

Torrent Suite™ Software 5.6 Release Notes

Publication no. MAN0017340 Rev. A

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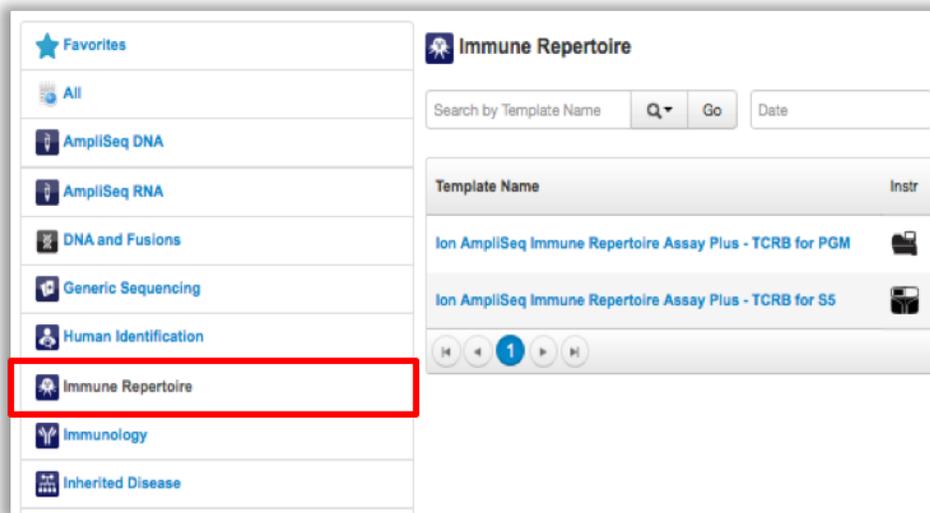
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New Features

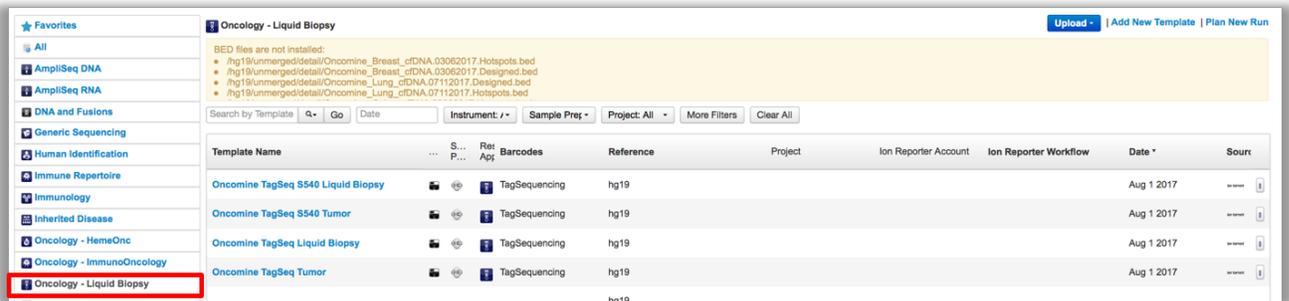
Templates for Ion AmpliSeq™ Immune Repertoire Plus – TCRB Assay templates

A new Ion Torrent™ AmpliSeq™ Immune Repertoire Plus T-cell receptor Beta Assay is available with the release of Torrent Suite™ Software 5.6. Torrent Suite™ Software supports this assay with two system templates for use with sequencing runs on Ion PGM™ and Ion S5™ instruments. The templates are pre-configured and export BAM files into Ion Reporter™ Software for secondary analysis through the TRBVNovel Allele Discovery Plugin. The templates will be available from the new Immune Repertoire, Immunology, and Oncology – ImmunoOncology research application categories.



