Site U1401[1]

Expedition 340 Scientists[2]

Chapter contents

Background and objectives

Integrated Ocean Drilling Program (IODP) Site U1401 (proposed Site CARI-12A; 14.39.10°′N, 61.25.08°′W; 2590 meters below sea level [mbsl]) is west of Martinique (Fig. F1). Site U1401 was dedicated to the characterization of debris avalanche deposits and study of their emplacement processes. The Montagne Pelée Volcano has experienced at least three major flank-collapse events, which systematically destroyed the western flank of the volcano. Previous studies revealed the presence of a debris avalanche deposit with hummocky morphology associated with the 9000-year-old flank collapse (Le Friant et al., 2003; Boudon et al., 2007). Seismic site survey data indicated that Site U1401 could penetrate volcanic and biogenic sediment with intercalated large chaotic units (interpreted as debris avalanche deposits). We expected to drill through mass-wasting Deposit 3 and mass-wasting Deposit 2 from the Montagne Pelée Volcano with the aim of distinguishing the two deposits and also identifying erosive levels or frictional interactions between them. In addition, we expected to recover sediment from the top of the debris avalanche deposit which would allow better age constraint of the event. The data obtained from the sampled sediment will provide valuable insights into the chronology (one or several pulses), the mobility of debris avalanches, and the processes of possible syntransport flow transformation.

Operations

Transit to Site U1401

After making a 7 nmi dynamic positioning move from Site U1400, the vessel stabilized over the site coordinates for Site U1401 at 1200 h on 13 April 2012. All times reported in this volume are given in ship local time, which was Universal Time Coordinated (UTC) – 4 h. The position reference was a combination of GPS signals and one of two acoustic beacons. The first positioning beacon was deployed at 1755 h on 13 April at the primary site coordinates. The second beacon was deployed 250 m southwest along the crossing seismic line at 1842 h on 14 April. At the end of operations on Site U1401, both beacons were sent acoustic commands to release. Both beacons released on command and were successfully recovered. The vessel began the voyage to Curaçao at 1240 h on 15 April.

[1] Expedition 340 Scientists, 2013. Site U1401. *In* Le Friant, A., Ishizuka, O., Stroncik, N.A., and the Expedition 340 Scientists, *Proc. IODP,* 340: Tokyo (Integrated Ocean Drilling Program Management International, Inc.). doi:10.2204/iodp.proc.340.111.2013
[2] Expedition 340 Scientists' addresses.

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Site U1401

Site U1401 consists of four holes (Table T1). This site was originally an alternate site to proposed Site CARI-07C, but it was felt to be a better fit with expedition objectives in the time remaining. The original plan called for two holes to be cored to ~500 meters below seafloor (mbsf). With the limited time remaining, the site was reprogrammed for a single hole to ~350 mbsf. The first hole was terminated at 81.5 mbsf because of unstable hole conditions. It was apparent from the difficult drilling conditions and the time remaining that a new plan was needed. The plan was modified to core a transect on 300 m centers along a seismic line running along a 062°/242° line. In all, four holes were cored at the site. Holes U1401B and U1401C were cored with three piston cores, and a single 9.2 m core was recovered in Hole U1401D before time expired. The advanced piston corer (APC) was deployed 11 times. The cored interval with the APC was 46.7 m with a recovery of 46.43 m of core (99%). The extended core barrel (XCB) was deployed seven times. The cored interval with the XCB system was 67.2 m with a recovery of 1.16 m of core (2%). Overall recovery for Site U1401 was 42%. Total time spent on Site U1401 was 53.00 h.

Hole U1401A

The vessel arrived at Hole U1401A at 1200 h on 13 April 2012 while still tripping drill pipe to bottom. The pipe trip to bottom was without problems, and at 70 stands in, the upper guide horn was pulled and the vibration-isolated television (VIT) camera was installed around the drill pipe. The camera was then run to bottom as the pipe trip continued. At 1610 h, using the subsea camera, we tagged bottom at 2608.5 meters below rig floor (mbrf). After dropping an acoustic positioning beacon, we initiated a bottom survey on a 40 m box to make sure that the area was suitable for spudding Hole U1401A. After spacing out the bit to 1 m above the seafloor, Hole U1401A was spudded at 1950 h on 13 April. APC wireline coring continued through Core 340-U1401A-4H. Every core was a partial stroke of the piston, including the mudline core. Because the mudline core was a partial stroke with a 7.75 m recovery, the official depth used for Hole U1401A was 2608.5 mbrf. The coring system was switched to the XCB for Core 5X, and XCB coring continued through Core 11X at 81.5 mbsf. Hole conditions were abysmal during the entire XCB section of the hole. Recovery was poor, and the hole was terminated at 81.5 mbsf, before the bottom-hole assembly (BHA) became a permanent part of the formation. Four piston cores were taken over a 14.3 m interval with a total recovery of 14.45 m of core (101%). Seven XCB cores were taken over a 67.2 m interval. A total of 1.16 m were recovered (1.7%). Overall core recovery for Hole U1401A was 19%. Hole U1401A took 26.25 h to complete.

Hole U1401B

Given the limited success in trying to core Hole U1401A, we decided to move the ship 300 m in a direction of 242° from Hole U1401A. With the short amount of time remaining and the very difficult coring conditions, a plan was proposed to APC core a transect along one of seismic lines crossing Site U1401. At the location for Hole U1401B, another acoustic beacon was deployed. After recording a new precision depth recorder (PDR) reading for spacing out the drill string, the seafloor was tagged to verify water depth. The bit was then raised 1 m above the seafloor to prevent another broken core barrel. Hole U1401B was spudded at 1620 h on 14 April 2012. Depth was calculated from the tag to be 2618 mbrf. After three partial stroke piston cores, Hole U1401B was terminated; the bit was pulled from the hole and cleared the seafloor at 1940 h, ending Hole U1401B. The total depth of Hole U1401B was 12.9 m, with 12.42 m of core recovered (96%). Hole U1401B took 5.5 h to complete.

Hole U1401C

The ship was then moved 600 m in a direction of 062° from Hole U1401B. At the conclusion of the dynamic positioning move, a new PDR reading was taken for spacing out the drill string. The seafloor was then tagged to verify water depth. The bit was raised 1 m above the seafloor, and Hole U1401C was spudded at 2130 h on 14 April 2012. Depth was calculated from the tag to be 2590.6 mbrf. After three partial stroke piston cores, Hole U1401C was terminated; the bit was pulled from the hole and cleared the seafloor at 2355 h, ending Hole U1401C. Total depth of Hole U1401C was 10.3 m, with 10.44 m of core recovered for an overall recovery percentage of 101%. Hole U1401C took 4.25 h to complete.

Hole U1401D

The ship was then moved 900 m in a direction of 242° from Hole U1401C. At the conclusion of the dynamic positioning move, a new PDR reading was taken for spacing out the drill string. The seafloor was then tagged to verify water depth. The bit was then raised 1 m above the seafloor. Despite manually tagging the seafloor and taking a new PDR reading, the first mudline core came up empty. On the second attempt, Hole U1401D was spudded at 0305 h on 15 April 2012. Depth was calculated to be 2630.4 mbrf. Because operation time had expired, Hole U1401D was terminated after the full stroke mudline core.

