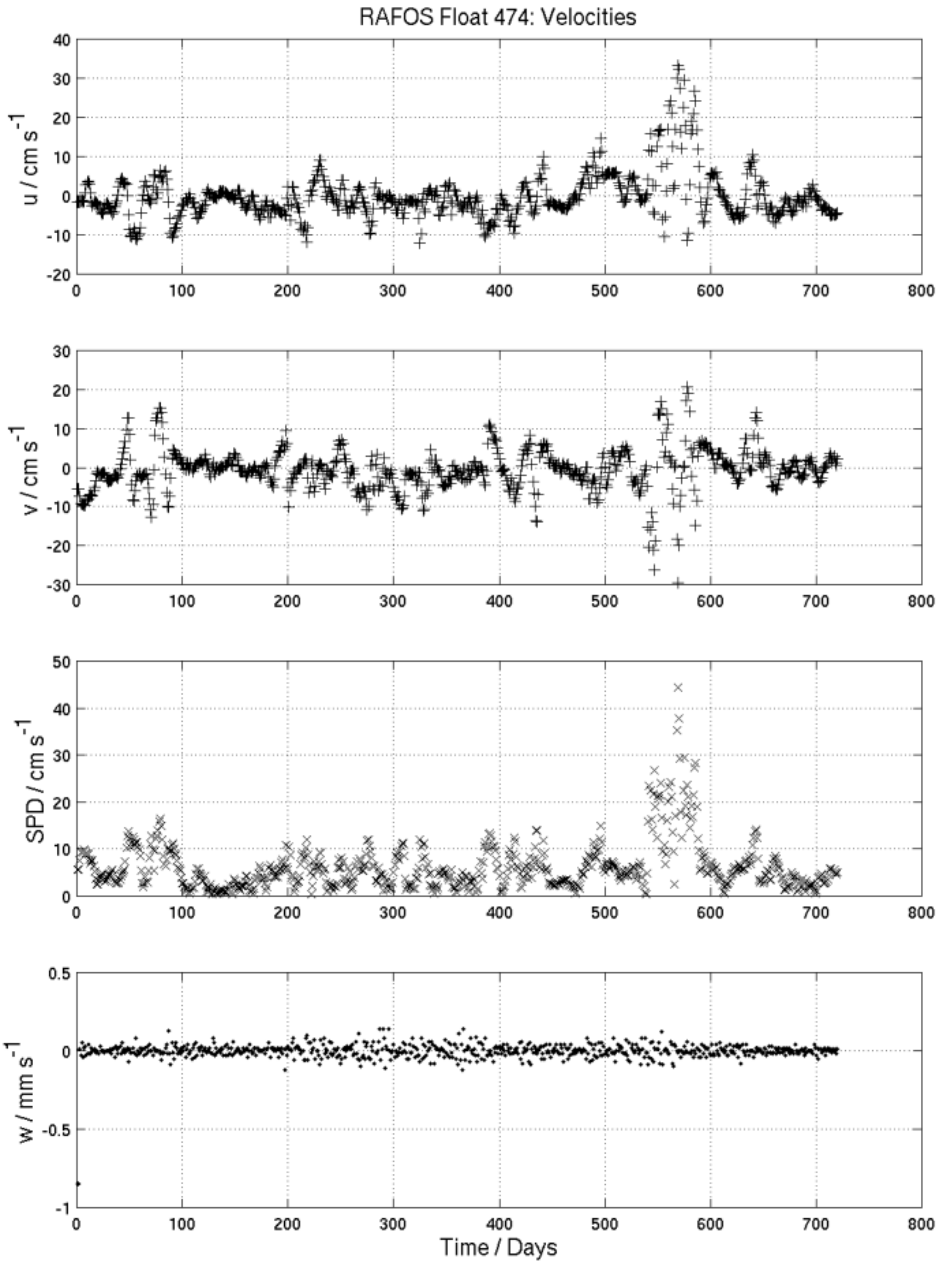

RAFOS Float 473: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days



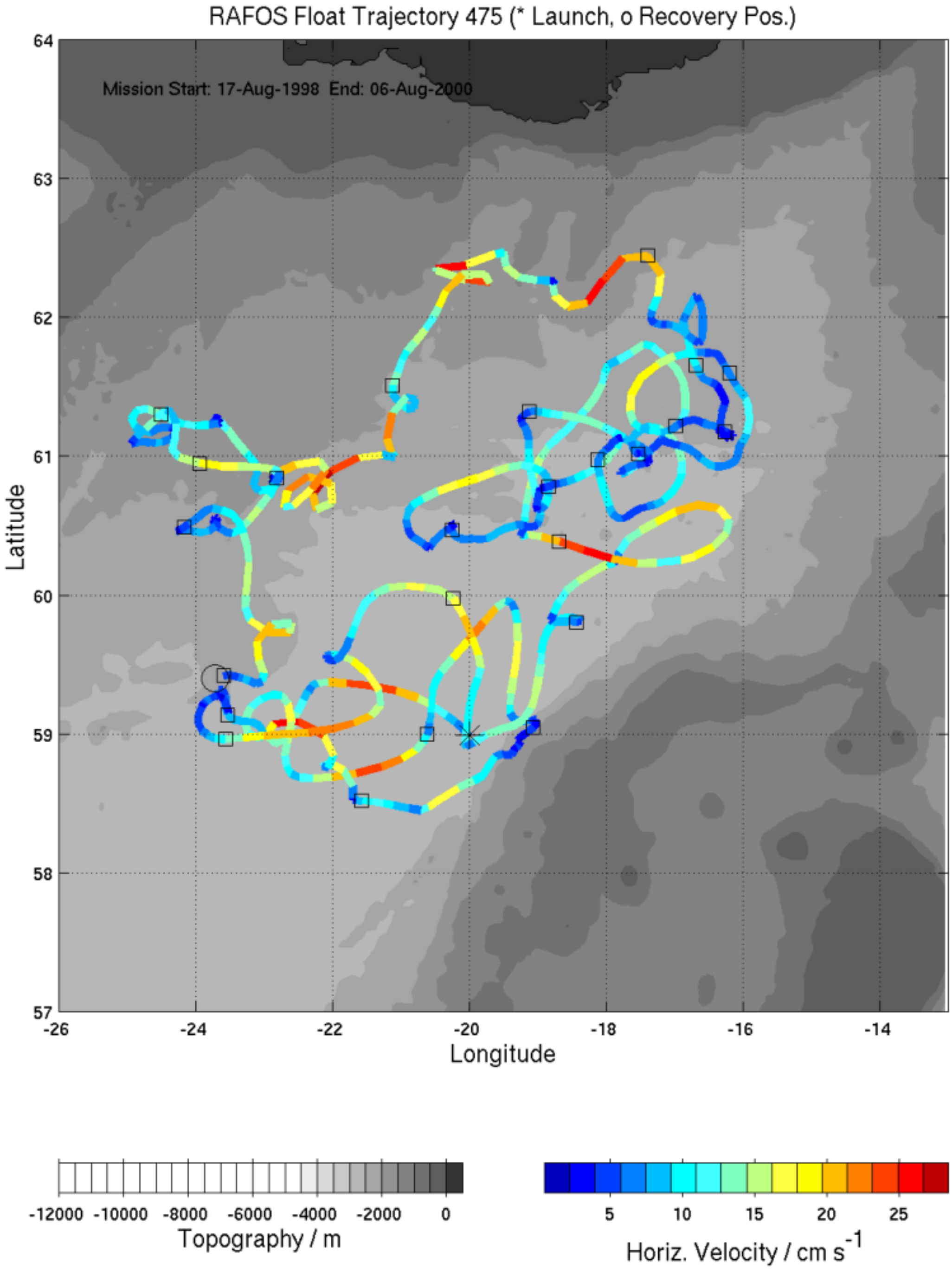
RAFOS Float Trajectory 474 (* Launch, o Recovery Pos.)
Mission Start: 15-Aug-1998 End: 04-Aug-2000
Latitude
Longitude
Horiz. Velocity / cm s-1
Topography / m


RAFOS Float 474: Temperature
Temperature / ^{O}C
Time / Days
3.65
3.6
3.55
3.5
3.45
3.4
3.35
3.3
3.25
3.2
3.15
0
100
200
300
400
500
600
700
800

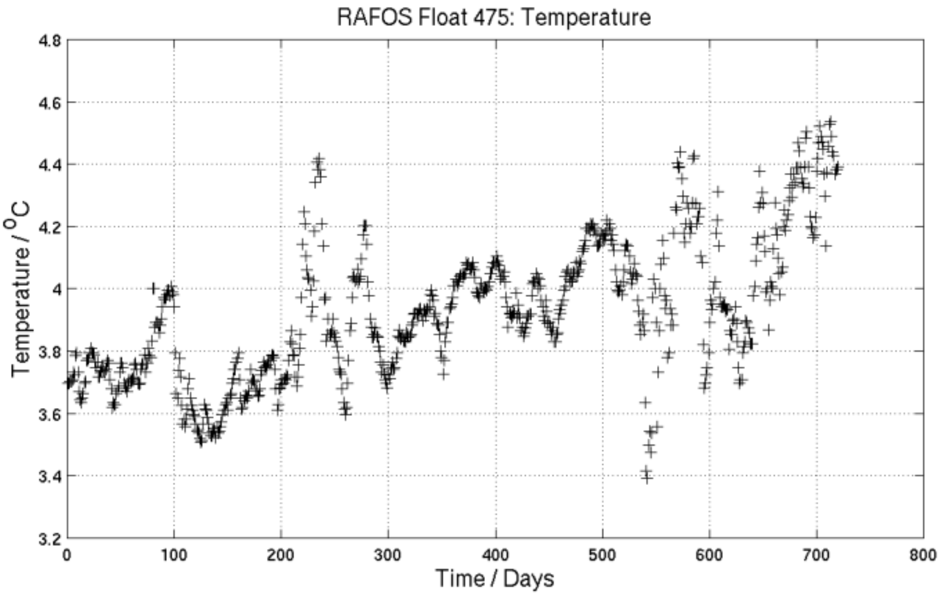

RAFOS Float 474: Pressure
Pressure / dbar
Time / Days
-1450
-1460
-1470
-1480
-1490
-1500
-1510
-1520
-1530
-1540
0
100
200
300
400
500
600
700
800

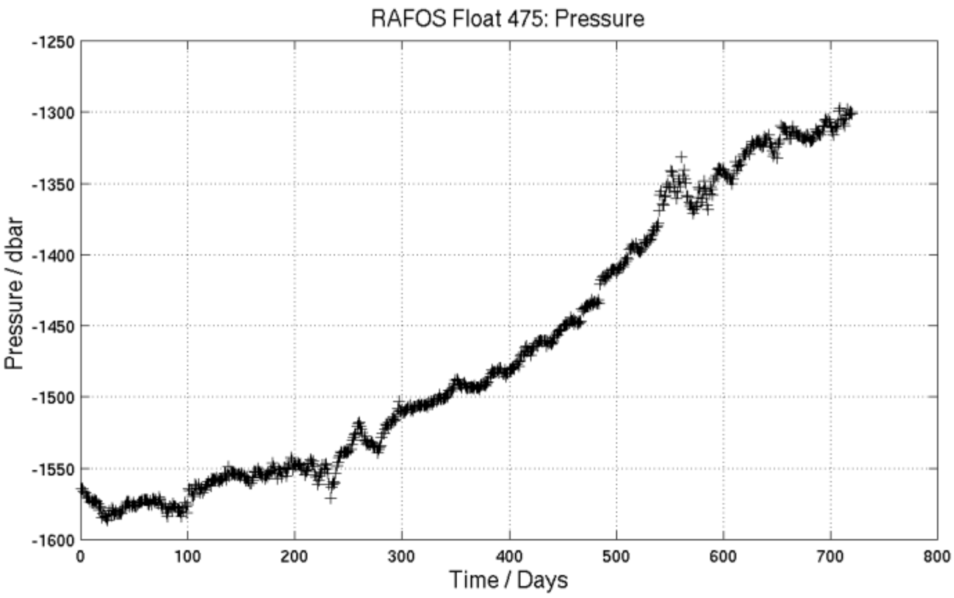


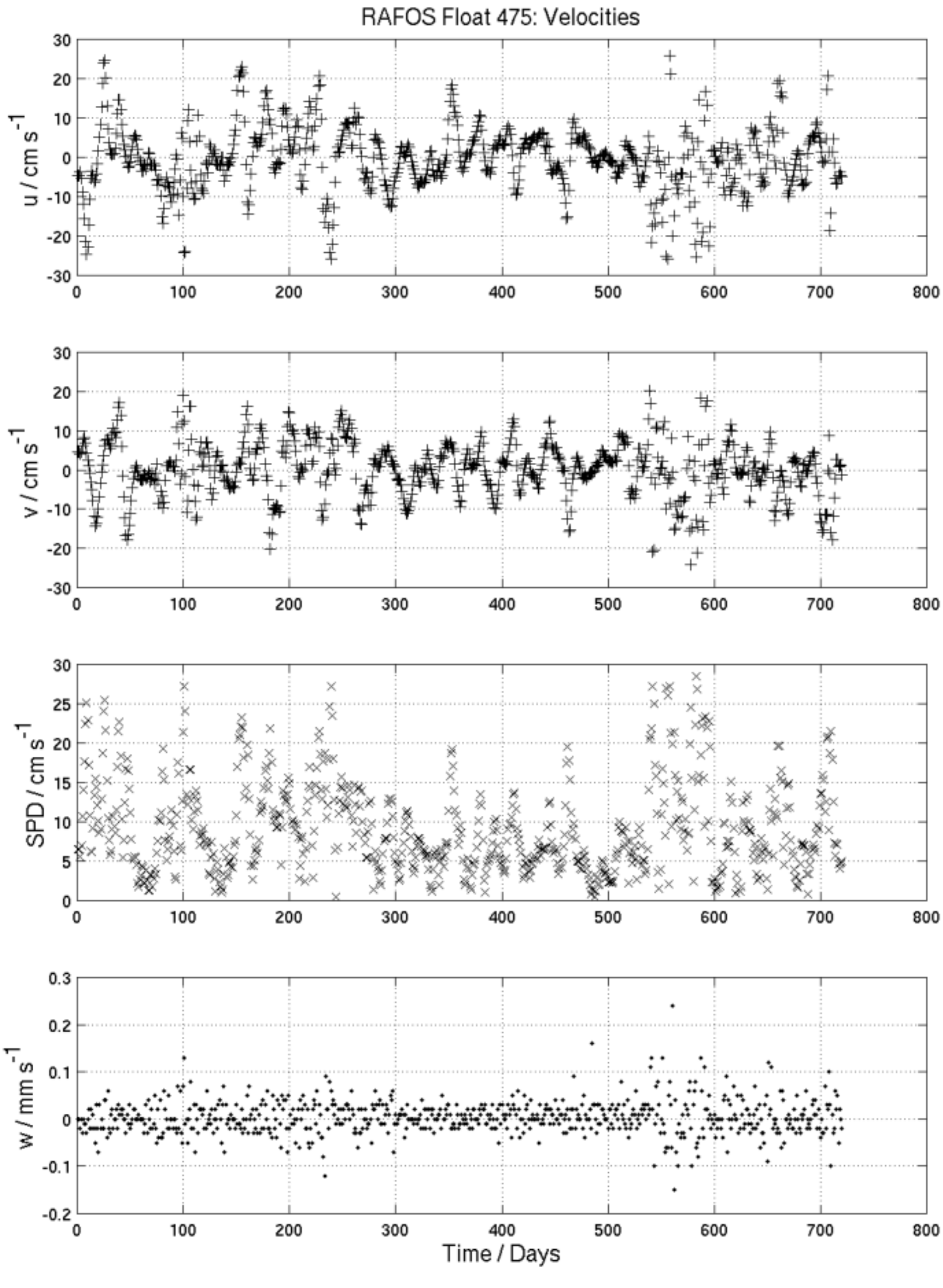
RAFOS Float 474: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

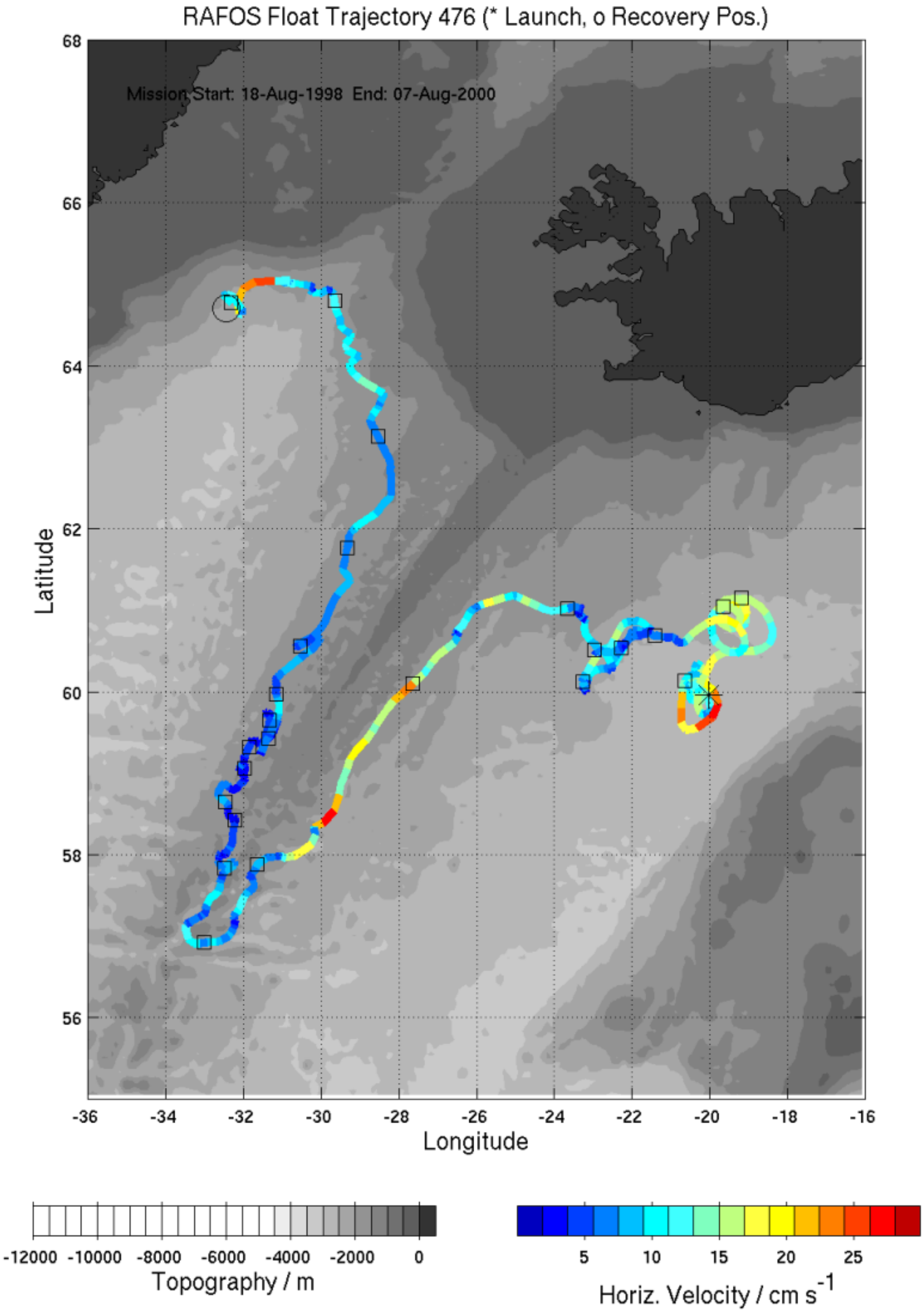


RAFOS Float Trajectory 475 (* Launch, o Recovery Pos.)
Mission Start: 17-Aug-1998 End: 06-Aug-2000
Latitude
Longitude
64
63
62
61
60
59
58
57
-26
-24
-22
-20
-18
-16
-14
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5 10 15 20 25
Horiz. Velocity / cm s^{-1}

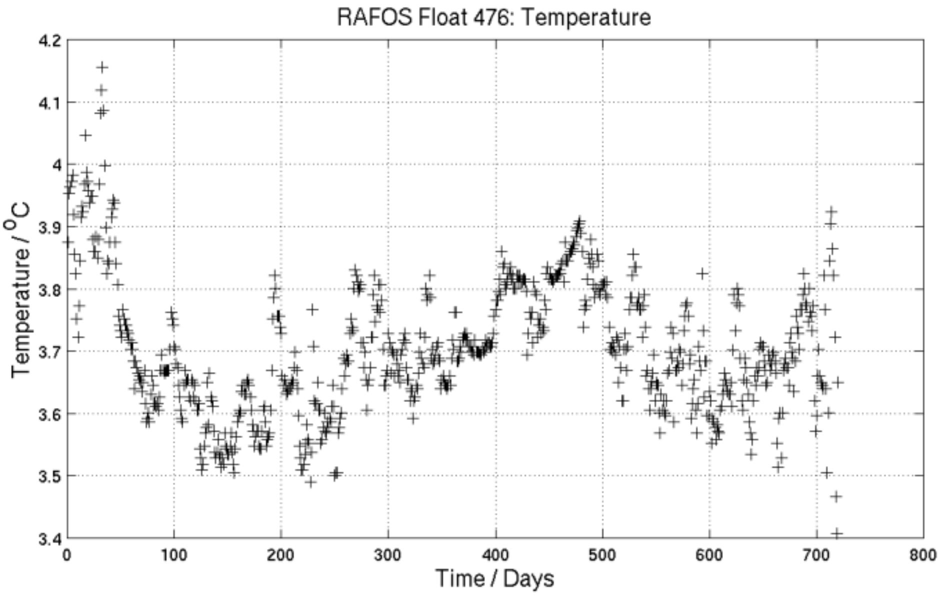

RAFOS Float 475: Temperature
Temperature / ^{o}C
Time / Days
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
0
100
200
300
400
500
600
700
800


RAFOS Float 475: Pressure
Pressure / dbar
Time / Days
-1250
-1300
-1350
-1400
-1450
-1500
-1550
-1600
0
100
200
300
400
500
600
700
800

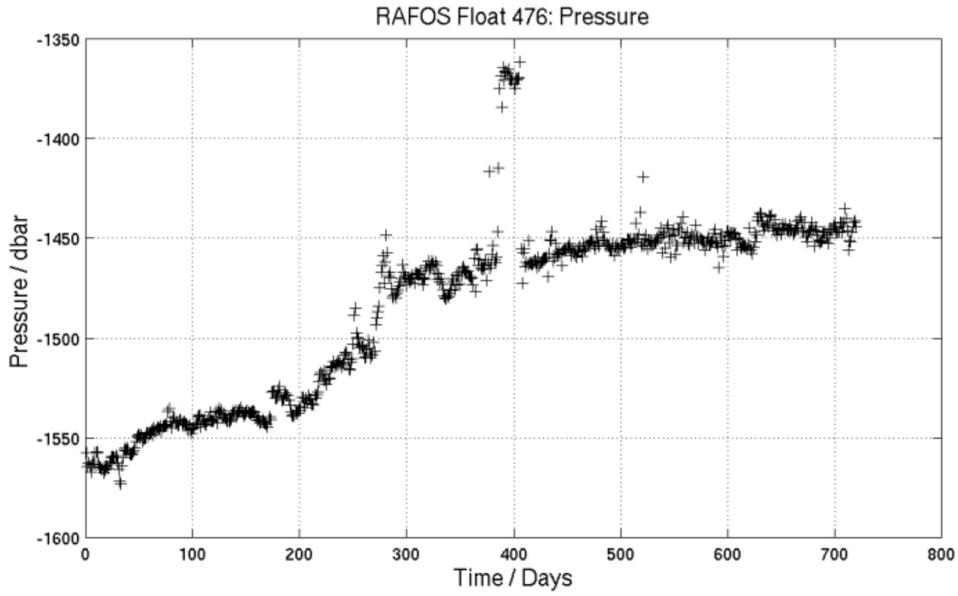

RAFOS Float 475: Velocities
u / cm s^-1
v / cm s^-1
SPD / cm s^-1
w / mm s^-1
Time / Days



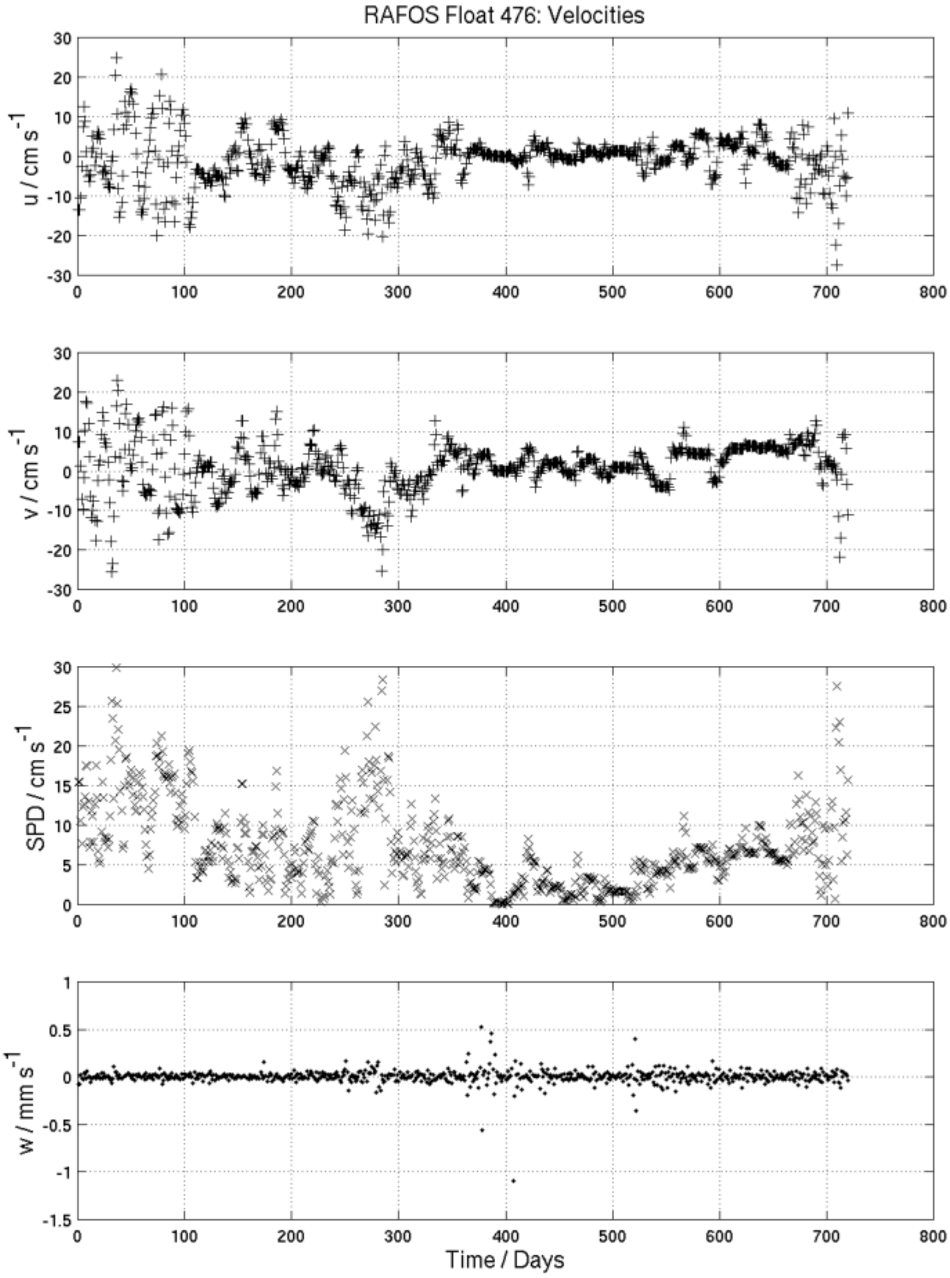
RAFOS Float Trajectory 476 (* Launch, o Recovery Pos.)
Mission Start: 18-Aug-1998 End: 07-Aug-2000
Latitude
Longitude
68
66
64
62
60
58
56
-36
-34
-32
-30
-28
-26
-24
-22
-20
-18
-16
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5 10 15 20 25
Horiz. Velocity / cm s-1



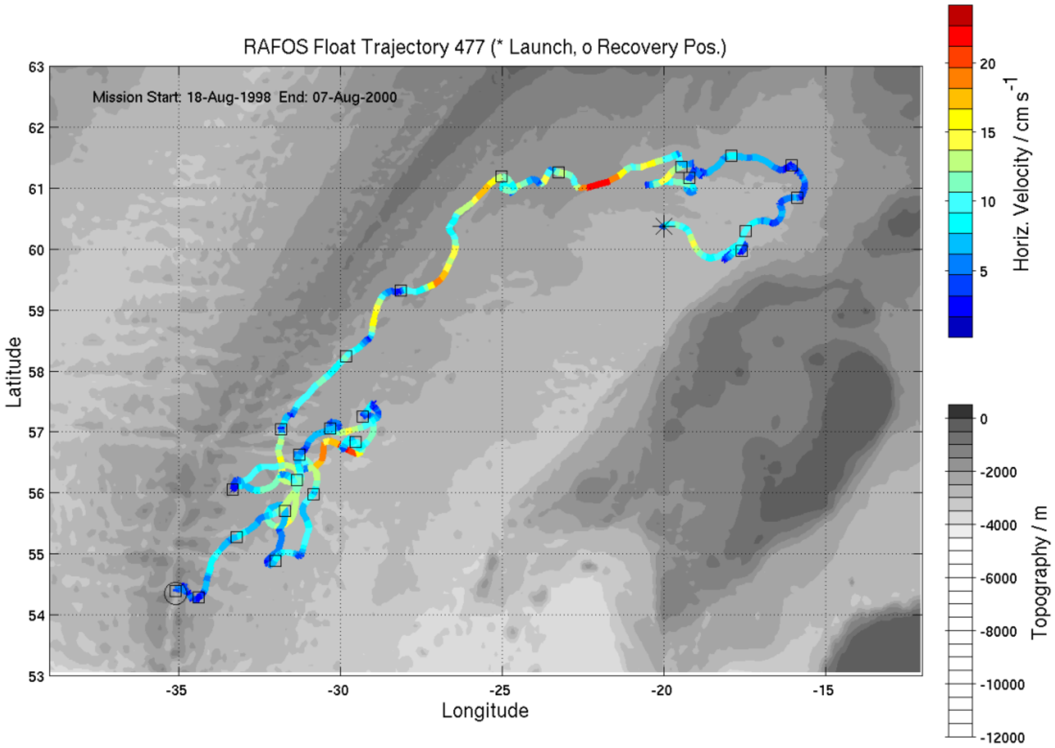
RAFOS Float 476: Temperature
Temperature / ^{o}C
Time / Days
4.2
4.1
4
3.9
3.8
3.7
3.6
3.5
3.4
0
100
200
300
400
500
600
700
800



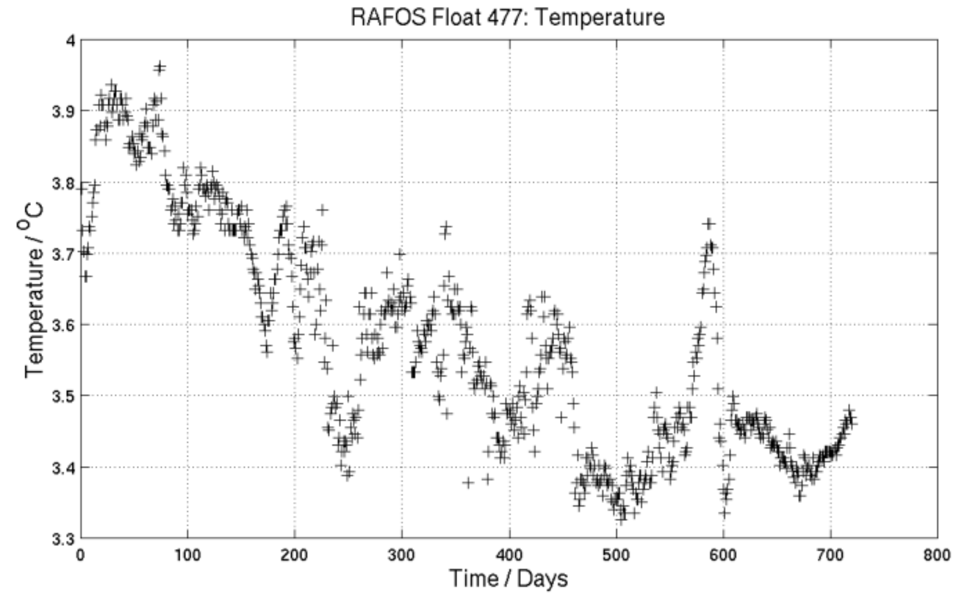
RAFOS Float 476: Pressure
Pressure / dbar
Time / Days
-1350
-1400
-1450
-1500
-1550
-1600
0
100
200
300
400
500
600
700
800

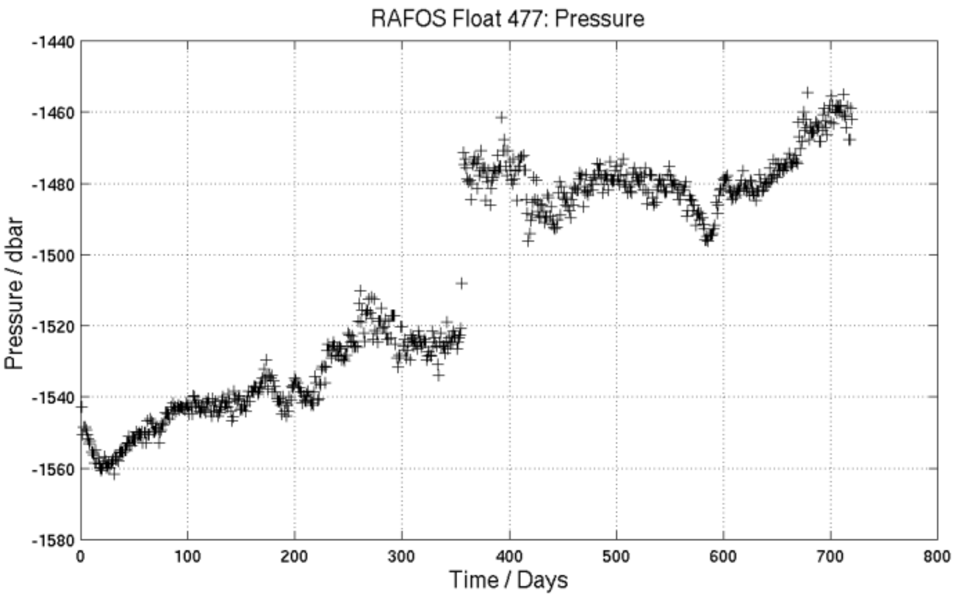


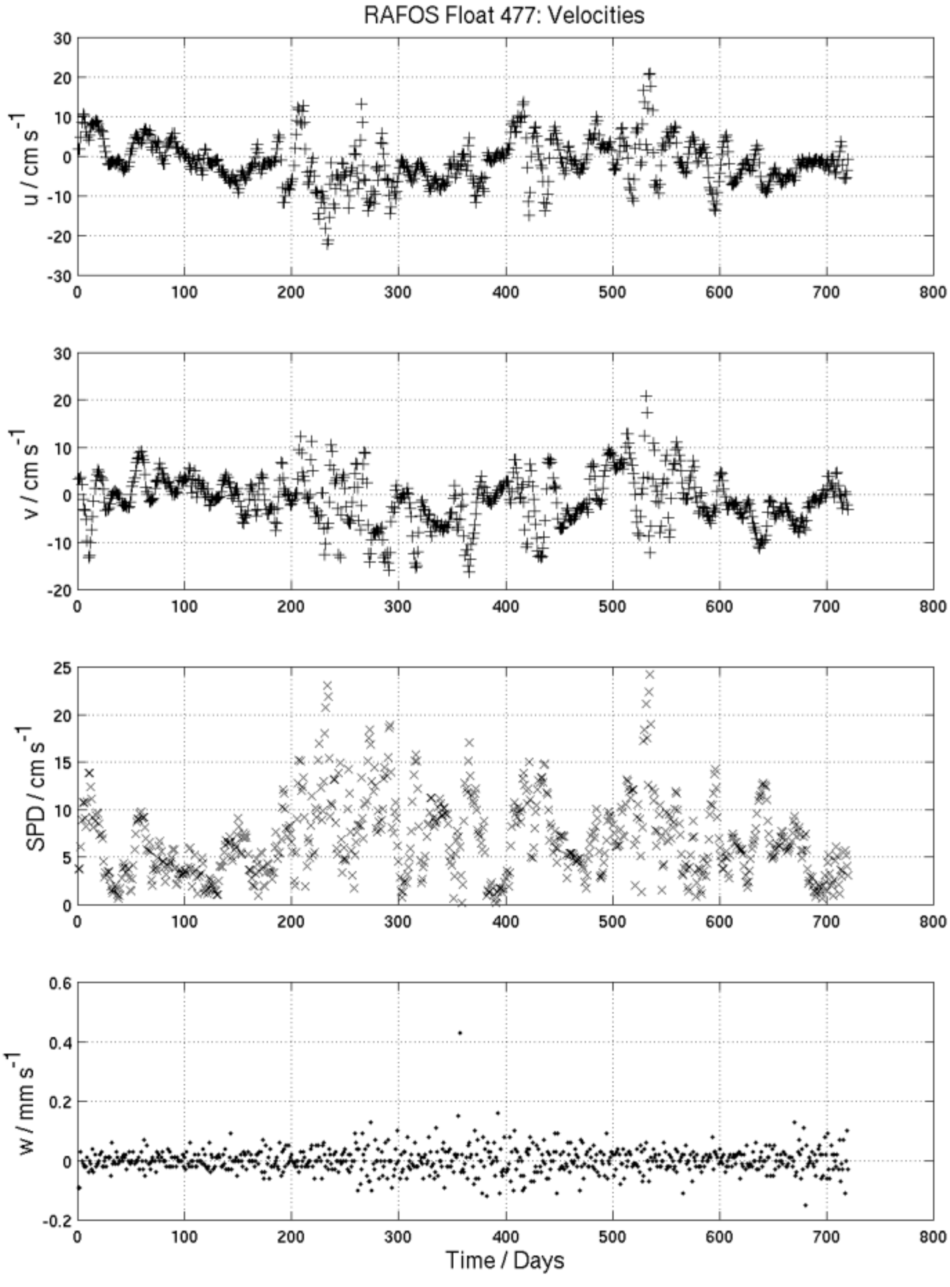
RAFOS Float 476: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

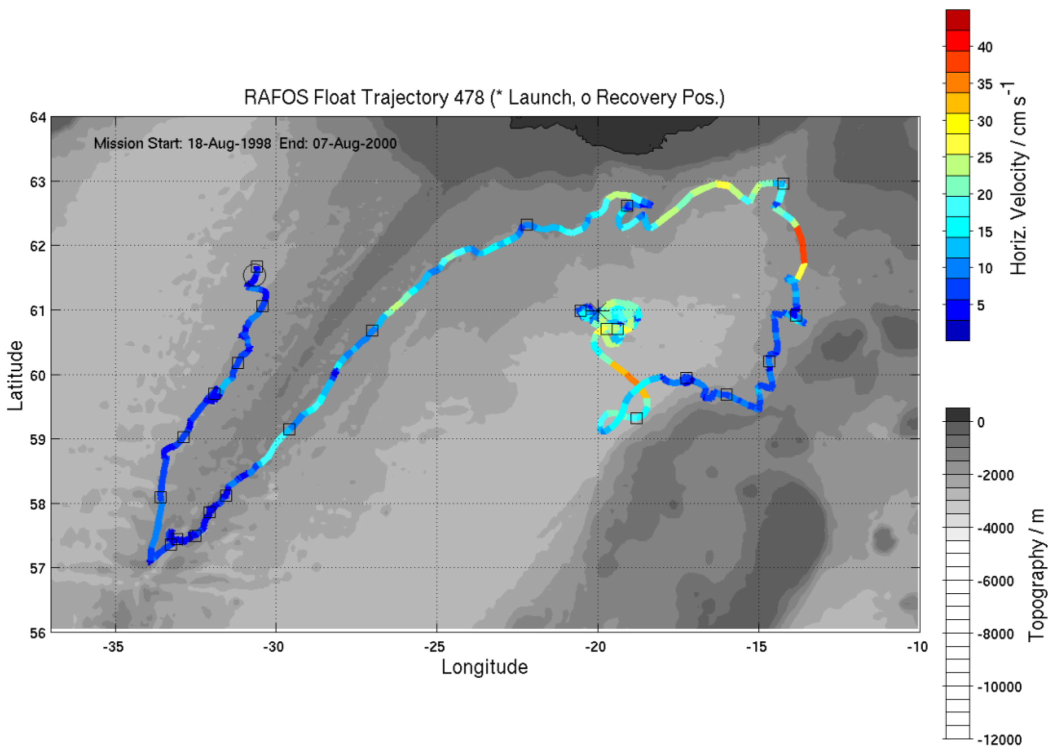


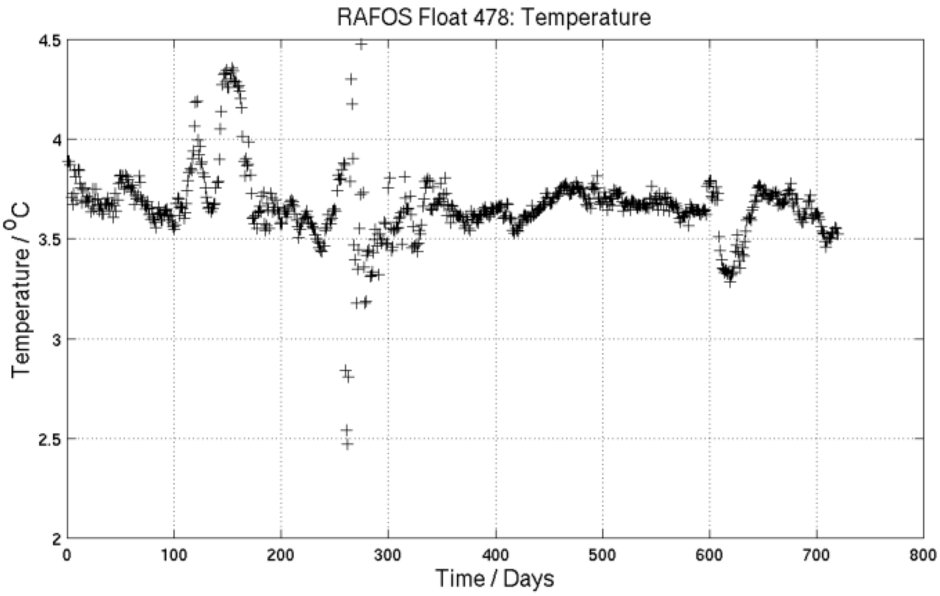
RAFOS Float Trajectory 477 (* Launch, o Recovery Pos.)
Mission Start: 18-Aug-1998 End: 07-Aug-2000
Latitude
Longitude
63
62
61
60
59
58
57
56
55
54
53
-35
-30
-25
-20
-15
Horiz. Velocity / cm s^{-1}
20
15
10
5
Topography / m
0
-2000
-4000
-6000
-8000
-10000
-12000