OncoPrint™ cfTNA Lung panel and cfDNA Breast panel

Two other products launching with Torrent Suite™ Software 5.6 are the OncoPrint™ Lung Cell-Free Total Nucleic Acid Assay including CNV and Fusion detection, and OncoPrint™ Breast cfDNA Assay v2 including CNV detection. Torrent Suite™ Software 5.6 supports these panels through four templates for analysis on the Ion 530 and Ion 540 chips. The cfDNA and Fusion templates are configured for completion of variant calling and secondary analysis in Ion Reporter™ Software.



Enhanced search capabilities on the Planned Runs screen

The Planned Runs screen now comes with a new search function that includes filters for some columns to narrow the list of displayed results.

The screenshot shows the 'Planned Runs' interface. At the top, there are tabs for 'All', 'by Template', and 'by Sample'. Below these are search filters: 'Search by Plan Name or Code', 'Date', 'Status', 'Research App', 'Project: All', 'Barcodes: All', and 'Reference: All'. A 'Clear All' button is present. The main table has columns: Run Code, Planned Run Name, Barcodes, Reference, Res App, Library Prep Type, Combined Library Tube Label, Project, Sample, Sample Tube Label, Chip Barcode, Last Modified, and Status. Two runs are listed: 'U3HAW' (Sample - 8d83704e, Aug 1 2017, Reserved) and '24N12' (2 Samples, Aug 1 2017, Pending). A pagination bar shows '1 - 2 of 2 planned runs' and 'Delete Selected' / 'Clear Selection' buttons.

Enhanced search capabilities on the Plan templates screen

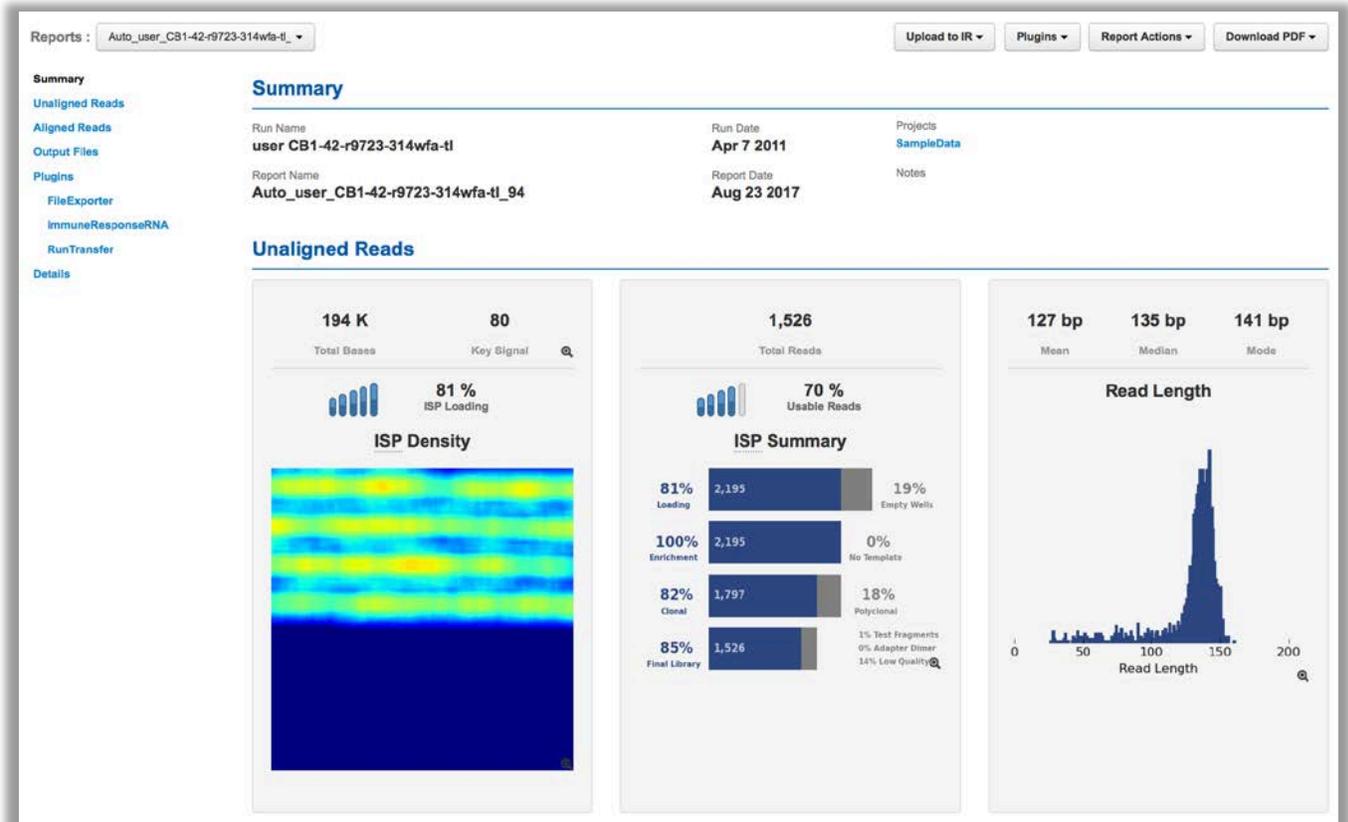
The new Torrent Suite™ Software version also introduces a new search and filter functionality provided on the Templates screen under the Plan tab. You can now search directly for templates that you created and saved.