The drill string was then pulled back to the rig floor. The drill pipe was secured in the pipe racker, and the BHA was disassembled and put away in the drill collar racks. The rig floor was secured at 1230 h on 15 April, ending Hole U1401D and Site U1401. Total depth of Hole U1401D was 9.2 m, with 9.12 m of core recovered (99%). Hole U1401D took 12.5 h to complete.

Lithostratigraphy

Sediment cored at Site U1401 consists of three lithostratigraphic units (A–C) (Fig. F2). Different lithologies are observed from top to base. The cores are dominated by a combination of hemipelagic mud with interbedded tephra layers and/or volcaniclastic turbidites. Each lithology is described in detail in "Lithostratigraphy" in the "Site U1394" chapter (Expedition 340 Scientists, 2013).

Unit A

Depths: Hole U1401A = 0–8.4 mbsf, Hole U1401B = 0–7.6 mbsf, Hole U1401C = 0–5.7 mbsf, Hole U1401D = 0–3.70 mbsf

Unit A extends from 0 to 8.4 mbsf in Hole U1401A, from 0 to 7.6 mbsf in Hole U1401B, from 0 to 5.7 mbsf in Hole U1401C, and from 0 to 3.70 mbsf in Hole U1401D. Unit A is divided in two subunits (A-1 and A-2).

Subunit A-1

Subunit A-1 extends from 0 to 0.5 mbsf in Hole U1401A, from 0 to 1 mbsf in Hole U1401B, from 0 to 0.57 mbsf in Hole U1401C, and from 0 to 0.12 mbsf in Hole U1401D. Immediately below the seafloor, there is a thick volcanic sand layer (from 12 cm in Hole U1401D to 100 cm in Hole U1401B) that may have been emplaced during recent volcanic eruptions of Montagne Pelée, such as those in 1902 and 1929. If this is the case, this layer is located ~35 km from its source. The uppermost layer is generally massive, ungraded, or very weakly graded and locally contains some light-colored lava/pumice granules. The base of the layer (from 2 cm in Hole U1401D to 20 cm in Hole U1401B) includes sediment in which a zone of hemipelagic mud occurs as a clast within volcanic sand. The base of the layer contains a mixture of grains: pumice (~50%), individual crystals (~42%), scoria (~1%), massive lava (5%), and only a small fraction (~2%) of carbonate.

Subunit A-2

Subunit A-2 extends from 0.5 to 8.4 mbsf in Hole U1401A, from 1 to 7.6 mbsf in Hole U1401B, from 0.57 to 5.7 mbsf in Hole U1401C, and from 0.12 to 3.7 mbsf in Hole U1401D. Subunit A-2 is composed of hemipelagic mud with abundant interbedded volcanic sand layers (at least 44 tephra layers in Hole U1401A). Most of these layers have relatively sharp bases and tops, poor sorting, and, in some cases, spaced planar lamination. The layers are dark brown-black and generally 2–15 cm thick, although some of them are thicker: 25 cm or even 87 cm. In a few cases, well-sorted volcanic layers are recognized, but they are rare. Most of these layers can be interpreted as tephra layers. The thicker layers have spaced planar lamination, which together with their poor sorting features suggests their emplacement by density flows rather than by fallout from an eruption plume. They have few (2%) or no carbonate grains and variable amounts of pumice, scoriae, massive lava, vesicular lava, and crystals. Most of these tephra layers can be correlated with pumiceous eruptions well identified on land on the western flank of the Montage Pelée Volcano.

In a few places, the sandy tephra layers are separated by fine brown mud, which is most likely volcanic in origin.

Unit B

Depths: Hole U1401A = 8.4–14.4 mbsf, Hole U1401B = 7.6–12.9 mbsf, Hole U1401C = 5.7–10.3 mbsf, Hole U1401D = 3.7–9.25 mbsf

Unit B extends from 8.4 to 14.4 mbsf in Hole U1401A, from 7.6 to 12.9 in Hole U1401B, from 5.7 to 10.3 mbsf in Hole U1401C, and from 3.7 to 9.25 mbsf in Hole U1401D. Unit B is composed of a series of coarse to very coarse volcaniclastic turbidites. These turbidites are thick (≤2 m) and generally normally graded with a basal part rich in gravels and a top part composed of fine to medium sand. At least three or four distinct turbidites are observed. These turbidites contain pumice and scoria in variable proportions, as well as vesiculated, massive, and oxidized lava clasts and crystals. The basal part of the turbidites is rich in granules and clasts of gray to reddish gray dense lava; some of them reach 7 cm in size. The clasts comprise mainly two-pyroxene andesites or dacites. Pyrite veins are present in some dense lava clasts, indicating hydrothermal fluid circulation in situ on the volcano. This juvenile material was likely transported from the volcano into the sea by pyroclastic density currents. Carbonate encrusted lava clasts occur, and carbonate clasts are present but very rare (<2%). The normal grading may be generated during initial deposition or possibly during core recovery (i.e., a coring artifact).

No hemipelagic mud is present between the turbidites in Holes U1401A and U1401C. In Hole

U1401B, 50 cm of hemipelagic mud is interbedded between two of the turbidites (10.5–11 mbsf). This mud contains two tephra layers and a zone of mixed ash and mud. In Hole U1401D, this sequence of hemipelagic mud is observed at the base of the hole (8.3–9.25 mbsf). It contains a higher proportion of volcanic sand layers (10), most of which are interpreted as tephra layers.

The presence of scoria in the majority of the turbidites and tephra layers can be related to well-known subaerial deposits from Montagne Pelée. The absence of hemipelagic mud between several turbidite deposits indicates a short time between their deposition and the erosion of interlayered sediments during their emplacement.

Unit C

Depth: Hole U1401A = 14.4–81.5 mbsf

Unit C extends from 14.4 to 81.5 mbsf in Hole U1401A. Unit C is characterized by abundant mafic andesite clasts. This unit is poorly recovered in core catcher samples, which are not in situ. It comprises loose pebbles, as long as 7 cm, made of vesicular mafic andesite, as well as subsidiary amounts of clasts of two-pyroxene andesite.

Paleontology and biostratigraphy

Core catcher samples at Site U1401 contain calcareous nannofossils and planktonic foraminifers of generally low abundance and were often found to be barren. Because of the coarse nature of much of the material collected, very few core catcher samples were adequate for biostratigraphic analysis. However, planktonic foraminiferal and nannofossil content was sufficient to indicate a late Pleistocene age (Fig. **F3**) for Holes U1401B–U1401D.

Calcareous nannofossils

From the four holes drilled at Site U1401, only four core catcher samples (340-U1401B-1H-CC, 340-U1401C-1H-CC and 3H-CC, and 340-U1401D-1H-CC) were appropriate for calcareous nannofossil analysis. Nannofossil samples were found to be abundant to barren and nannofossil preservation was good to moderate in samples within Holes U1401B–U1401D because of the coarse nature of materials collected. In Hole U1401A, an additional sample was taken from the working half of the core (Sample 340-U1401A-1H-5W, 52–53 cm). This sample contains late Pleistocene species such as *Emiliania huxleyi* and *Gephyrocapsa* sp., dating this sample as younger than 0.08 Ma, Zone CN15. Core catcher samples in Holes U1401B–U1401D contain similar assemblages (except for Sample 340-U1401C-3H-CC, which was barren), with a notable occurrence of small forms of *E. huxleyi* present in all samples. Consequently, these samples were also assigned to Zone CN15.