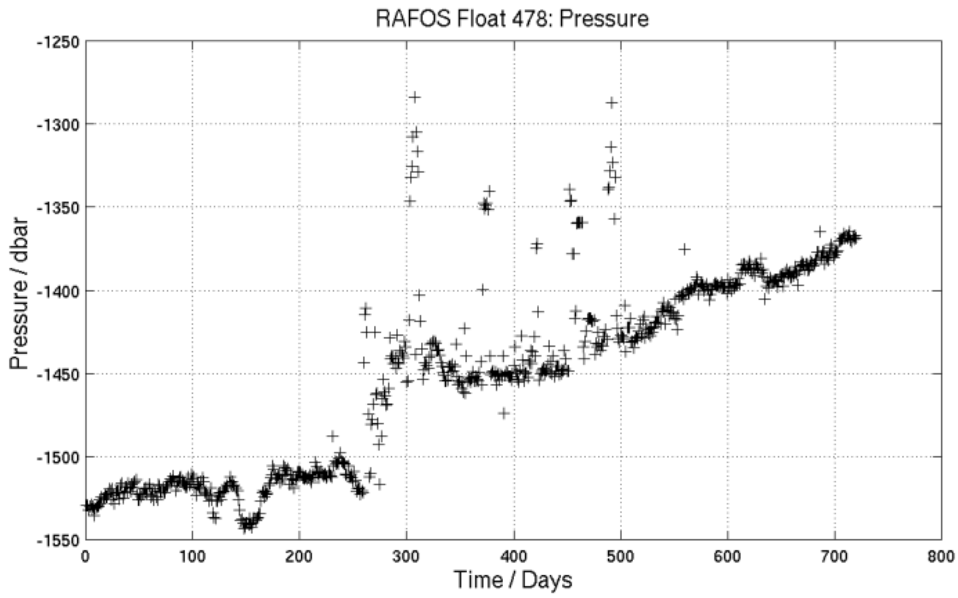

RAFOS Float 477: Temperature
Temperature / ^{o}C
Time / Days

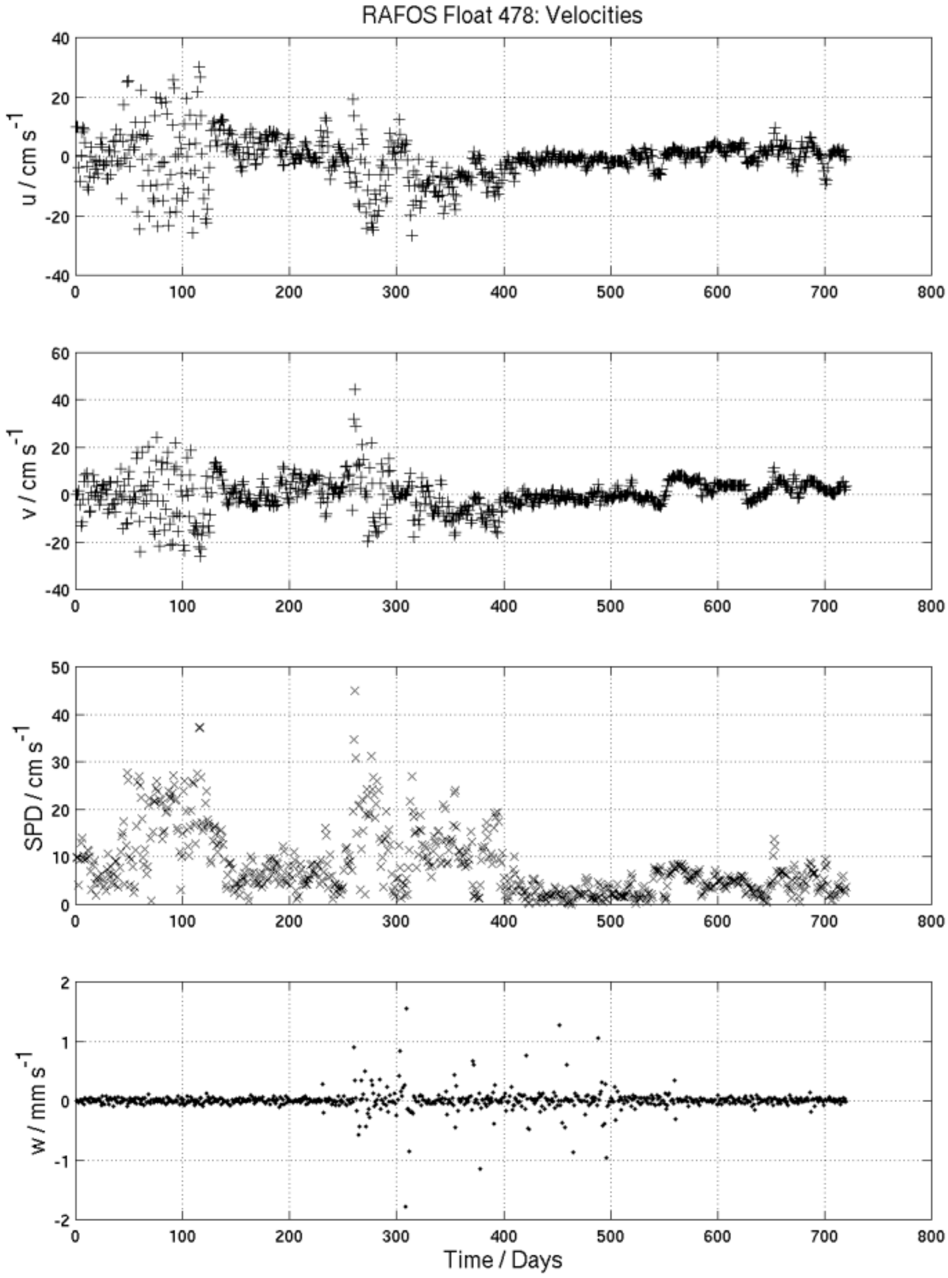

RAFOS Float 477: Pressure
Pressure / dbar
Time / Days


RAFOS Float 477: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

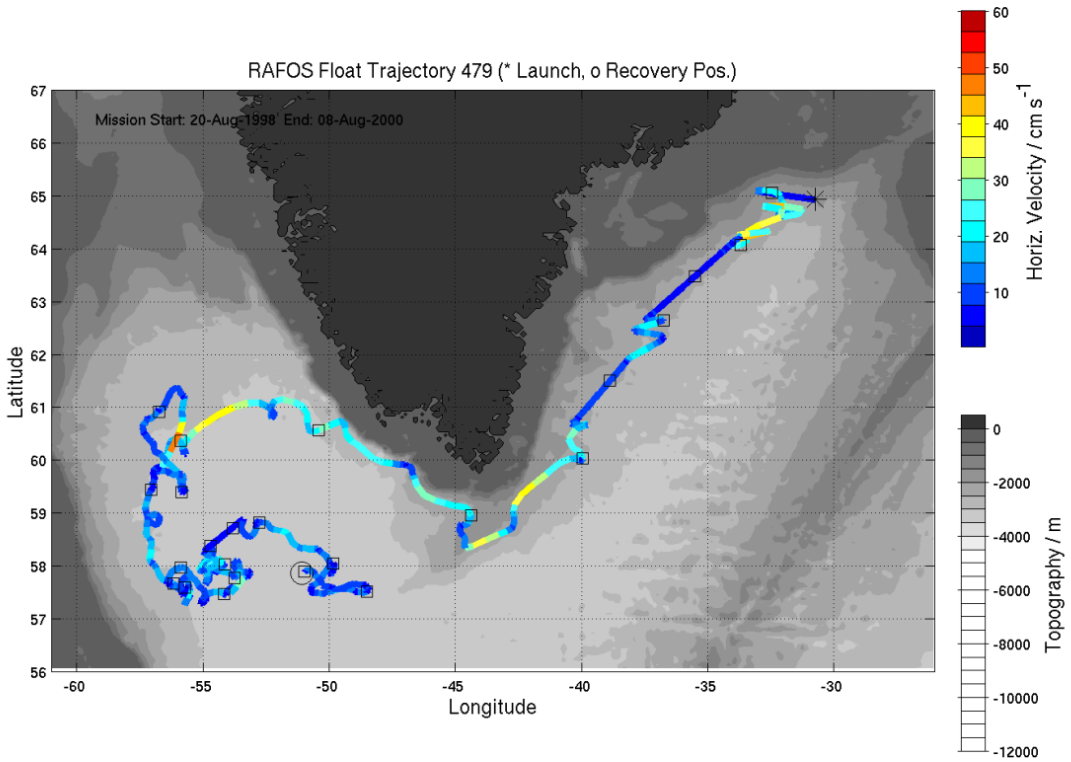

RAFOS Float Trajectory 478 (* Launch, o Recovery Pos.)
Mission Start: 18-Aug-1998 End: 07-Aug-2000
Latitude
Longitude
Horiz. Velocity / cm s-1
Topography / m


RAFOS Float 478: Temperature
Temperature / ^{o}C
Time / Days

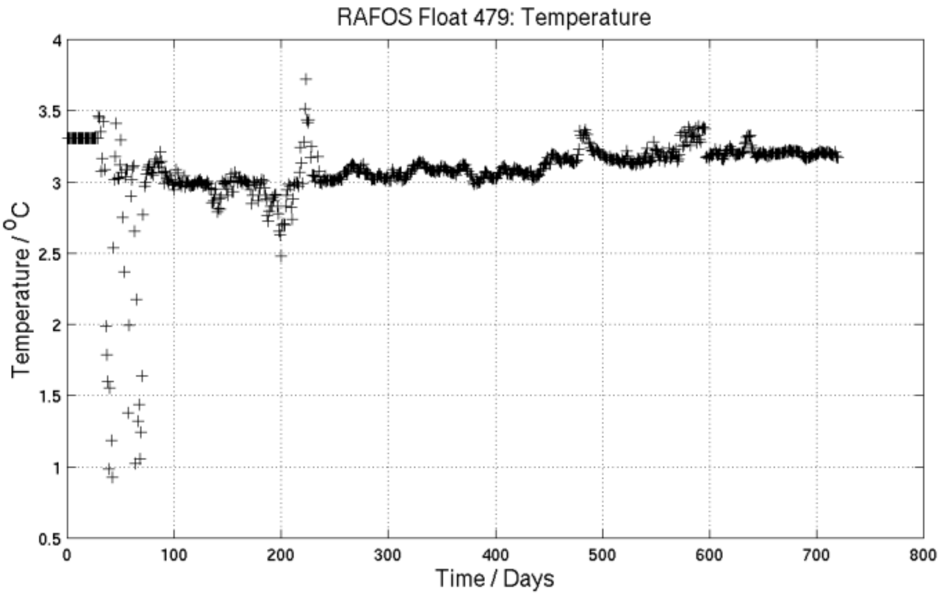

RAFOS Float 478: Pressure
Pressure / dbar
Time / Days

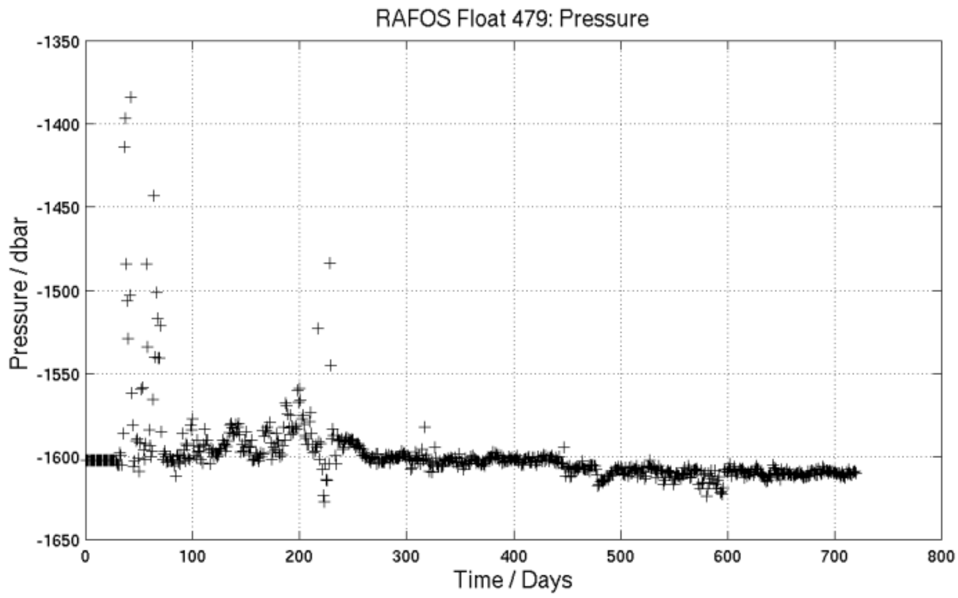


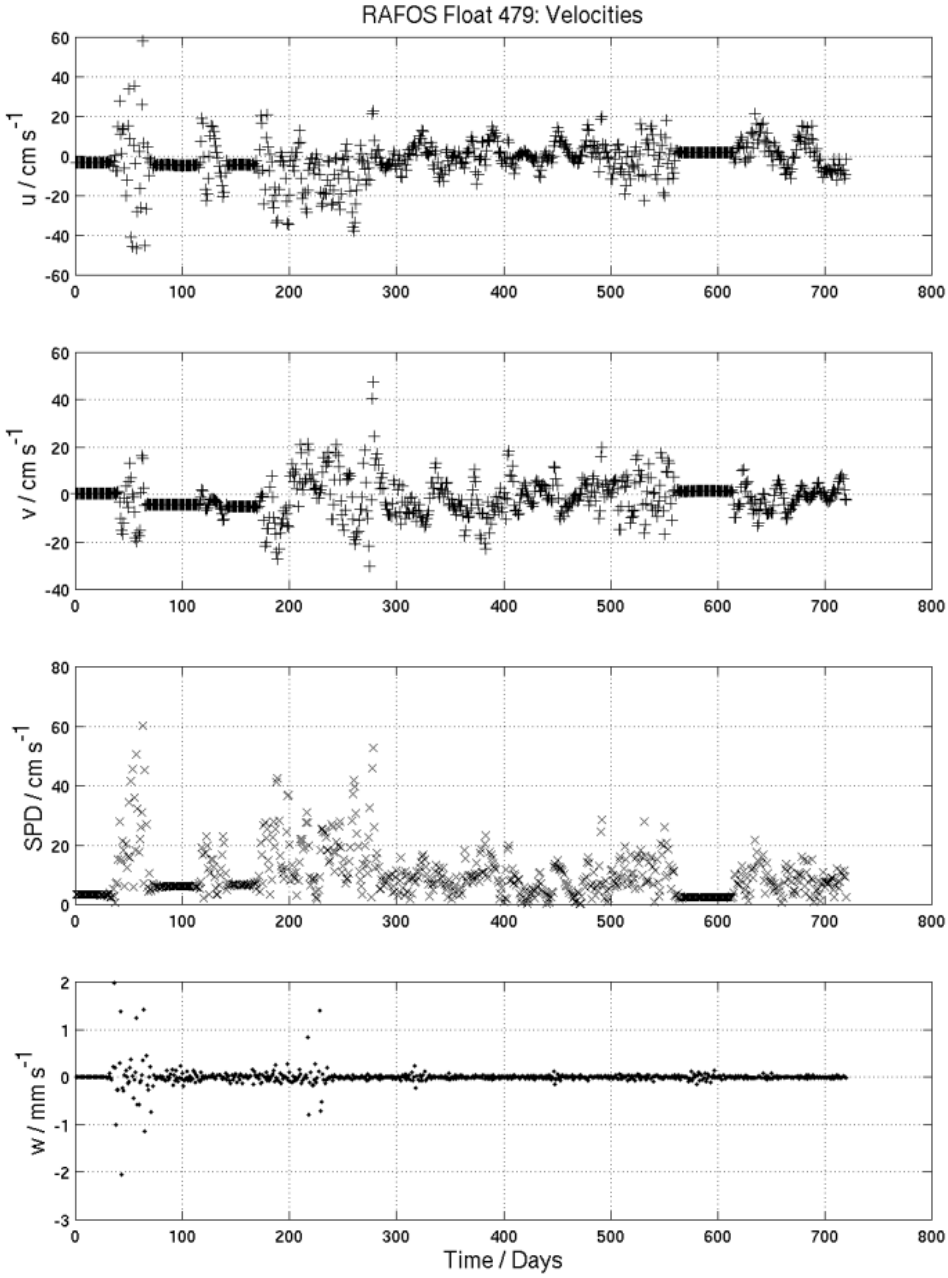
RAFOS Float 478: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

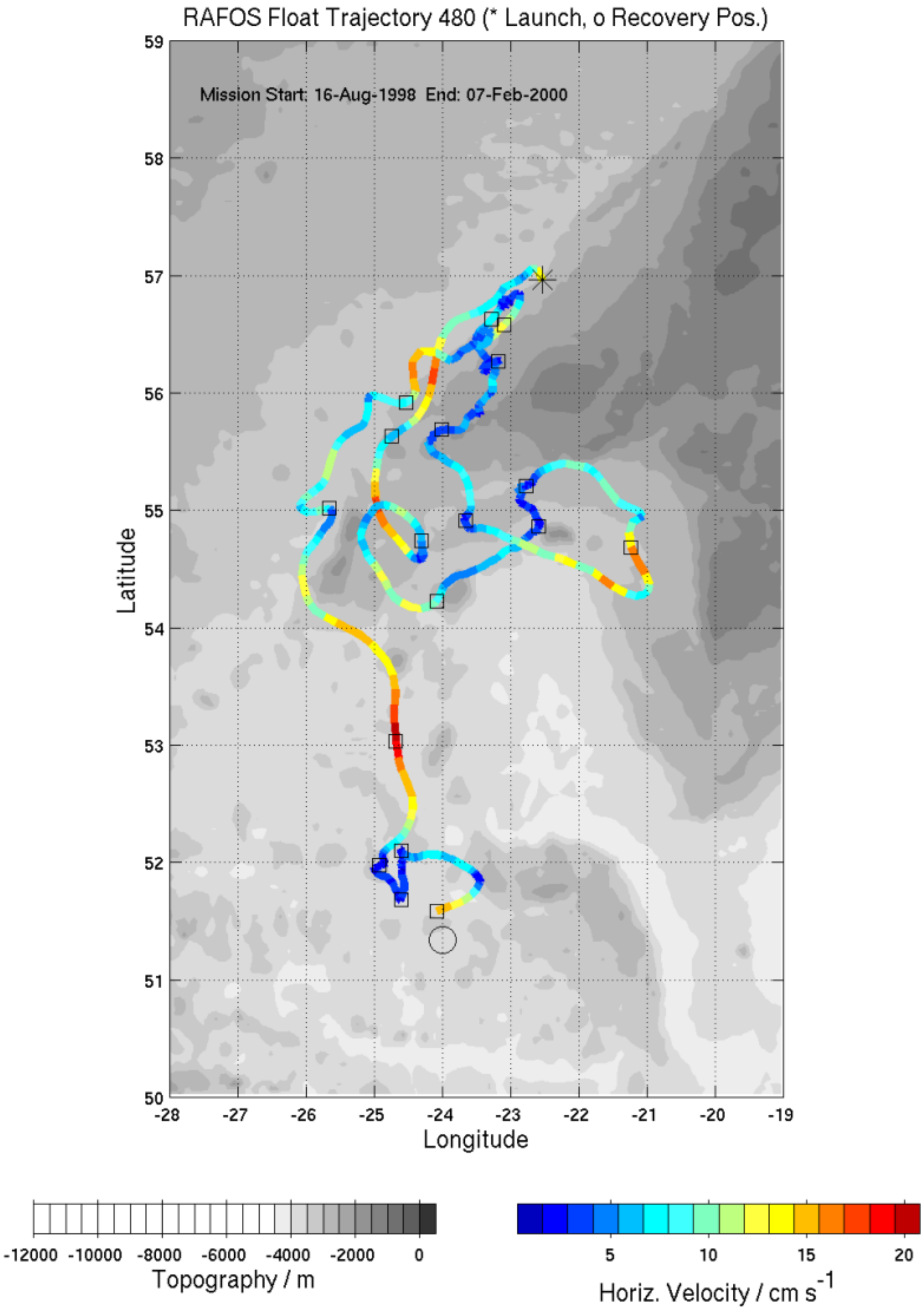


RAFOS Float Trajectory 479 (* Launch, o Recovery Pos.)
Mission Start: 20-Aug-1998 End: 08-Aug-2000
Latitude
Longitude
Horiz. Velocity / cm s^{-1}
Topography / m

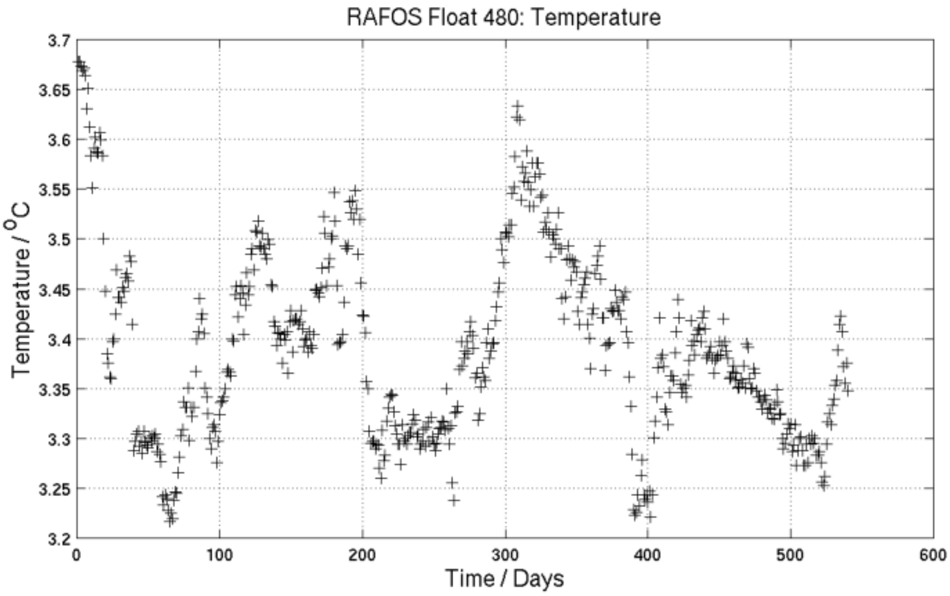

RAFOS Float 479: Temperature
Temperature / ^{o}C
Time / Days
4
3.5
3
2.5
2
1.5
1
0.5
0
100
200
300
400
500
600
700
800

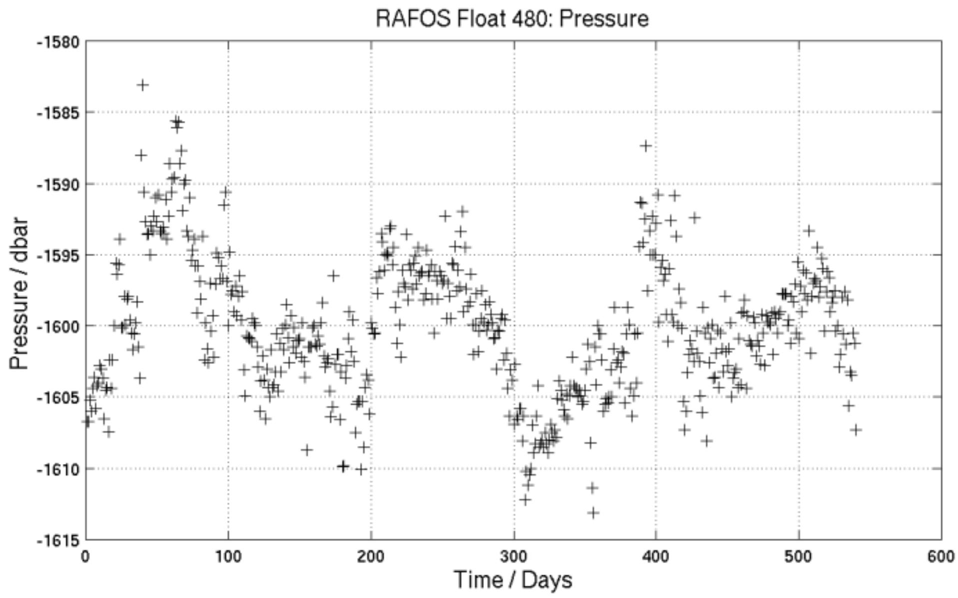

RAFOS Float 479: Pressure
Pressure / dbar
Time / Days
-1350
-1400
-1450
-1500
-1550
-1600
-1650
0
100
200
300
400
500
600
700
800

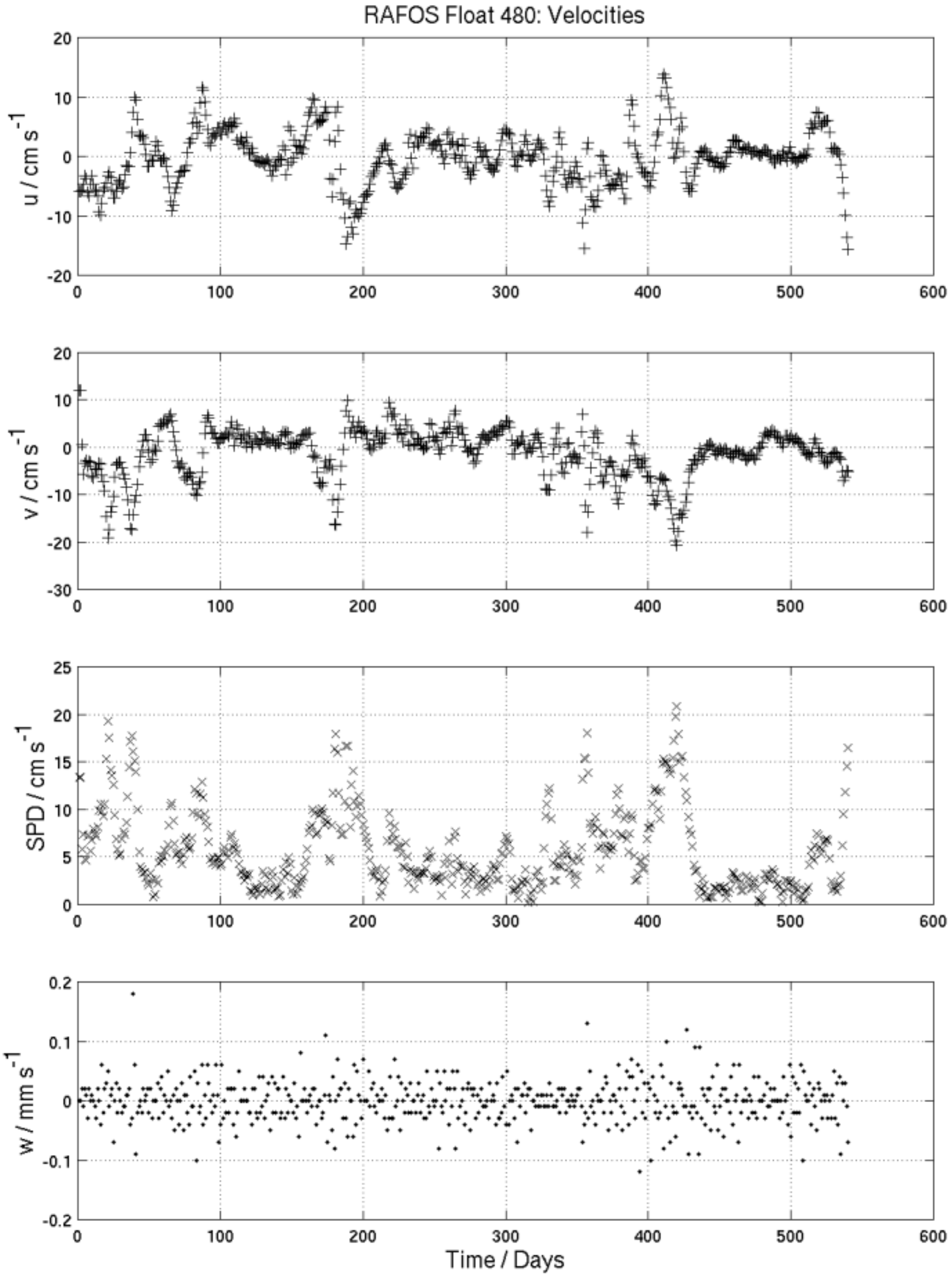

RAFOS Float 479: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

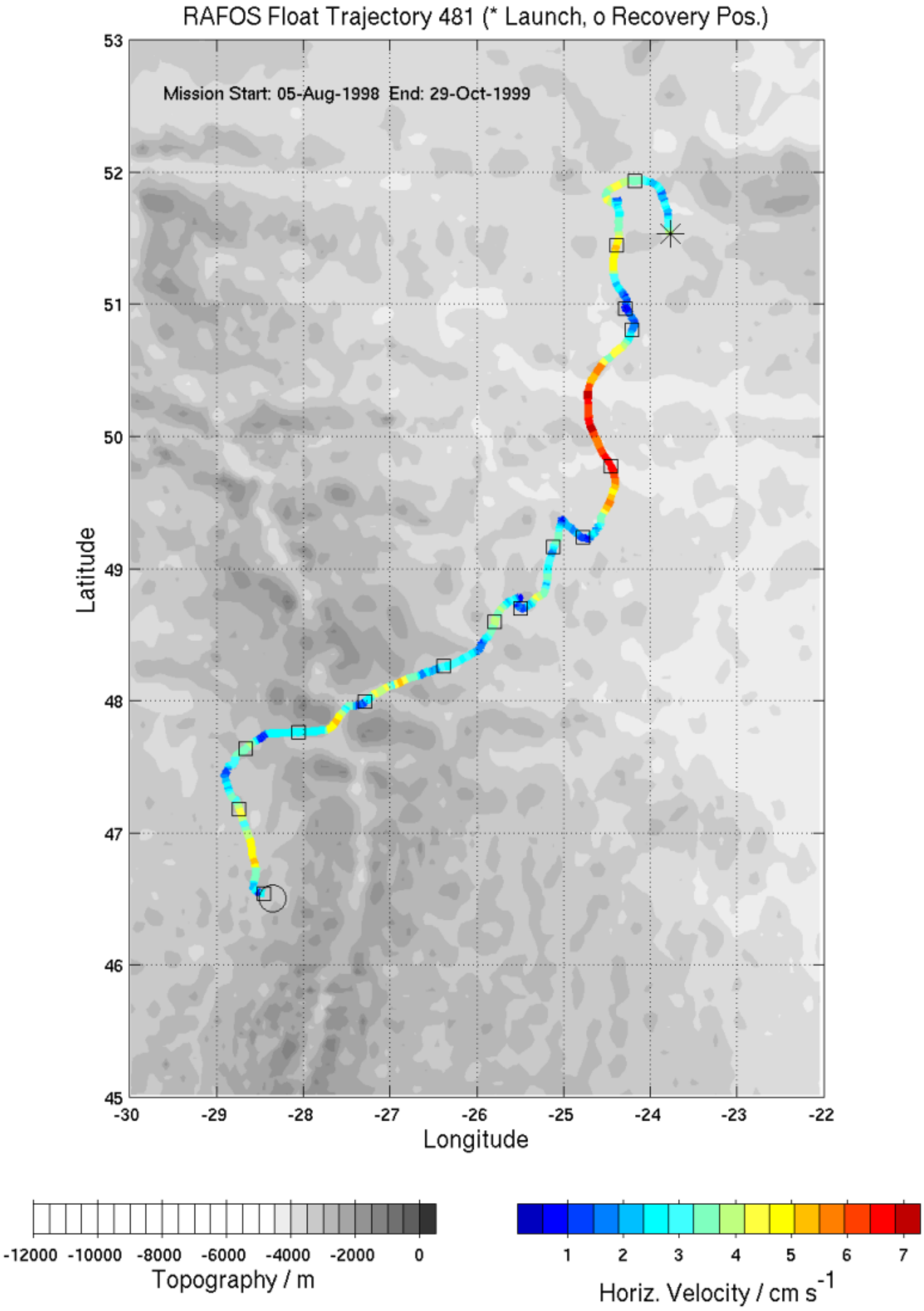


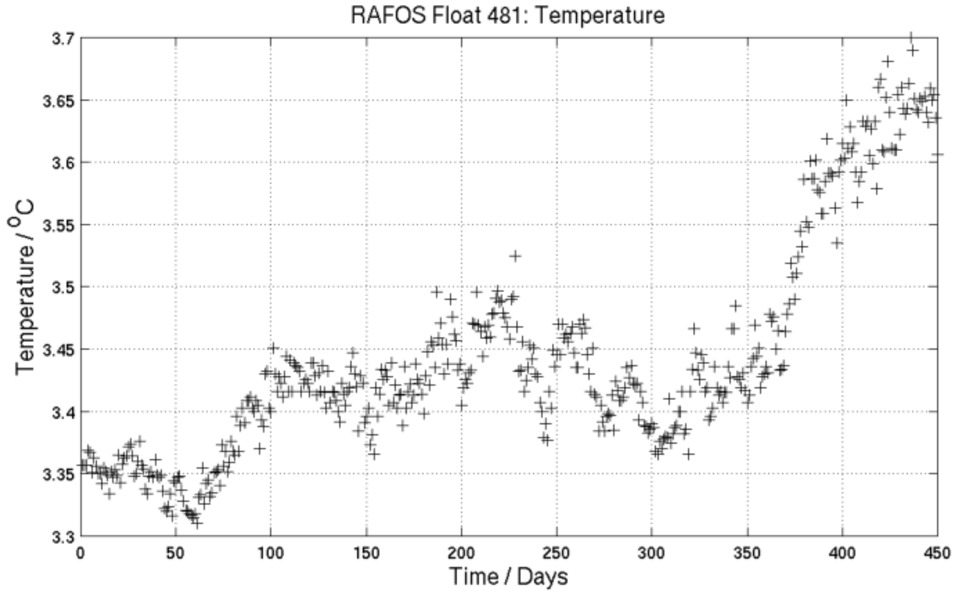
RAFOS Float Trajectory 480 (* Launch, o Recovery Pos.)
Mission Start: 16-Aug-1998 End: 07-Feb-2000
59
58
57
56
55
54
53
52
51
50
Latitude
-28
-27
-26
-25
-24
-23
-22
-21
-20
-19
Longitude
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5
10
15
20
Horiz. Velocity / cm s-1

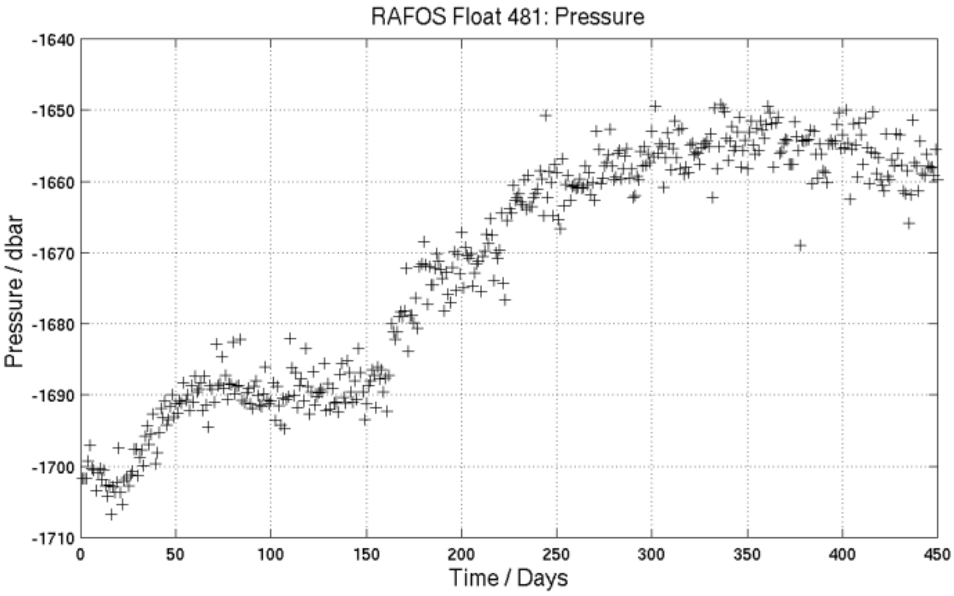

RAFOS Float 480: Temperature
Temperature / ^{o}C
Time / Days
3.7
3.65
3.6
3.55
3.5
3.45
3.4
3.35
3.3
3.25
3.2
0
100
200
300
400
500
600

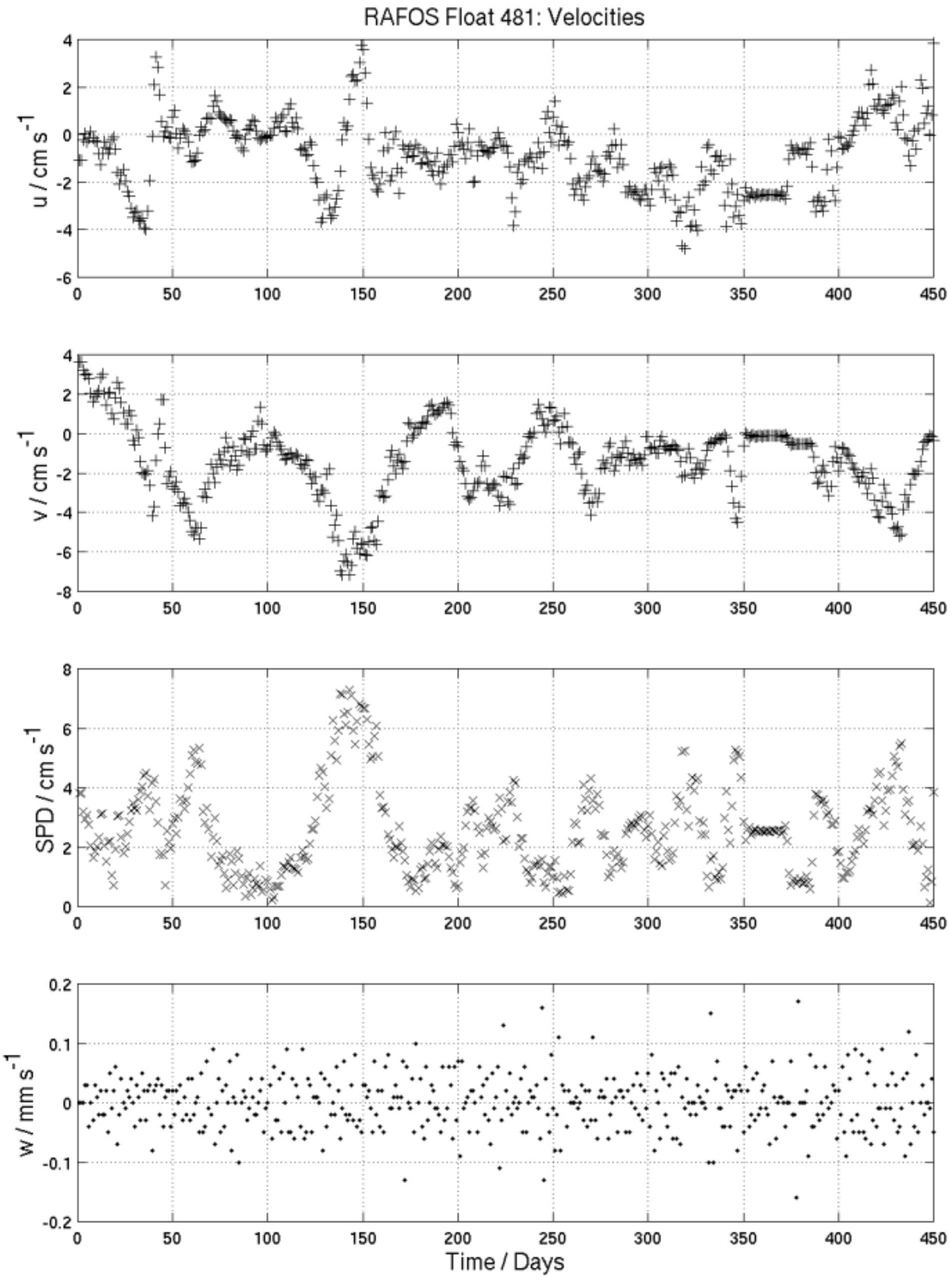

RAFOS Float 480: Pressure
Pressure / dbar
Time / Days
-1580
-1585
-1590
-1595
-1600
-1605
-1610
-1615
0
100
200
300
400
500
600


RAFOS Float 480: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

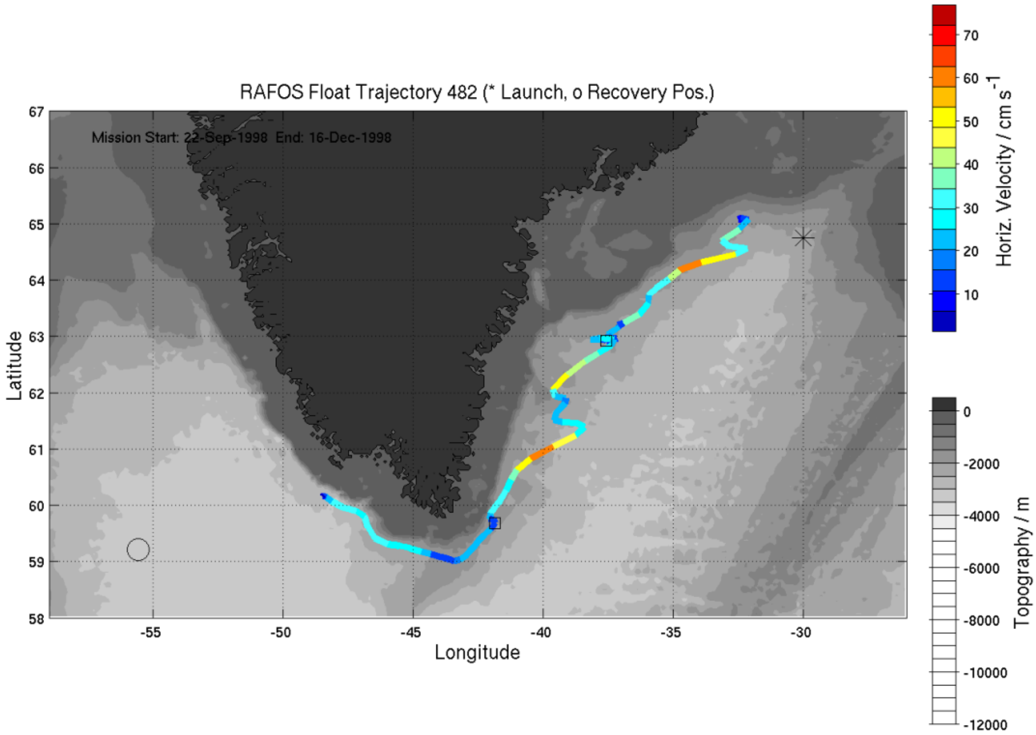

RAFOS Float Trajectory 481 (* Launch, o Recovery Pos.)
Mission Start: 05-Aug-1998 End: 29-Oct-1999
Latitude
Longitude
53
52
51
50
49
48
47
46
45
-30
-29
-28
-27
-26
-25
-24
-23
-22
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
1 2 3 4 5 6 7
Horiz. Velocity / cm s^-1