Note: The search function will only find templates that include keywords for the type of template. For example, if you select “AmpliSeqDNA” in the left navigation bar, templates that include AmpliSeqDNA in the name are listed. Click “All” in the navigation bar if you are unsure how the template is named.

The screenshot shows the 'Reproductive' templates screen. On the left is a sidebar with 'Favorites' and a list of template categories: 'All', 'AmpliSeq DNA', 'AmpliSeq RNA', 'DNA and Fusions', 'Generic Sequencing', 'Human Identification', 'Immune Repertoire', 'Immunology', 'Inherited Disease', and 'Oncology - HemeOnc'. The main area has a search bar 'Search by Template Name', 'Date', and filters for 'Instrument: All', 'Sample Prep: All', and 'Project: All'. A 'More Filters' button is also present. The table has columns: Template Name, Instr, Sam... Prep, Res App, Barcodes, Reference, Project, Ion Reporter Account, Ion Reporter Workflow, Date, and Source. Two templates are listed: 'Ion ReproSeq Aneuploidy - Ion S5 System' and 'Ion ReproSeq Aneuploidy - Ion PGM System'. A pagination bar shows '1 - 2 of 2 templates'.

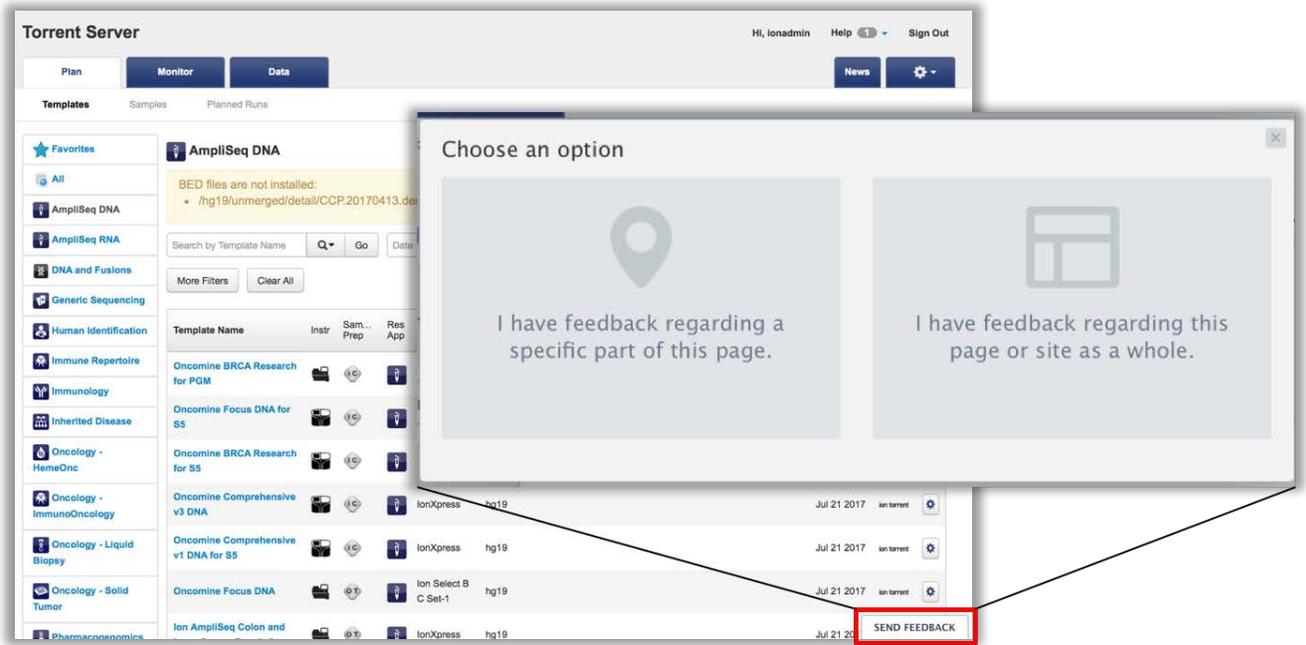
Completed Runs & Reports screen is simpler to use