Planktonic foraminifers

Three of the eleven core catchers collected from Hole U1401A, one of the three core catchers collected from Hole U1401B, two of the three core catchers collected from Hole U1401C, and the single core catcher collected from Hole U1401D were analyzed for planktonic foraminiferal content. The remaining core catchers were not suitable for analysis because of the extremely coarse nature of the material collected. The abundance of planktonic foraminifers was generally very low. In Hole U1401A, only one sample (340-U1401A-2H-CC) contained specimens, unfortunately at an extremely low abundance (four specimens). One sample from Hole U1401B (Sample 340-U1401B-1H-CC) contained a low abundance (rare) of planktonic foraminifers, but because of the lack of datum species, the sample was inadequate to determine an age for the sediment. All samples analyzed from Hole U1401C were entirely barren of planktonic foraminifers. The single sample from Hole U1401D (Sample 340-U1401D-1H-CC) was found to contain abundant, well-preserved foraminifers, pteropods, and heteropods. The most abundant species of planktonic foraminifers included *Globigerinoides ruber* (pink and white) and *Globigerinoides sacculifer*. *Neogloboquadrina dutertrei* and *Globigerinita glutinata* were also common in the sample. One datum species, *Globigerinella calida* (bottom occurrence at 0.22 Ma), was found in Sample 340-U1401D-1H-CC, assigning this sediment to the late Pleistocene.

Benthic foraminifers

No benthic foraminifers were found at this location.

Physical properties

We observe a good correlation between Holes U1401A and U1401B but poor correlation between all other holes. The poor correlation between these other holes likely results from significant (>100 m) lateral separation. Magnetic susceptibility and seismic velocity are higher where coarse-grained volcanic sand exists and lower where we observe hemipelagic sediment. *P*-wave velocity shows no clear trend with depth. Although measurements are limited, shear strength generally increases with depth. We were unable to measure heat flow or thermal conductivity at this site.

Stratigraphic correlation between Holes U1401A, U1401B, U1401C, and U1401D

We correlated Holes U1401B, U1401C, and U1401D to Hole U1401A (Fig. F4) using magnetic susceptibility. We trimmed 5.1 cm off of each end of the core sections in the magnetic susceptibility data to minimize edge effects during correlation. Results yielded moderately good correlation (correlation coefficient = 0.58) between Holes U1401B and U1401A (Fig. F5). For Holes U1401C and U1401D, correlation is weak. It was especially difficult to find clear tie points in the uppermost few meters of sediment to tie Holes U1401C and U1401D to Hole U1401A, and we suspect reworking of the core during recovery and section cutting may be the cause. In addition, it appears that Hole U1401D is missing the uppermost 1 m of sediment, making it difficult to tie the top of this core. Ultimately, we achieved correlation coefficients with Hole U1401A of 0.30 and 0.68 for Holes U1401C and U1401D, respectively. Hole U1401C required downward stretching, whereas Holes U1401B and U1401D required both downward and upward stretching to achieve good correlations. Correlation corrections for each hole are generally consistent with the corrections expected from core descriptions. Nonetheless, we caution that the correlations displayed represent an initial analysis, and more detailed analysis using additional track data is warranted. All picked correlation depth shifts are shown in Tables T2, T3, and T4.

Gamma ray attenuation density, magnetic susceptibility, and *P*-wave velocity

We measured gamma ray attenuation (GRA) density, magnetic susceptibility, *P*-wave velocity, and natural gamma radiation (NGR) for cores recovered from all holes (Fig. F6). In all holes, positive peaks in magnetic susceptibility correspond to volcaniclastic beds (2000×10^{-5} to 5000×10^{-5} SI) and low magnetic susceptibility values (<2000×10^{-5} SI) correspond to hemipelagic mud. In the uppermost 6 m in Hole U1401A, GRA progressively increases from 1.4 to 2.0 g/cm^3 despite several mud layers interlaced with volcaniclastic sand at these depths. We did not observe this trend in the other three holes at this site. As at the other sites, NGR is strongly correlated with mud content in the beds, with more mud resulting in higher NGR values. The mud layer at ~10.3 mbsf in Hole U1401B has the highest NGR value, at 21 cps. *P*-wave logger (PWL) values clearly identify the two major lithologies: hemipelagic mud (1500–1650 m/s) and volcaniclastic turbidites (1650–1800 m/s; maximum = 1860 m/s).

Shear strength

Undrained shear strength measurements (S_u) in hemipelagic intervals were only performed with the fall cone in Holes U1401A and U1401B. No S_u measurements could be performed with the handheld penetrometer because the sand content was too high at the bottom of core sections. The automated vane shear was only used twice to avoid disturbing intervals of potential interest for stratigraphic and dating purposes. Available S_u measurements are consistent between holes and increase from 3–5 kPa in the upper few meters to 20 kPa at 15 m.

P-wave velocity

Discrete measurements of *P*-wave velocity measured on the *x*-axis (PW-X) show similar values to those at the other sites, with distinctly different speeds between the two major lithologies. Mud has velocities ranging from 1530 to 1660 m/s, whereas volcaniclastic sand has velocities of 1720–1920 m/s. These discrete measurements match the values from the PWL on whole-round cores. We measured a *P*-wave velocity on a single andesitic lava clast of >6000 m/s.

Moisture and density

We collected three moisture and density samples from Hole U1401A at this site, all in the first core (340-U1401A-1H). Two of these samples consist of hemipelagic mud; the other one is volcanic sand. The three samples have grain densities of ~2.75 g/cm^3 and porosities between 50% and 60%.

Thermal conductivity

Thermal conductivity was not measured because the sediment was too coarse to permit reliable measurement.

Paleomagnetism

Cores 340-U1401A-1H through 4H were recovered with the APC using nonmagnetic core barrels; all other APC cores were recovered using standard steel core barrels. The FlexIt core orientation tool was not used to orient declination at this site; thus, declination remains uncorrected. Expected inclination for the site is 27.6° during normal polarity and –27.6° during reversed polarity, assuming a geocentric axial dipole (GAD) model. Archive halves of cores from Holes U1401A–U1401D were measured on the three-axis superconducting rock magnetometer (SRM) at 2.5 cm intervals. NRM was measured before (NRM_0) and after stepwise alternating field demagnetization at 20 mT (NRM_{20}).

Results

Sediments recovered from Site U1401 were heterogeneous in composition. Generally hemipelagic sediment is discontinuous and restricted to the zone above 10 mbsf in all cores, below ~5–10 mbsf sediment is dominated by coarse volcaniclastic sand and gravel (see **"Lithostratigraphy"**).

Intensity at NRM_0 and NRM_{20}, inclination at NRM_{20}, and arbitrarily corrected declination at NRM_{20} for Holes U1401A–U1401D are shown in Figure **F7.** As at other sites, NRM_0 intensity shows a similar signature to magnetic susceptibility (see **"Physical properties"**). These parameters, particularly magnetic susceptibility, are strongly related to the concentration of ferrimagnetic minerals (e.g., magnetite) and correlate well with depositional units of volcanic origin (see **"Lithostratigraphy"**).

Where available, SRM inclination data show positive values and a normal GAD-like inclination. Declination shows some scatter, but coupled with the positive inclination data, suggests all sediment was deposited under normal polarity conditions. If this was during the Brunhes Chron, it agrees with biostratigraphic ages, which give a late Pleistocene age for the site.