RAFOS Float 481: Temperature
Temperature / ^{o}C
Time / Days
3.7
3.65
3.6
3.55
3.5
3.45
3.4
3.35
3.3
0
50
100
150
200
250
300
350
400
450

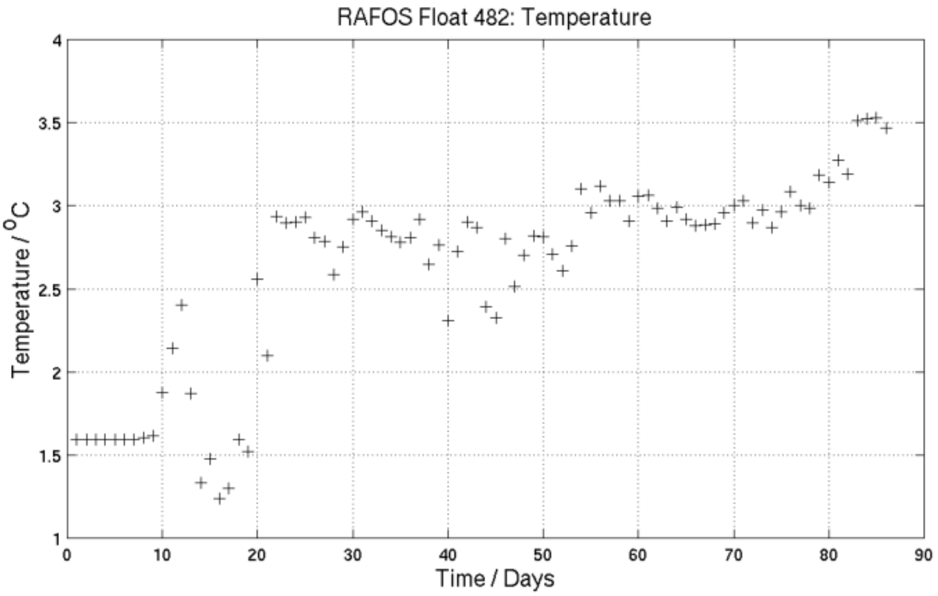

RAFOS Float 481: Pressure
Pressure / dbar
Time / Days
-1640
-1650
-1660
-1670
-1680
-1690
-1700
-1710
0
50
100
150
200
250
300
350
400
450

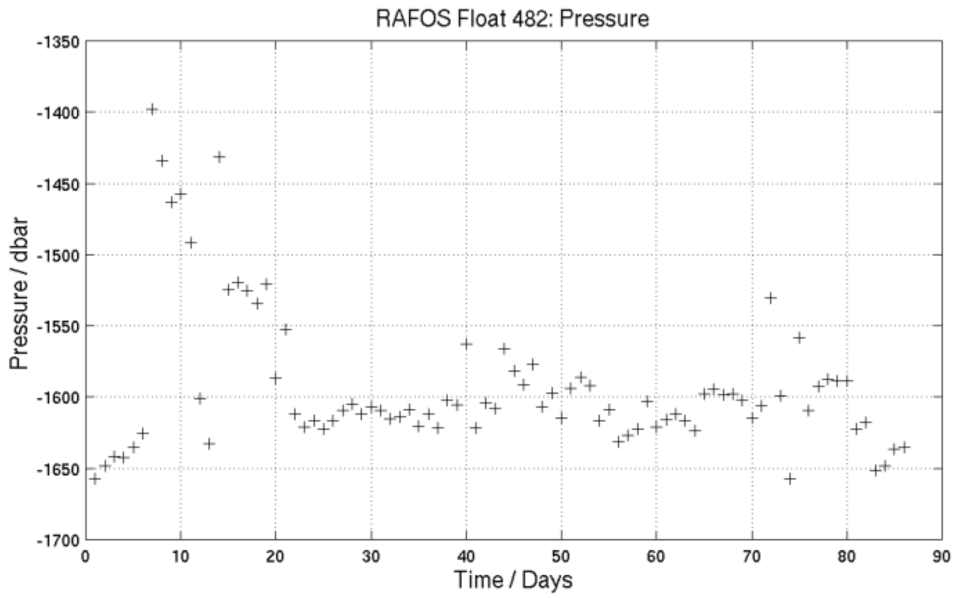


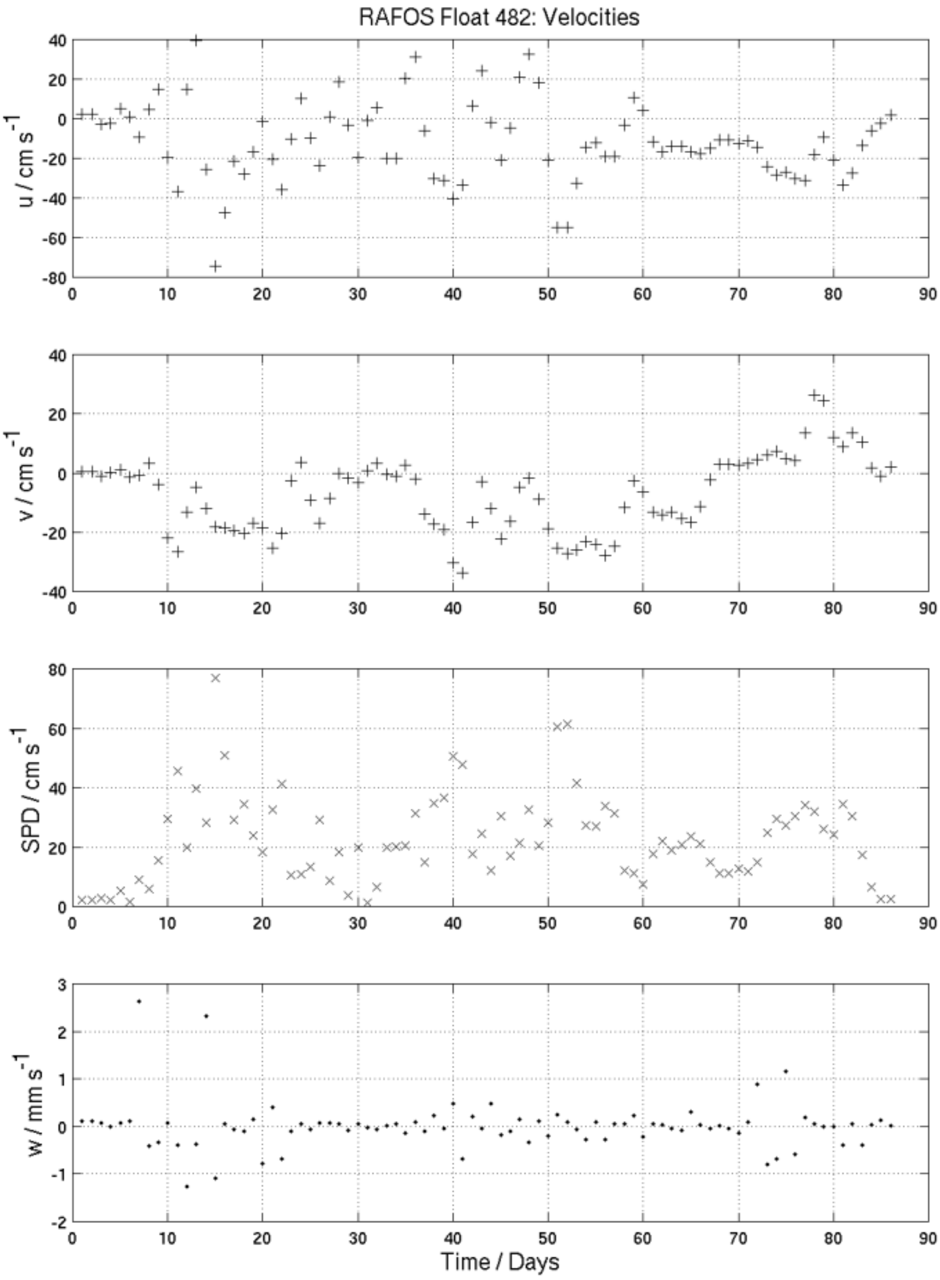
RAFOS Float 481: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days



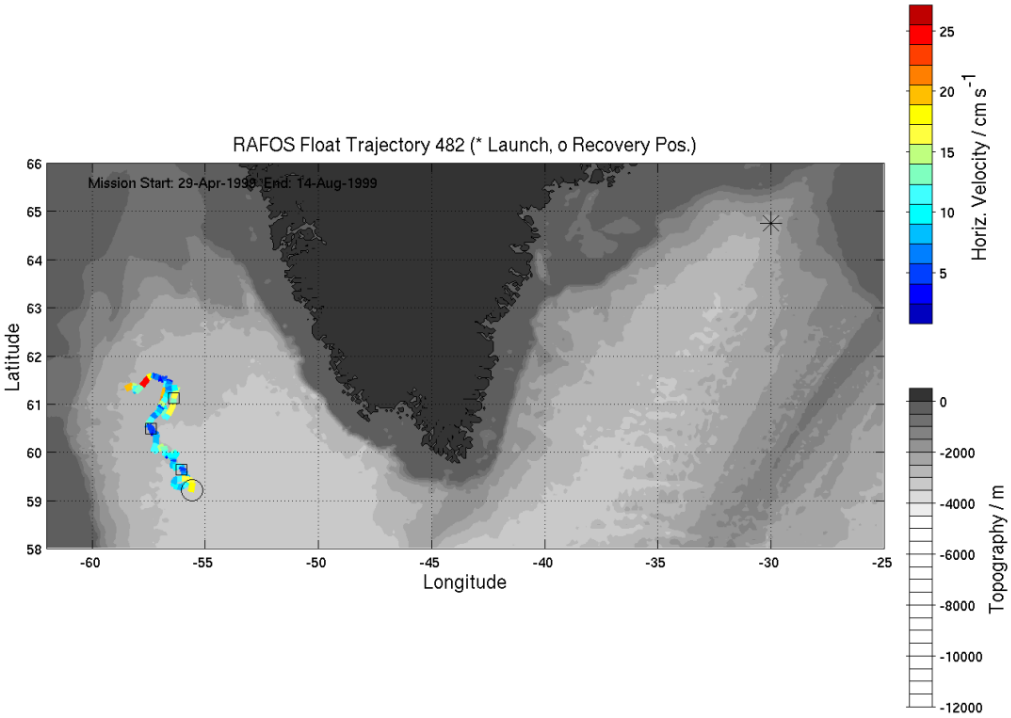
RAFOS Float Trajectory 482 (* Launch, o Recovery Pos.)
Mission Start: 22-Sep-1998 End: 16-Dec-1998
Latitude
Longitude
Horiz. Velocity / cm s-1
Topography / m


RAFOS Float 482: Temperature
Temperature / ^oC
Time / Days
1
1.5
2
2.5
3
3.5
4
0
10
20
30
40
50
60
70
80
90

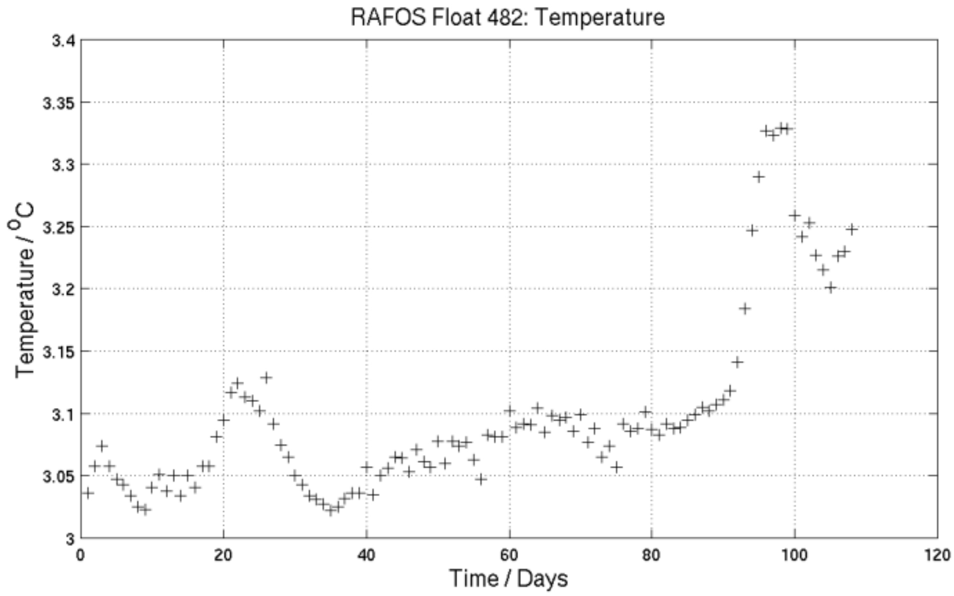

RAFOS Float 482: Pressure
Pressure / dbar
Time / Days
-1350
-1400
-1450
-1500
-1550
-1600
-1650
-1700
0
10
20
30
40
50
60
70
80
90

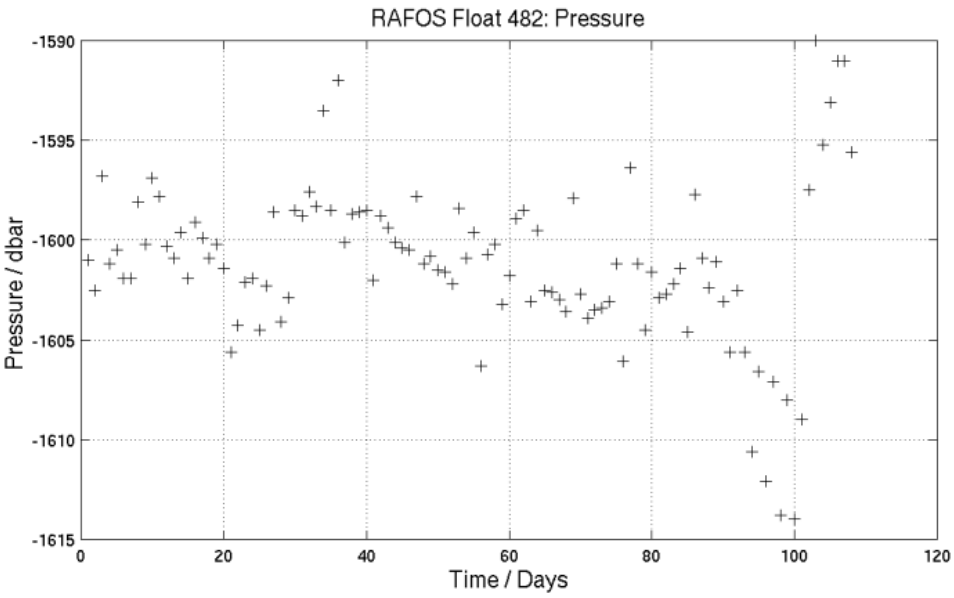


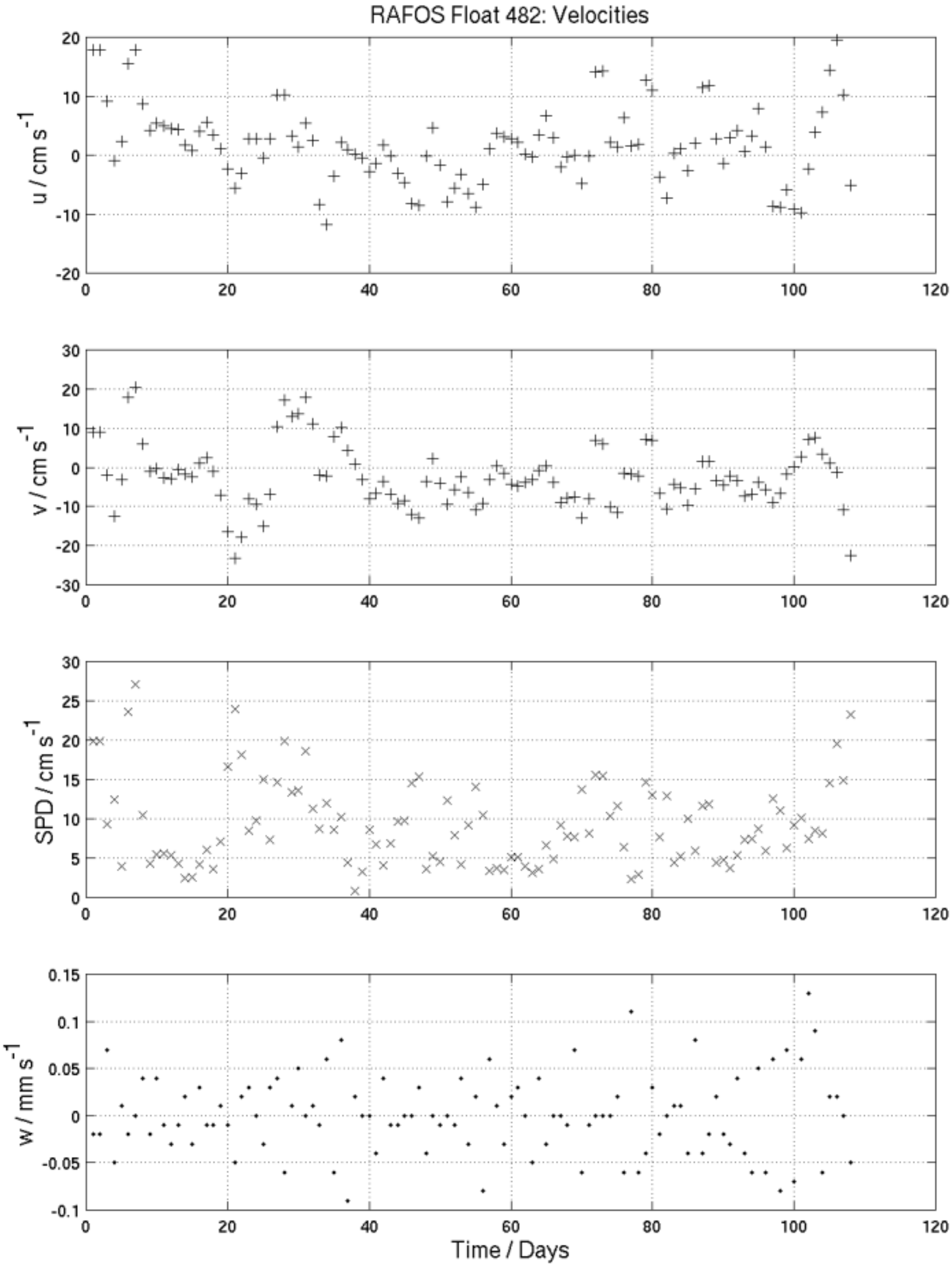
RAFOS Float 482: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days



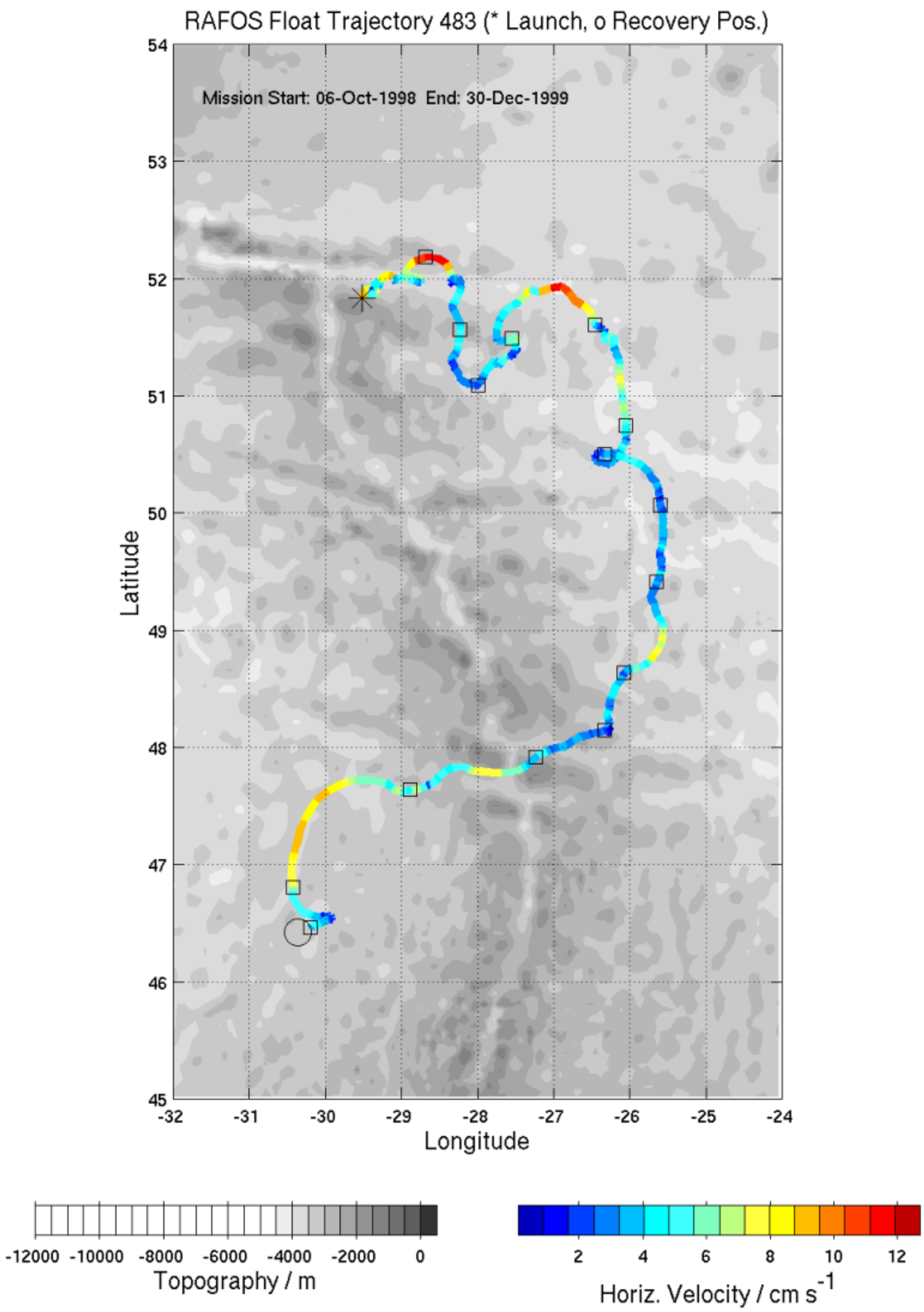
RAFOS Float Trajectory 482 (* Launch, o Recovery Pos.)
Mission Start: 29-Apr-1999 End: 14-Aug-1999
Latitude
Longitude
66
65
64
63
62
61
60
59
58
-60
-55
-50
-45
-40
-35
-30
-25
25
20
15
10
5
Horiz. Velocity / cm s-1
0
-2000
-4000
-6000
-8000
-10000
-12000
Topography / m


RAFOS Float 482: Temperature
Temperature / ^{o}C
Time / Days
3.4
3.35
3.3
3.25
3.2
3.15
3.1
3.05
3
0
20
40
60
80
100
120

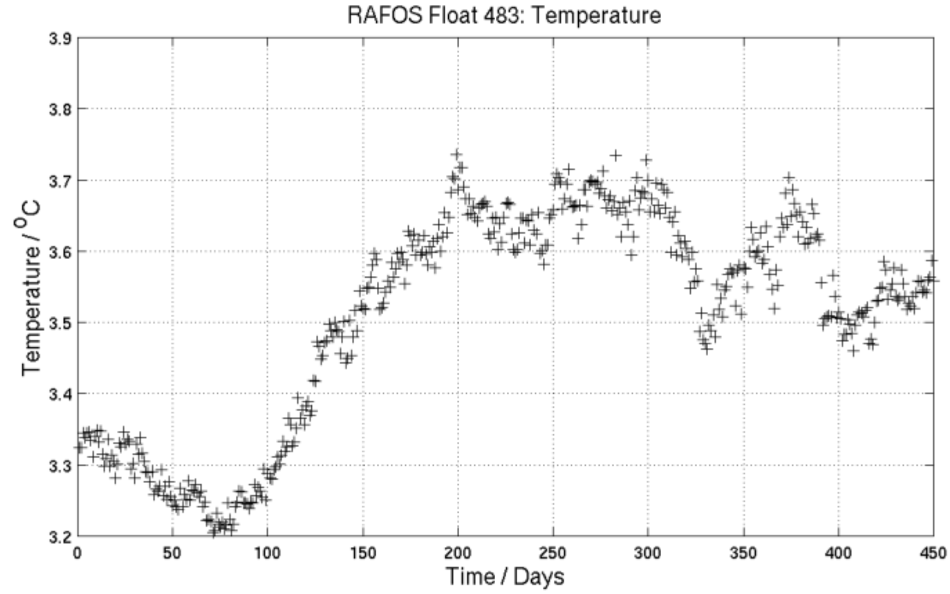

RAFOS Float 482: Pressure
Pressure / dbar
Time / Days
-1590
-1595
-1600
-1605
-1610
-1615
0
20
40
60
80
100
120

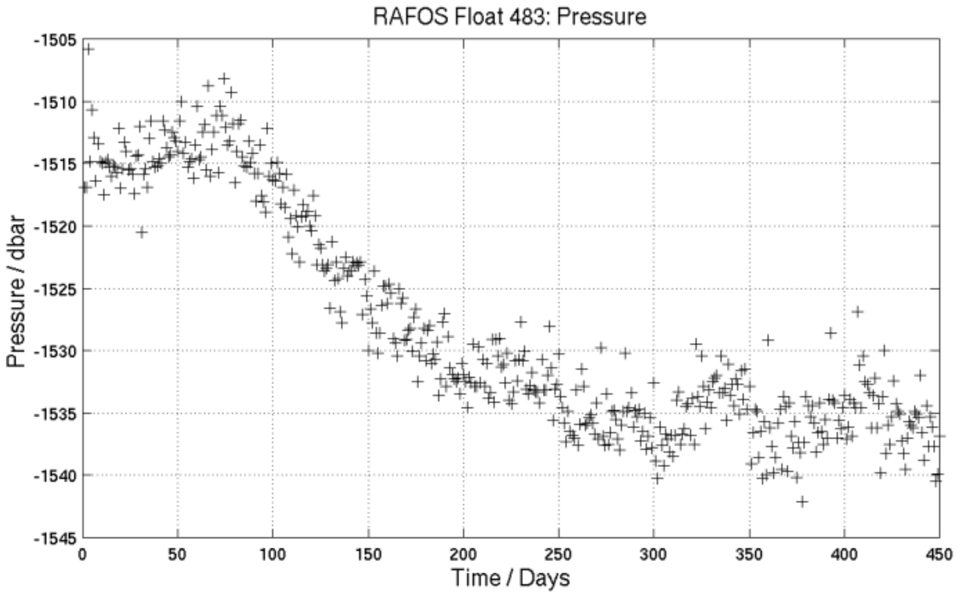


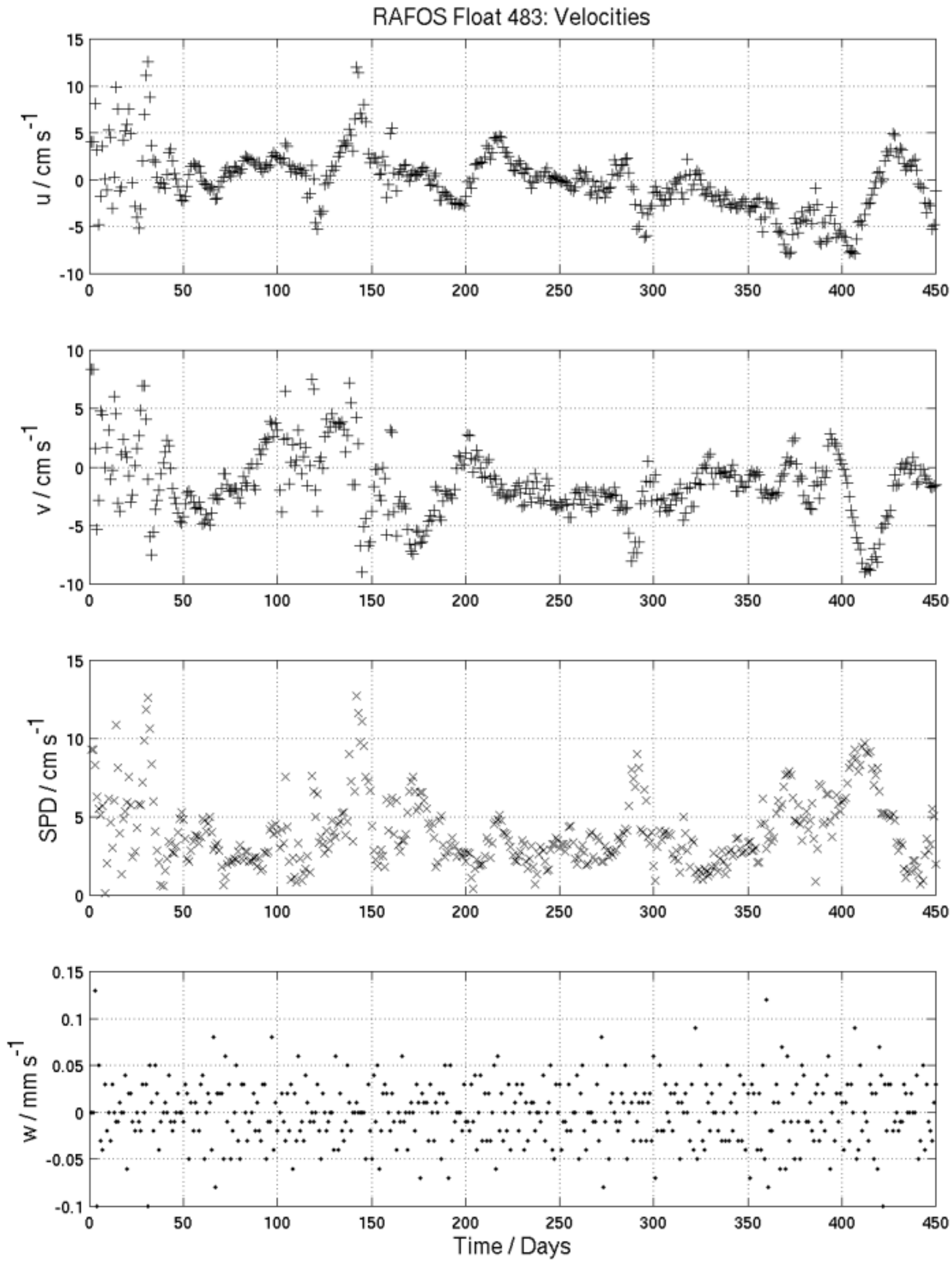
RAFOS Float 482: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

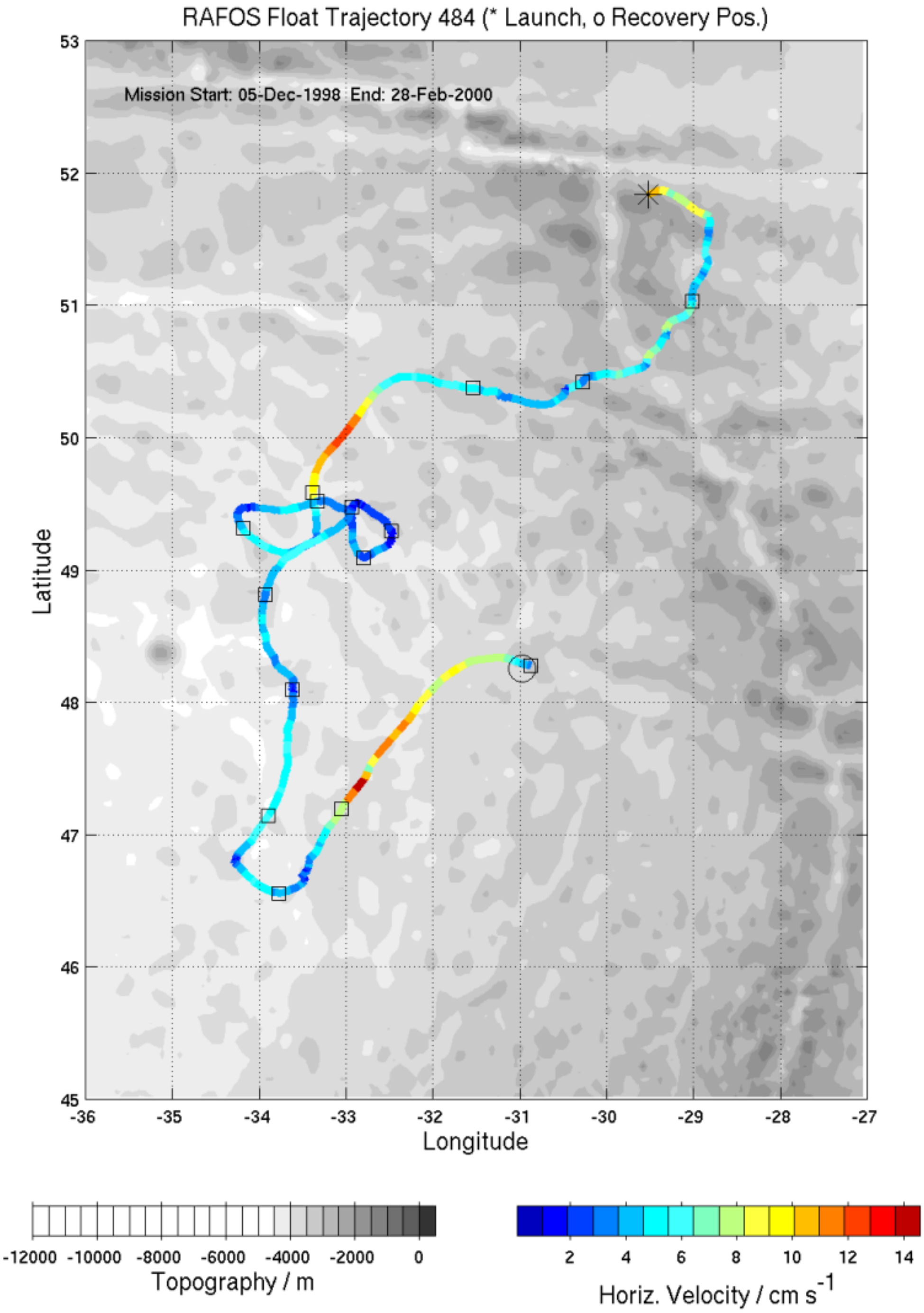


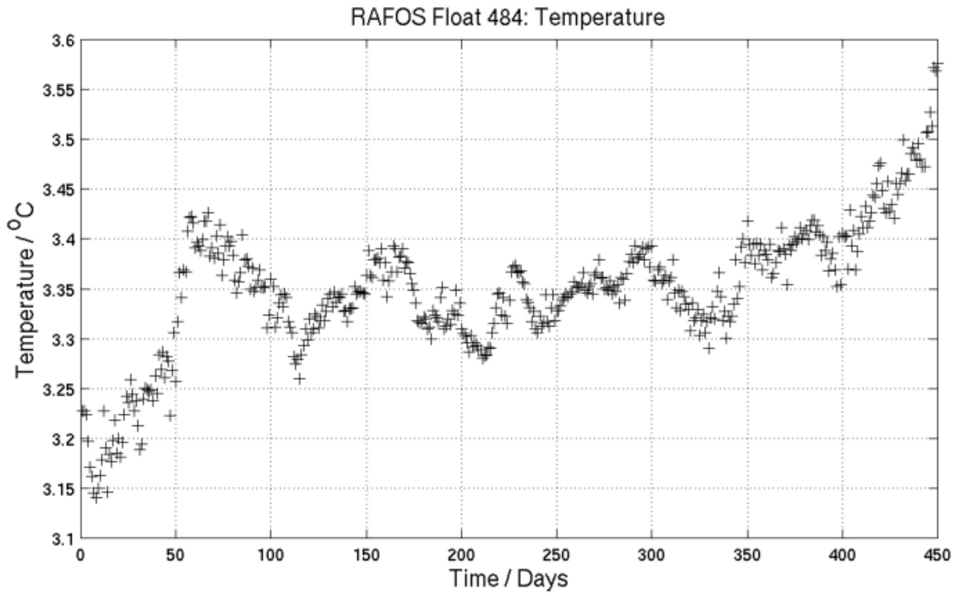
RAFOS Float Trajectory 483 (* Launch, o Recovery Pos.)
Mission Start: 06-Oct-1998 End: 30-Dec-1999
Latitude
Longitude
54
53
52
51
50
49
48
47
46
45
-32
-31
-30
-29
-28
-27
-26
-25
-24
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
2 4 6 8 10 12
Horiz. Velocity / cm s-1

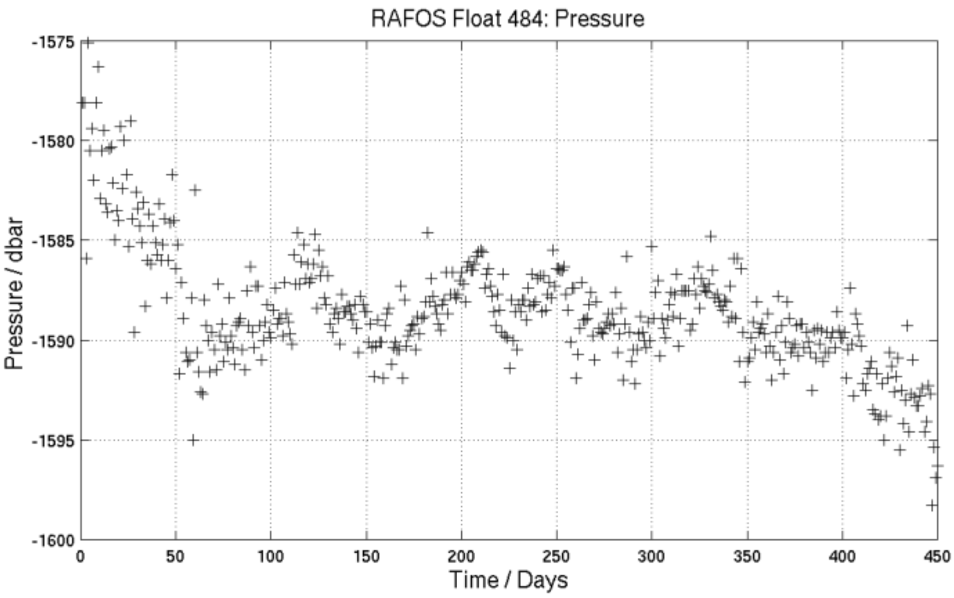

RAFOS Float 483: Temperature
Temperature / ^{o}C
Time / Days
3.9
3.8
3.7
3.6
3.5
3.4
3.3
3.2
0
50
100
150
200
250
300
350
400
450

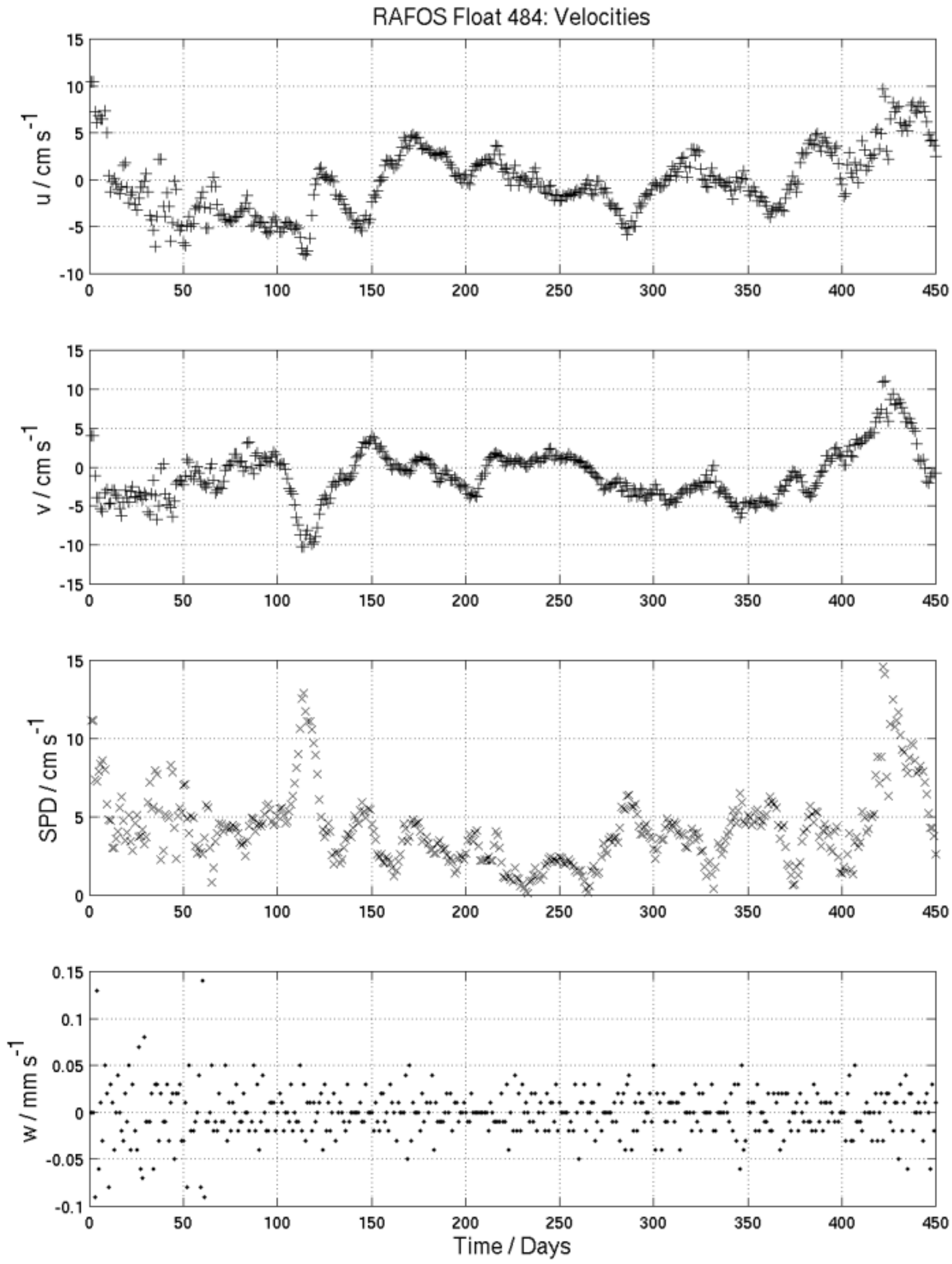

RAFOS Float 483: Pressure
Pressure / dbar
Time / Days
-1505
-1510
-1515
-1520
-1525
-1530
-1535
-1540
-1545
0
50
100
150
200
250
300
350
400
450