Significant improvements were made to the Completed Runs & Reports screen. Each section is now accessible from a navigation bar on the left of the screen. The navigation allows user to move quickly to each section of the screen. It also allows users to access commonly used features at from drop-down lists at the upper right of the screen, and allows user to toggle between multiple reports summaries.



Send Feedback feature

Users can easily and quickly submit feedback by clicking a button at the bottom right of each screen. Clicking this button will enable users to select a specific part of the screen for which they want to comment or provide feedback regarding their user experience. This feedback is directly communicated to the Torrent Suite™ Software development team.



Improvements to Kit workflow bar for Planned Runs

The Kit workflow bar in the Planned Run wizard now contains all the advanced settings under a single section that is collapsed by default. To adjust these settings, users must click **Advanced Settings** to open this section and access the advanced parameters.

The screenshot shows the 'Kits' step in the Planned Run wizard. The 'Advanced Settings' section is expanded, revealing a warning banner and several configuration options:

- Warning!** It's *not recommended* to change these settings, please consult your local field representative before modifying parameters below.
- Templating Protocol:** [Dropdown menu]
- Forward Library Key:** Ion TCAG
- Test Fragment Key:** ATCG
- Mark as Duplicates Reads:**
- Base Calibration Mode:** Default Calibration
- Forward 3' Adapter:** Ion P1B
- Flow Order:** Use Instrument Default
- Enable Realignment:**

Plugin alerts

Updated plugins can now be more easily identified by a text banner that now appears on the Plugins screen.

Enabled	Name	Selected by Default	Version	Installed Date	Ion Supported
<input checked="" type="checkbox"/>	variantCaller Updates available!	<input type="checkbox"/>	5.4.0.39	2017/04/11 05:28 PM	Yes
<input checked="" type="checkbox"/>	coverageAnalysis	<input type="checkbox"/>	5.4.0.6	2017/04/05 02:34 PM	Yes
<input checked="" type="checkbox"/>	FieldSupport	<input type="checkbox"/>	5.4.0.3	2017/03/31 01:04 PM	Yes
<input checked="" type="checkbox"/>	RunTransfer Updates available!	<input type="checkbox"/>	5.4.0.7	2017/03/31 01:04 PM	Yes
<input checked="" type="checkbox"/>	FilterDuplicates	<input type="checkbox"/>	5.4.0.0	2017/03/27 10:11 PM	Yes

New Ion Chef™ run initialization and completion timestamps

The Ion Chef™ screen now shows two new data points to allow users to better plan templating and sequencing runs: Estimated Time Remaining and Estimated Time to User Intervention.