References

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Le Friant, A., Boudon, G., Deplus C., and Villemant B., 2003. Large-scale flank collapse events during the activity of Montagne Pelée, Martinique, Lesser Antilles. *J. Geophys. Res., [Solid Earth],* 108(B1):2055. **doi:10.1029/2001JB001624**

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Figure F1. Site U1401 maps. **A.** Shaded image of topography-bathymetry and chaotic deposits (interpreted as debris avalanche deposits). DAD = debris avalanche deposit. (Continued on next page.)

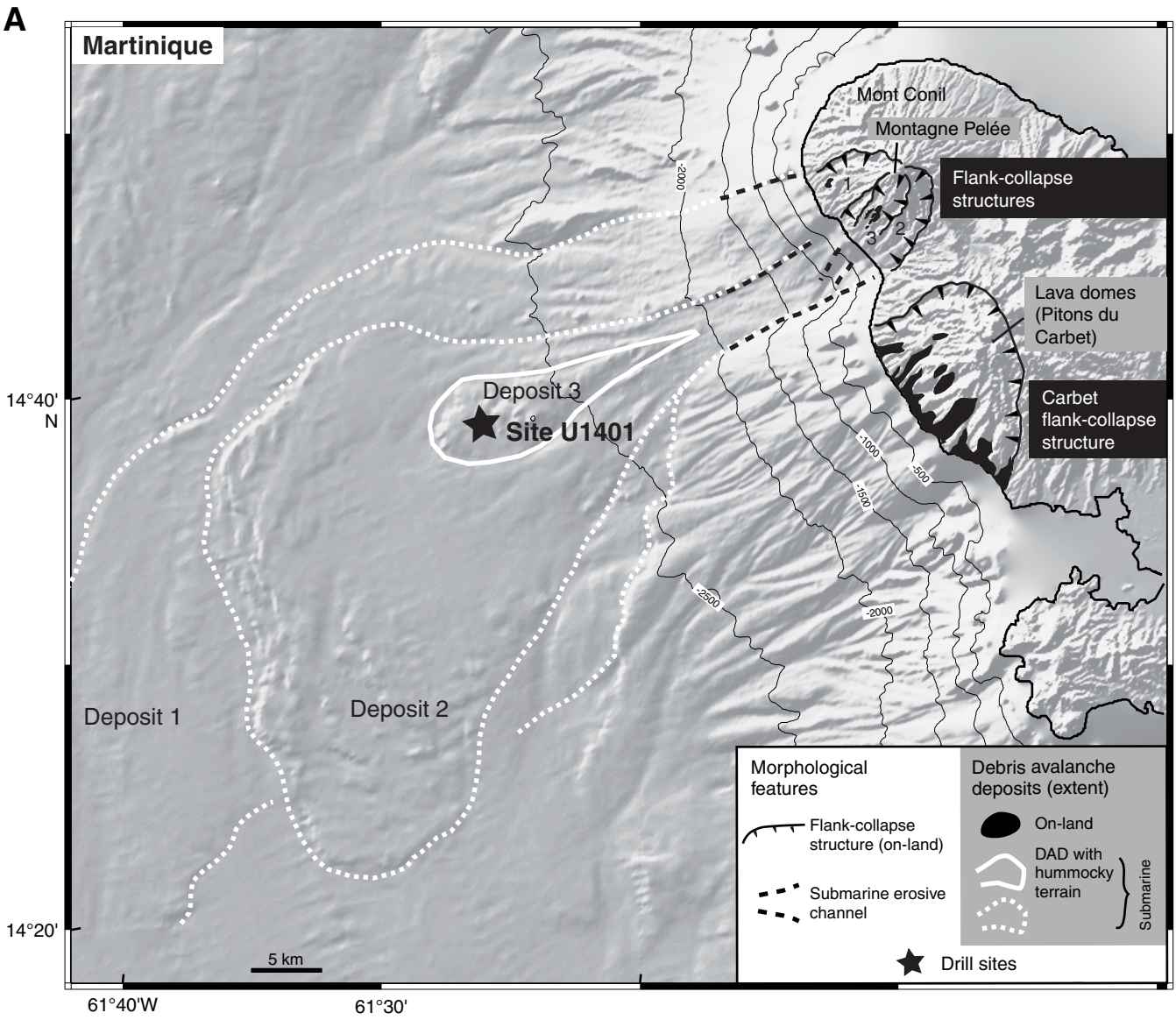

Figure F1 (continued). B. Location of seismic reflection lines across the Site U1401.

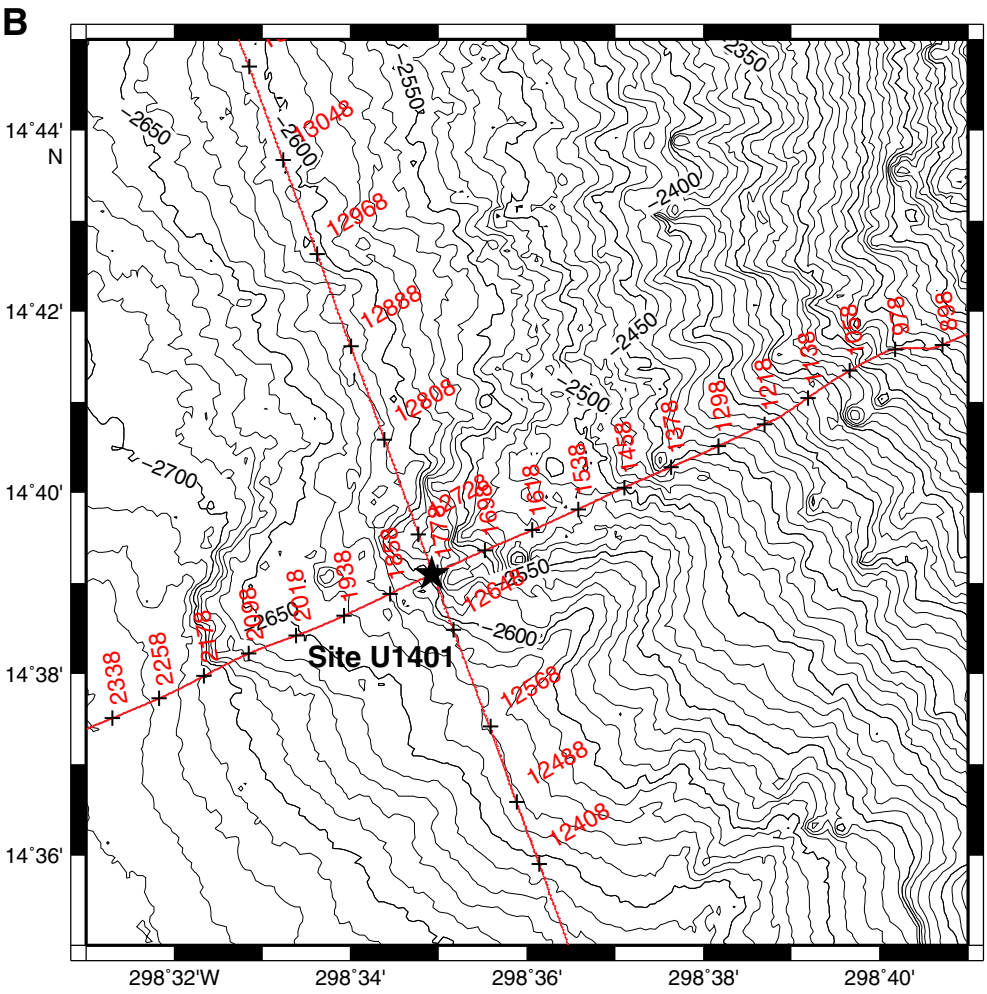

Figure F2. Plot showing the location of lithostratigraphic Subunits A-1 and A-2 and Units B and C in Holes U1401A–U1401D.