RAFOS Float 483: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

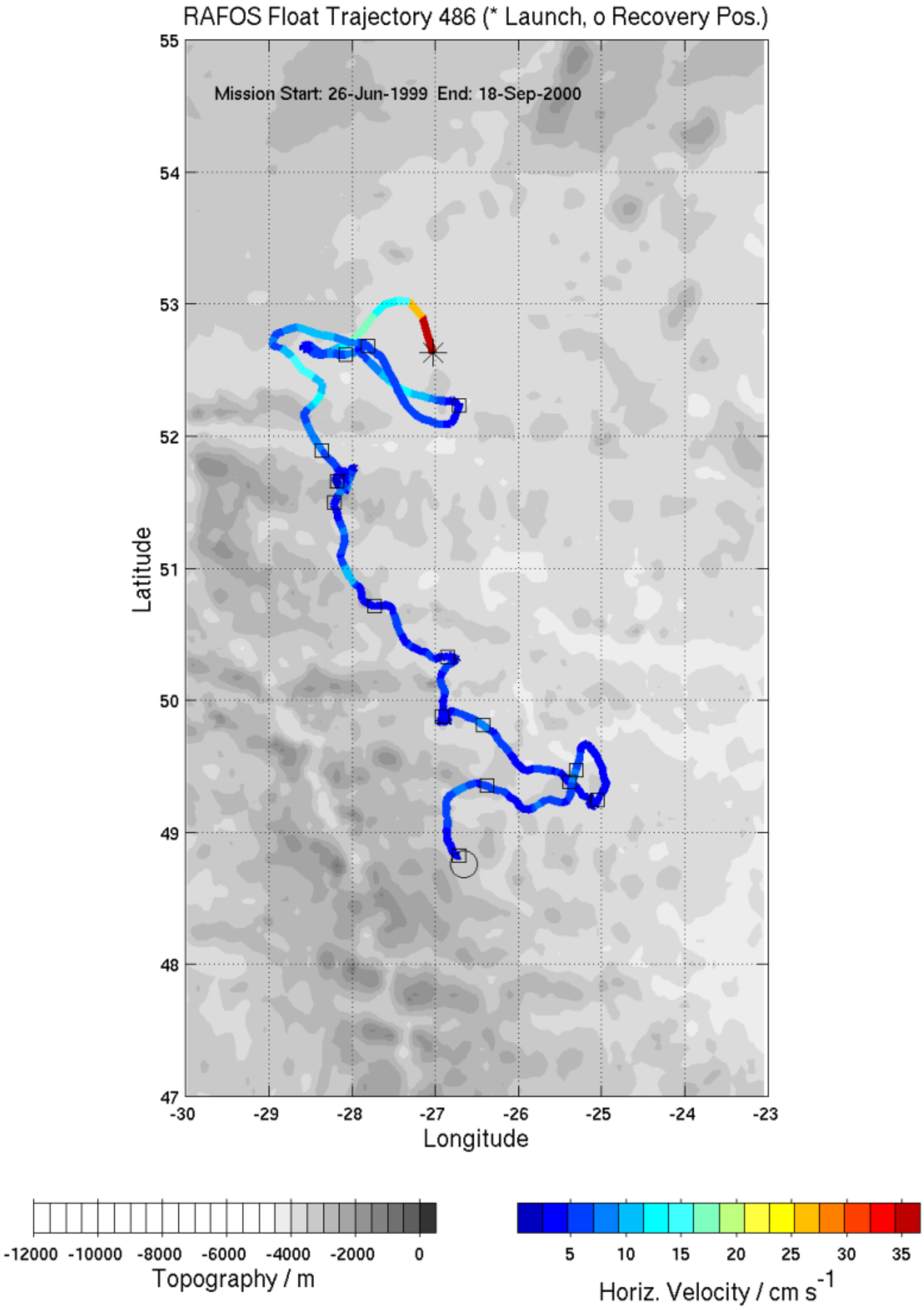

RAFOS Float Trajectory 484 (* Launch, o Recovery Pos.)
Mission Start: 05-Dec-1998 End: 28-Feb-2000
Latitude
Longitude
53
52
51
50
49
48
47
46
45
-36
-35
-34
-33
-32
-31
-30
-29
-28
-27
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
2 4 6 8 10 12 14
Horiz. Velocity / cm s-1

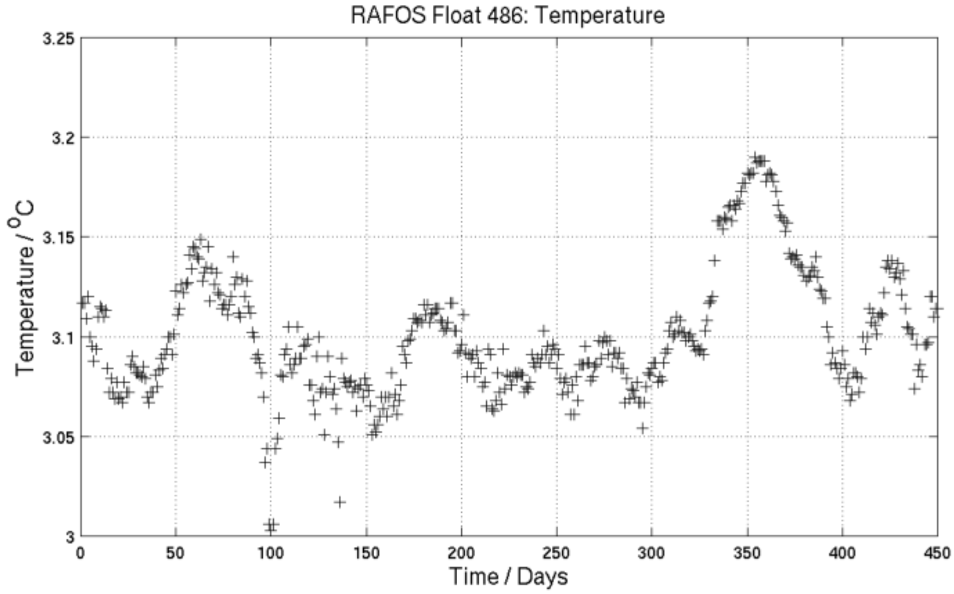

RAFOS Float 484: Temperature
Temperature / ^{o}C
Time / Days
3.6
3.55
3.5
3.45
3.4
3.35
3.3
3.25
3.2
3.15
3.1
0
50
100
150
200
250
300
350
400
450


RAFOS Float 484: Pressure
Pressure / dbar
Time / Days
-1575
-1580
-1585
-1590
-1595
-1600
0
50
100
150
200
250
300
350
400
450

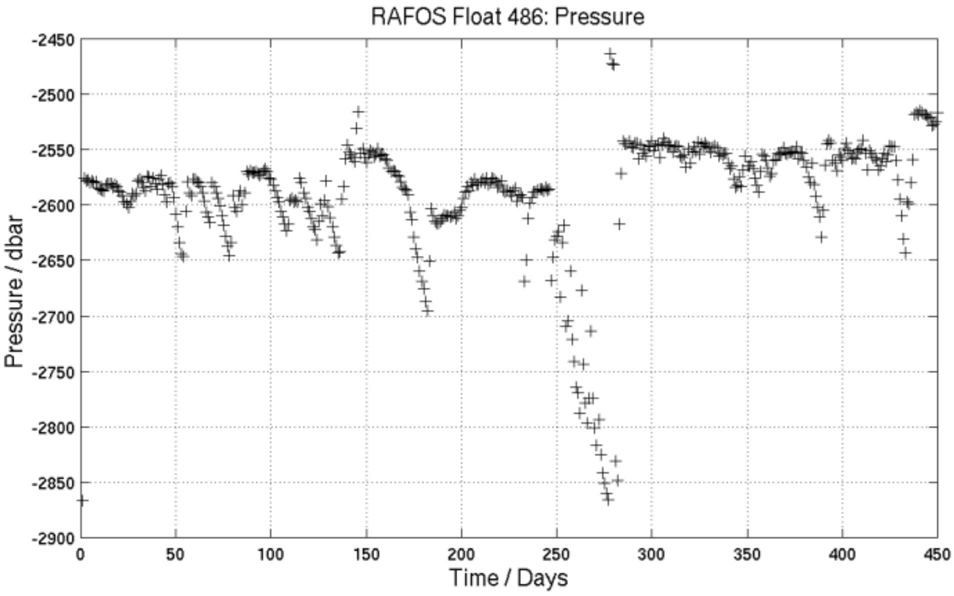


RAFOS Float 484: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

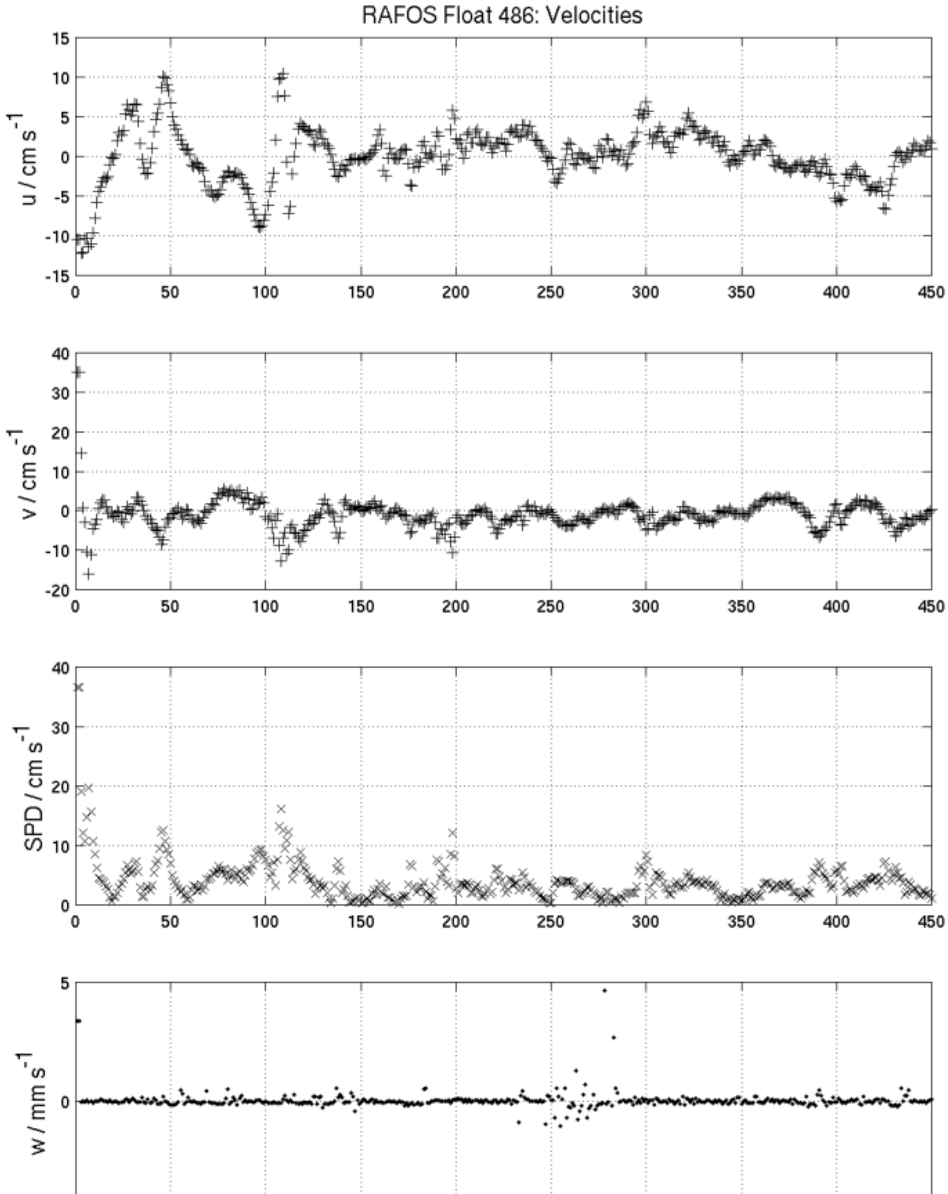

RAFOS Float Trajectory 486 (* Launch, o Recovery Pos.)
Mission Start: 26-Jun-1999 End: 18-Sep-2000
Latitude
Longitude
55
54
53
52
51
50
49
48
47
-30
-29
-28
-27
-26
-25
-24
-23
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5 10 15 20 25 30 35
Horiz. Velocity / cm s-1



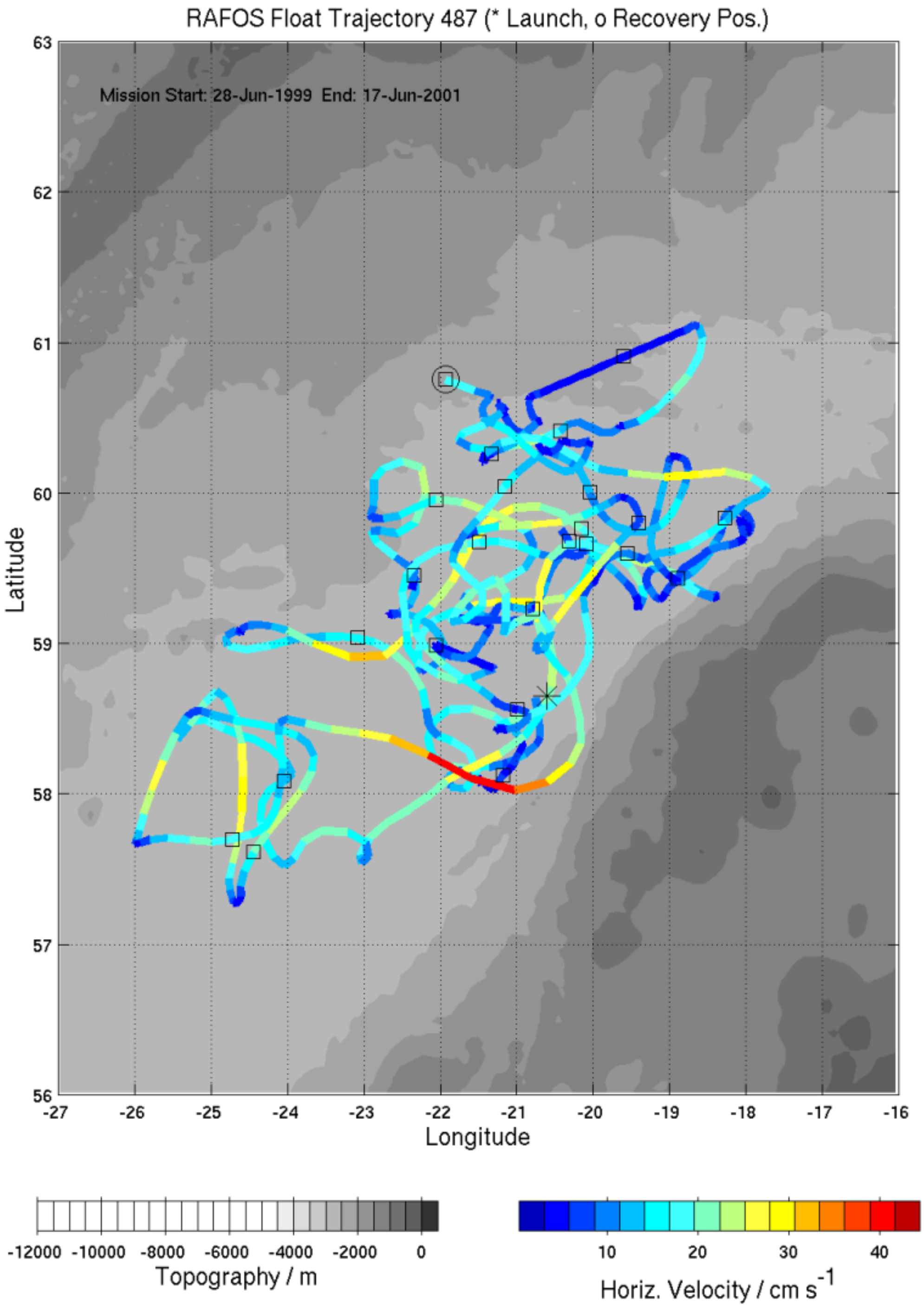
RAFOS Float 486: Temperature
Temperature / °C
3.25
3.2
3.15
3.1
3.05
3
0
50
100
150
200
250
300
350
400
450
Time / Days



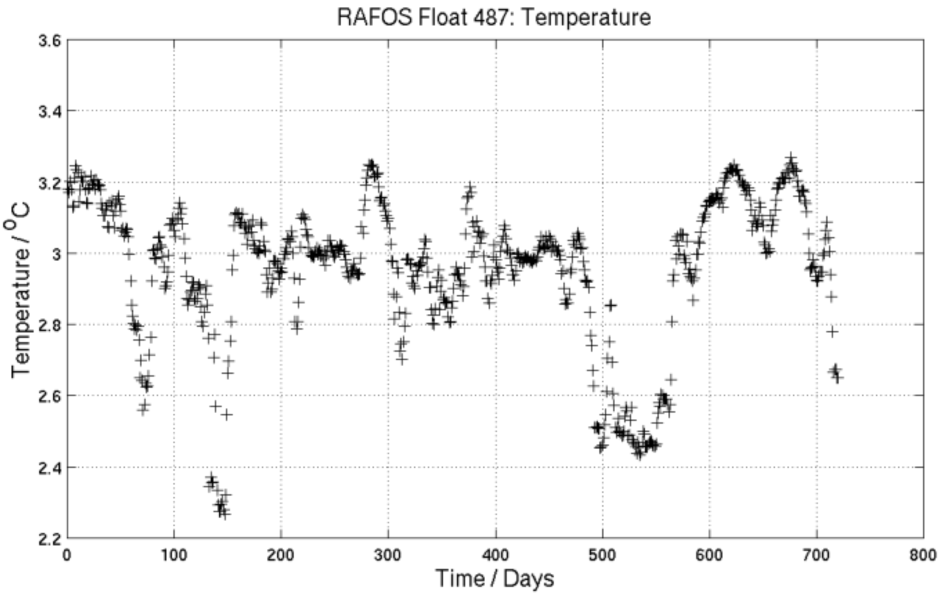
RAFOS Float 486: Pressure
Pressure / dbar
-2450
-2500
-2550
-2600
-2650
-2700
-2750
-2800
-2850
-2900
0
50
100
150
200
250
300
350
400
450
Time / Days

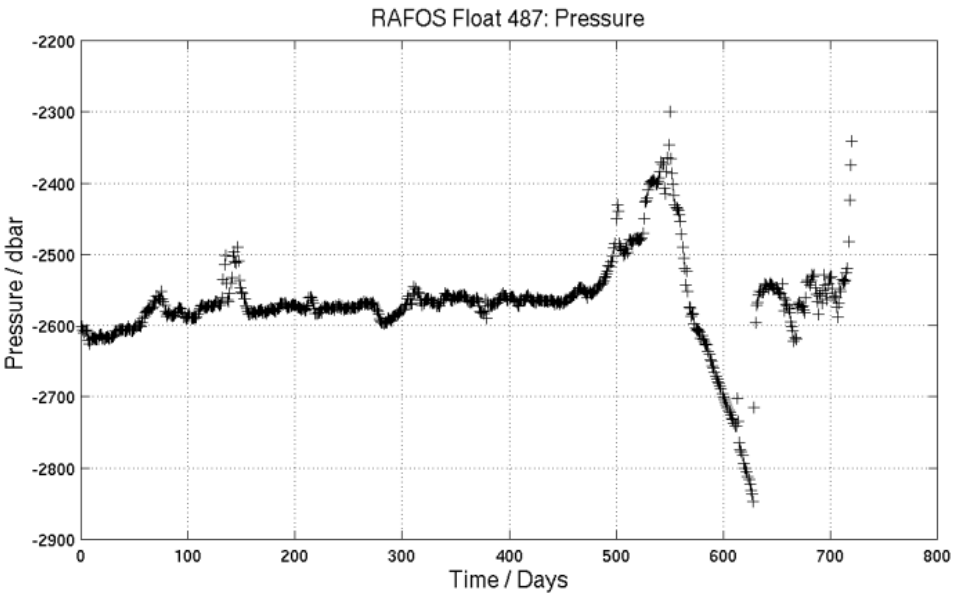


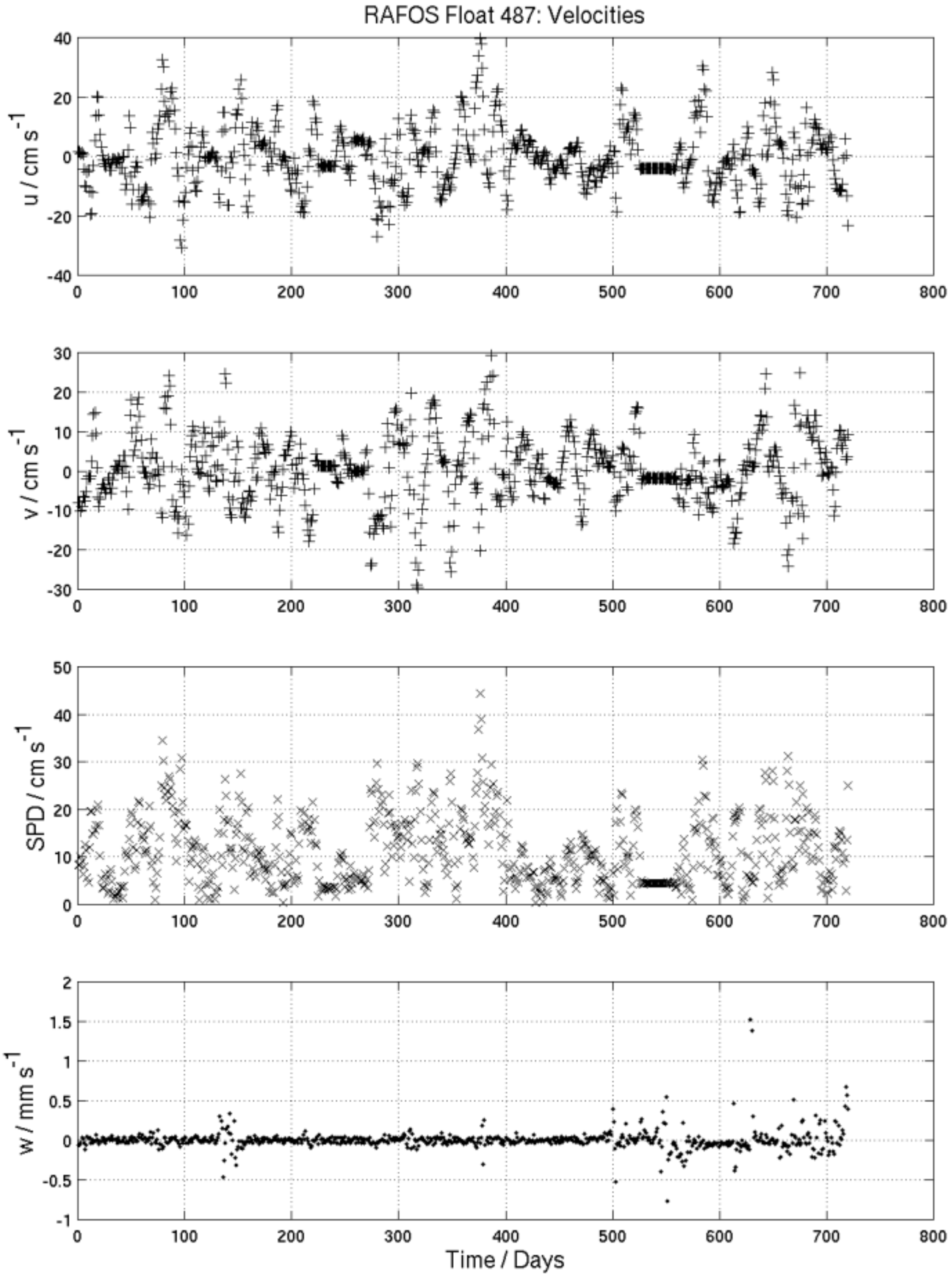
RAFOS Float 486: Velocities
u / cm s^-1
v / cm s^-1
SPD / cm s^-1
w / mm s^-1
Time / Days



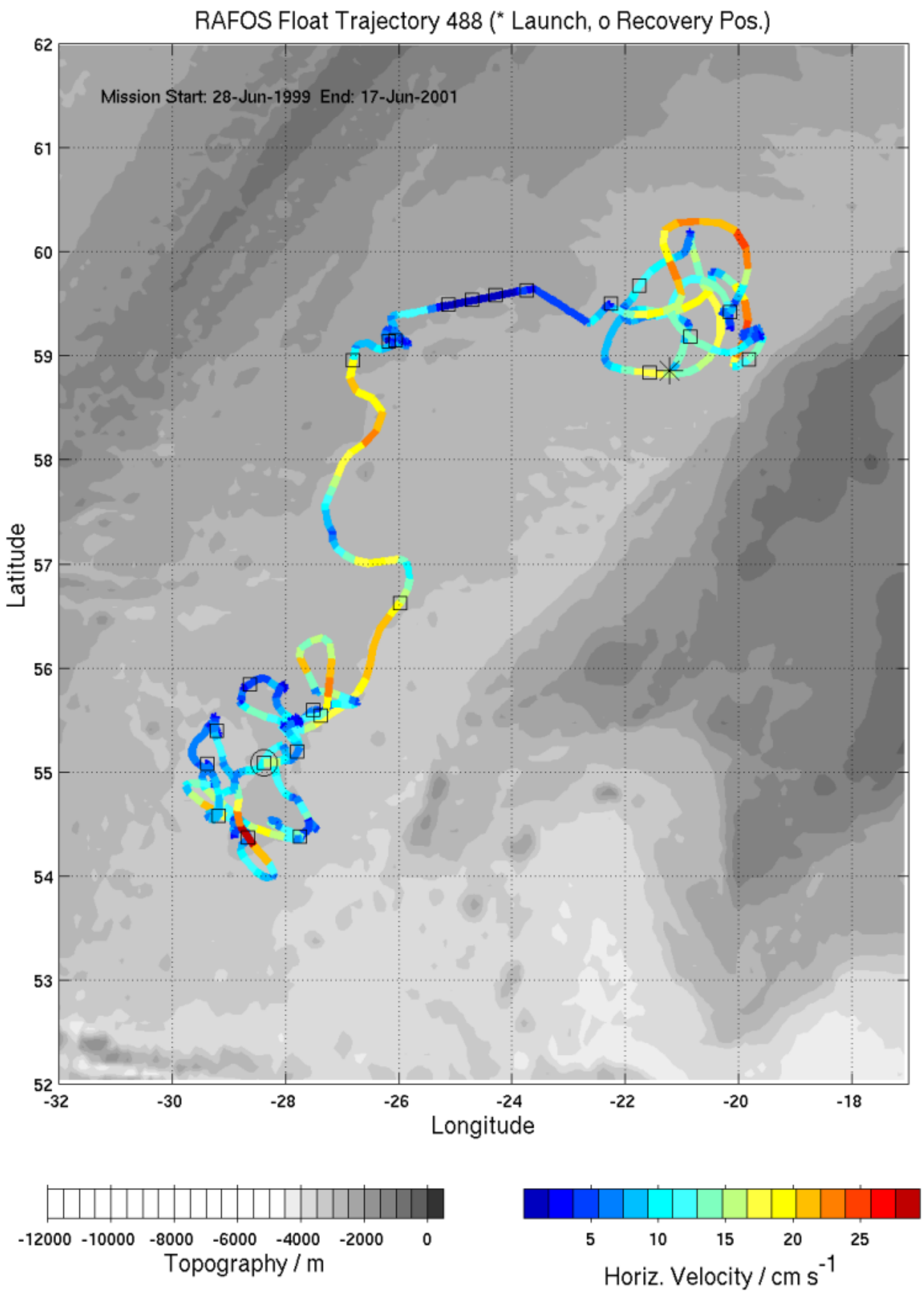
RAFOS Float Trajectory 487 (* Launch, o Recovery Pos.)
Mission Start: 28-Jun-1999 End: 17-Jun-2001
Latitude
Longitude
63
62
61
60
59
58
57
56
-27
-26
-25
-24
-23
-22
-21
-20
-19
-18
-17
-16
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
10 20 30 40
Horiz. Velocity / cm s-1

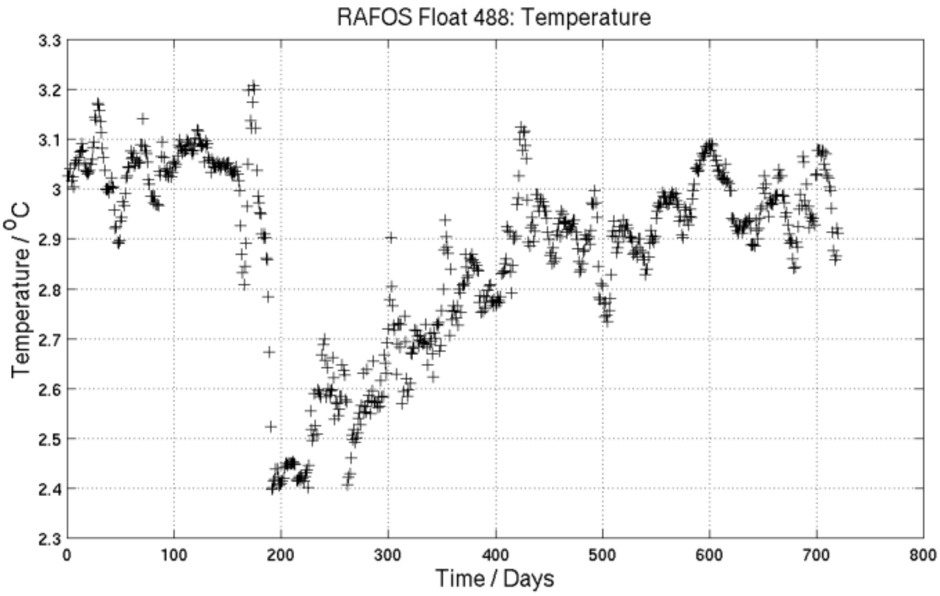

RAFOS Float 487: Temperature
Temperature / ^{o}C
Time / Days
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
0
100
200
300
400
500
600
700
800


RAFOS Float 487: Pressure
Pressure / dbar
Time / Days
-2200
-2300
-2400
-2500
-2600
-2700
-2800
-2900
0
100
200
300
400
500
600
700
800

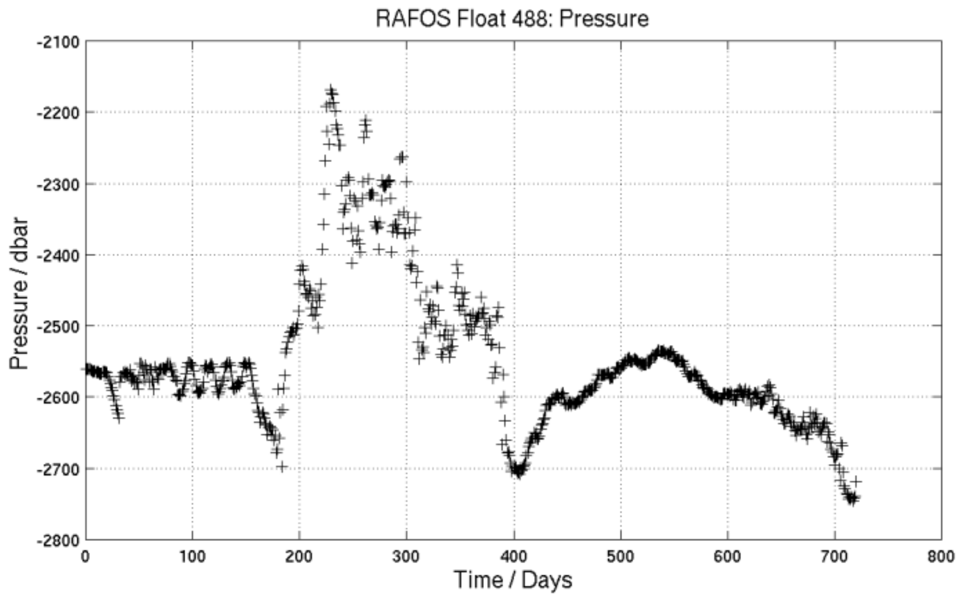


RAFOS Float 487: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

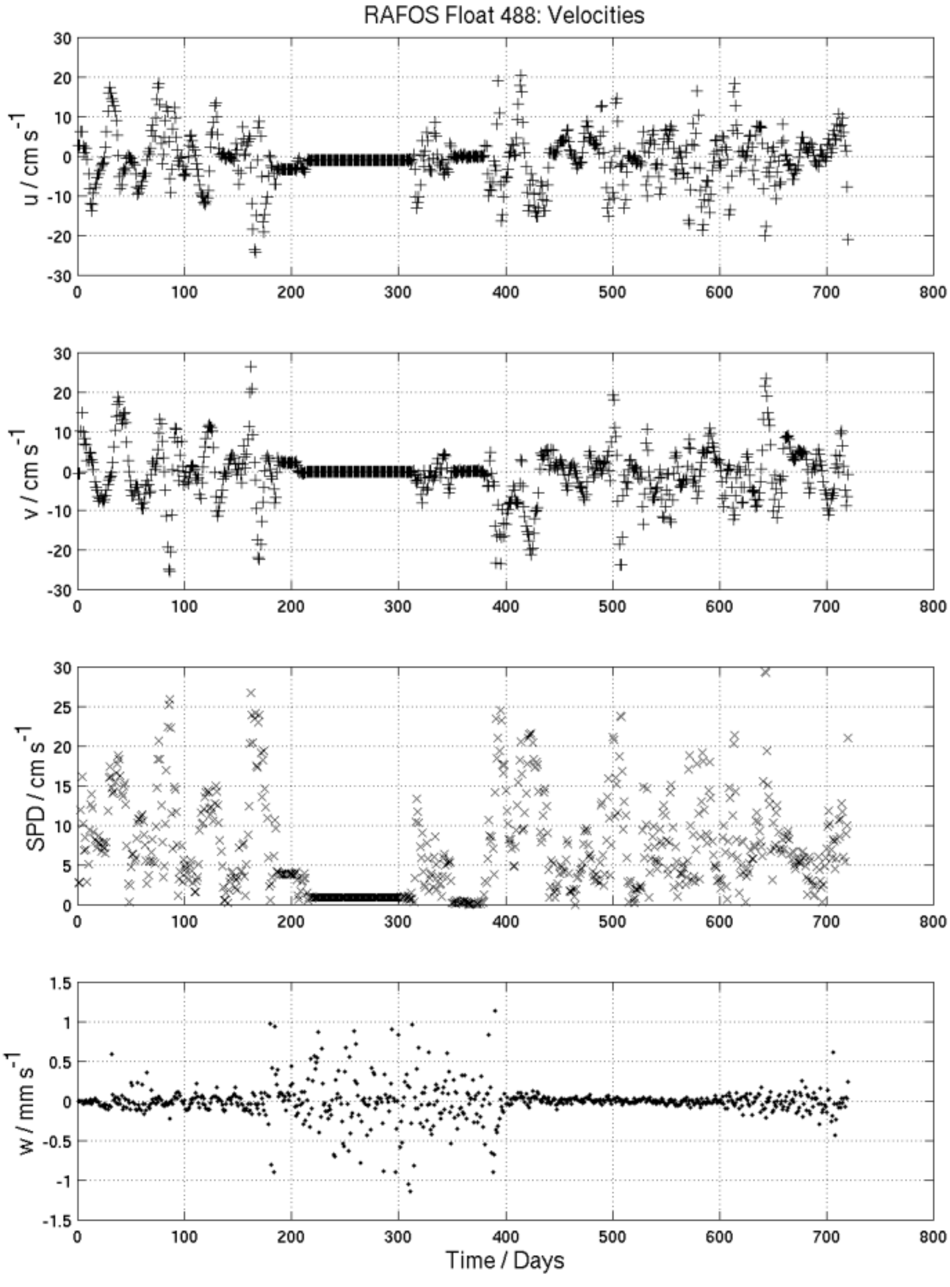

RAFOS Float Trajectory 488 (* Launch, o Recovery Pos.)
Mission Start: 28-Jun-1999 End: 17-Jun-2001
Latitude
Longitude
62
61
60
59
58
57
56
55
54
53
52
-32
-30
-28
-26
-24
-22
-20
-18
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5 10 15 20 25
Horiz. Velocity / cm s-1



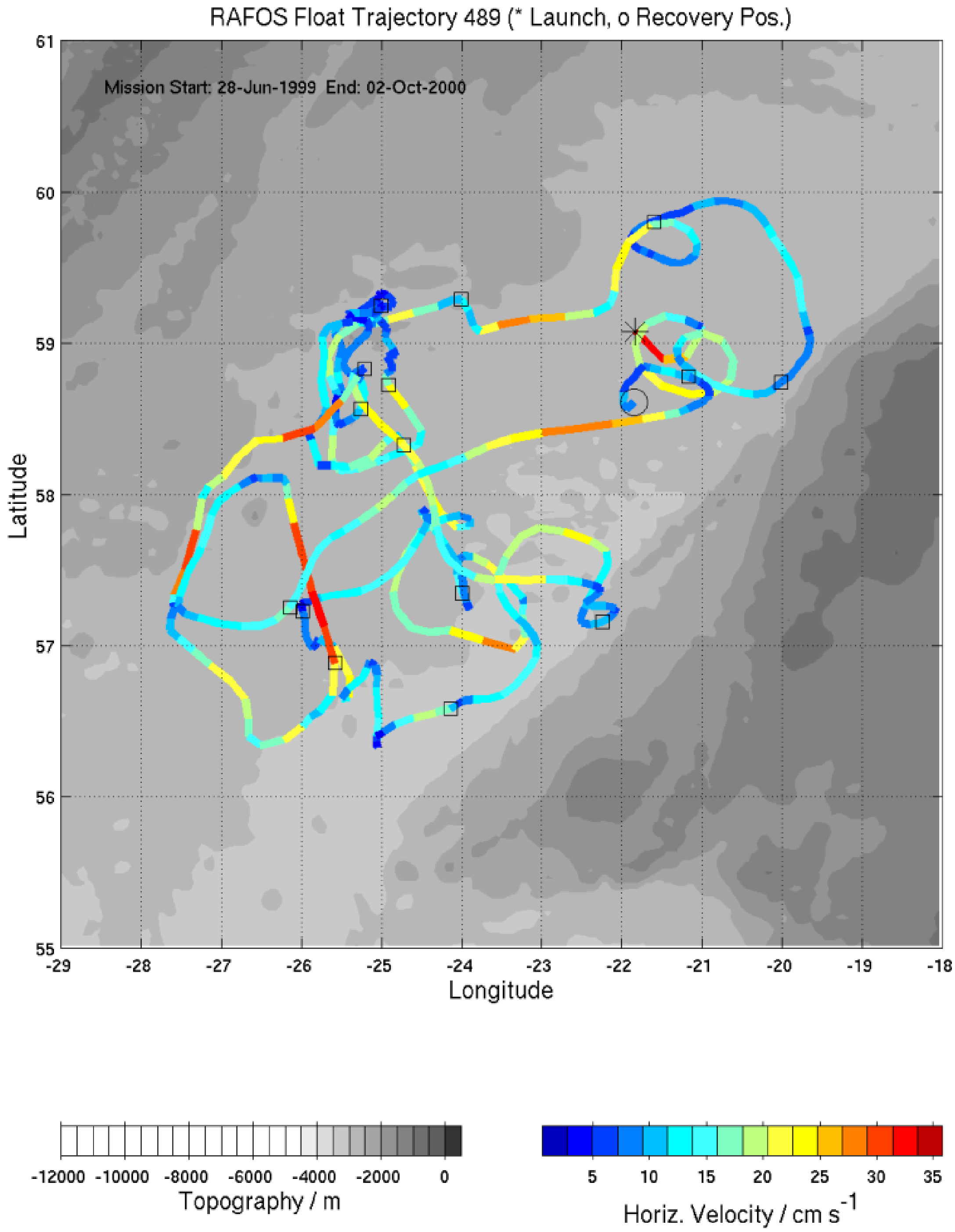
RAFOS Float 488: Temperature
Temperature / ^{o}C
Time / Days

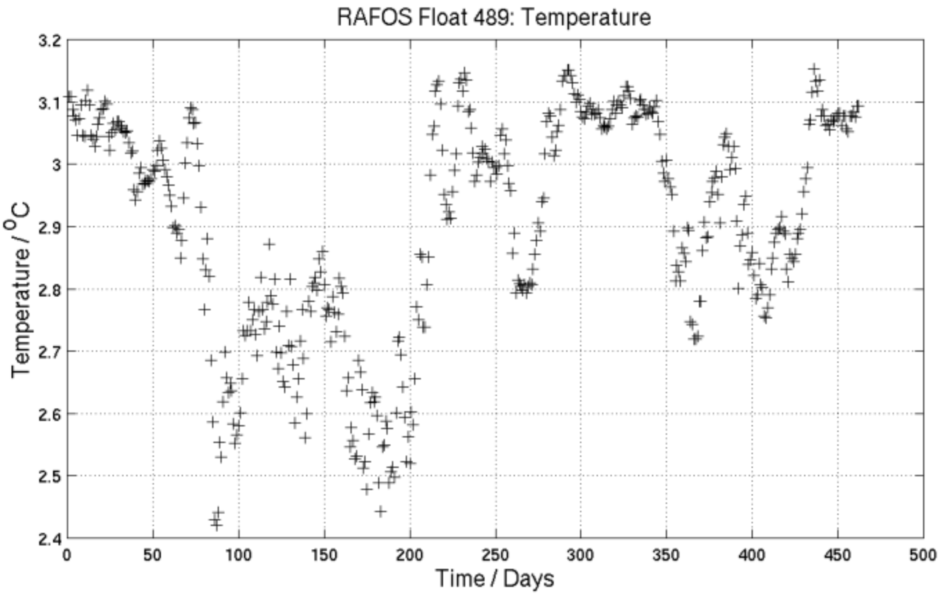


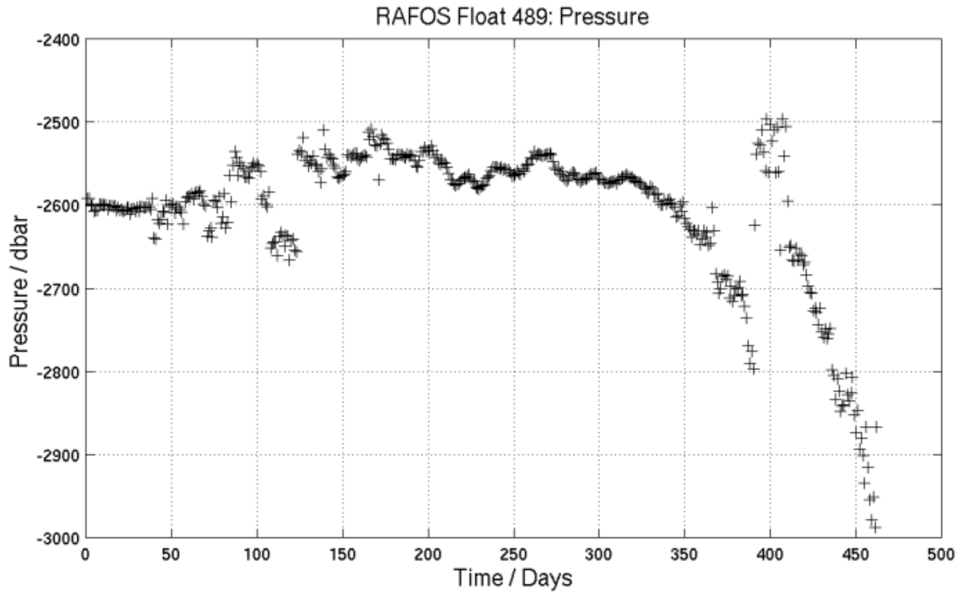
RAFOS Float 488: Pressure
Pressure / dbar
Time / Days