Ion Chef Refresh									
Last Updated	Sample Set	Plan	Chef Instrument	Library Prep Progress	Library Prep Status	Template Prep Progress	Template Prep Status	Estimated Time Remaining	Estimated Time Until User Intervention
Aug. 22, 2017, 10 a.m.		R0GC1205P2_IC_4	IMCB	<div style="width: 100%;"></div>		<div style="width: 100%;"></div>	Preparing Reaction	17:00:09	Aug. 24, 2017, 9:49 a.m.
Aug. 22, 2017, 10 a.m.		R0GC1205P2_IC_3	IMCB	<div style="width: 100%;"></div>		<div style="width: 100%;"></div>	Preparing Reaction	17:00:09	Aug. 24, 2017, 9:49 a.m.
Aug. 22, 2017, 9:58 a.m.		R0GC1205P2_IC_2	IMCA	<div style="width: 100%;"></div>		<div style="width: 100%;"></div>	Complete		
Aug. 22, 2017, 9:58 a.m.		R0GC1205P2_IC_1	IMCA	<div style="width: 100%;"></div>		<div style="width: 100%;"></div>	Complete		

Mix and Match chip types for templating on Ion Chef™

The Ion Chef™ instrument introduces a new capability to users, enabling mixing and matching of different chip types for templating on the instrument. Currently, this capability is enabled only for the following templating kits and chip types:

- (a) Ion PGM™ Hi-Q View Chef Templating kit: 316 and 318 chips
- (b) Ion 510/520/530 Chef Templating kit: 510, 520, and 530 chips

← Data Destination

Server: bluejay.itw

Kit type: Ion 510 & Ion 520 & Ion 530 Kit-Chef Chip type(s): 510v1,530v1

Chip ID: DBAG00465 Chip ID: DBAG00469
Sample ID: 11319 Sample ID: 00028400

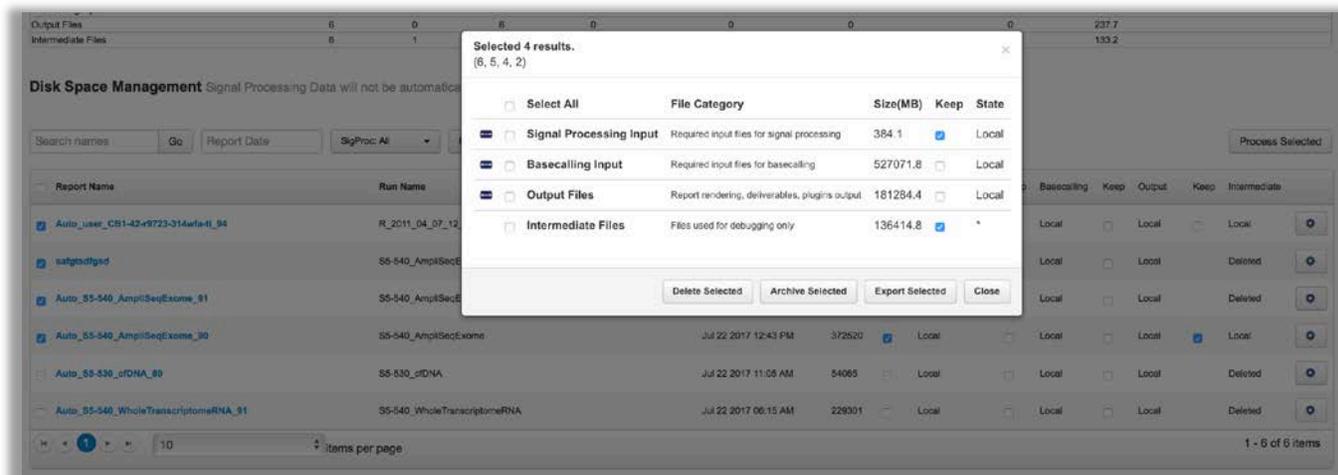
No Selection No Selection

Template size: Template size:

Refresh Plans Cancel Next

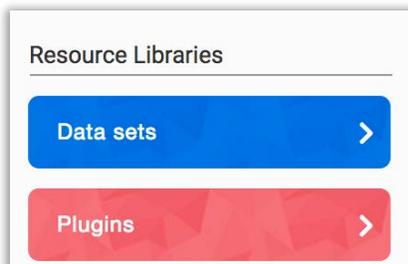
Delete, Archive and Export multiple output files

Based on user feedback, data management functions now provide users with the ability to select multiple runs and delete, archive or export those runs.