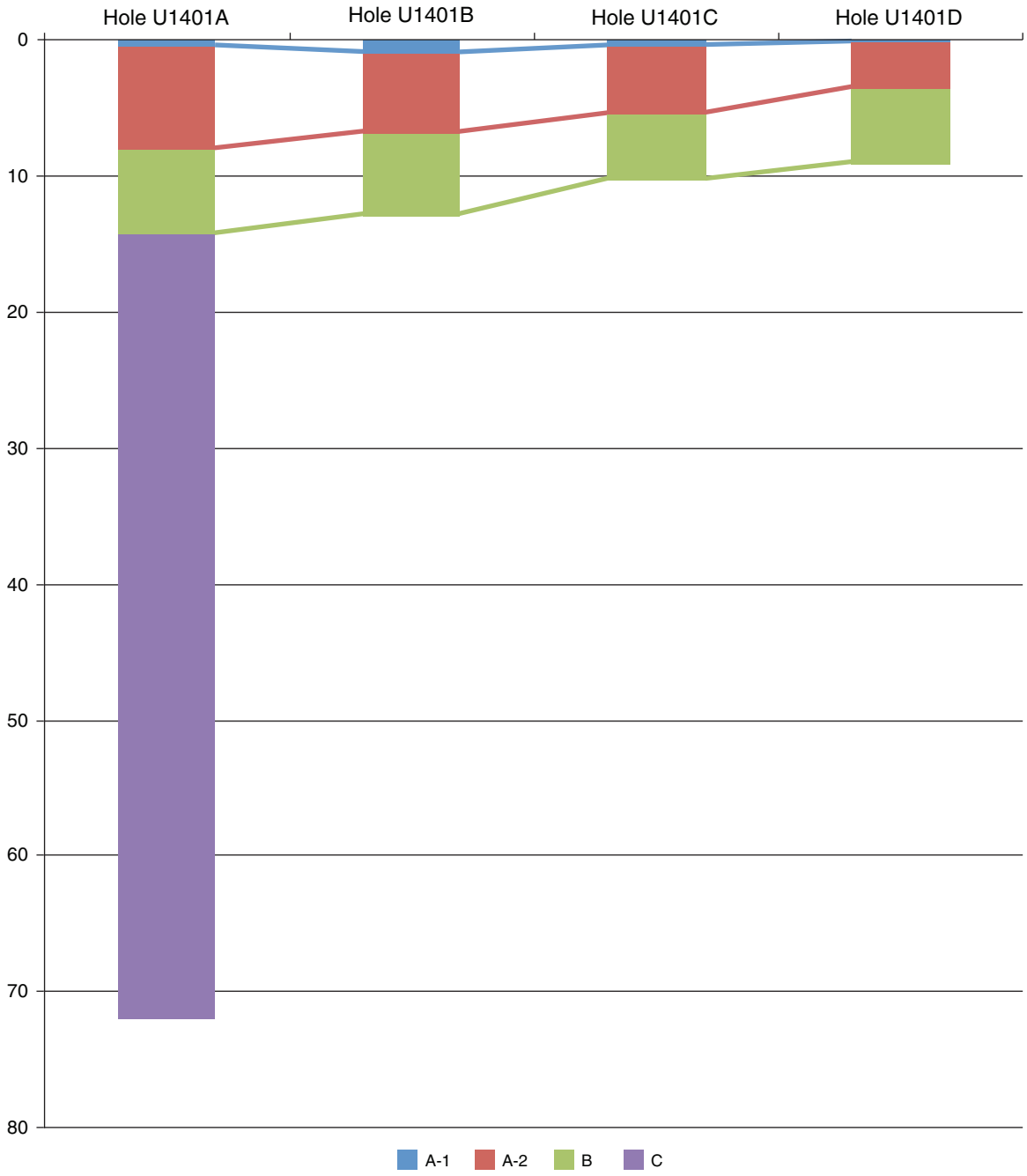

Figure F3. Integrated nannofossil and planktonic foraminiferal biozonation, Site U1401.

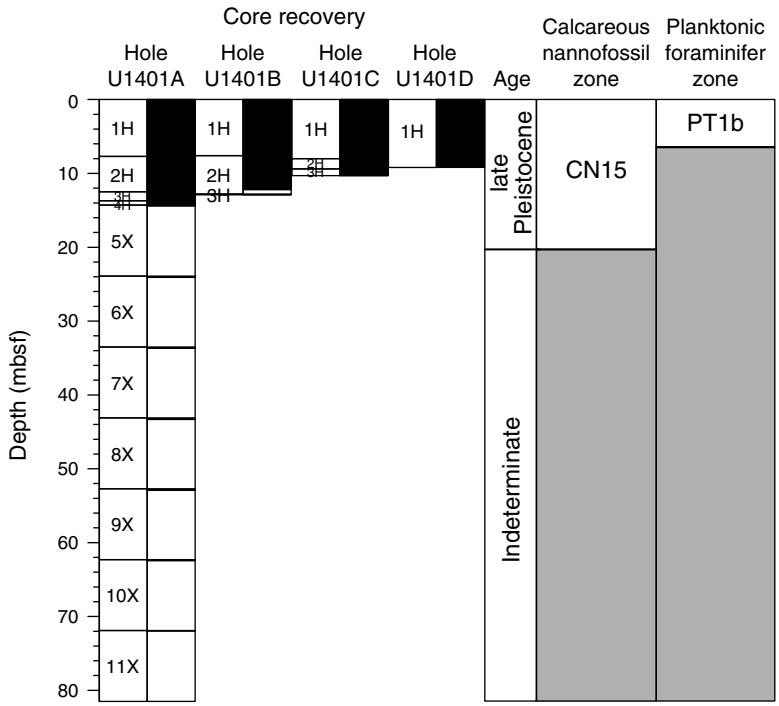

Figure F4. Magnetic susceptibility before correlation shifts, Holes U1401A–U1401D.