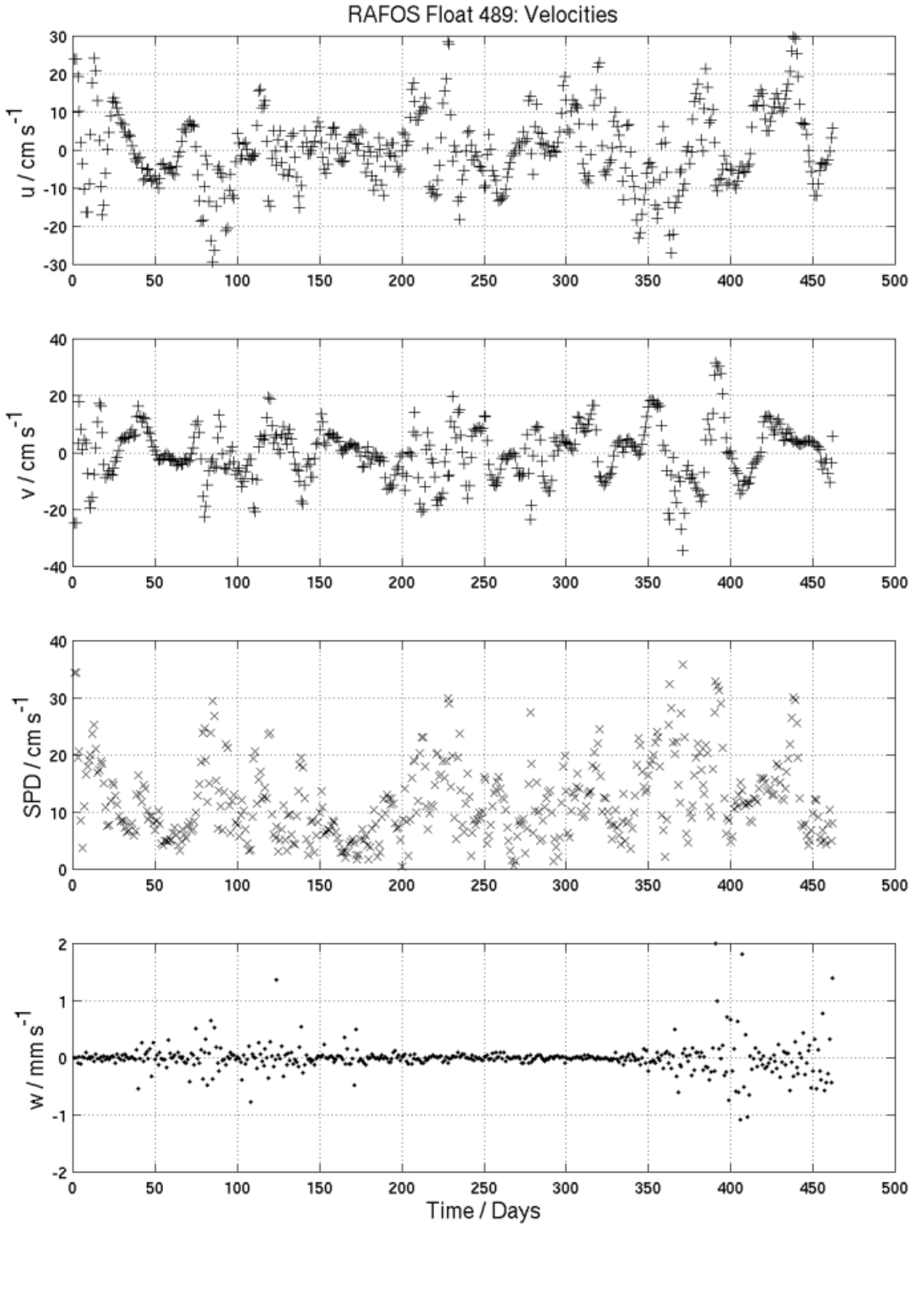


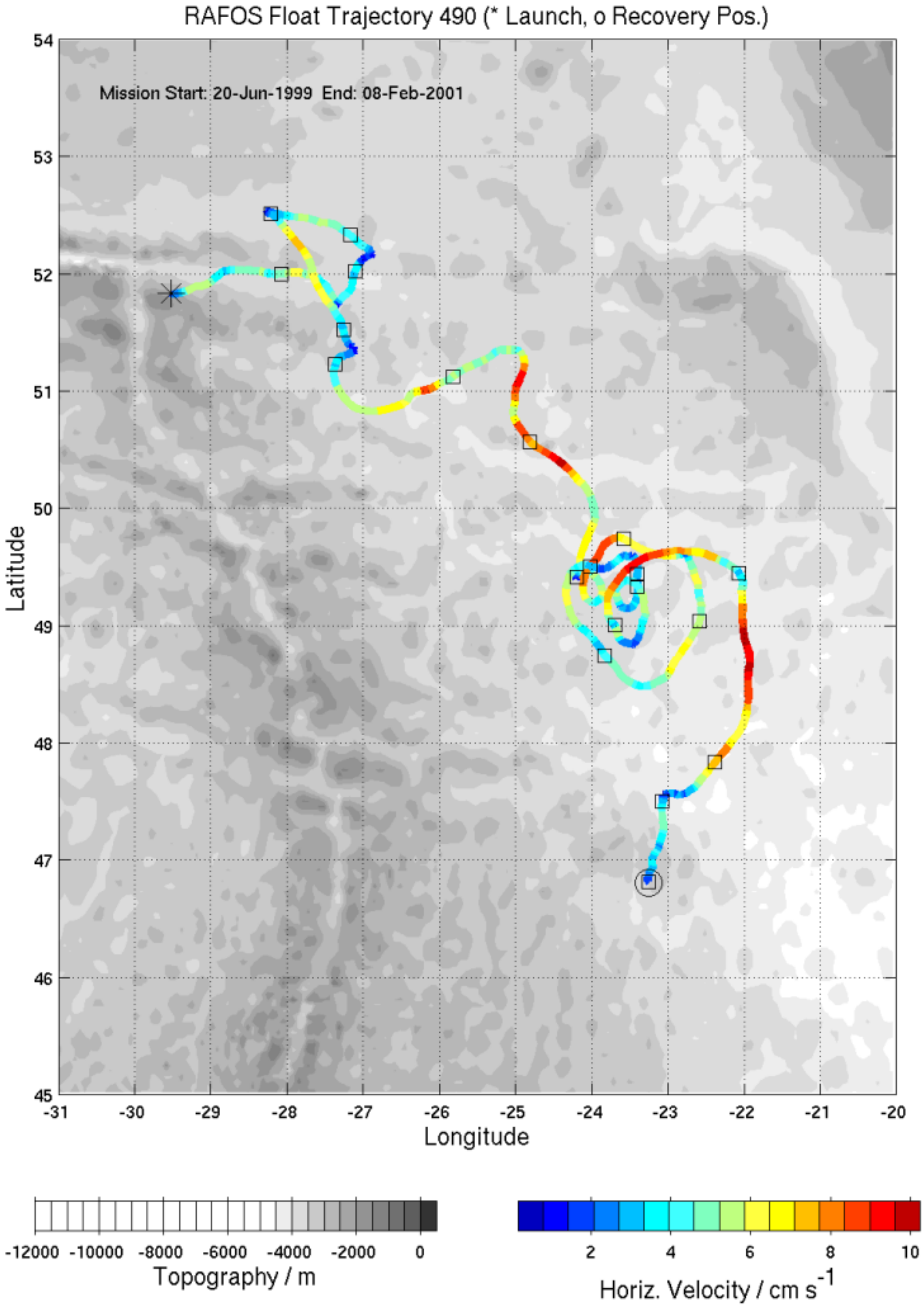
RAFOS Float 488: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days


RAFOS Float Trajectory 489 (* Launch, o Recovery Pos.)
Mission Start: 28-Jun-1999 End: 02-Oct-2000
Latitude
Longitude
Topography / m
Horiz. Velocity / cm s-1

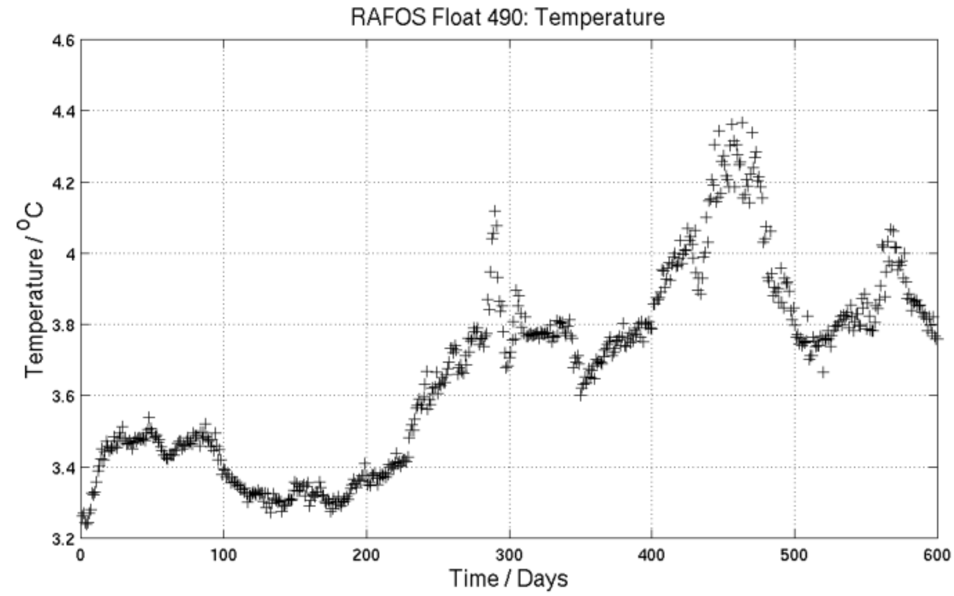

RAFOS Float 489: Temperature
Temperature / ^{o}C
Time / Days
3.2
3.1
3
2.9
2.8
2.7
2.6
2.5
2.4
0
50
100
150
200
250
300
350
400
450
500


RAFOS Float 489: Pressure
Pressure / dbar
Time / Days
-2400
-2500
-2600
-2700
-2800
-2900
-3000
0
50
100
150
200
250
300
350
400
450
500

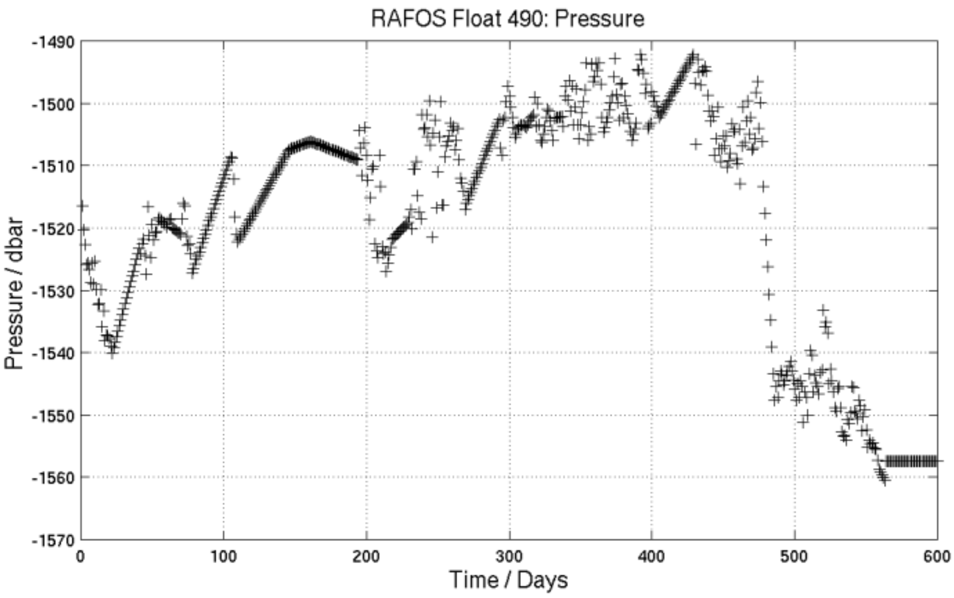

RAFOS Float 489: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days



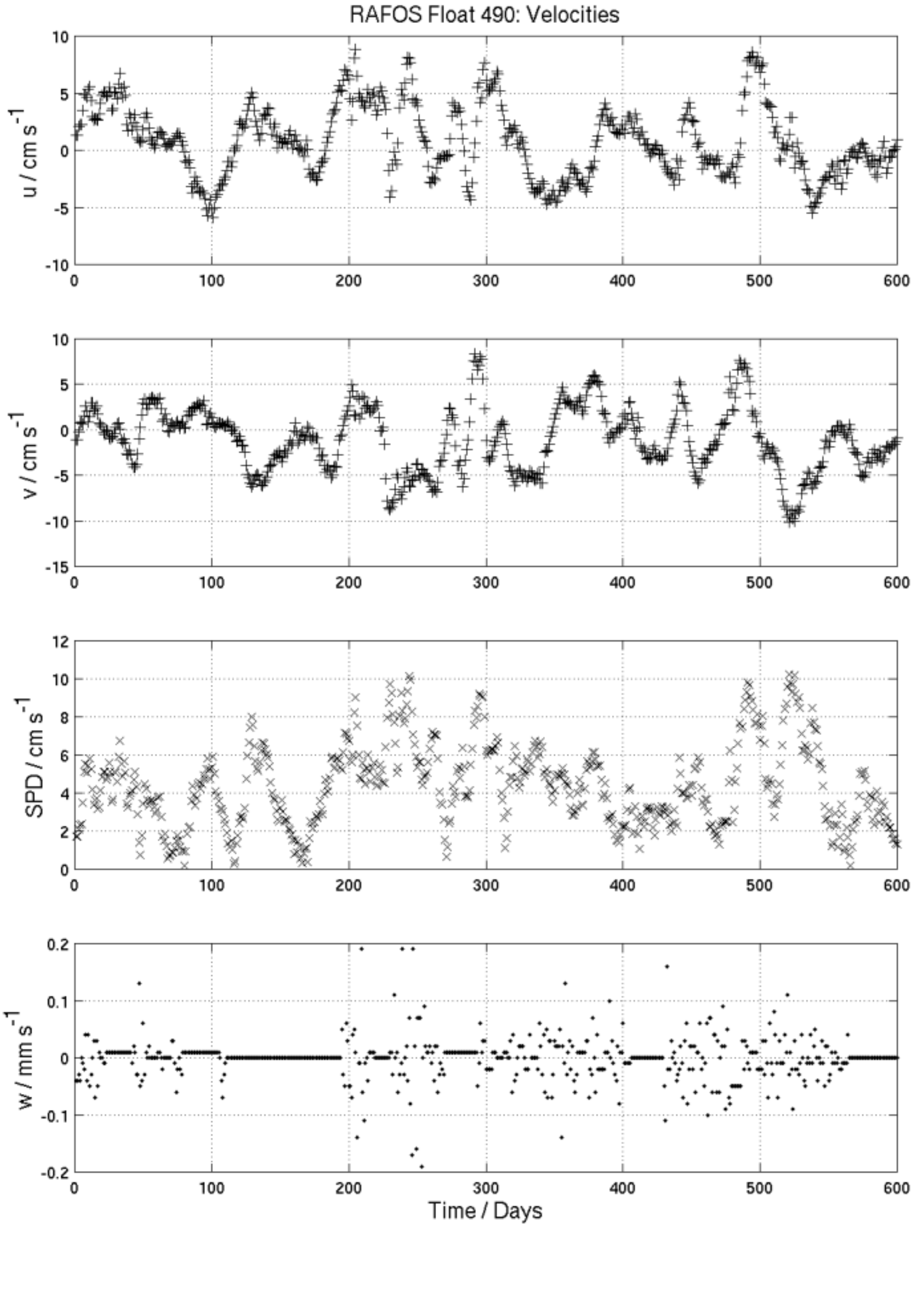
RAFOS Float Trajectory 490 (* Launch, o Recovery Pos.)
Mission Start: 20-Jun-1999 End: 08-Feb-2001
Latitude
Longitude
54
53
52
51
50
49
48
47
46
45
-31
-30
-29
-28
-27
-26
-25
-24
-23
-22
-21
-20
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
2 4 6 8 10
Horiz. Velocity / cm s^{-1}

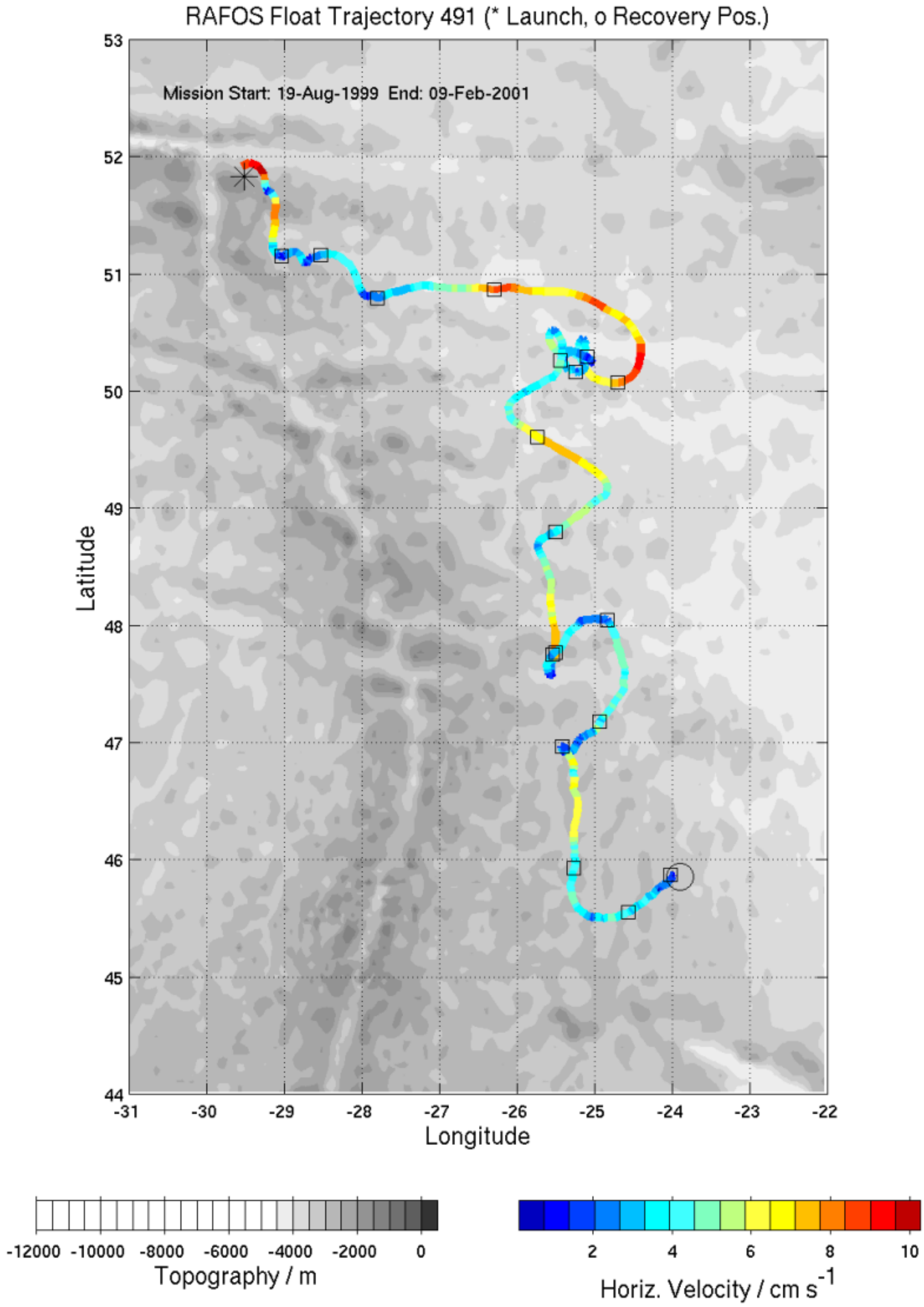


RAFOS Float 490: Temperature
Temperature / ^oC
Time / Days
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
0
100
200
300
400
500
600

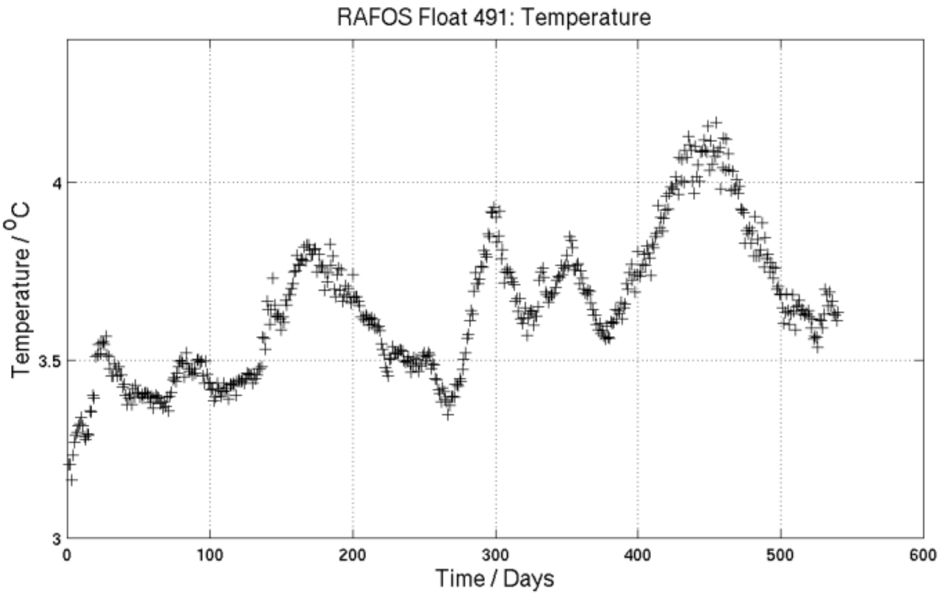


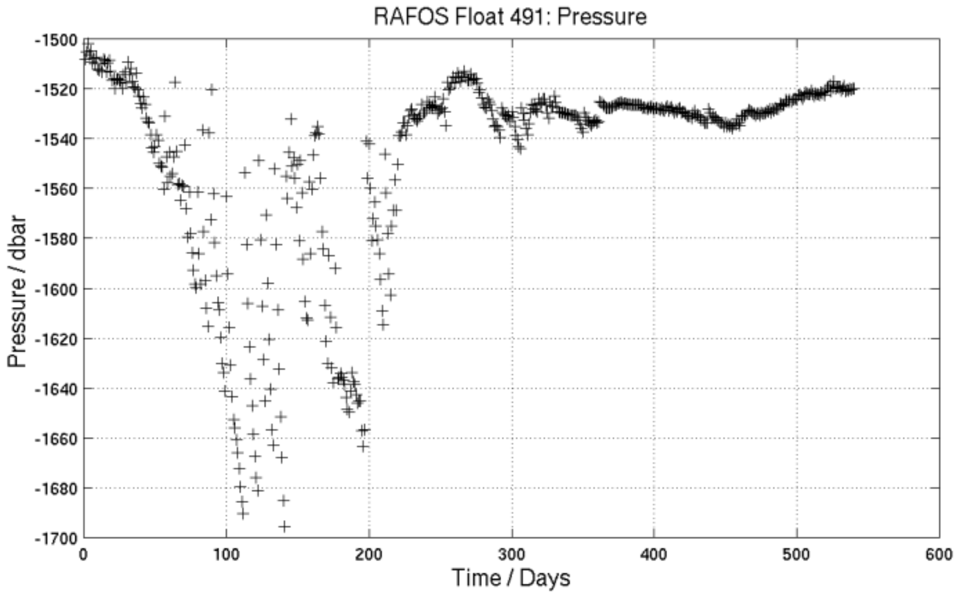
RAFOS Float 490: Pressure
Pressure / dbar
Time / Days
-1490
-1500
-1510
-1520
-1530
-1540
-1550
-1560
-1570
0
100
200
300
400
500
600

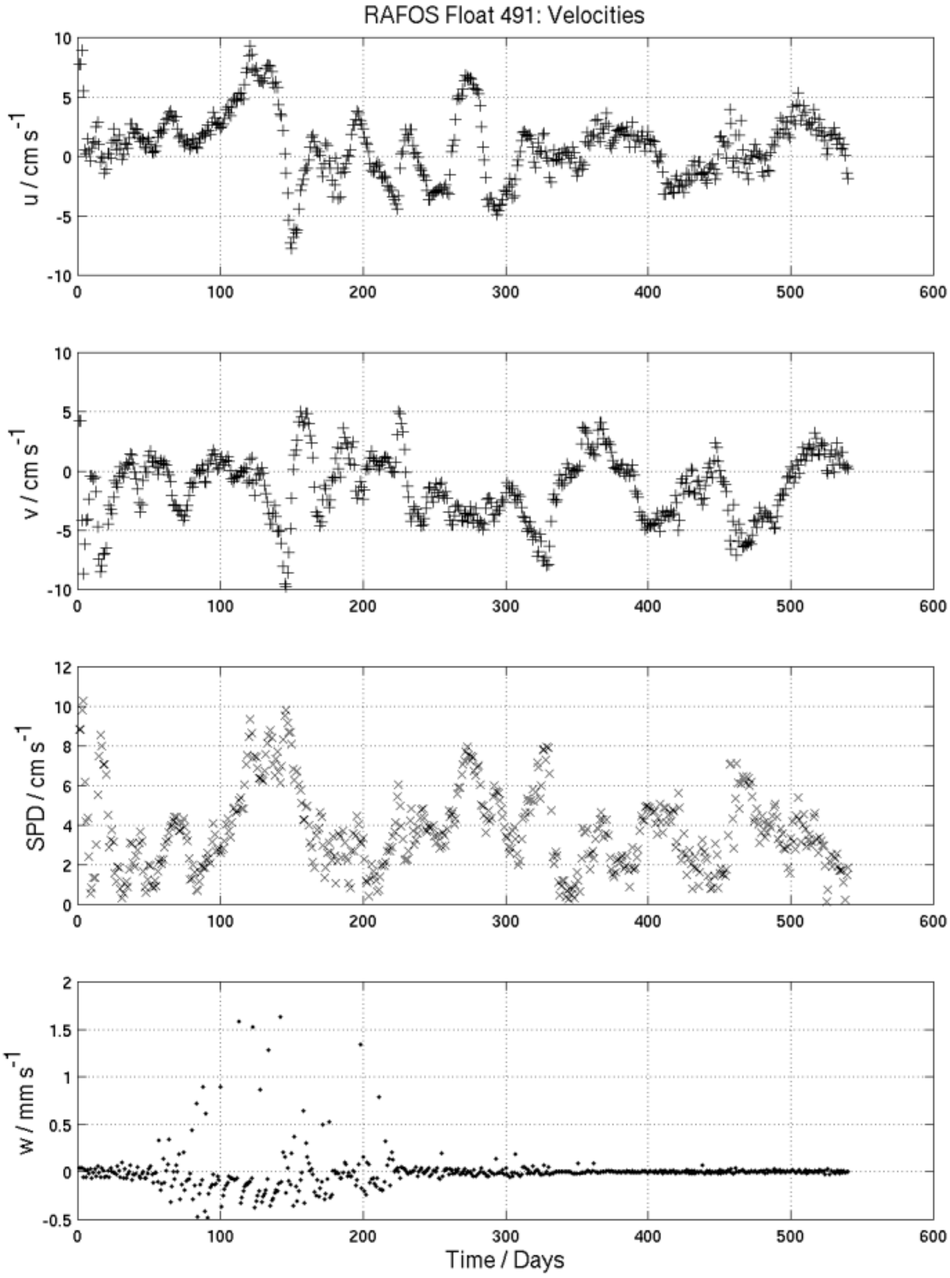

RAFOS Float 490: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

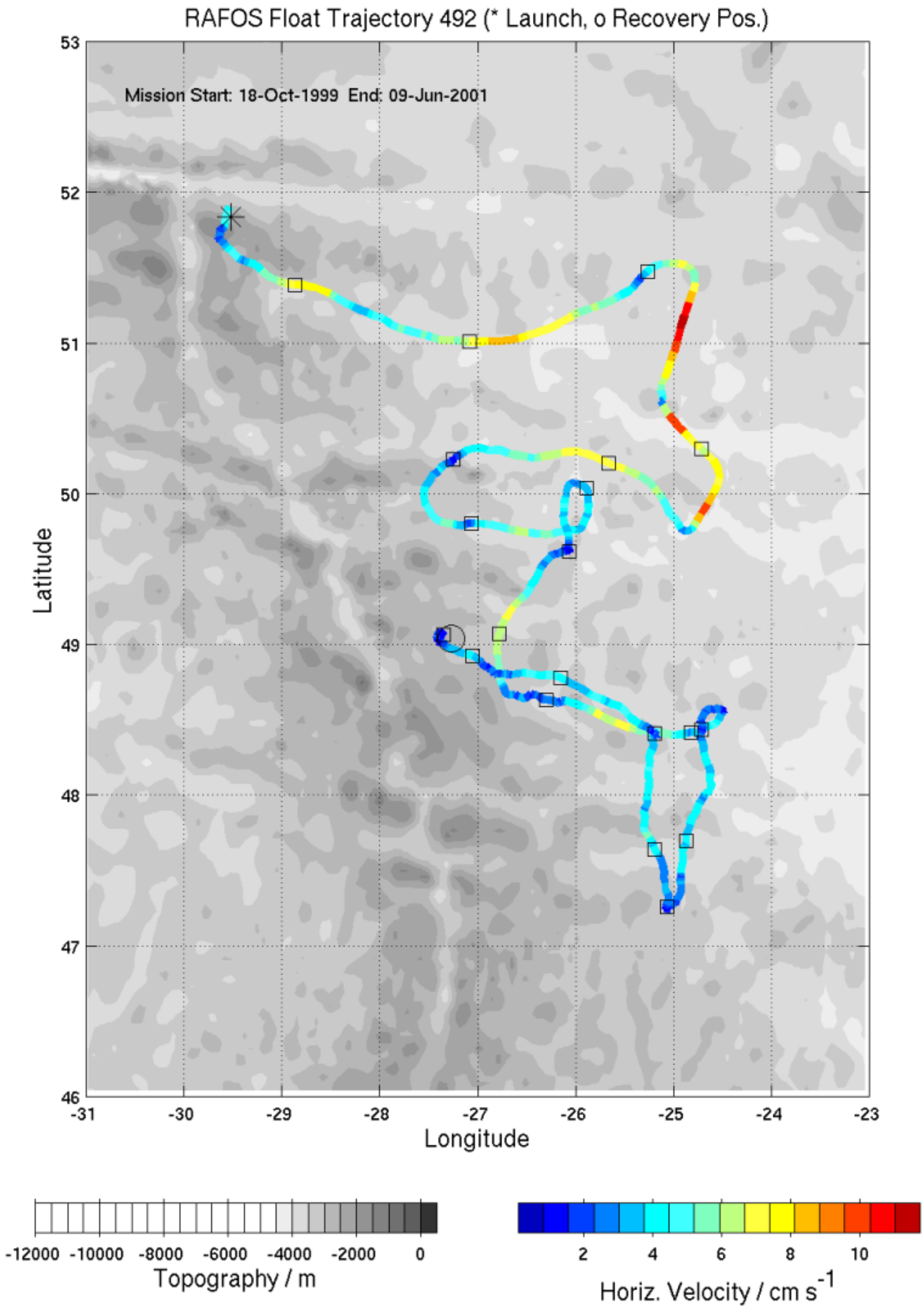


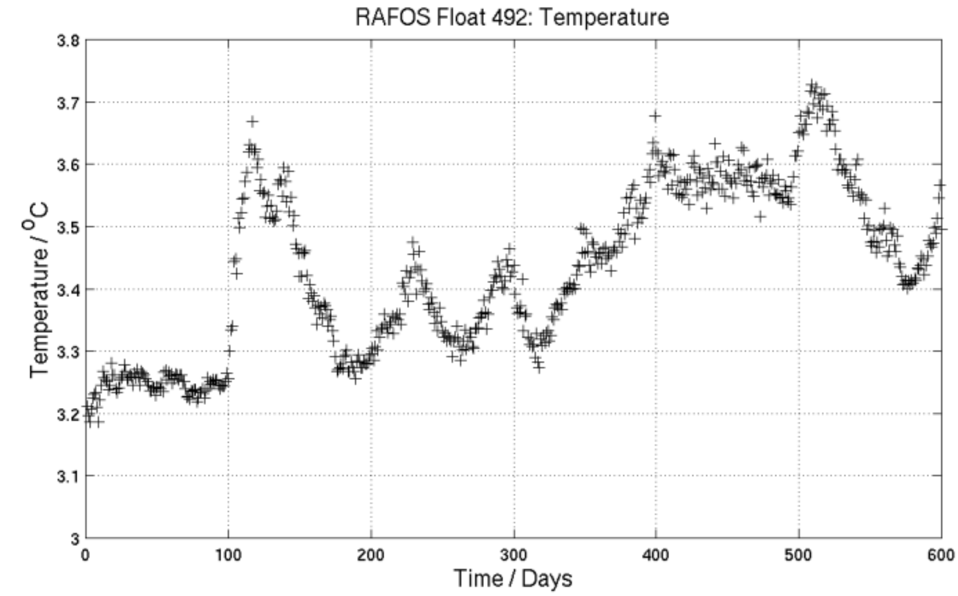
RAFOS Float Trajectory 491 (* Launch, o Recovery Pos.)
Mission Start: 19-Aug-1999 End: 09-Feb-2001
Latitude
Longitude
53
52
51
50
49
48
47
46
45
44
-31
-30
-29
-28
-27
-26
-25
-24
-23
-22
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
2 4 6 8 10
Horiz. Velocity / cm s-1

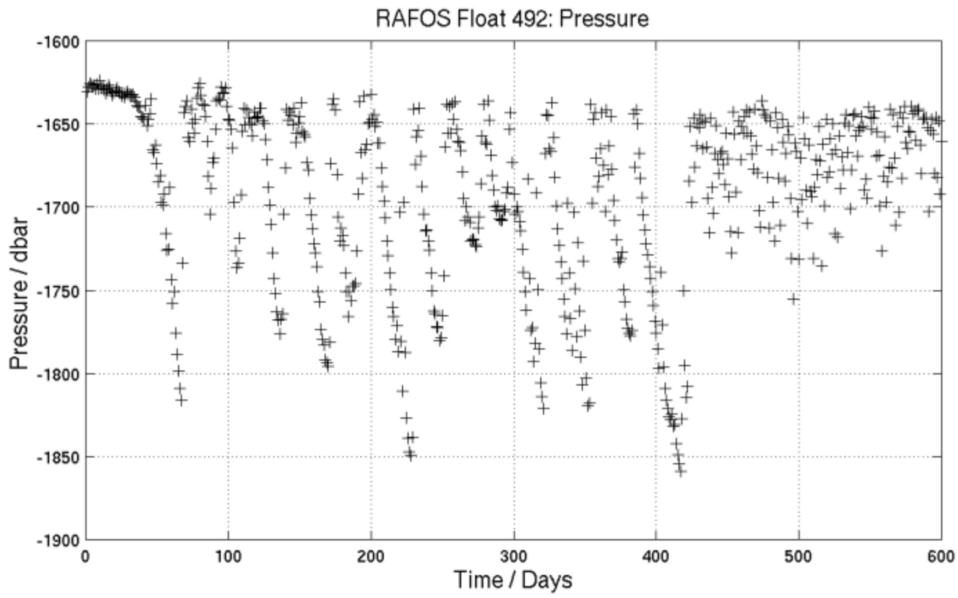

RAFOS Float 491: Temperature
Temperature / ^{o}C
Time / Days
3
3.5
4
0
100
200
300
400
500
600

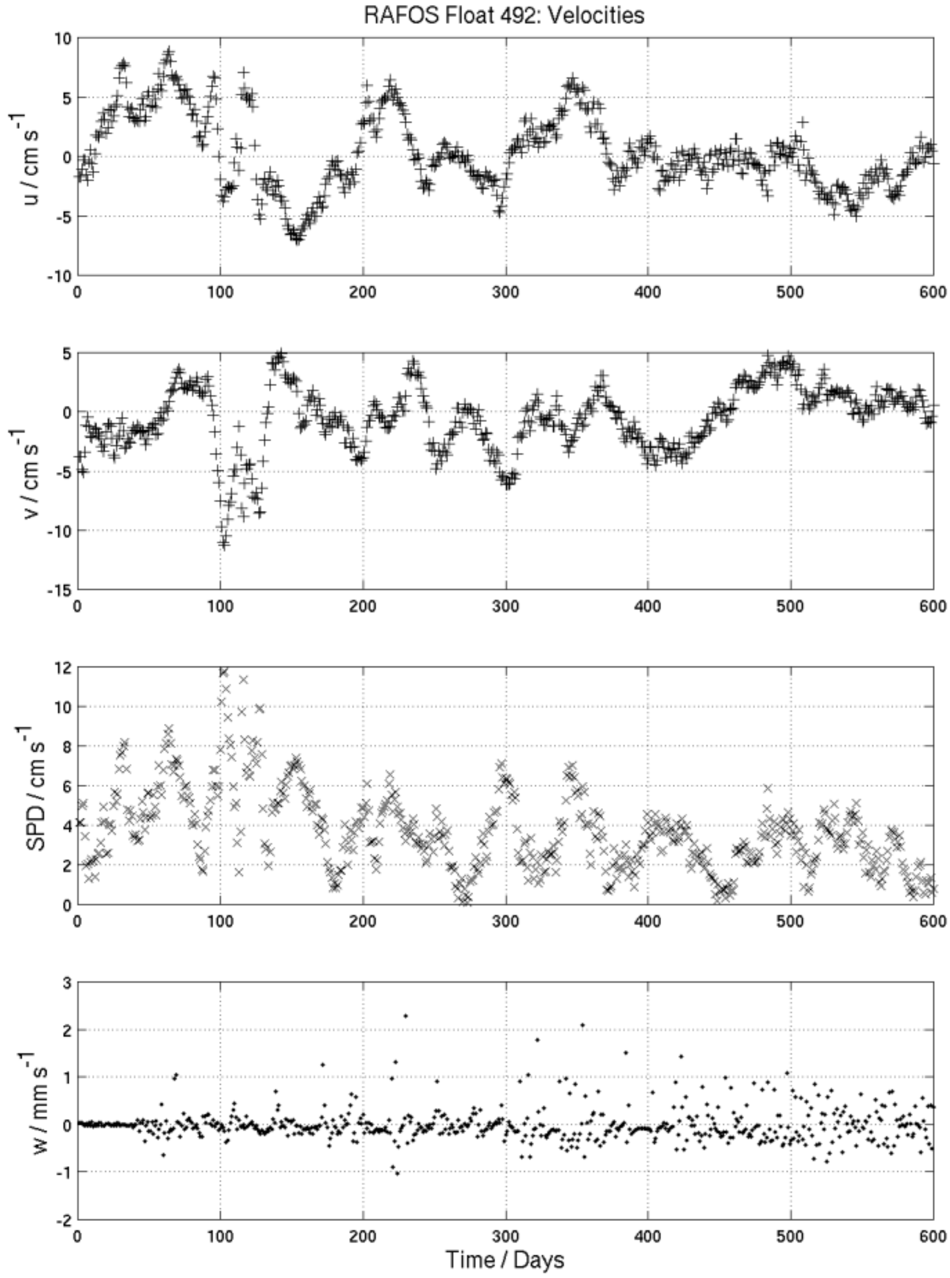

RAFOS Float 491: Pressure
Pressure / dbar
Time / Days
-1500
-1520
-1540
-1560
-1580
-1600
-1620
-1640
-1660
-1680
-1700
0
100
200
300
400
500
600

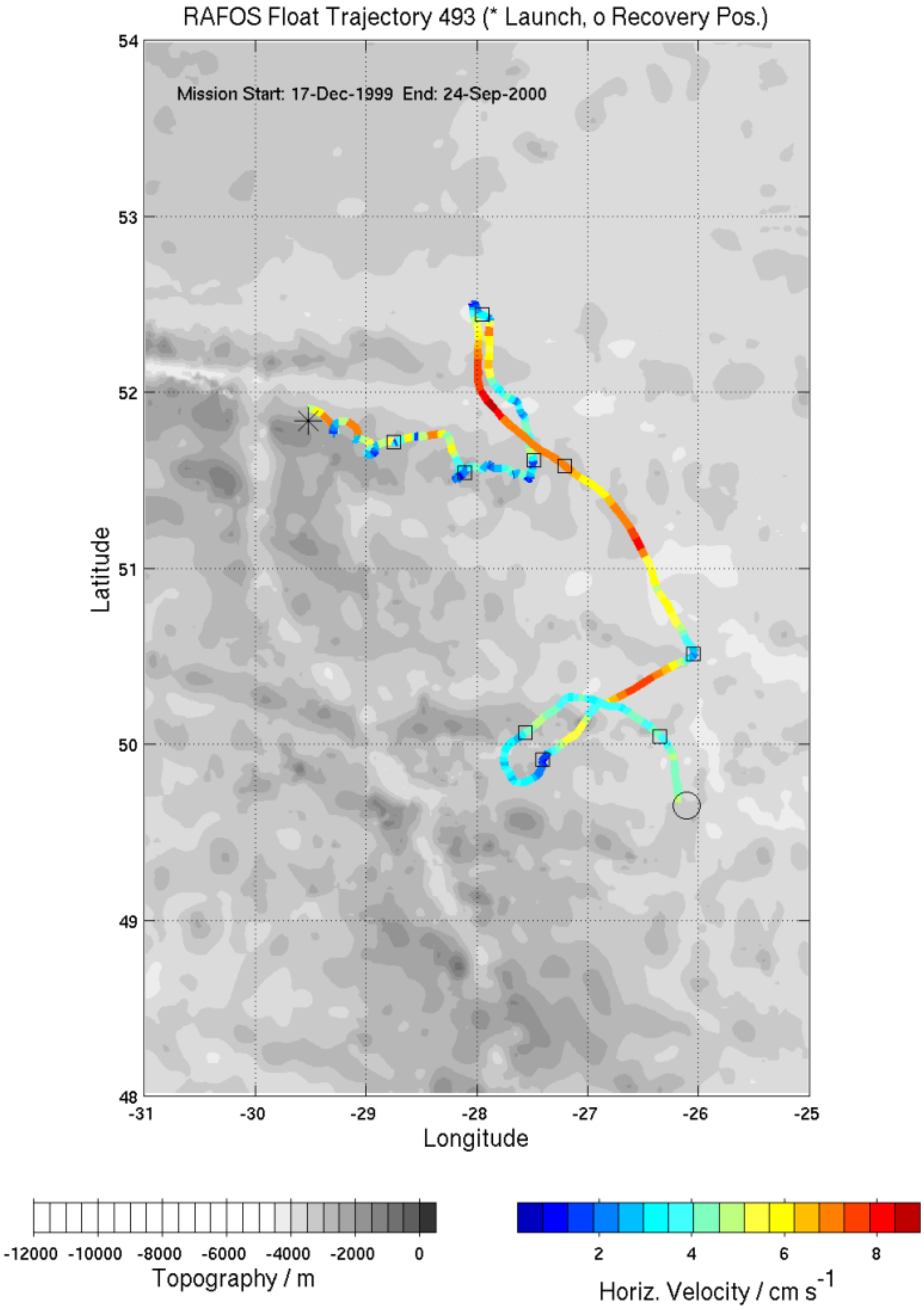

RAFOS Float 491: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days


RAFOS Float Trajectory 492 (* Launch, o Recovery Pos.)
Mission Start: 18-Oct-1999 End: 09-Jun-2001
Latitude
Longitude
53
52
51
50
49
48
47
46
-31
-30
-29
-28
-27
-26
-25
-24
-23
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
2 4 6 8 10
Horiz. Velocity / cm s-1