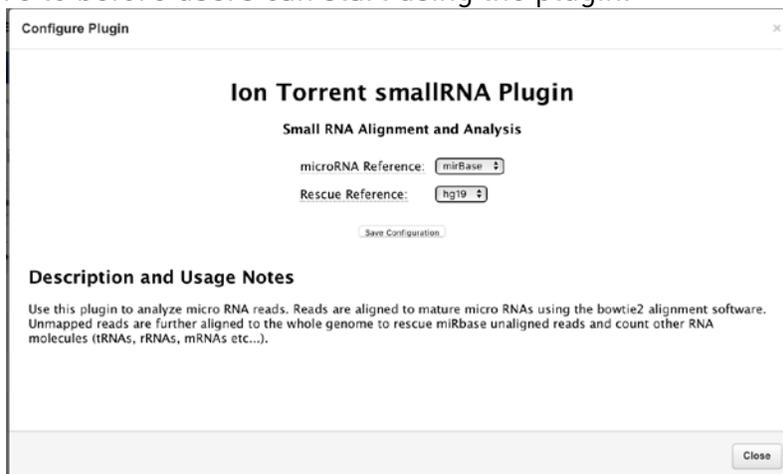


Small RNA Analysis Plugin

A new plugin to analyze micro RNA reads is now available. This plugin will be



available from the Thermo Fisher Cloud™ plugin resource library. The plugin file must be downloaded from Thermo Fisher Cloud™ and then uploaded into Torrent Suite™ Software to before users can start using the plugin.



Note:

The SmallRNAAnalysis and RNASeqAnalysis plugins (v5.6) are available only on Thermo Fisher Cloud™ for Torrent Suite™ Software 5.6.

AmpliseqRNA plugin will provide CHP files for download

The AmpliseqRNA plugin now provides CHP files for download when data is analyzed. This will facilitate users to upload the output into the Transcriptome Analysis Console (TAC) software for secondary analysis. TAC software is available for free [here](#).

Better password management

In the Account Management screen (/configure/account/) the user now has an option to change their password by updating both the password and password confirm fields with the same password. Users should leave both fields blank if they do not want to change the password.

New cell number attribute for ReproSeq Aneuploidy

Torrent Suite™ Software now supports new cell number attributes for ReproSeq Aneuploidy Ion Reporter™ Software workflows. The attribute tracks the biopsied cell number and the previously supported biopsy days, couple id, and other fields. Users can then reference the cell number info when looking at the mosaicism call prediction in Ion Reporter™ Software.

510 chip support for HID templates

The HID system templates in Torrent Suite™ Software 5.6 are now enabled for use with 510 chips for run planning purposes.

New flow order for Ion ReproSeq Aneuploidy – Ion S5 System template

The Ion ReproSeq Aneuploidy – Ion S5 System template is now pre-configured with a new optimized flow order that improves barcode balance. The name of the new flow order is `lon_samba.c.2step.pgs` flow order.