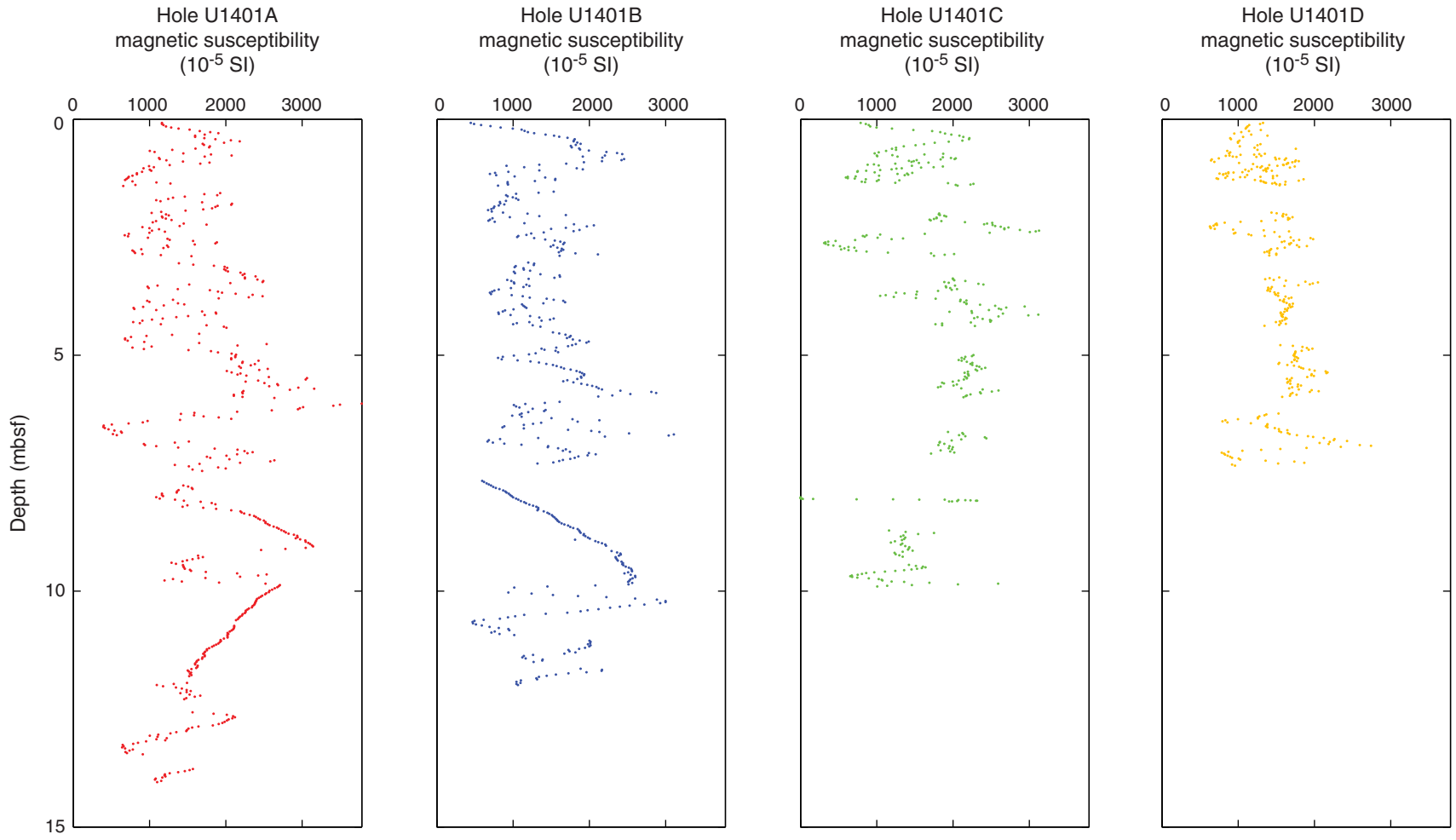

Figure F5. Magnetic susceptibility correlation, Holes U1401B (blue), U1401C (green), and U1401D (yellow) to Hole U1401A (red). Magnetic susceptibility was measured on the Whole-Round Multisensor Logger (WRMSL). Negative values in the last column indicate a downhole shift.

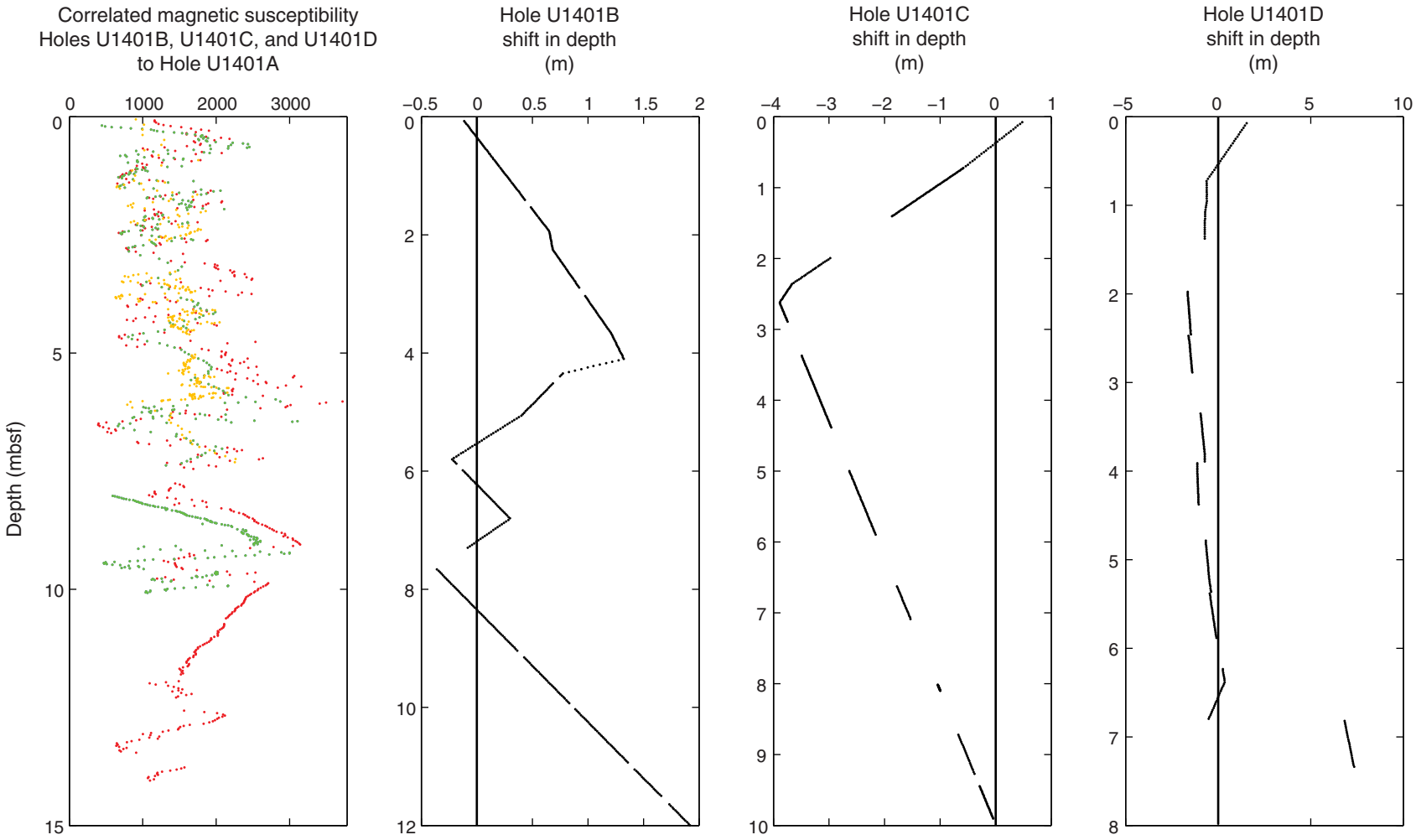

Figure F6. Physical properties, Holes U1401A (red), U1401B (green), U1401C (blue), and U1401D (yellow), 0–15 mbsf. Small points indicate measurements on whole cores using the Whole-Round Multisensor Logger (WRMSL) or Natural Gamma Radiation Logger (NGRL). Larger circles indicate spot measurements obtained from samples of the split working half of the core. AVS = automated vane shear.