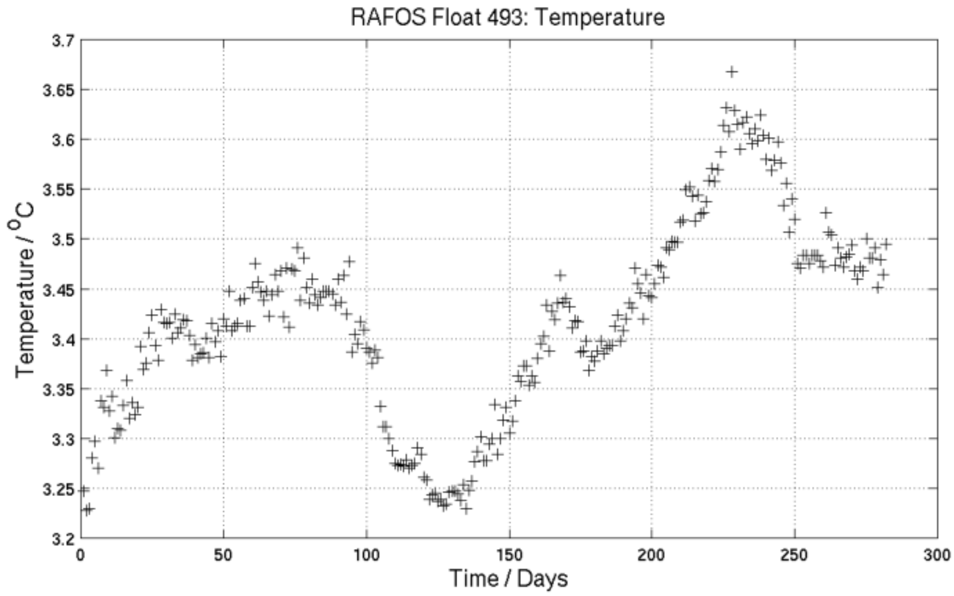

RAFOS Float 492: Temperature
Temperature / ^{o}C
Time / Days
3.8
3.7
3.6
3.5
3.4
3.3
3.2
3.1
3
0
100
200
300
400
500
600

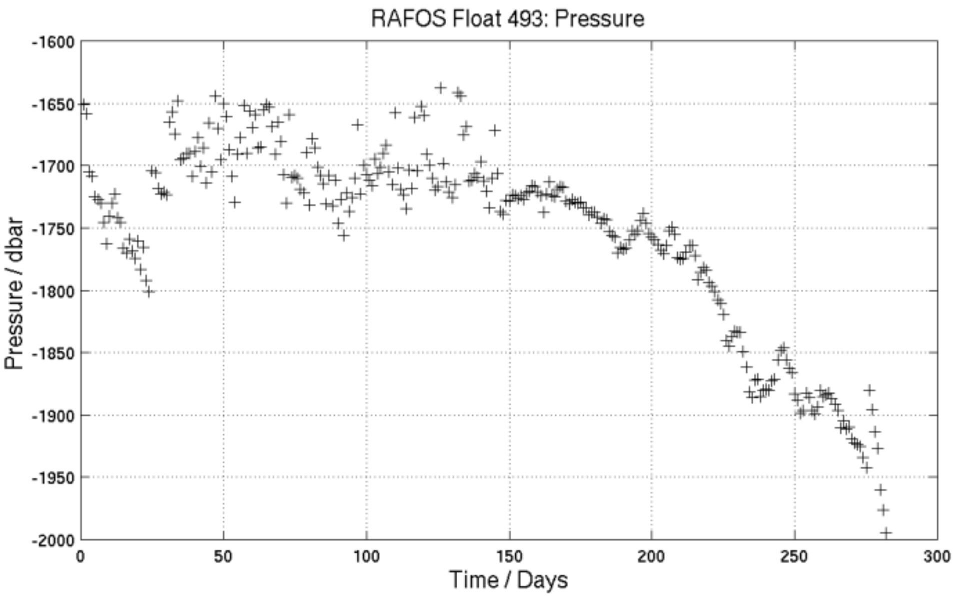

RAFOS Float 492: Pressure
Pressure / dbar
Time / Days
-1600
-1650
-1700
-1750
-1800
-1850
-1900
0
100
200
300
400
500
600

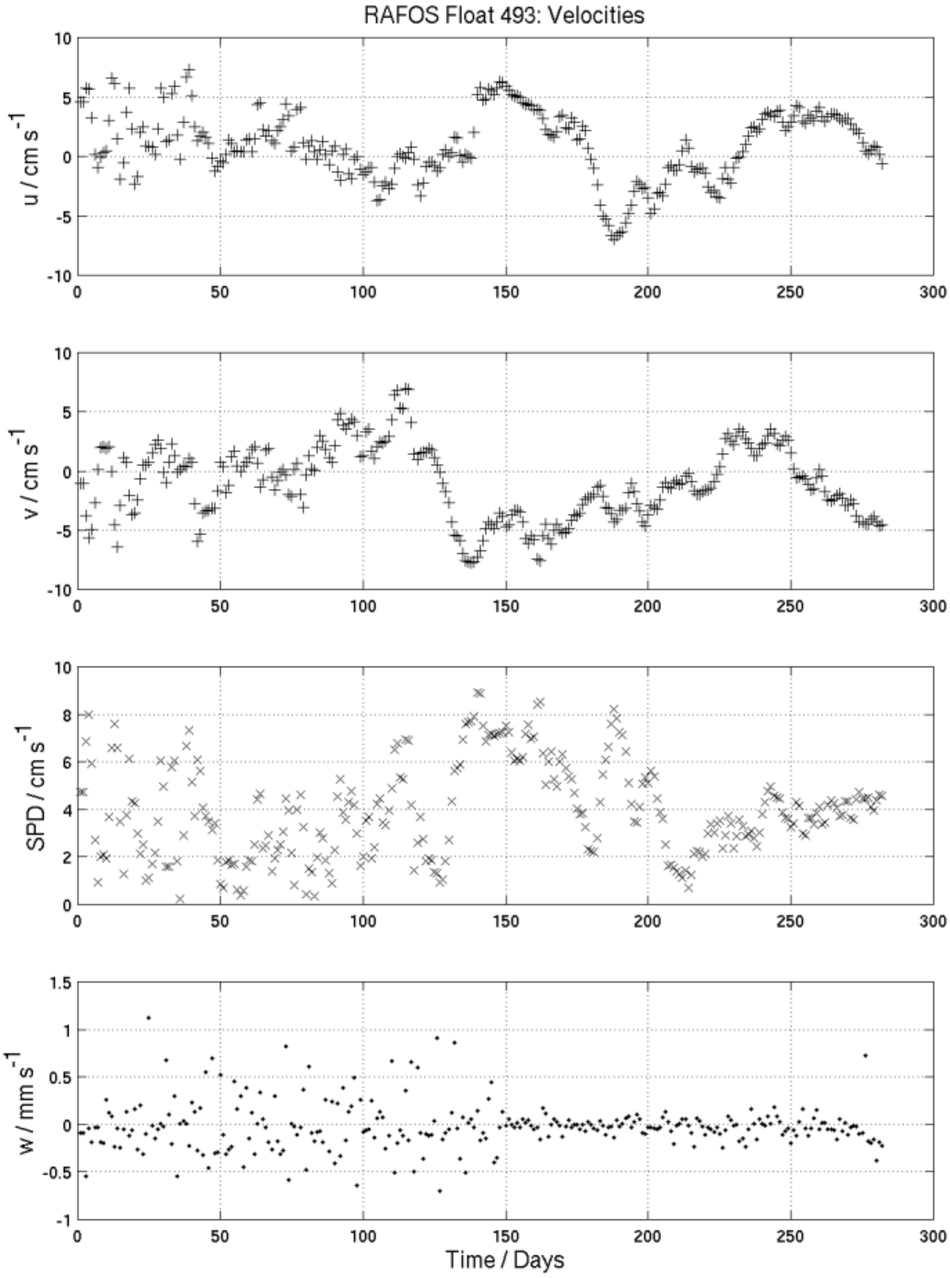

RAFOS Float 492: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

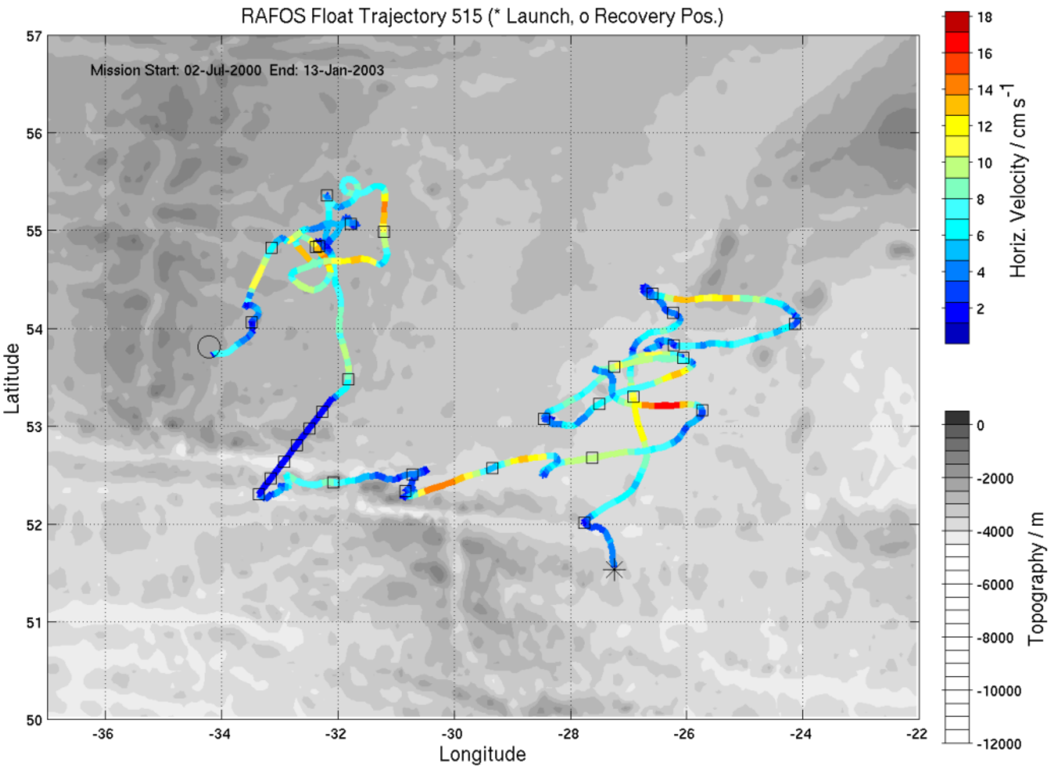


RAFOS Float Trajectory 493 (* Launch, o Recovery Pos.)
Mission Start: 17-Dec-1999 End: 24-Sep-2000
54
53
52
51
50
49
48
Latitude
-31
-30
-29
-28
-27
-26
-25
Longitude
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
2 4 6 8
Horiz. Velocity / cm s-1

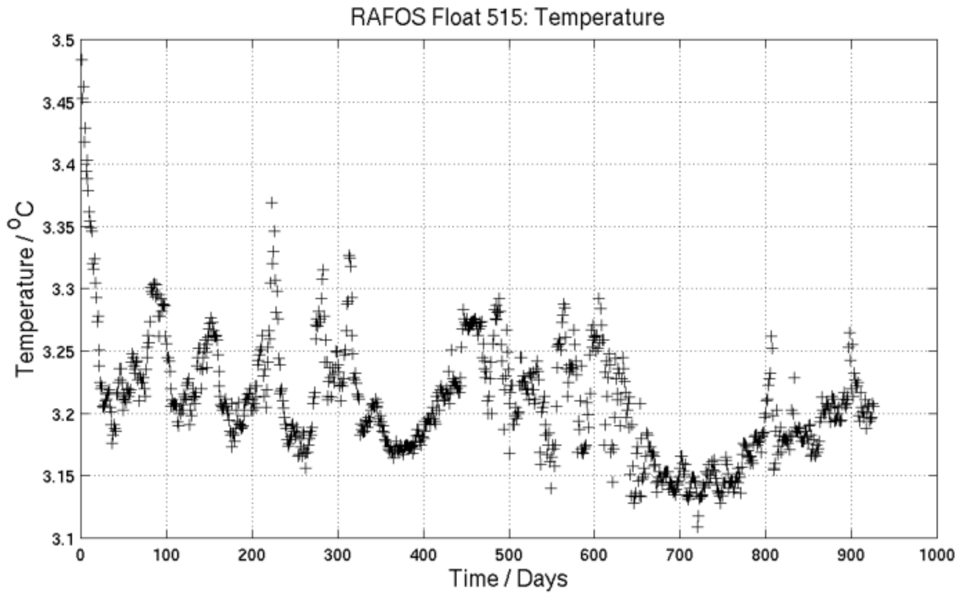

RAFOS Float 493: Temperature
Temperature / ^{o}C
Time / Days
3.7
3.65
3.6
3.55
3.5
3.45
3.4
3.35
3.3
3.25
3.2
0
50
100
150
200
250
300


RAFOS Float 493: Pressure
Pressure / dbar
Time / Days
-1600
-1650
-1700
-1750
-1800
-1850
-1900
-1950
-2000
0
50
100
150
200
250
300

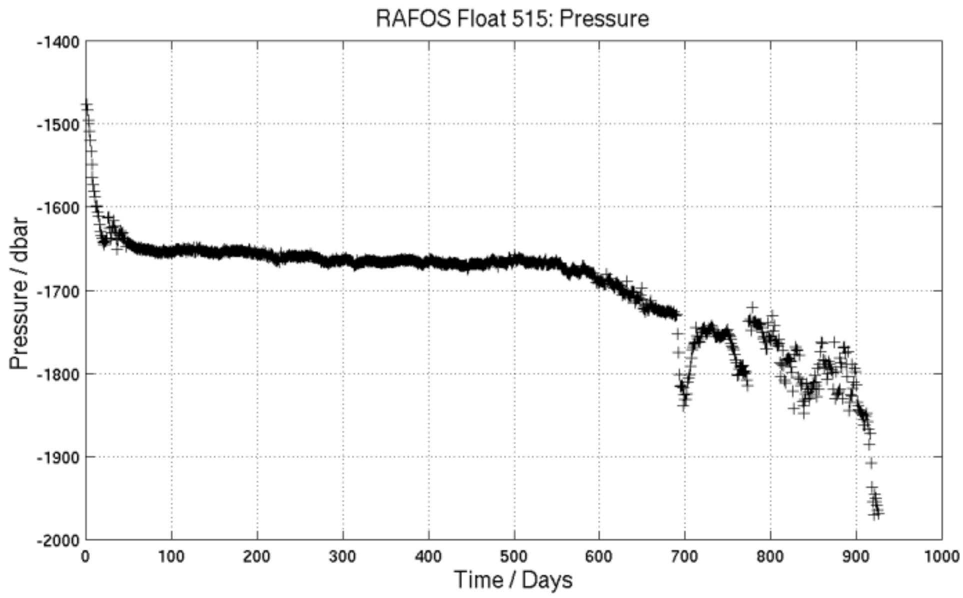

RAFOS Float 493: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days



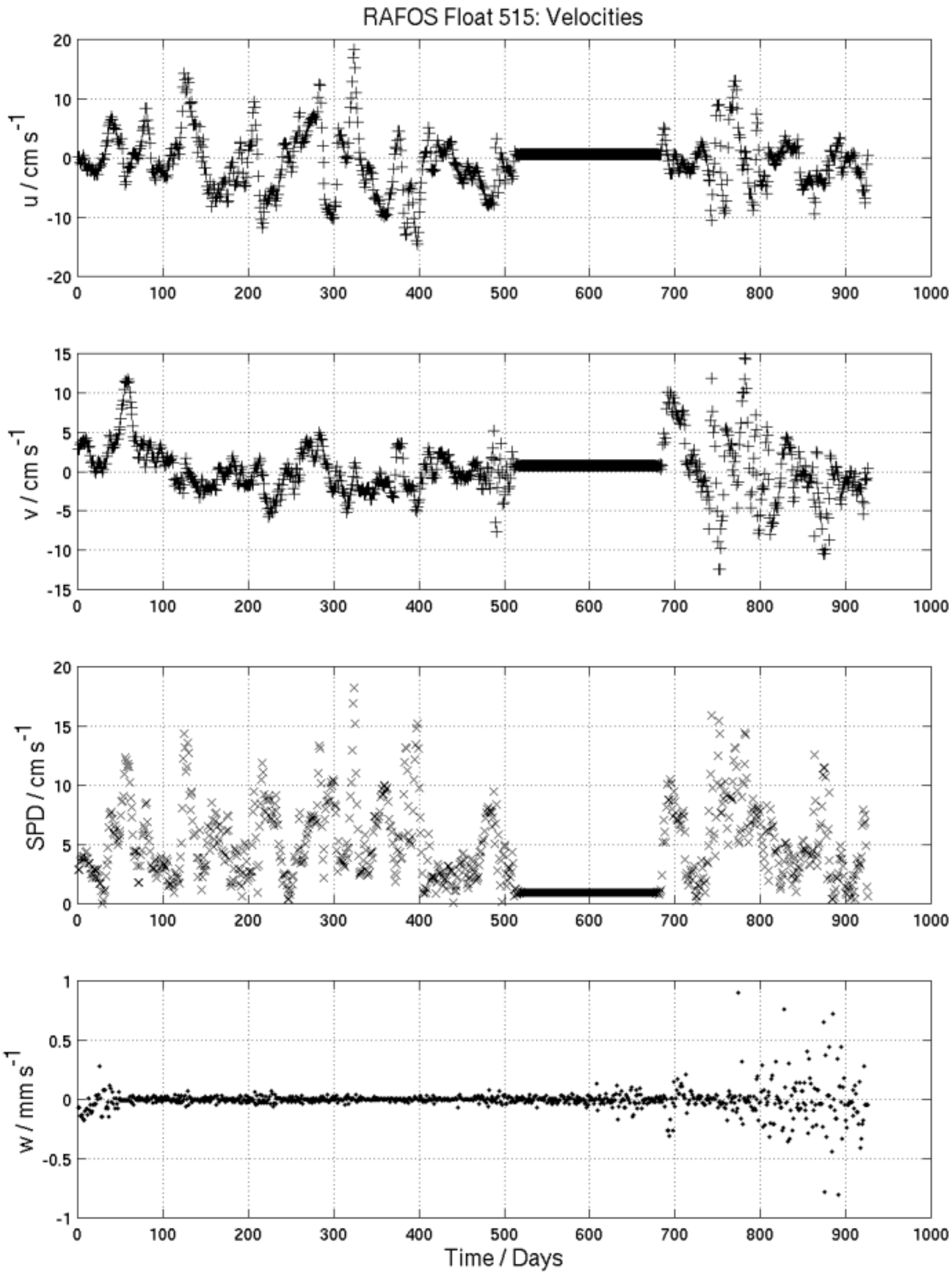
RAFOS Float Trajectory 515 (* Launch, o Recovery Pos.)
Mission Start: 02-Jul-2000 End: 13-Jan-2003
Latitude
Longitude
Horiz. Velocity / cm s-1
Topography / m

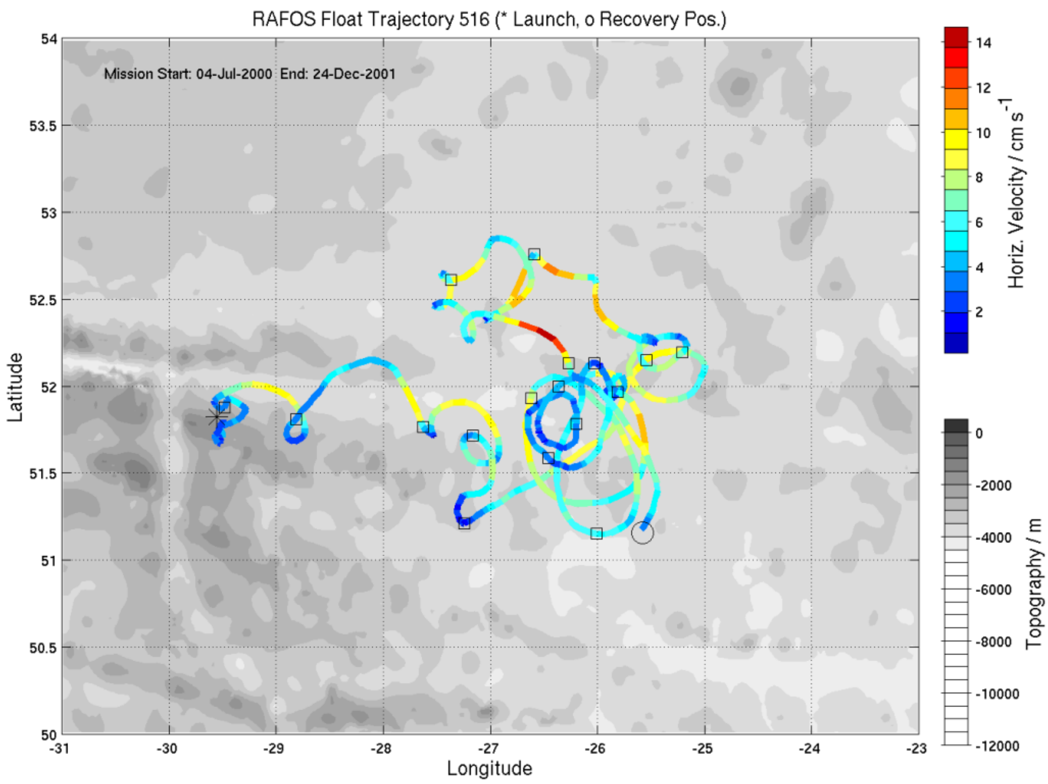


RAFOS Float 515: Temperature
Temperature / ^{o}C
Time / Days

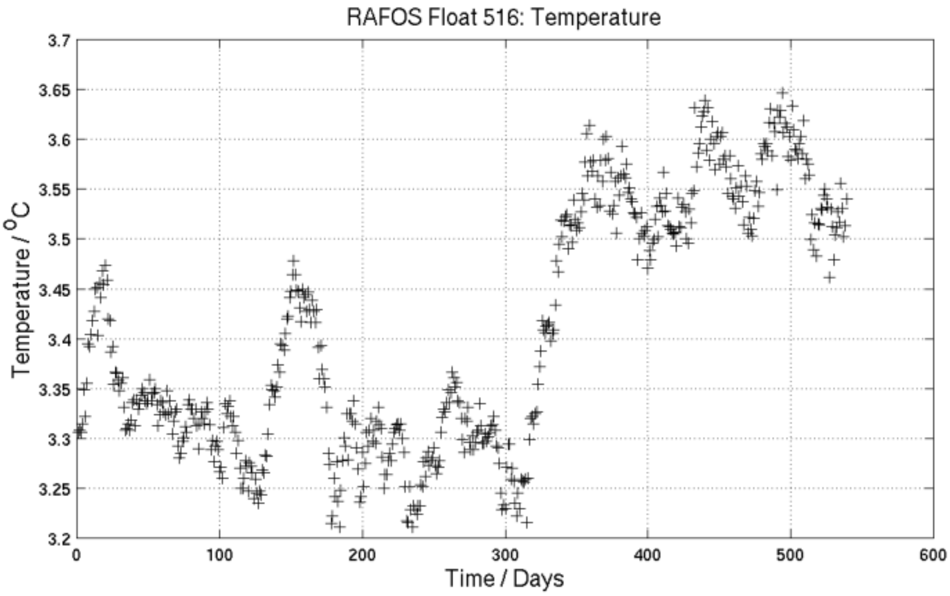


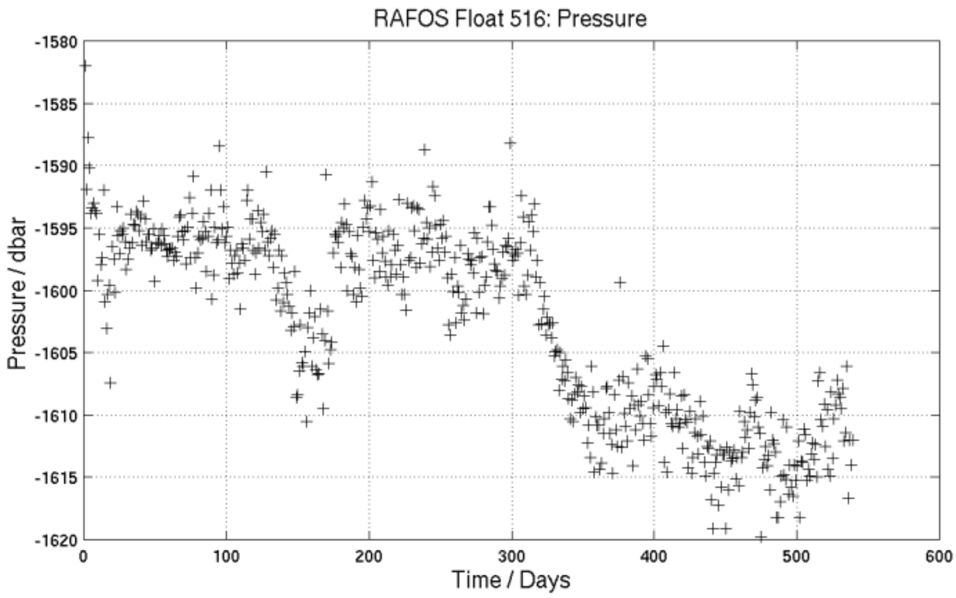
RAFOS Float 515: Pressure
Pressure / dbar
Time / Days

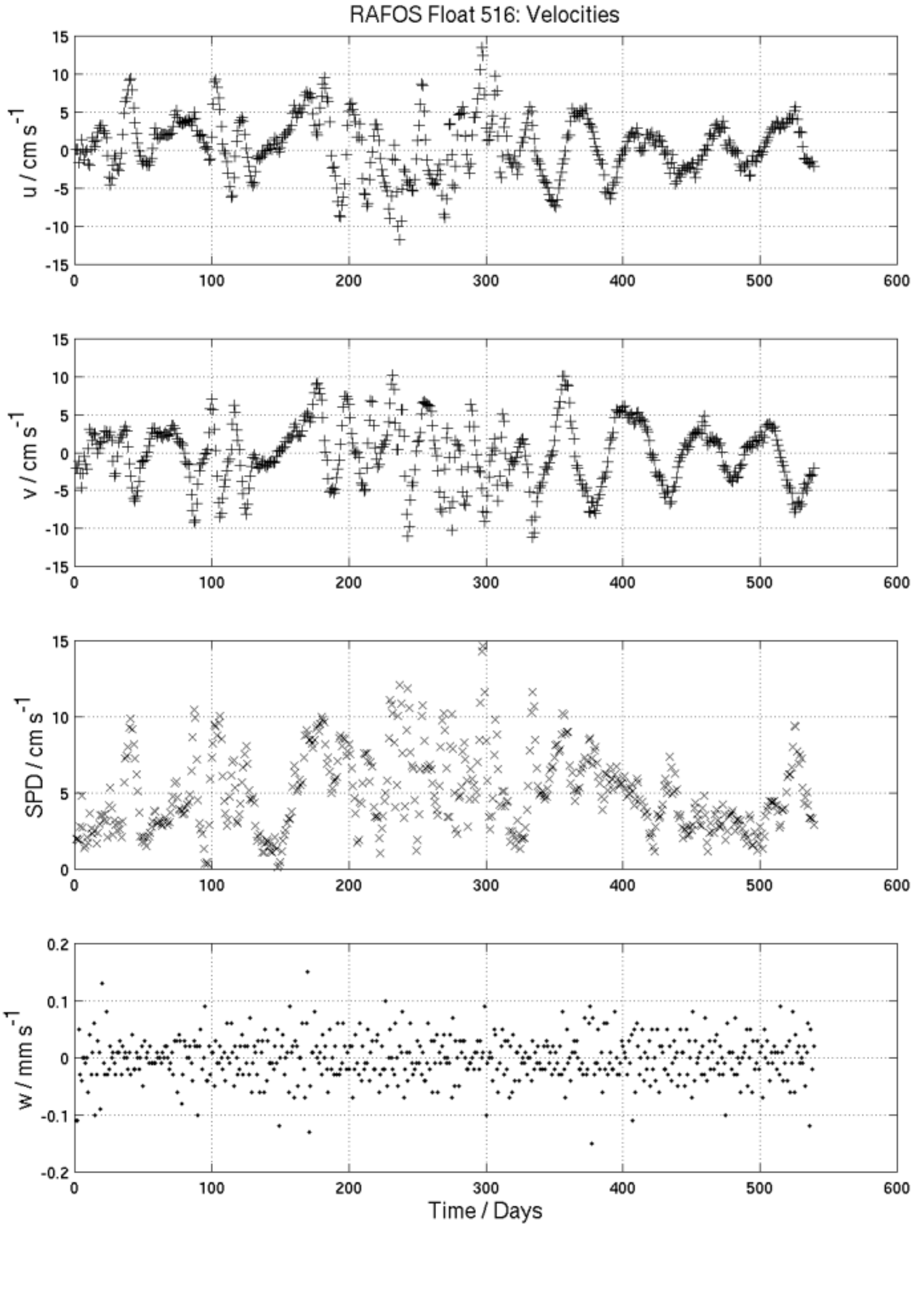

RAFOS Float 515: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

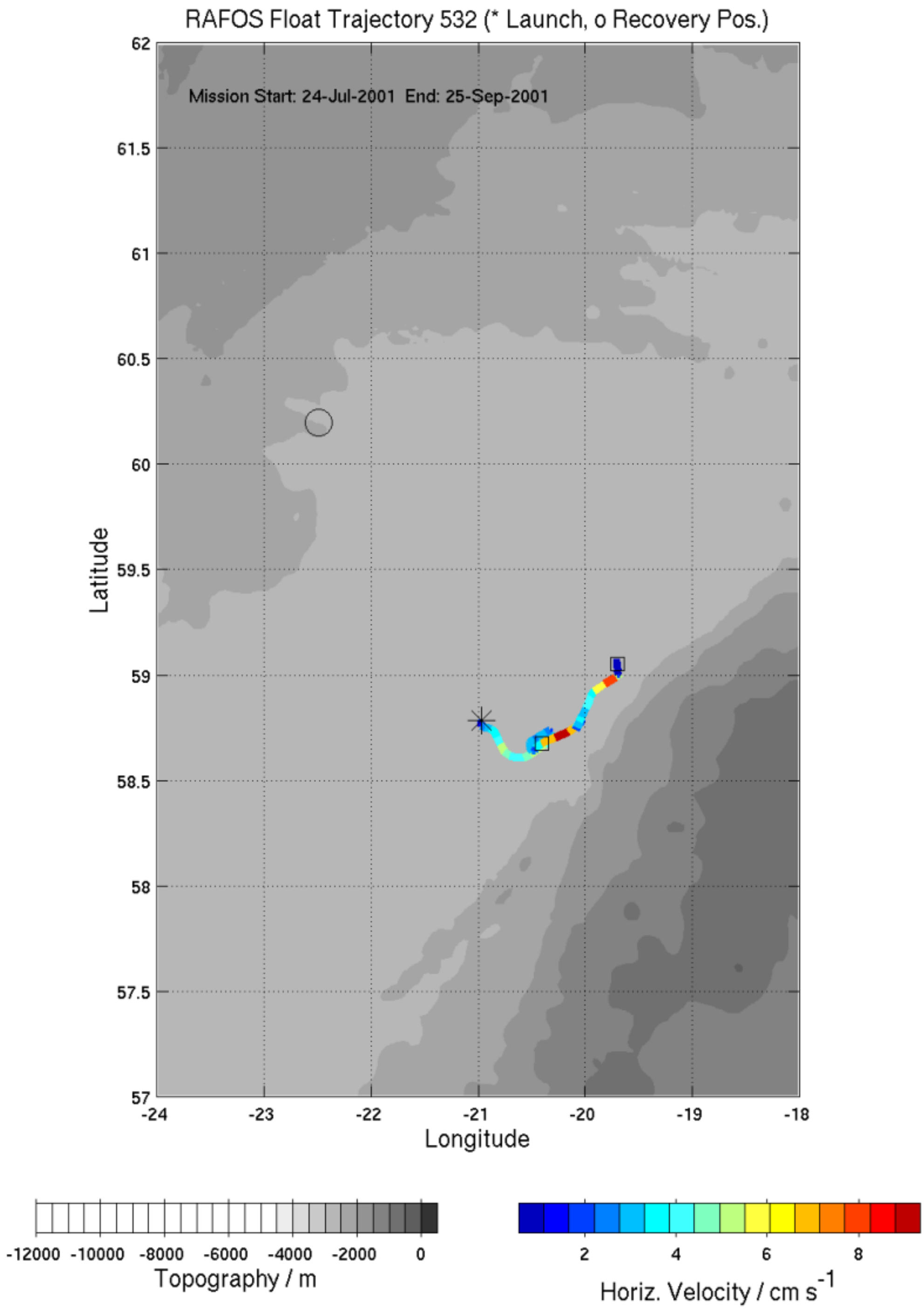


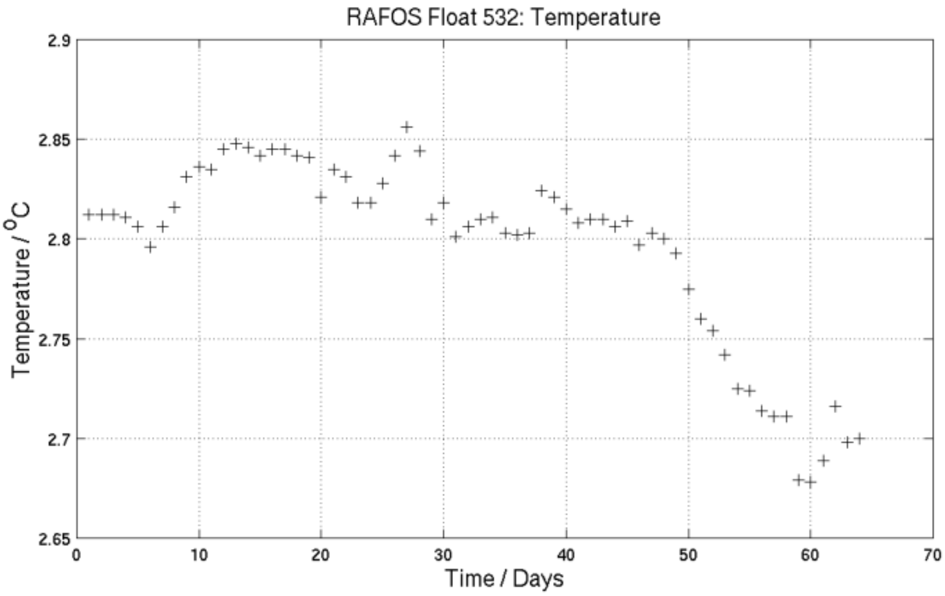
RAFOS Float Trajectory 516 (* Launch, o Recovery Pos.)
Mission Start: 04-Jul-2000 End: 24-Dec-2001
Latitude
Longitude
54
53.5
53
52.5
52
51.5
51
50.5
50
-31
-30
-29
-28
-27
-26
-25
-24
-23
Horiz. Velocity / cm s-1
14
12
10
8
6
4
2
Topography / m
0
-2000
-4000
-6000
-8000
-10000
-12000

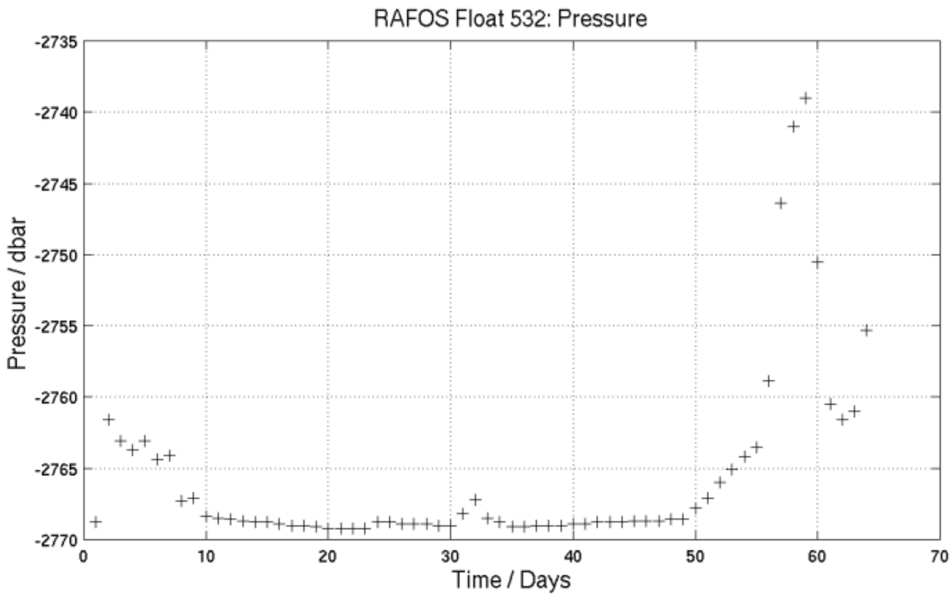

RAFOS Float 516: Temperature
Temperature / °C
Time / Days
3.7
3.65
3.6
3.55
3.5
3.45
3.4
3.35
3.3
3.25
3.2
0
100
200
300
400
500
600

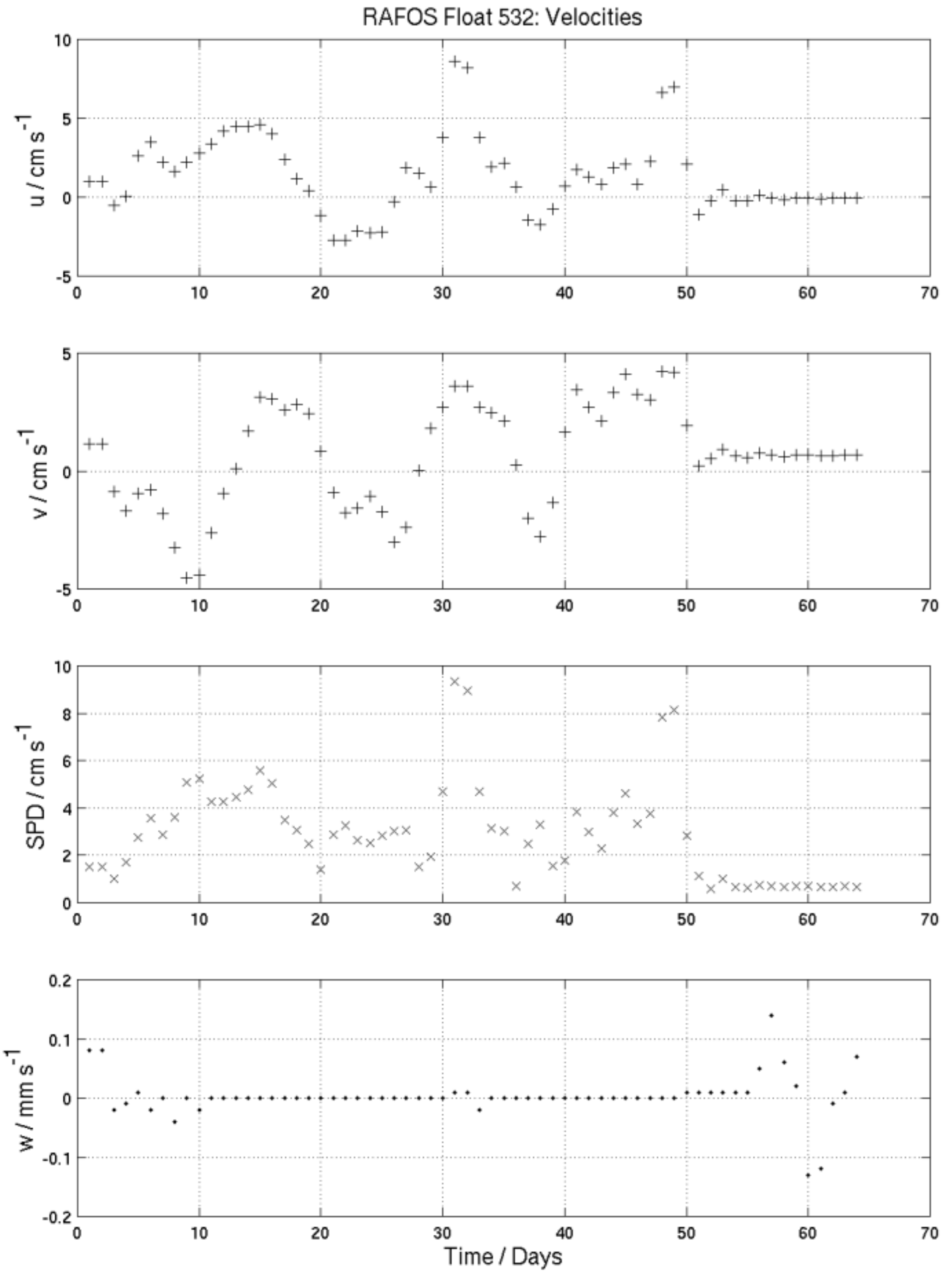

RAFOS Float 516: Pressure
Pressure / dbar
Time / Days
-1580
-1585
-1590
-1595
-1600
-1605
-1610
-1615
-1620
0
100
200
300
400
500
600