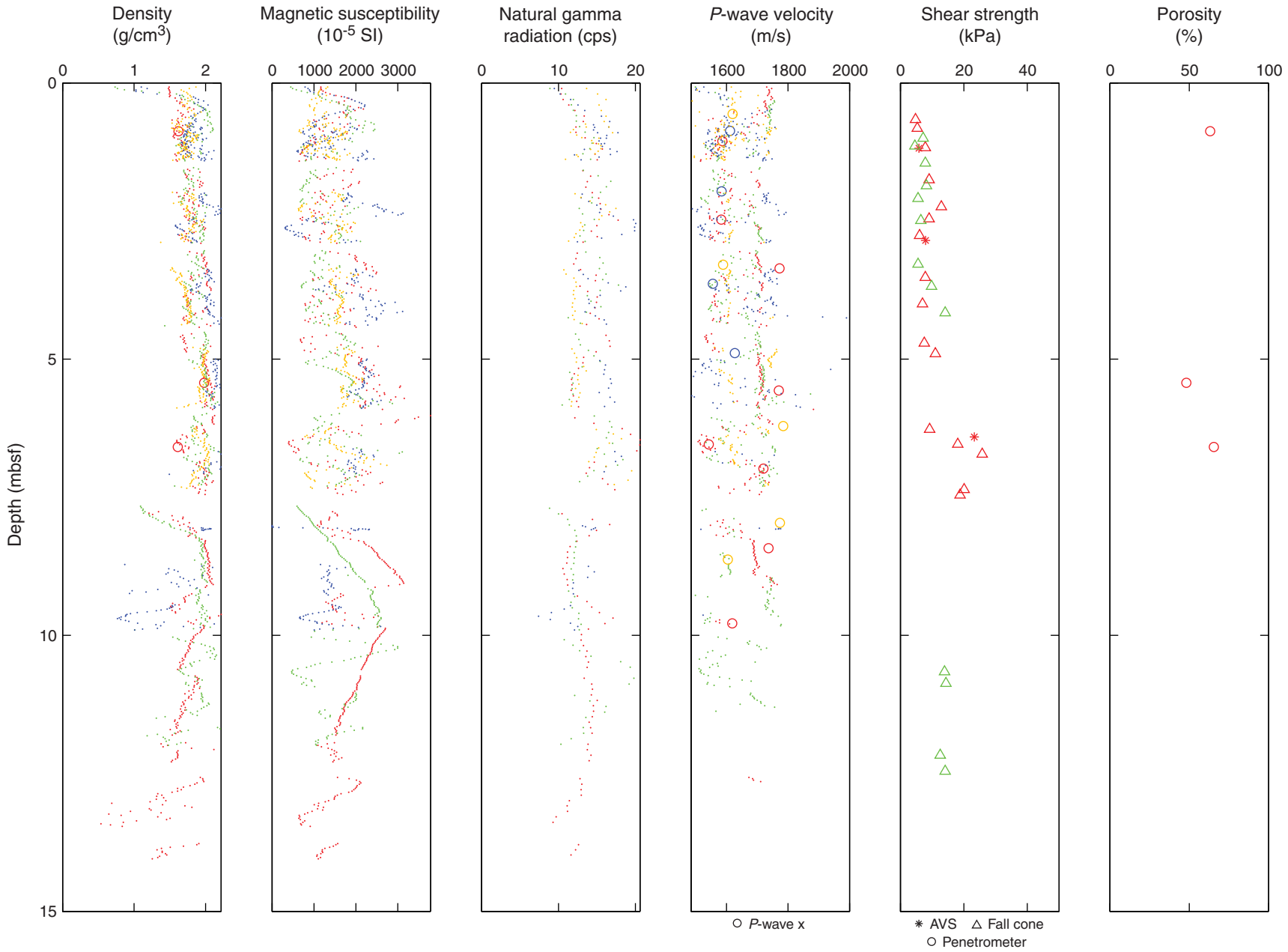

Figure F7. Plots of intensity of NRM_0 (red) and NRM_{20} (blue) and inclination and declination after 20 mT demagnetization, Holes U1401A–U1401D. For inclination data, gray points are all measurements made and red data are measurements made on hemipelagic sediment shown against a geocentric axial dipole (GAD) inclination of 27.6°. For declination data, gray points are all unoriented declination points and orange points are those on hemipelagic sediment rotated to a mean of 0°.

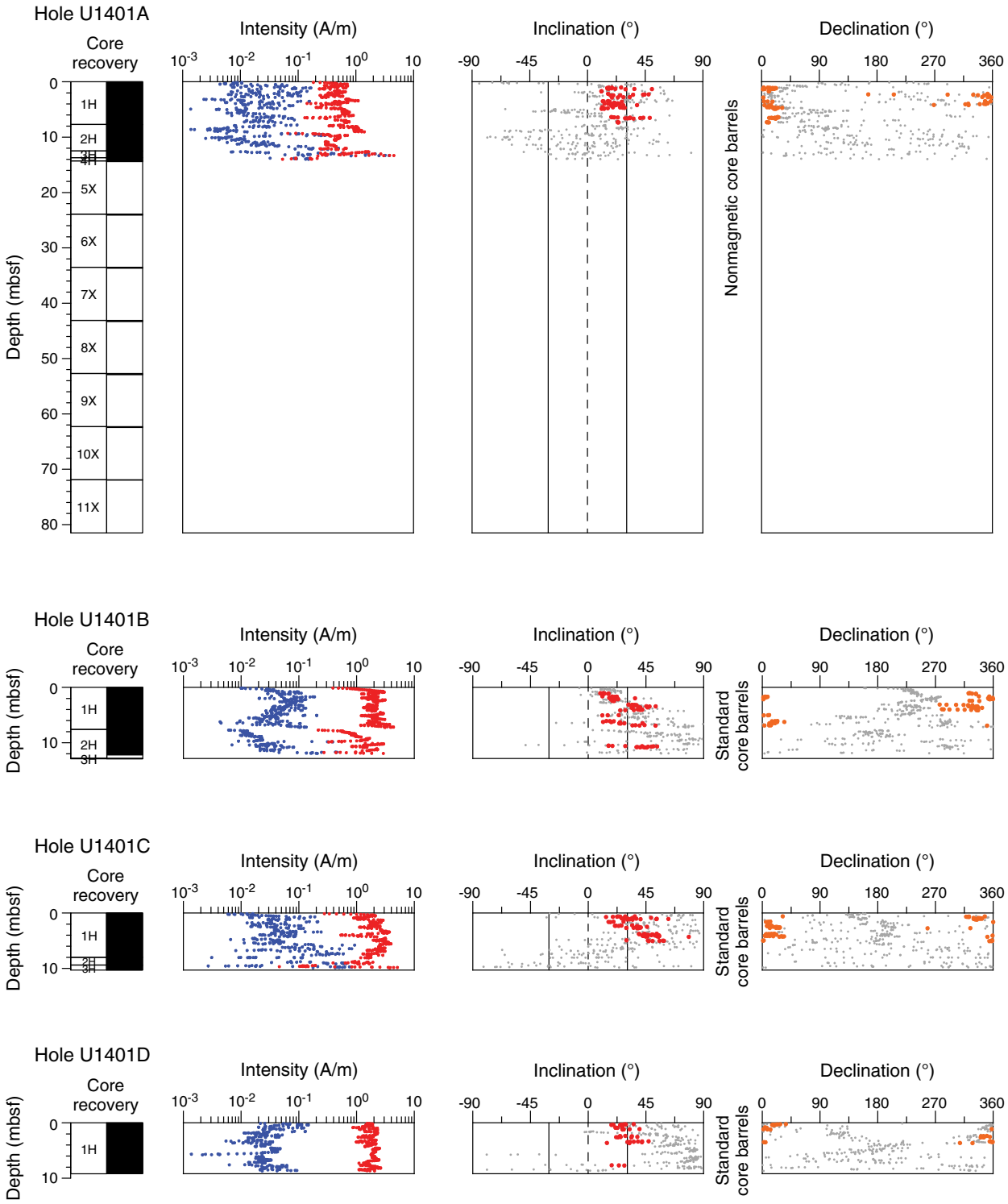

Table T1. Coring summary, Site U1401. (Continued on next page.)

Hole:	U1401A
Latitude:	14°39.0991′N
Longitude:	61°25.0797′W
Water depth (m):	2596.7
Date started (UTC*):	0800 h 13 April 2012
Date finished (UTC*):	1015 h 14 April 2012
Time on hole (days):	1.1
Seafloor depth DRF (m):	2608.5
Penetration DSF (m):	81.5
Cored interval (m):	81.5
Recovered length (m):	15.61
Recovery (%):	19
Total cores (no.):	11
Hole:	U1401B
Latitude:	14°39.0237′N
Longitude:	61°25.2273′W
Water depth (m):	2606.22
Date started (UTC*):	1015 h 14 April 2012
Date finished (UTC*):	1545 h 14 April 2012
Time on hole (days):	0.2
Seafloor depth DRF (m):	2618.0
Penetration DSF (m):	12.9
Cored interval (m):	12.9
Recovered length (m):	12.42
Recovery (%):	96
Total cores (no.):	3
Hole:	U1401C
Latitude:	14°39.1744′N
Longitude:	61°24.9323′W
Water depth (m):	2578.82
Date started (UTC*):	1545 h 14 April 2012
Date finished (UTC*):	2000 h 14 April 2012
Time on hole (days):	0.2
Seafloor depth DRF (m):	2590.6
Penetration DSF (m):	10.3
Cored interval (m):	10.3
Recovered length (m):	10.44
Recovery (%):	101
Total cores (no.):	3
Hole:	U1401D
Latitude:	14°38.9463′N
Longitude:	61°25.3743′W
Water depth (m):	2617.9
Date started (UTC*):	2000 h 14 April 2012
Date finished (UTC*):	0830 h 15 April 2012
Time on hole (days):	0.5
Seafloor depth DRF (m):	2629.7
Penetration DSF (m):	9.2
Cored interval (m):	9.2
Recovered length (m):	9.12
Recovery (%):	99
Total cores (no.):	1

Core	Top depth drilled DSF (m)	Bottom depth drilled DSF (m)	Advanced (m)	Recovered length (m)	Curated length (m)	Top depth cored CSF (m)	Bottom depth recovered CSF (m)	Recovery (%)	Time on deck (UTC*)
340-U1401A-									
1H	0.0	7.7	7.7	7.75	7.75	0.0	7.75	101	4/14/12 00:00
2H	7.7	12.5	4.8	4.83	4.83	7.7	12.53	101	4/14/12 00:55
3H	12.5	13.7	1.2	1.22	1.22	12.5	13.72	102	4/14/12 01:50
4H	13.7	14.3	0.6	0.65	0.65	13.7	14.35	108	4/14/12 03:15
5X	14.3	23.9	9.6	0.12	0.12	14.3	14.42	1	4/14/12 06:25
6X	23.9	33.5	9.6	0.18	0.18	23.9	24.08	2	4/14/12 08:25
7X	33.5	43.1	9.6	0.18	0.18	33.5	33.68	2	4/14/12 10:15
8X	43.1	52.7	9.6	0.23	0.23	43.1	43.33	2	4/14/12 12:00
9X	52.7	62.3	9.6	0.23	0.23	52.7	52.93	2	4/14/12 13:55
10X	62.3	71.9	9.6	0.15	0.15	62.3	62.45	2	4/14/12 15:20
11X	71.9	81.5	9.6	0.07	0.07	71.9	71.97	1	4/14/12 19:00

Table T1 (continued).

Core	Top depth drilled DSF (m)	Bottom depth drilled DSF (m)	Advanced (m)	Recovered length (m)	Curated length (m)	Top depth cored CSF (m)	Bottom depth recovered CSF (m)	Recovery (%)	Time on deck (UTC*)
340-U1401B-									
1H	0.0	7.6	7.6	7.69	7.69	0.0	7.69	101	4/14/12 20:35
2H	7.6	12.8	5.2	4.60	4.60	7.6	12.20	88	4/14/12 21:35
3H	12.8	12.9	0.1	0.13	0.13	12.8	12.93	130	4/14/12 22:55
340-U1401C-									
1H	0.0	8.0	8.0	8.03	8.03	0.0	8.03	100	4/15/12 01:45
2H	8.0	9.4	1.4	1.43	1.43	8.0	9.43	102	4/15/12 02:45
3H	9.4	10.3	0.9	0.98	0.98	9.4	10.38	109	4/15/12 03:40
340-U1401D-									
1H	0.0	9.2	9.2	9.12	9.12	0.0	9.12	99	4/15/12 07:45
		Totals:	113.9	47.59	47.59				

* = ship local time was Universal Time Coordinated (UTC) – 4 h. DRF = drilling depth below rig floor, DSF = drilling depth below seafloor, CSF = core depth below seafloor. H = advanced piston corer, X = extended core barrel.

Table T2. Correlation of Hole U1401B to Hole U1401A.

Hole U1401B depth (mbsf)	Hole U1401A depth (mbsf)	Difference (m)
1.062	0.770	0.292
1.939	1.287	0.652
2.248	1.565	0.682
3.678	2.466	1.213
4.102	2.779	1.323
4.346	3.572	0.774
5.058	4.656	0.402
5.798	6.022	–0.224
6.805	6.505	0.300
7.658	8.020	–0.362
9.833	9.052	0.781

Table T3. Correlation of Hole U1401C to Hole U1401A.

Hole U1401C depth (mbsf)	Hole U1401A depth (mbsf)	Difference (m)
0.408	0.472	–0.064
0.717	1.284	–0.567
2.360	6.027	–3.667
2.622	6.510	–3.889
4.145	7.230	–3.085

Table T4. Correlation of Hole U1401D to Hole U1401A.

Hole U1401D depth (mbsf)	Hole U1401A depth (mbsf)	Difference (m)
0.625	0.919	–0.294
0.728	1.366	–0.638
0.827	1.566	–0.739
0.889	1.787	–0.898
1.093	2.234	–1.141
1.252	2.458	–1.206
1.387	2.611	–1.224
2.126	3.449	–1.323
2.870	3.923	–1.053
3.465	4.111	–0.645
4.306	4.537	–0.231
4.865	5.114	–0.249
5.357	5.491	–0.133
5.760	5.711	0.049
6.921	6.026	0.896
7.081	6.515	0.565