RAFOS Float 516: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

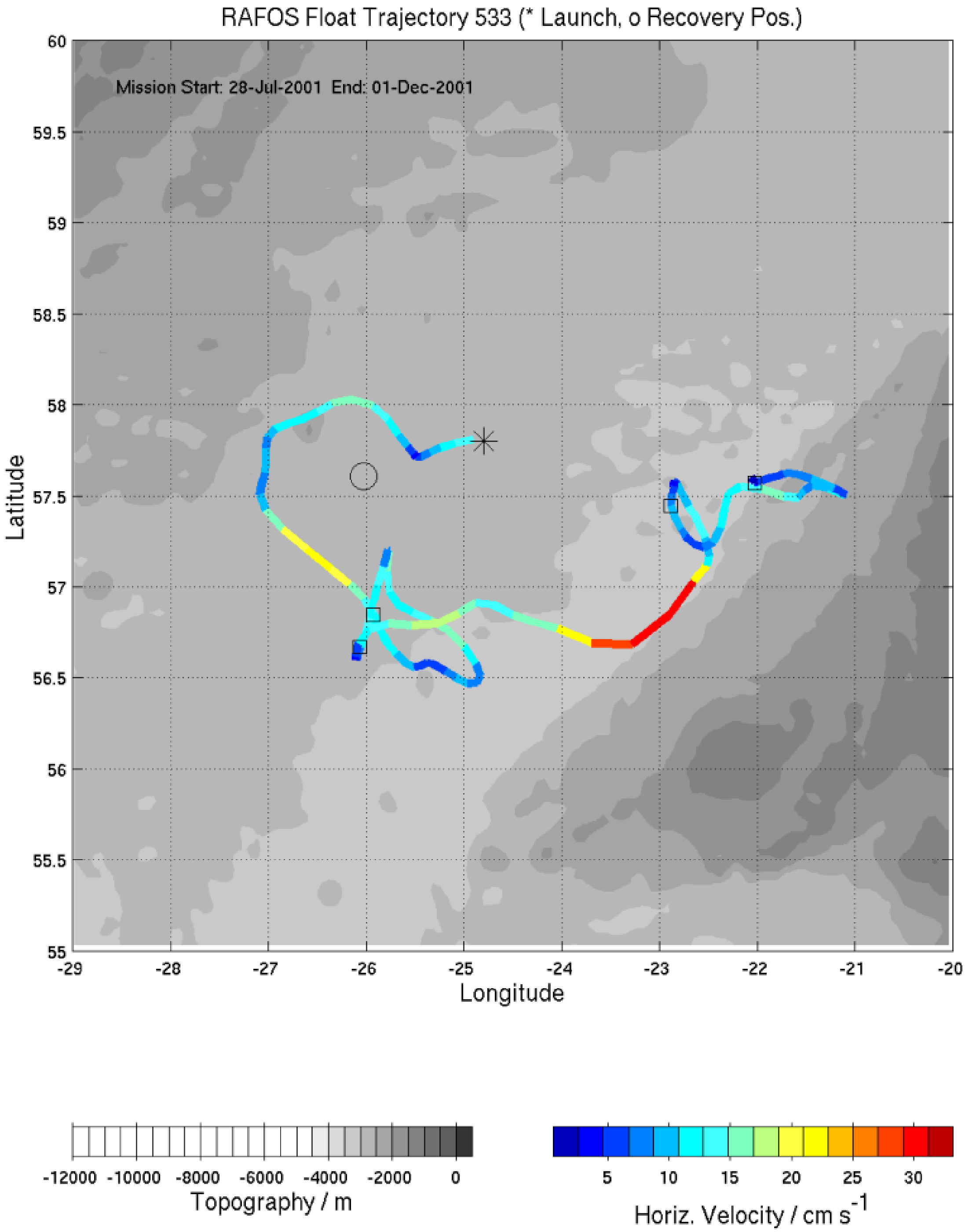

RAFOS Float Trajectory 532 (* Launch, o Recovery Pos.)
Mission Start: 24-Jul-2001 End: 25-Sep-2001
Latitude
62
61.5
61
60.5
60
59.5
59
58.5
58
57.5
57
-24
-23
-22
-21
-20
-19
-18
Longitude
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
2 4 6 8
Horiz. Velocity / cm s-1

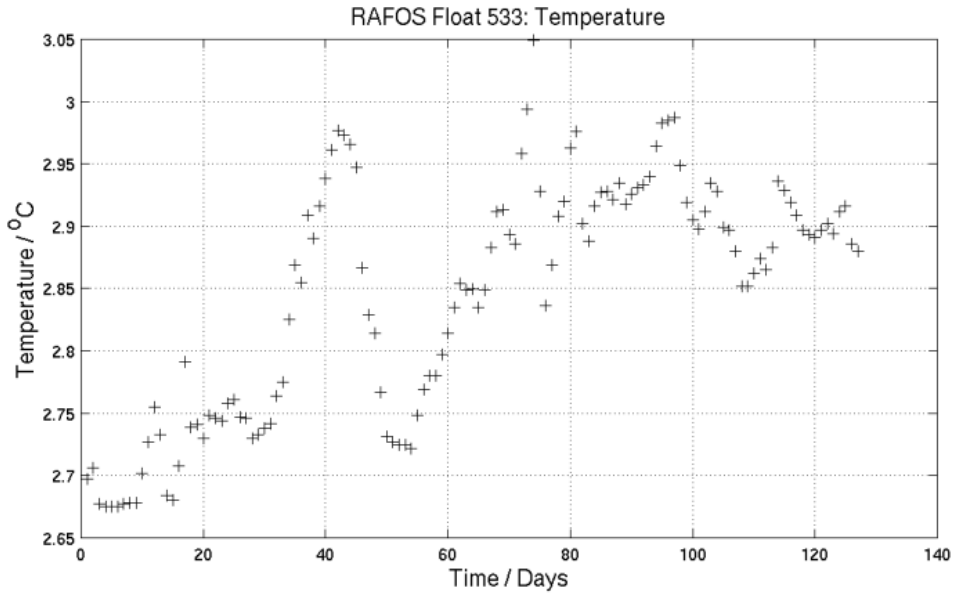

RAFOS Float 532: Temperature
Temperature / ^{o}C
Time / Days
2.9
2.85
2.8
2.75
2.7
2.65
0
10
20
30
40
50
60
70

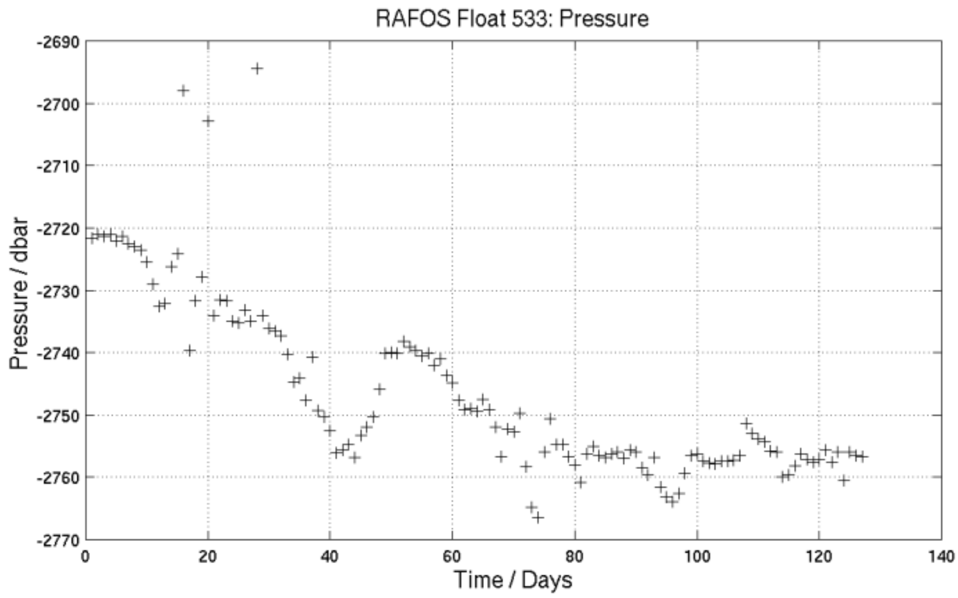

RAFOS Float 532: Pressure
Pressure / dbar
Time / Days
-2735
-2740
-2745
-2750
-2755
-2760
-2765
-2770
0
10
20
30
40
50
60
70

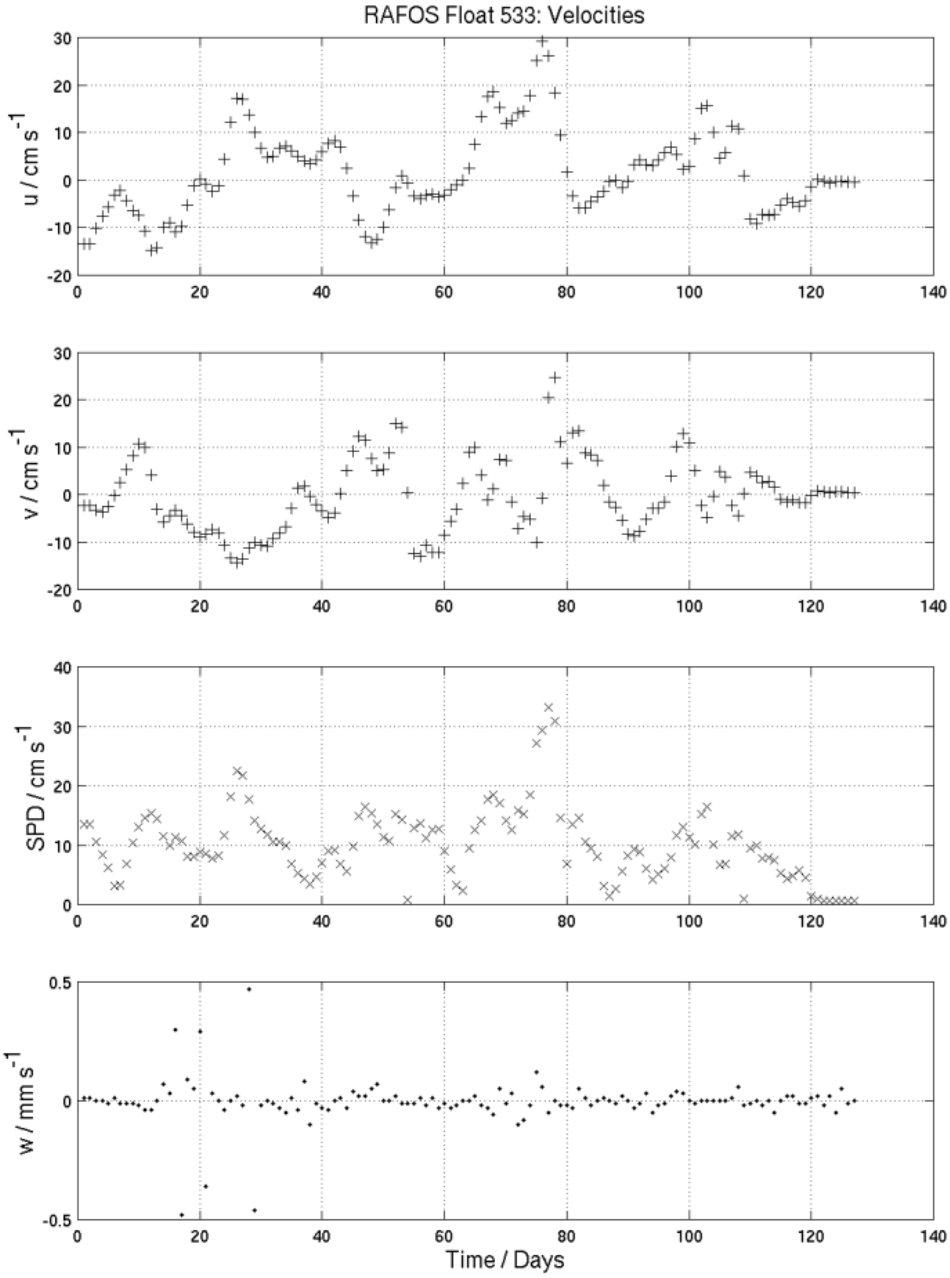


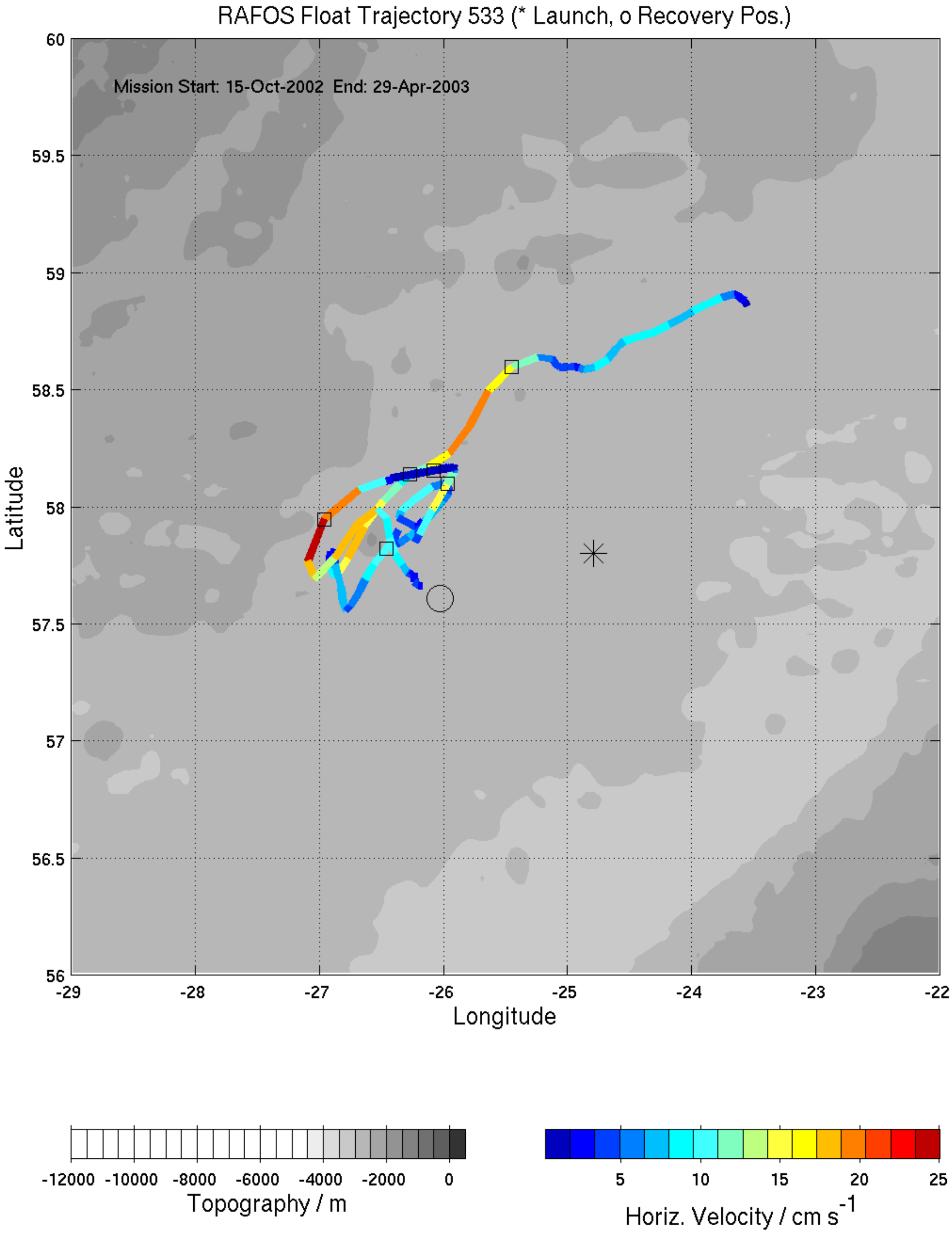
RAFOS Float 532: Velocities
u / cm s^{-1}
v / cm s^{-1}
SPD / cm s^{-1}
w / mm s^{-1}
Time / Days


RAFOS Float Trajectory 533 (* Launch, o Recovery Pos.)
Mission Start: 28-Jul-2001 End: 01-Dec-2001
Latitude
Longitude
60
59.5
59
58.5
58
57.5
57
56.5
56
55.5
55
-29
-28
-27
-26
-25
-24
-23
-22
-21
-20
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5 10 15 20 25 30
Horiz. Velocity / cm s-1

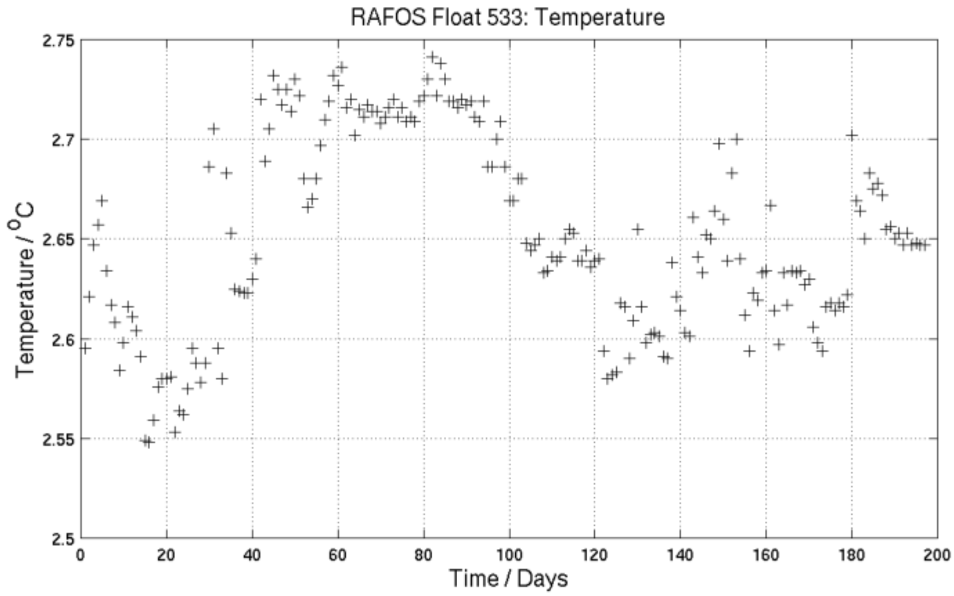

RAFOS Float 533: Temperature
Temperature / ^{o}C
Time / Days
3.05
3
2.95
2.9
2.85
2.8
2.75
2.7
2.65
0
20
40
60
80
100
120
140

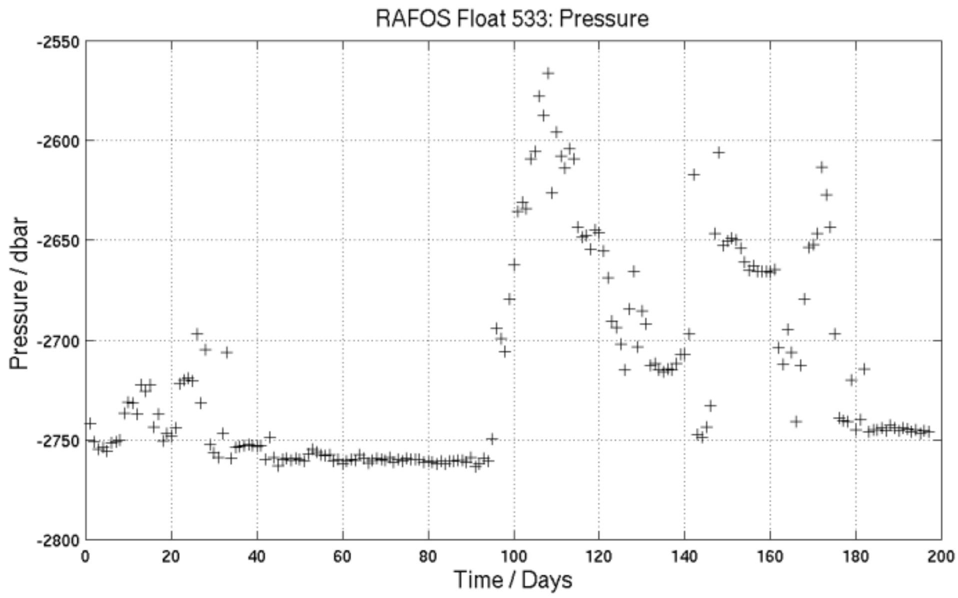

RAFOS Float 533: Pressure
Pressure / dbar
Time / Days
-2690
-2700
-2710
-2720
-2730
-2740
-2750
-2760
-2770
0
20
40
60
80
100
120
140

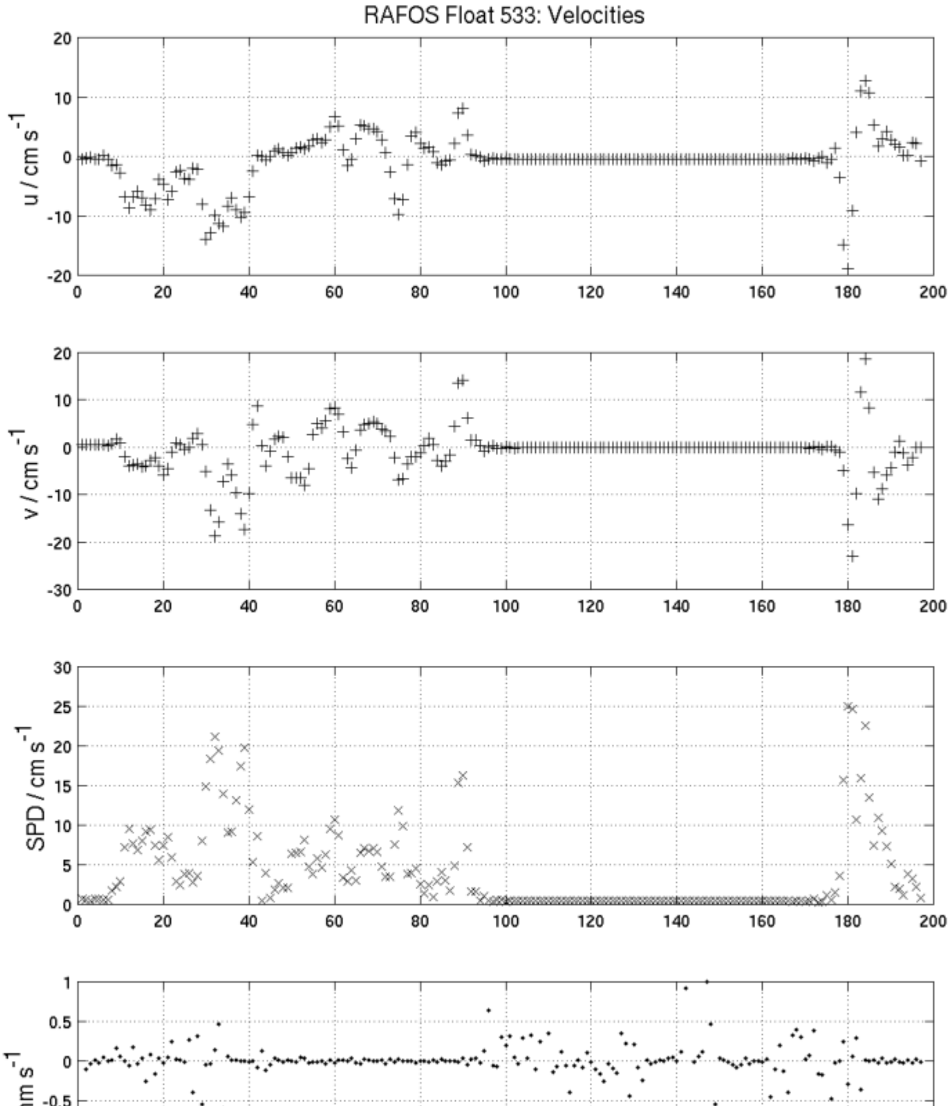

RAFOS Float 533: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days



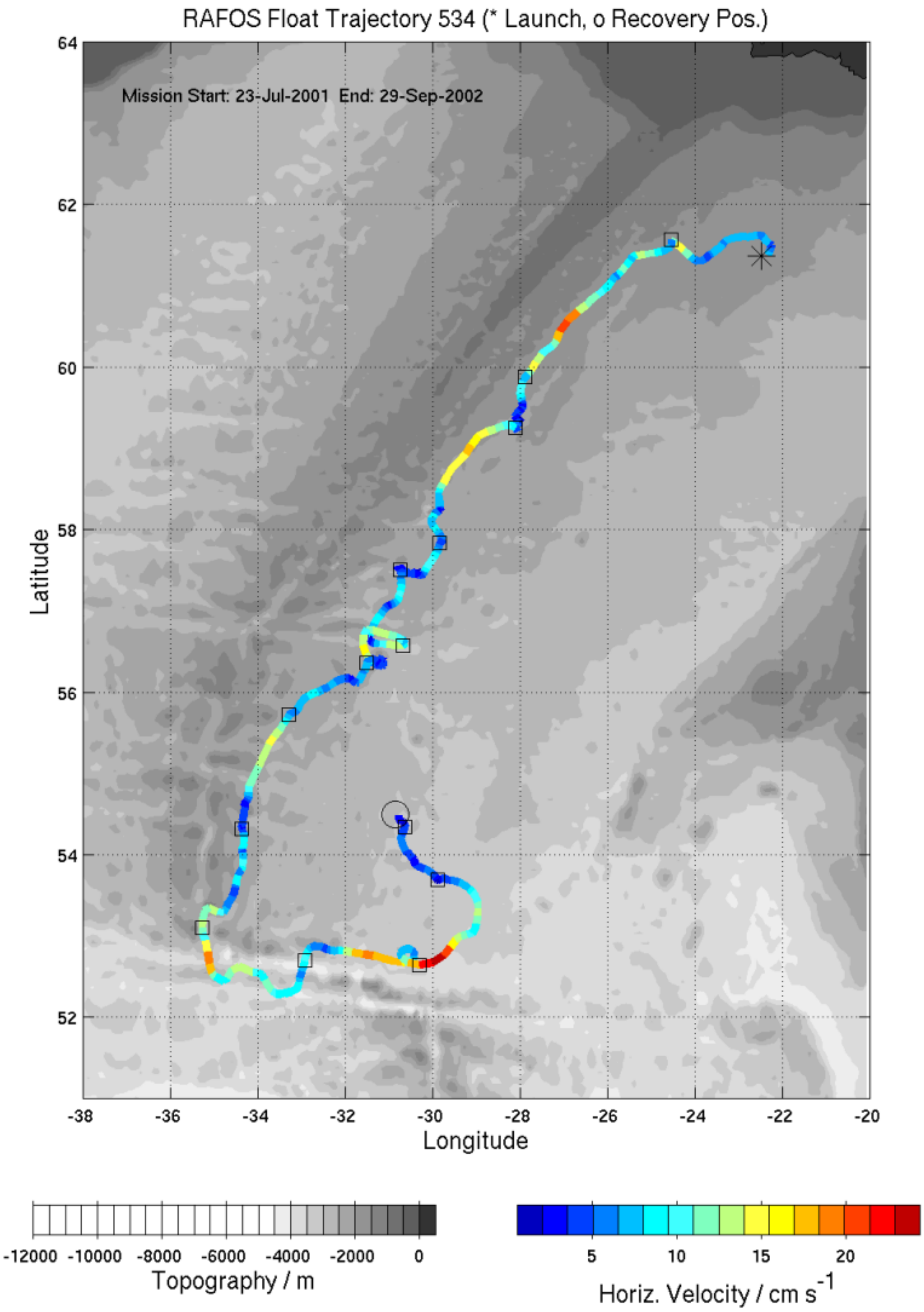
RAFOS Float Trajectory 533 (* Launch, o Recovery Pos.)
Mission Start: 15-Oct-2002 End: 29-Apr-2003
60
59.5
59
58.5
58
57.5
57
56.5
56
Latitude
-29
-28
-27
-26
-25
-24
-23
-22
Longitude
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5 10 15 20 25
Horiz. Velocity / cm s-1


RAFOS Float 533: Temperature
Temperature / ^{o}C
Time / Days
2.75
2.7
2.65
2.6
2.55
2.5
0
20
40
60
80
100
120
140
160
180
200

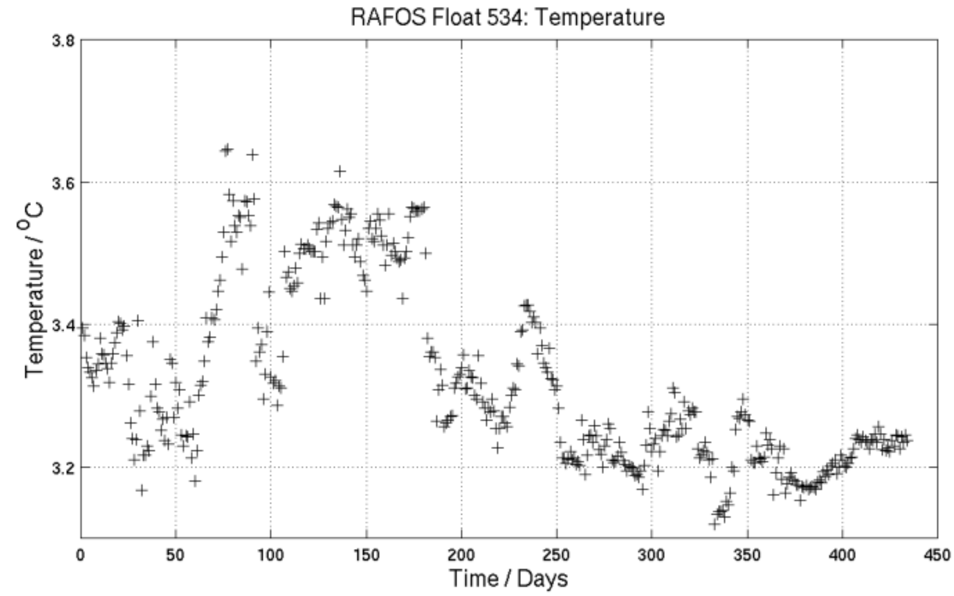

RAFOS Float 533: Pressure
Pressure / dbar
Time / Days
-2550
-2600
-2650
-2700
-2750
-2800
0
20
40
60
80
100
120
140
160
180
200

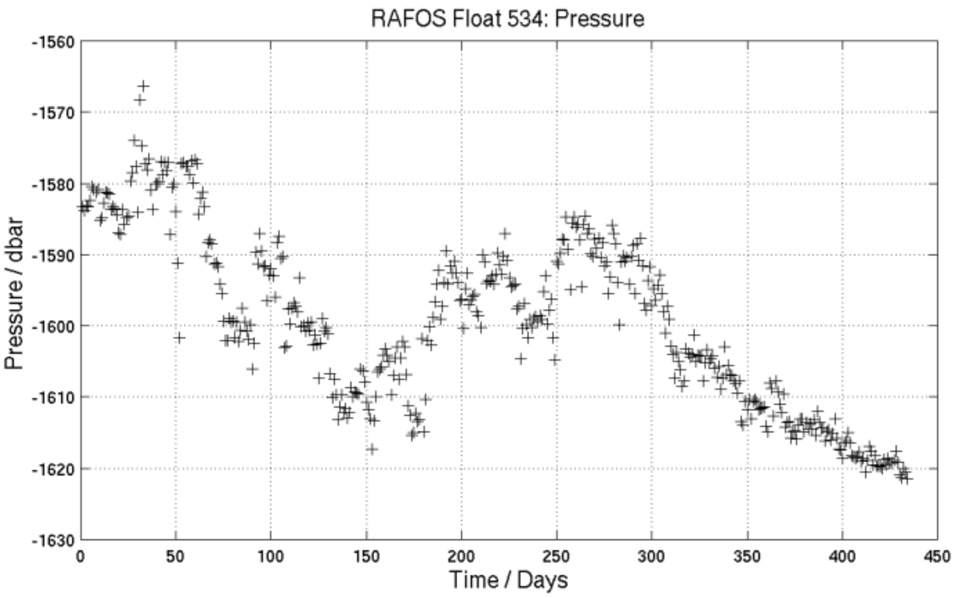


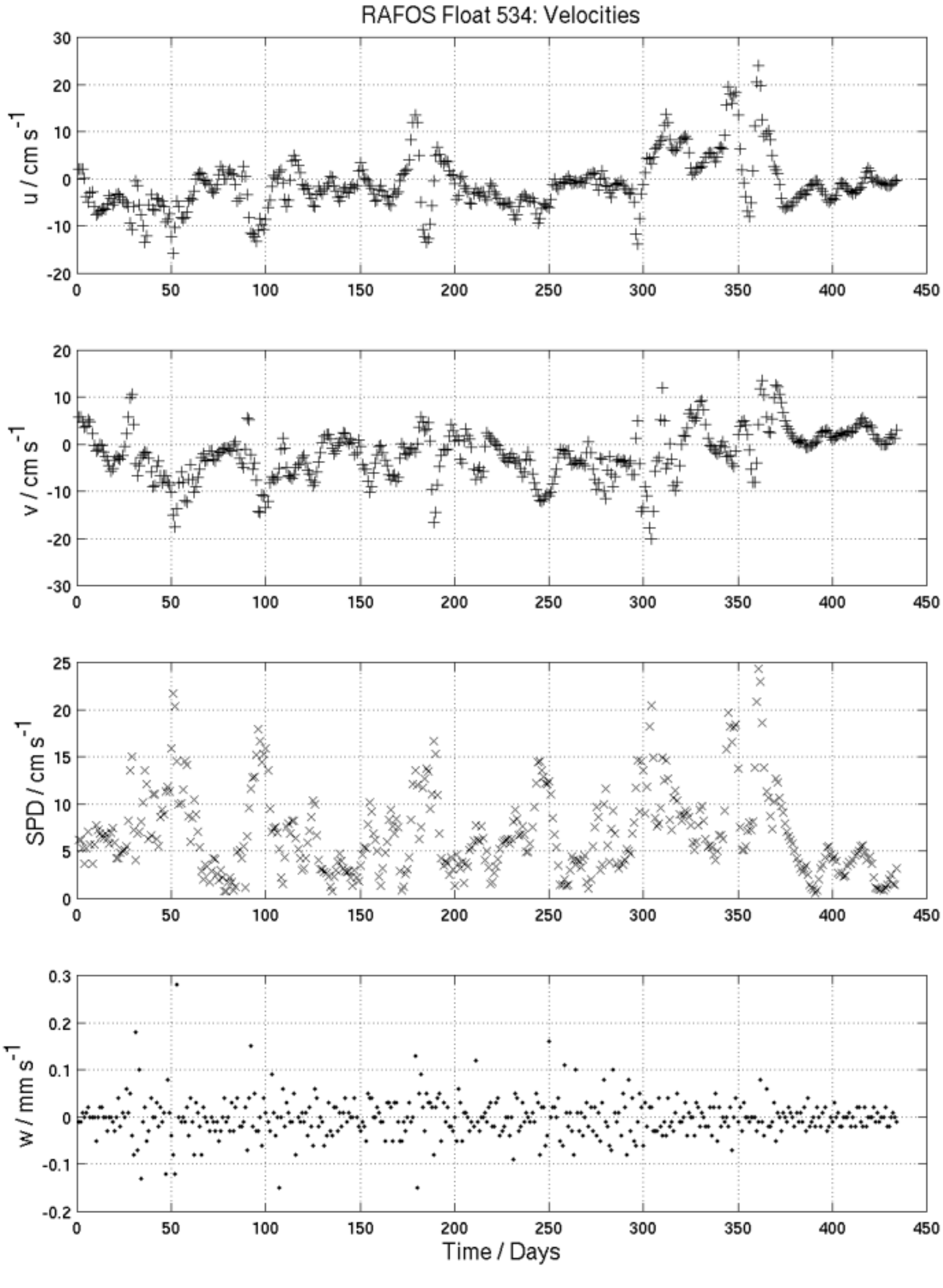
RAFOS Float 533: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

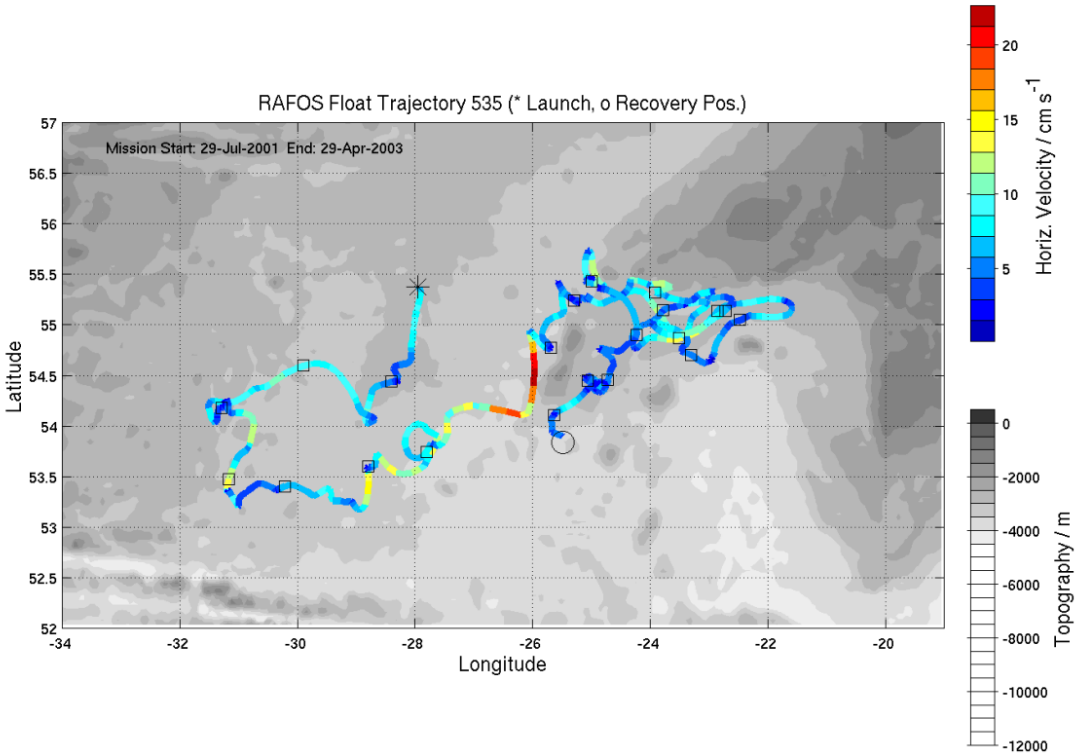


RAFOS Float Trajectory 534 (* Launch, o Recovery Pos.)
Mission Start: 23-Jul-2001 End: 29-Sep-2002
64
62
60
58
56
54
52
Latitude
-38
-36
-34
-32
-30
-28
-26
-24
-22
-20
Longitude
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5 10 15 20
Horiz. Velocity / cm s-1

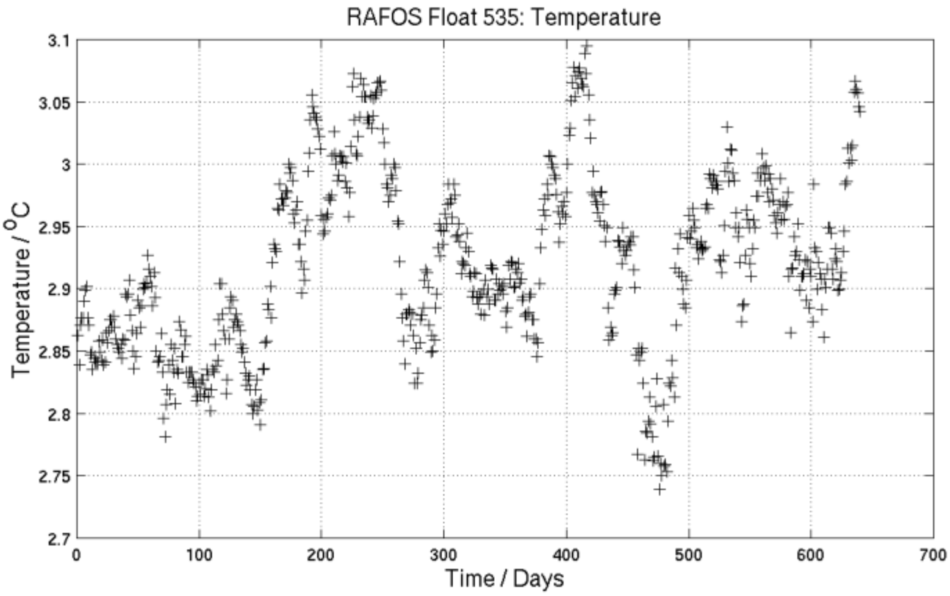

RAFOS Float 534: Temperature
Temperature / °C
Time / Days
3.8
3.6
3.4
3.2
0
50
100
150
200
250
300
350
400
450

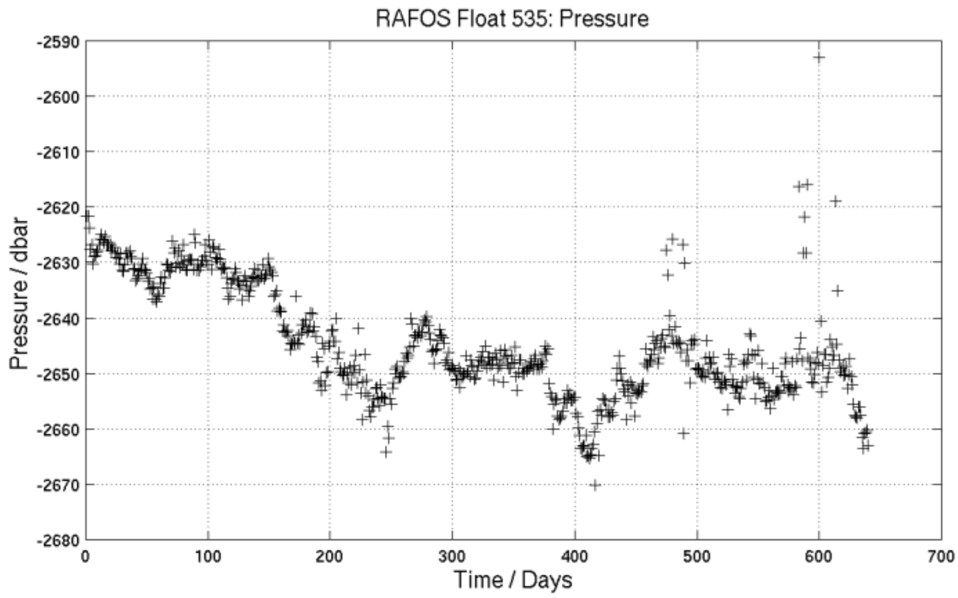

RAFOS Float 534: Pressure
Pressure / dbar
Time / Days
-1560
-1570
-1580
-1590
-1600
-1610
-1620
-1630
0
50
100
150
200
250
300
350
400
450

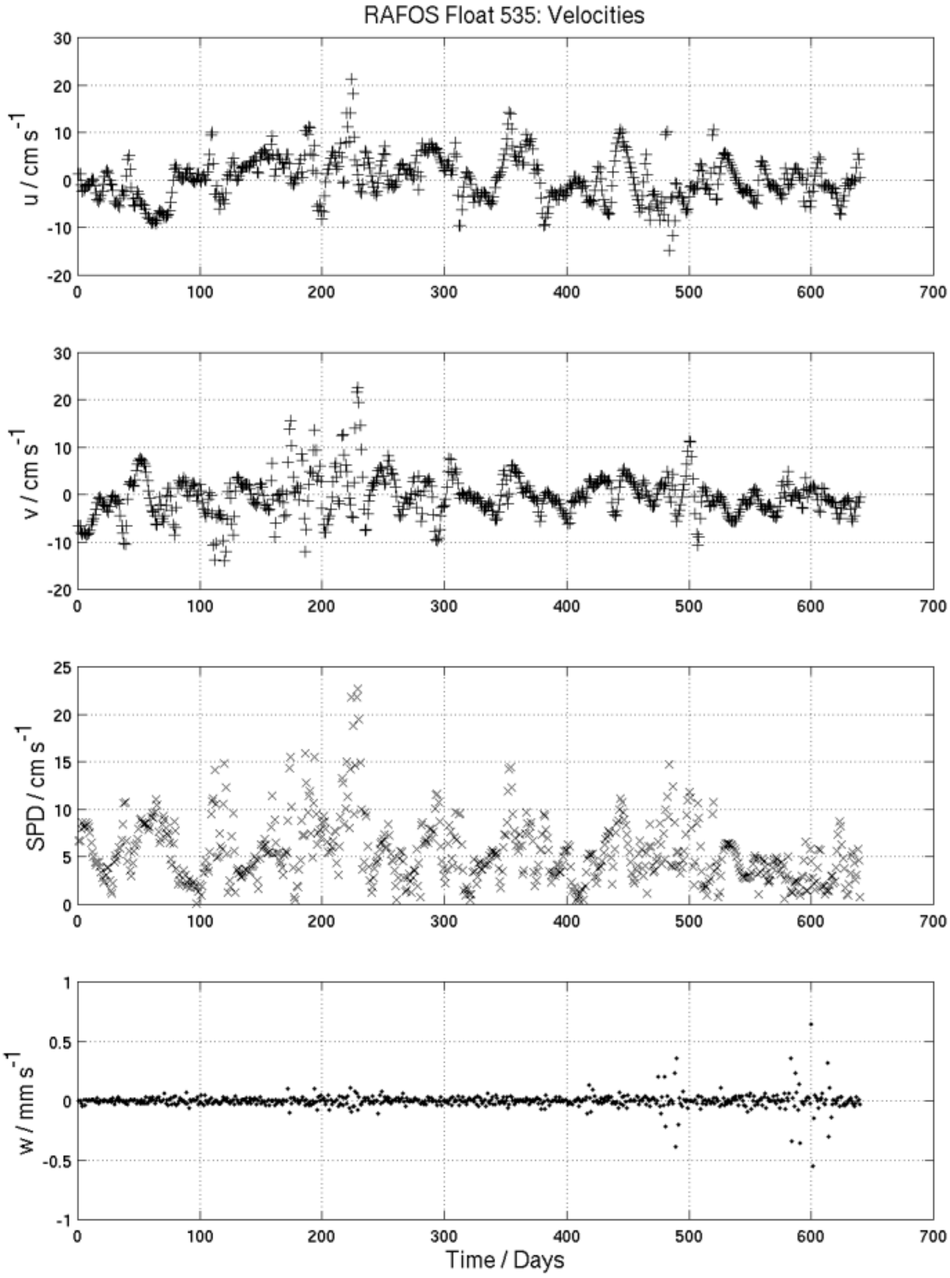

RAFOS Float 534: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days



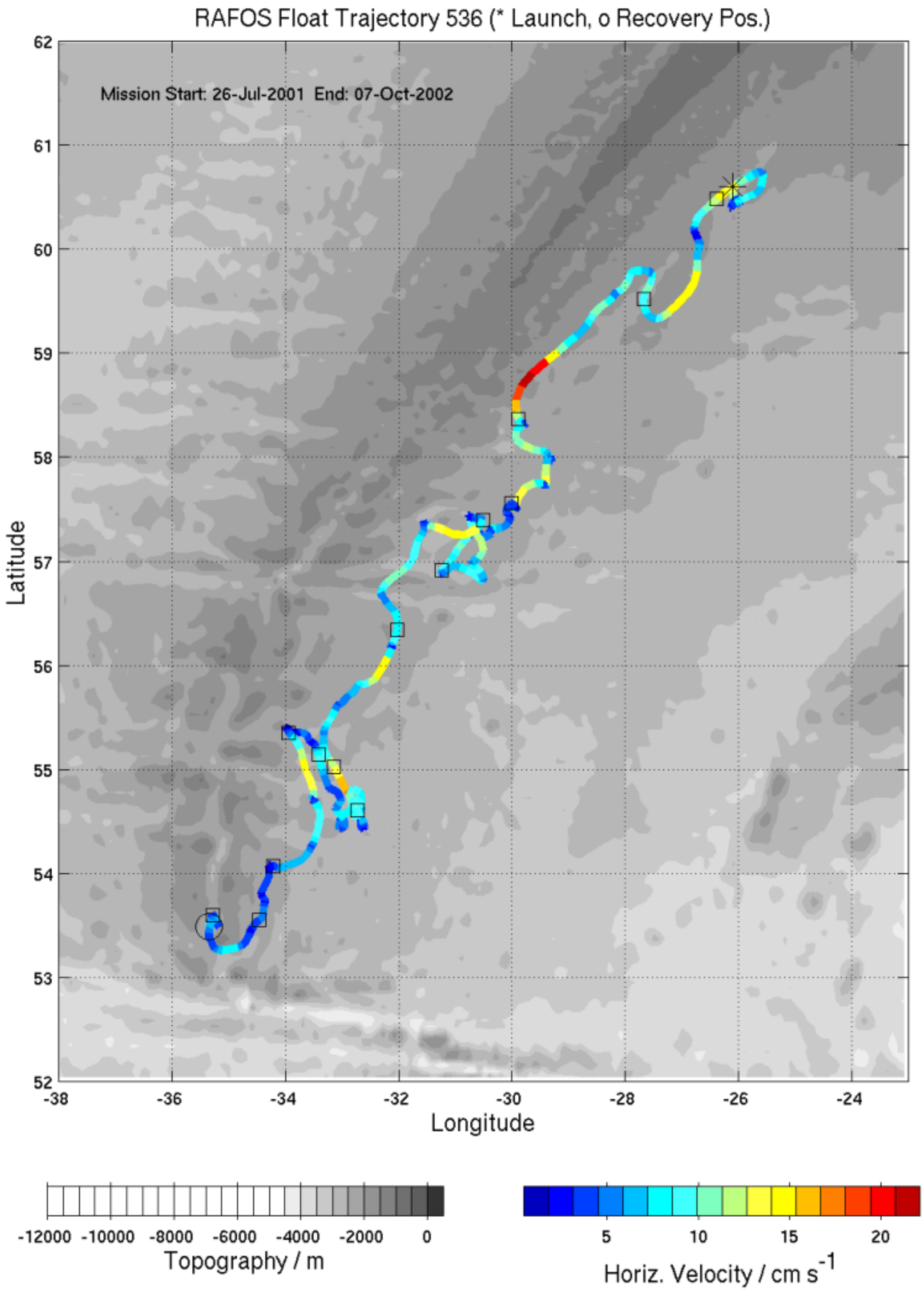
RAFOS Float Trajectory 535 (* Launch, o Recovery Pos.)
Mission Start: 29-Jul-2001 End: 29-Apr-2003
Latitude
Longitude
Horiz. Velocity / cm s⁻¹
Topography / m

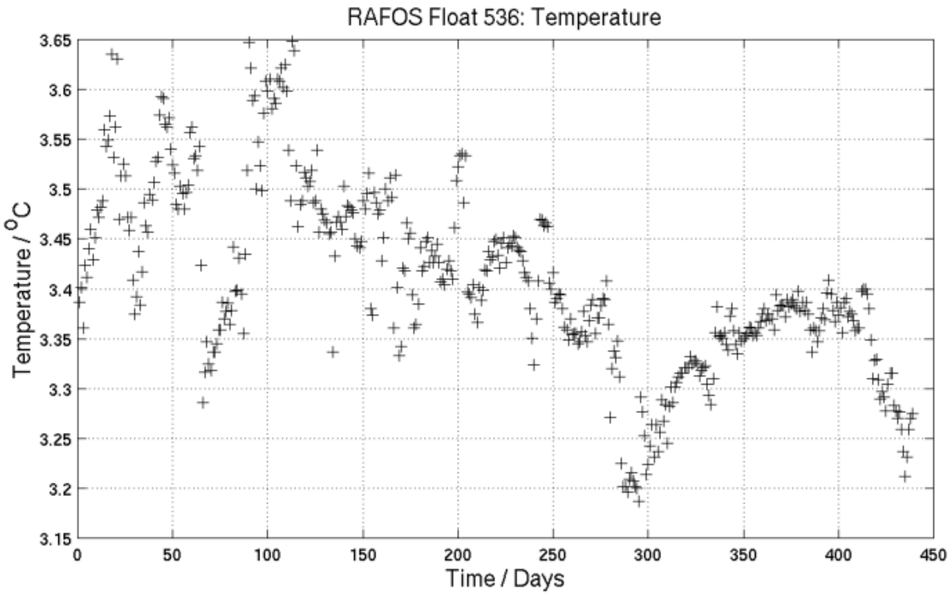

RAFOS Float 535: Temperature
Temperature / ^{o}C
Time / Days
3.1
3.05
3
2.95
2.9
2.85
2.8
2.75
2.7
0
100
200
300
400
500
600
700

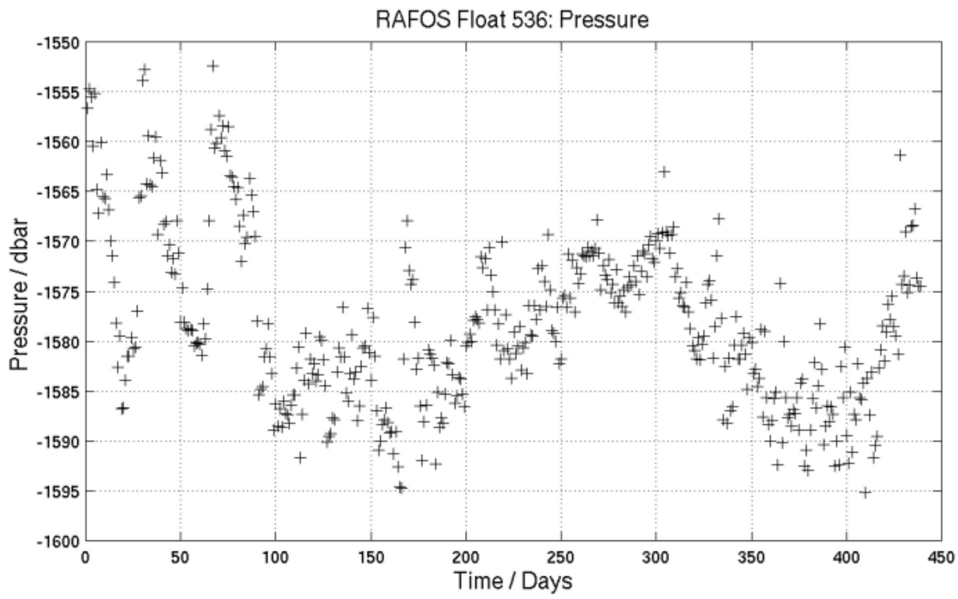

RAFOS Float 535: Pressure
Pressure / dbar
Time / Days
-2590
-2600
-2610
-2620
-2630
-2640
-2650
-2660
-2670
-2680
0
100
200
300
400
500
600
700

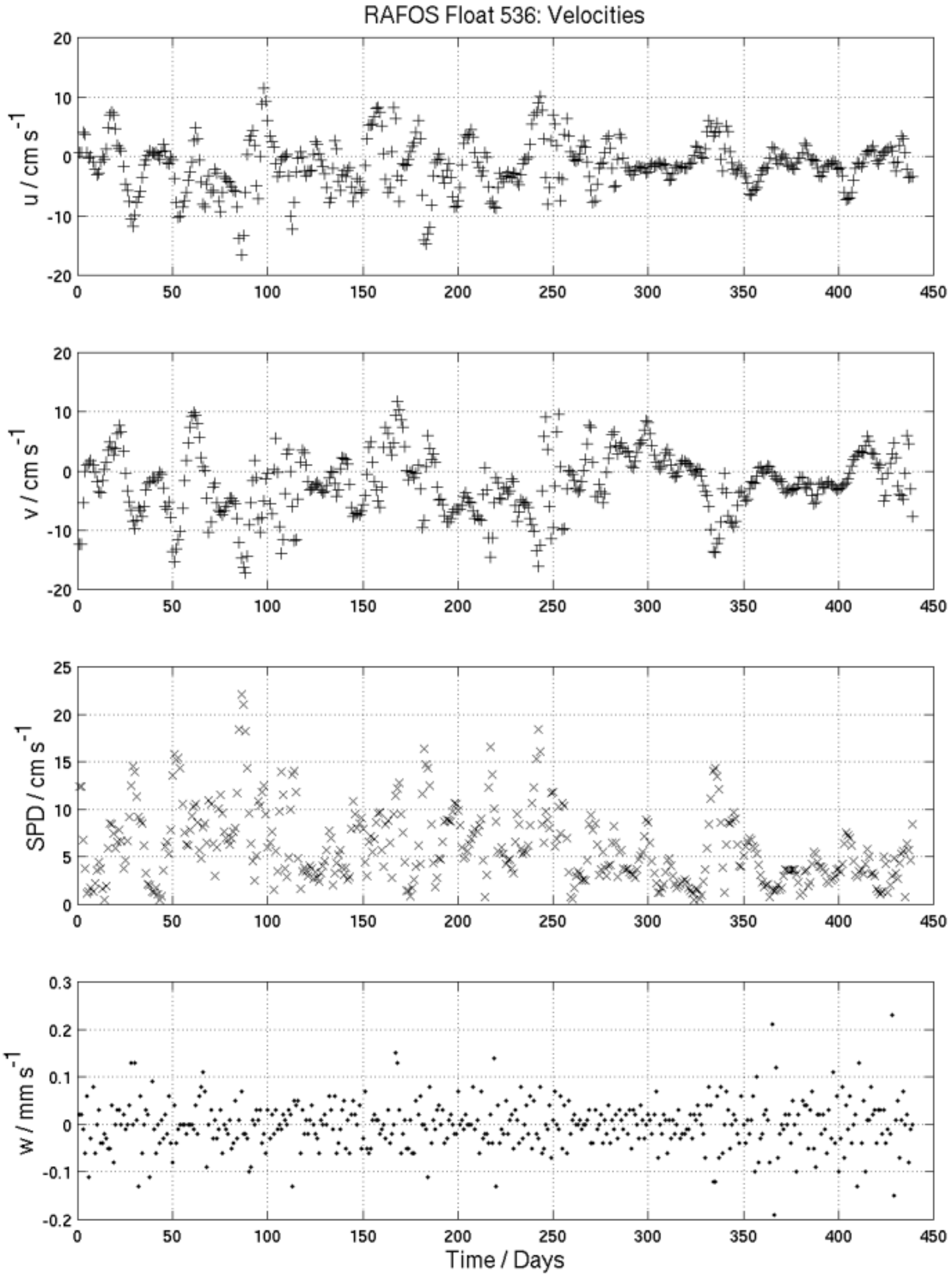


RAFOS Float 535: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

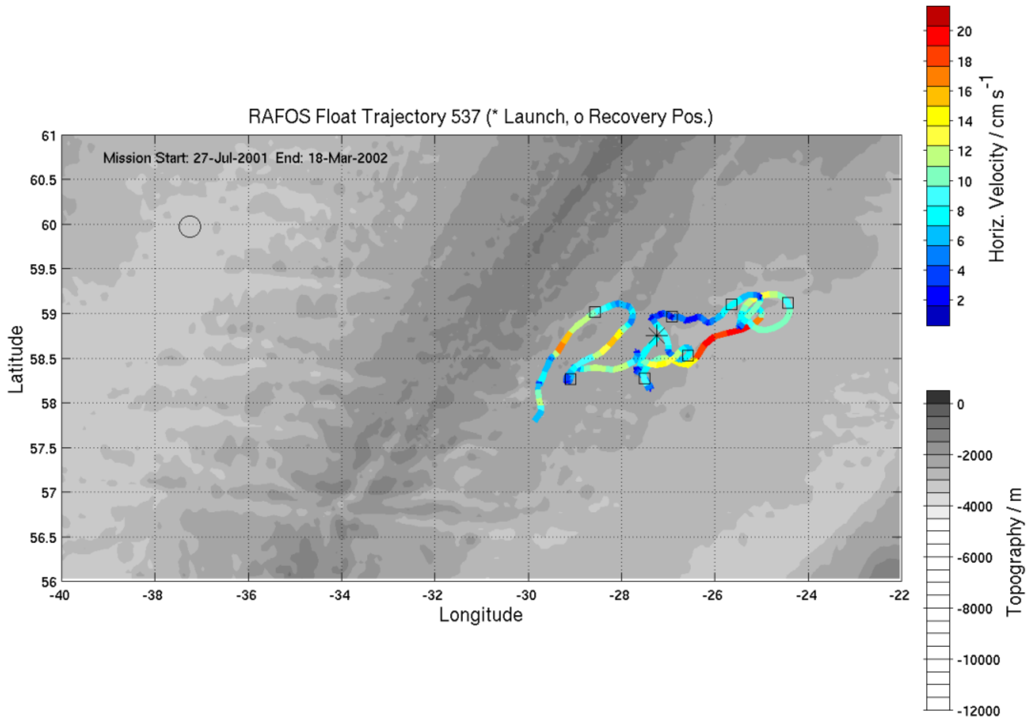

RAFOS Float Trajectory 536 (* Launch, o Recovery Pos.)
Mission Start: 26-Jul-2001 End: 07-Oct-2002
Latitude
Longitude
62
61
60
59
58
57
56
55
54
53
52
-38
-36
-34
-32
-30
-28
-26
-24
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5 10 15 20
Horiz. Velocity / cm s-1

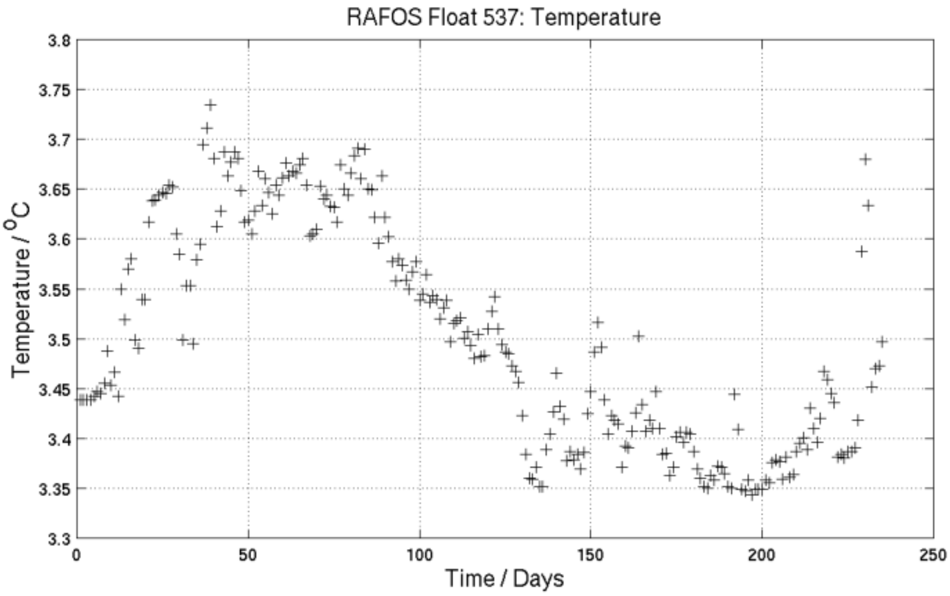

RAFOS Float 536: Temperature
Temperature / ^{o}C
Time / Days
3.65
3.6
3.55
3.5
3.45
3.4
3.35
3.3
3.25
3.2
3.15
0
50
100
150
200
250
300
350
400
450

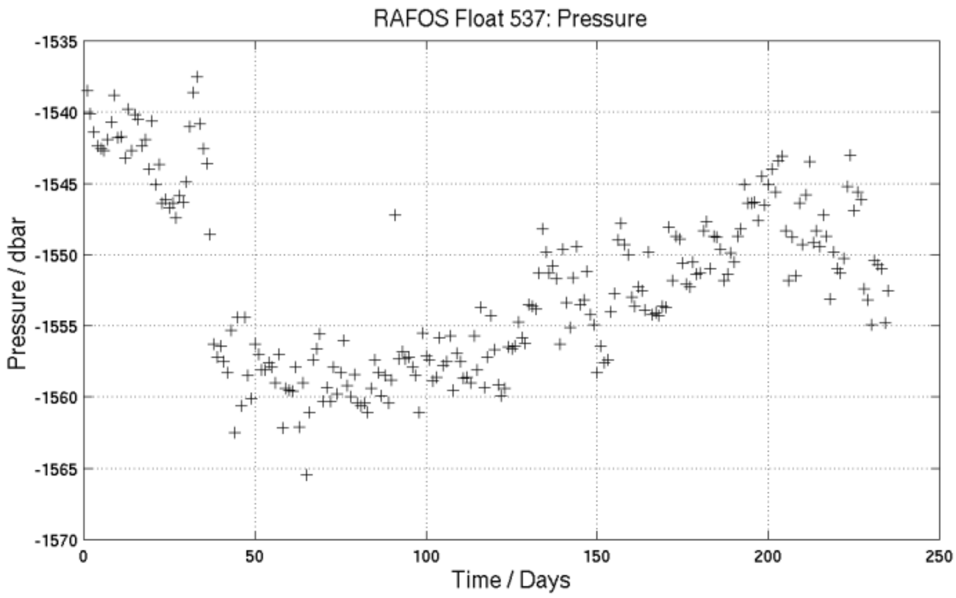

RAFOS Float 536: Pressure
Pressure / dbar
Time / Days
-1550
-1555
-1560
-1565
-1570
-1575
-1580
-1585
-1590
-1595
-1600
0
50
100
150
200
250
300
350
400
450

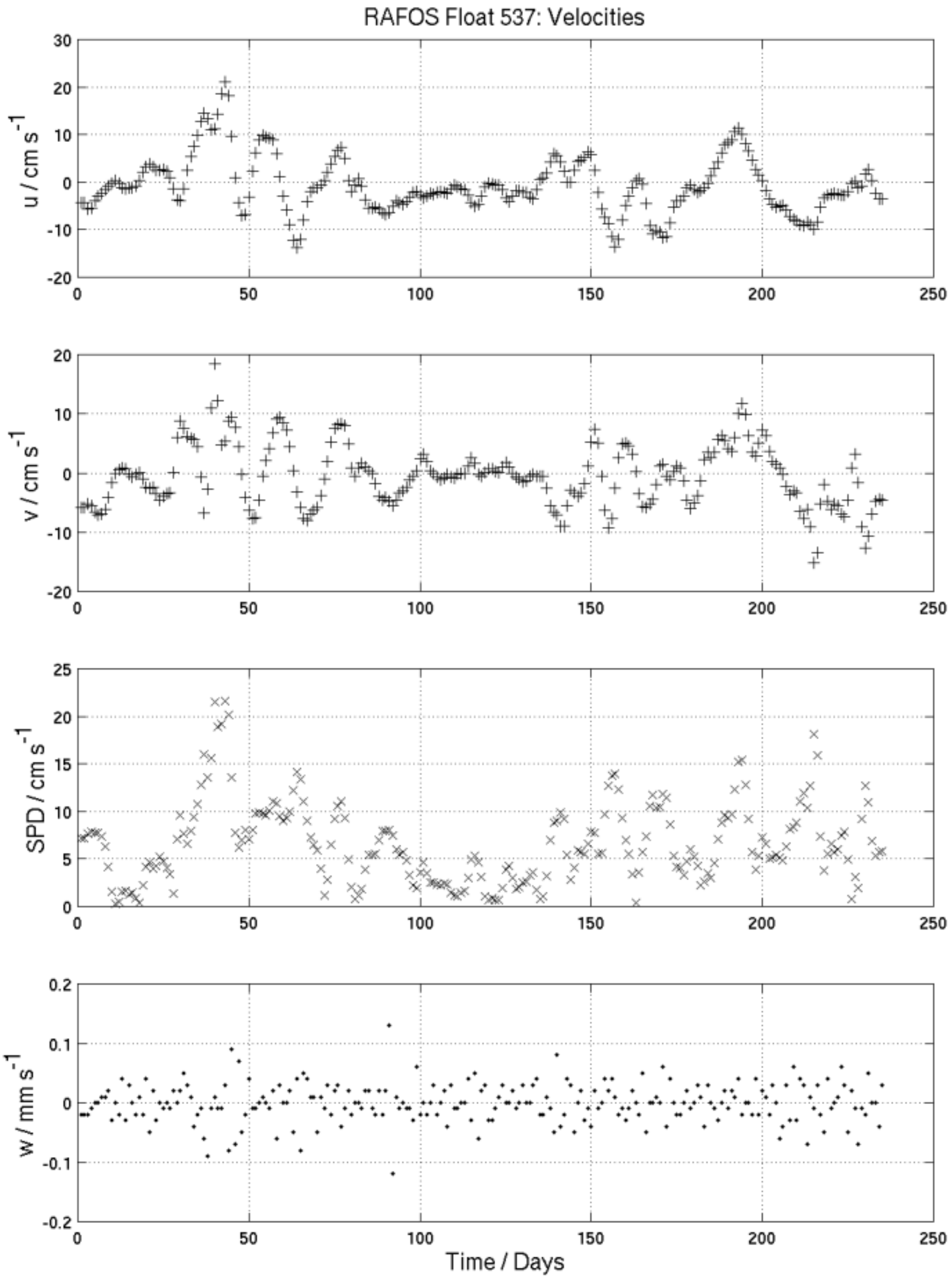


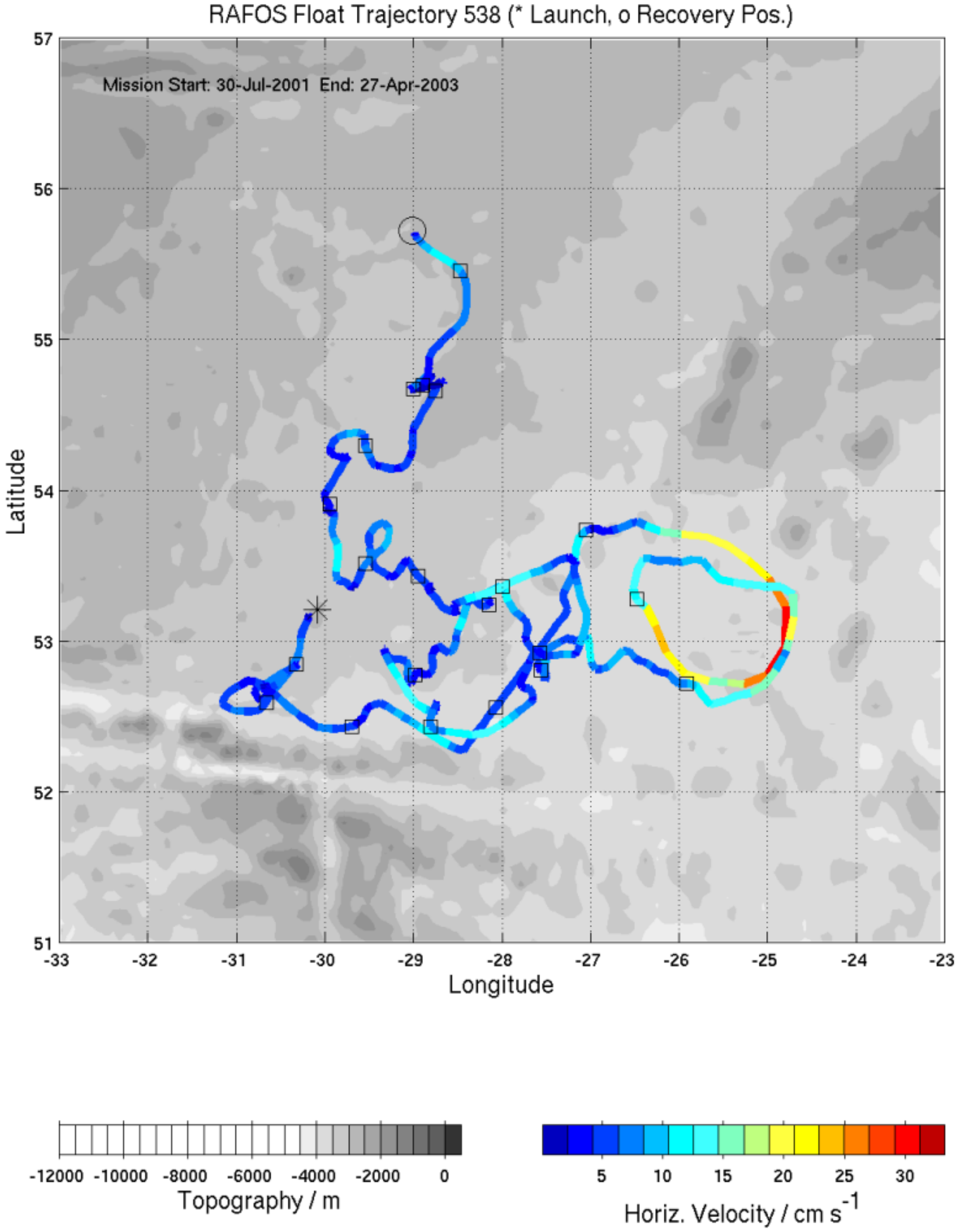
RAFOS Float 536: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days


RAFOS Float Trajectory 537 (* Launch, o Recovery Pos.)
Mission Start: 27-Jul-2001 End: 18-Mar-2002
Latitude
Longitude
Horiz. Velocity / cm s-1
Topography / m

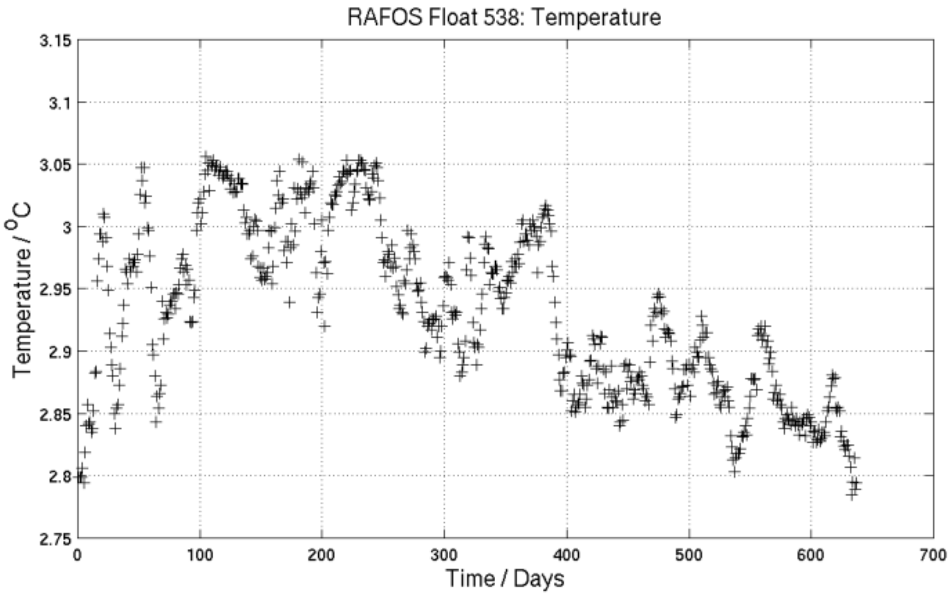

RAFOS Float 537: Temperature
Temperature / °C
Time / Days
3.8
3.75
3.7
3.65
3.6
3.55
3.5
3.45
3.4
3.35
3.3
0
50
100
150
200
250

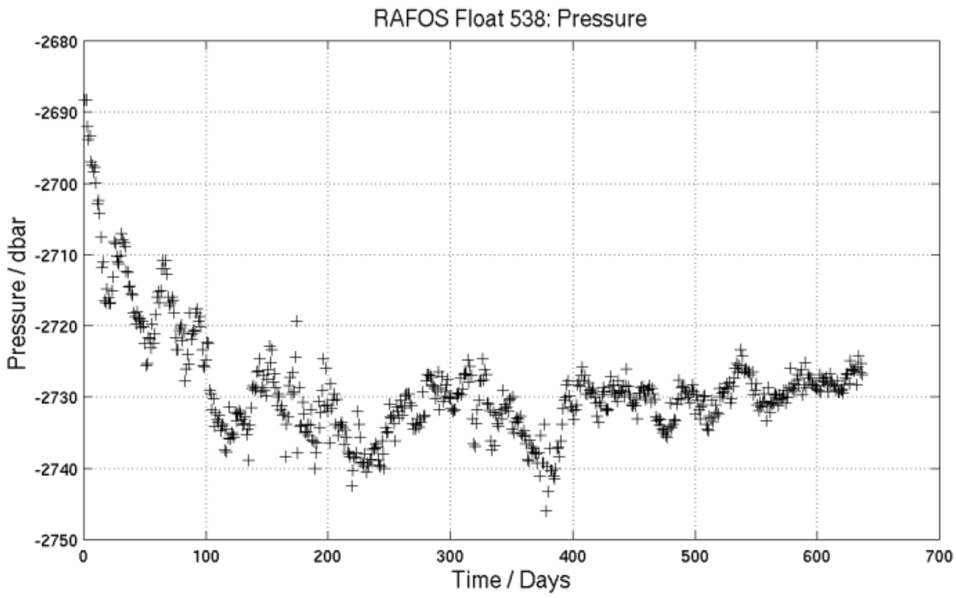

RAFOS Float 537: Pressure
Pressure / dbar
Time / Days
-1535
-1540
-1545
-1550
-1555
-1560
-1565
-1570
0
50
100
150
200
250

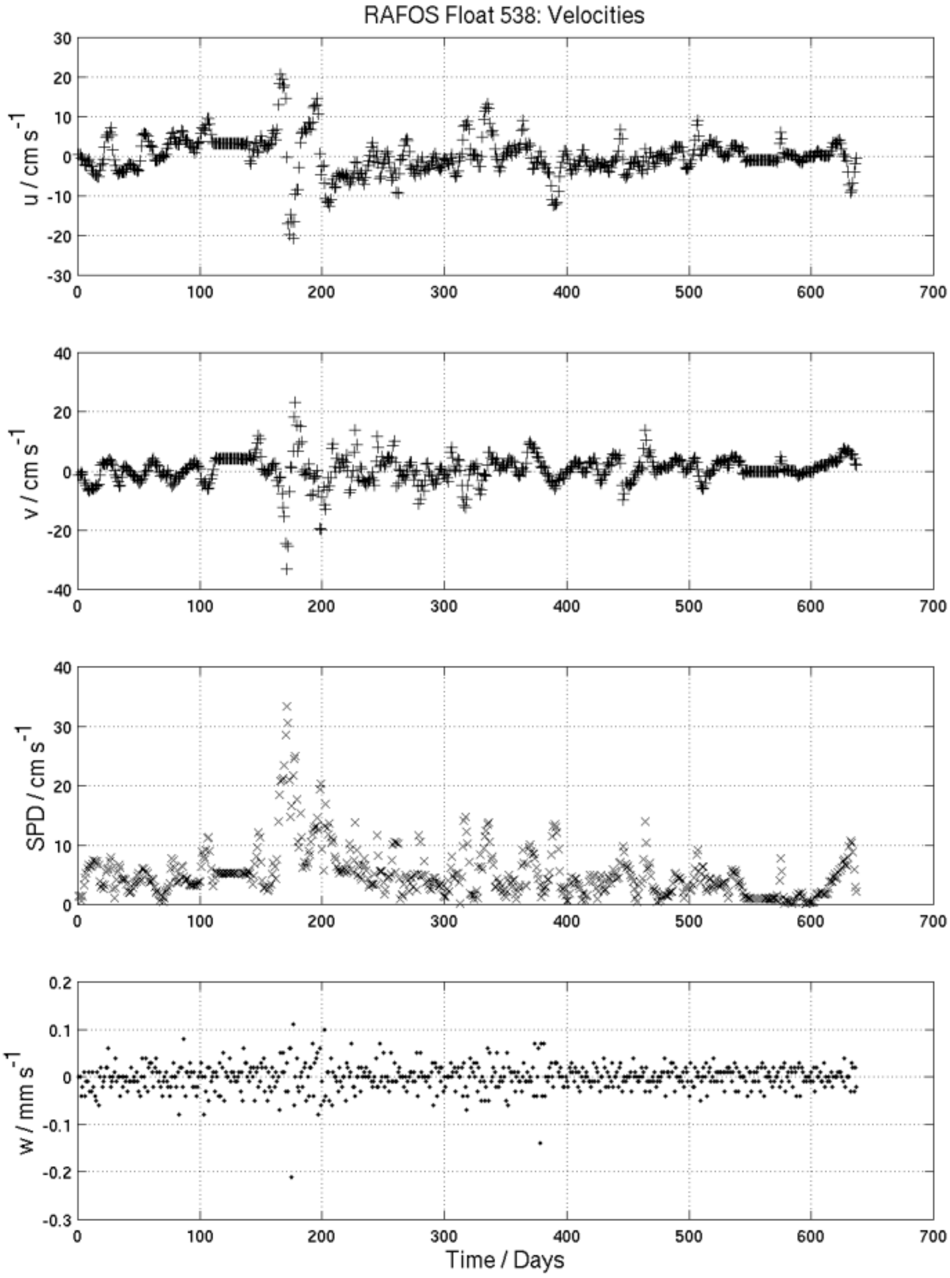

RAFOS Float 537: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days
30
20
10
0
-10
-20
25
15
5
0.2
0.1
-0.1
-0.2
50
100
150
200
250



RAFOS Float Trajectory 538 (* Launch, o Recovery Pos.)
Mission Start: 30-Jul-2001 End: 27-Apr-2003
57
56
55
54
53
52
51
Latitude
-33
-32
-31
-30
-29
-28
-27
-26
-25
-24
-23
Longitude
-12000 -10000 -8000 -6000 -4000 -2000 0
Topography / m
5 10 15 20 25 30
Horiz. Velocity / cm s-1


RAFOS Float 538: Temperature
Temperature / ^{o}C
Time / Days
3.15
3.1
3.05
3
2.95
2.9
2.85
2.8
2.75
0
100
200
300
400
500
600
700


RAFOS Float 538: Pressure
Pressure / dbar
Time / Days
-2680
-2690
-2700
-2710
-2720
-2730
-2740
-2750
0
100
200
300
400
500
600
700



RAFOS Float 538: Velocities
u / cm s-1
v / cm s-1
SPD / cm s-1
w / mm s-1
Time / Days

6 Acknowledgements

We thank the nautical crews of the METEOR and the POSEIDON for their engaged work in the Iceland Basin. In the initial phase of our RAFOS activities in the subpolar gyre we benefited substantially from the help of Sylvia Becker and many other members of the former IfM Marine Physics department. Collaboration with Thomas Müller within this project is gratefully appreciated. Financial support was provided by the Deutsche Forschungsgemeinschaft (SFB 460), Bonn.

ML processed the data, produced the graphics, and compiled this report. MN provided the layout of the original websites upon which this report is based. WZ wrote the text and was the principal investigator behind this float program.

7 References

Olaf Boebel, Claudia Schmid, and Walter Zenk. Kinematic elements of Antarctic Intermediate Water in the western South Atlantic. *Deep-Sea Res. II*, 46(1–2):355–392, 1999.

A. S. Bower, P. L. Richardson, H. D. Hunt, T. Rossby, M. D. Prater, H.-M. Zhang, P. Perez-Brunius, and P. Lazarevich. Warm-water pathways in the subpolar North Atlantic. *Int. WOCE Newsl.*, 38:14–16, 2000.

Jürgen Fischer and Friedrich A. Schott. Labrador Sea Water Tracked by Profiling Floats—From the Boundary Current into the Open North Atlantic. *J. Phys. Oceanogr.*, 32(2):573–584, 2002.

Heather D. Hunt, Christine M. Wooding, Cynthia L. Chandler, and Amy S. Bower. A Mediterranean Undercurrent Seeding Experiment (AMUSE): Part II: RAFOS Float Data Report May 1993–March 1995. Technical Report WHOI-98-14, Woods Hole Oceanographic Institution, Woods Hole, MA 02543, USA, June 1998.

Torsten Kanzow and Walter Zenk. Structure and transport of the Iceland Scotland Overflow plume along the Reykjanes Ridge in the Iceland Basin. *Deep-Sea Res. I*, 86:82–93, 2014. doi: 10.1016/j.dsr.2013.11.003.

R. H. Käse and W. Zenk. *The Warmwatersphere of the North Atlantic Ocean*, chapter Structure of the Mediterranean Water and meddy characteristics in the northeastern Atlantic, pages 365–395. Gebrüder Borntraeger, Berlin, Stuttgart, 1996.

Matthias Lankhorst and Walter Zenk. Lagrangian Observations of the Middepth and Deep Velocity Fields of the Northeastern Atlantic Ocean. *J. Phys. Oceanogr.*, 36(1):43–63, 2006.

M. Rhein, J. Fischer, W. M. Smethie, D. Smythe-Wright, R. F. Weiss, C. Mertens, D.-H. Min, U. Fleischmann, and A. Putzka. Labrador Sae Water: Pathways, CFC Inventory, and Formation Rates. *J. Phys. Oceanogr.*, 32(2):648–665, 2002.

P. L. Richardson and C. M. Wooding. RAFOS Float Trajectories in Meddies During the Semaphore Experiment, 1993–1995. Technical Report WHOI-99-05, Woods Hole Oceanographic Institution, Woods Hole, MA 02543, USA, April 1999.

T. Rossby, D. Dorson, and J. Fontaine. The RAFOS System. *J. Atmos. Oceanic Technol.*, 3(4): 672–679, 1986.

T. Rossby, M. D. Prater, H.-M. Zhang, S Anderson-Fontana, P. Perez-Brunius, P. Lazarevich, A.S. Bower, P.L. Richardson, and H.D. Hunt. Warm-water pathways in the Subpolar North Atlantic: Some case studies. *Intern. WOCE Newsletter*, 38:17–19, 2000.

Kevin G. Speer, John Gould, and Joseph LaCasce. Year-long float trajectories in the Labrador Sea Water of the eastern North Atlantic Ocean. *Deep-Sea Res. II*, 46(1–2):165–179, 1999.

Walter Zenk, Andreas Pinck, Sylvia Becker, and Pierre Tillier. The Float Park: A New Tool for a Cost-Effective Collection of Lagrangian Time Series with Dual Release RAFOS Floats. *J. Atmos. Oceanic Technol.*, 17(10):1439–1443, 2000.