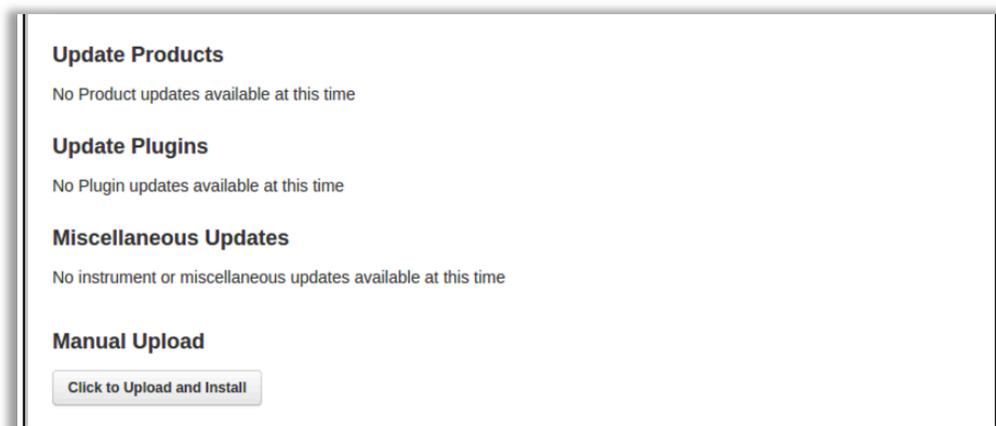
New reference and BED files for Ampliseq™ Transcriptome

Ampliseq™ Transcriptome templates are now enabled with new reference and BED files. The templates can be installed with one-click from the Templates screen, under the Plan tab of Torrent Suite™ Software.

Ability to install off-cycle bundles with no internet access

User with no internet access to their Torrent Server can now install off-cycle updates through installers available through their local support associate on a USB device. The installation package can be uploaded from the USB drive from a new “manual upload” function built into the updates screen.

Note: In Torrent Suite™ Software 5.6, this function will only work with Google Chrome browser.



Torrent Suite™ Software verification service

Beginning with Torrent Suite™ Software 5.4., Torrent Suite™ Software offers a verification service. The purpose of this service is to verify the latest Torrent Suite™ Software release on behalf of users before they perform upgrades on Torrent Servers that are used in production. User samples that contain known mutations are transferred from an internal server that runs the latest Torrent Suite™ Software . The verification service ensures that all expected mutations are properly called. If the results are not as expected, optimization is performed. As a result, the servers get freshly optimized parameters that fit their data, if needed, based on the latest version. This service prevents users from finding that some variants are no longer reported and are escalating after upgrade. Please contact your local field bioinformatics scientist to inquire about or purchase this service.

Bug fixes

Issue with “sliding” window candidate generation in variantCaller plugin

Torrent Suite™ Software 5.4 introduced the adaptive look ahead sliding window for candidate generation. However, a side effect of this approach was an undesirable large variant window that would be generated in the following scenario in practice: Suppose we have

- Two true haplotype SNPs at positions 100 and 200, say Novel 100 and Novel 200.
- Hotspots SNPs at 100, 101, ..., 199, 200, say HS 100, ..., HS 200.

In the above cases, FreeBayes software continues to expand the look ahead window from 100 to 200. Finally, it identifies a long "MNP" from 100 to 200 composed by Novel 100 and Novel 200. This issue is fixed in the Torrent Suite™ Software 5.6 release.

variantCaller plugin configuration screen display issue on Firefox

On Firefox browser, during run plan, the variantCaller plugin configuration screen was missing options in the dropdown menu for "Chip Type", "Library Type" and "Variant Frequency" in Torrent Suite™ Software 5.4. This issue is now fixed.

Known Issues

RunTransfer plugin thumbnail run issue

In the RunTransfer plugin, thumbnail runs can be transferred to destination Torrent Server successfully and auto-analysis can be started successfully. However, when trying to manually re-analyze the thumbnail runs on destination Torrent Server (a) having the "thumbnail only" box checked will result in error message (b) leaving the "thumbnail only" box unchecked will run but eventually will fail. This issue will be fixed in the next release of Torrent Suite™ Software.

Issue with plugin updates

After the plugin is updated to the latest available version, the "Update Available" message still continues to be displayed.

Workaround: Users need to click on the browser **Refresh** button to get the latest information to determine which new plugin versions are still available. The issue will be fixed in the next release.

Issues with multiple Torrent Suite™ Software versions on USB device

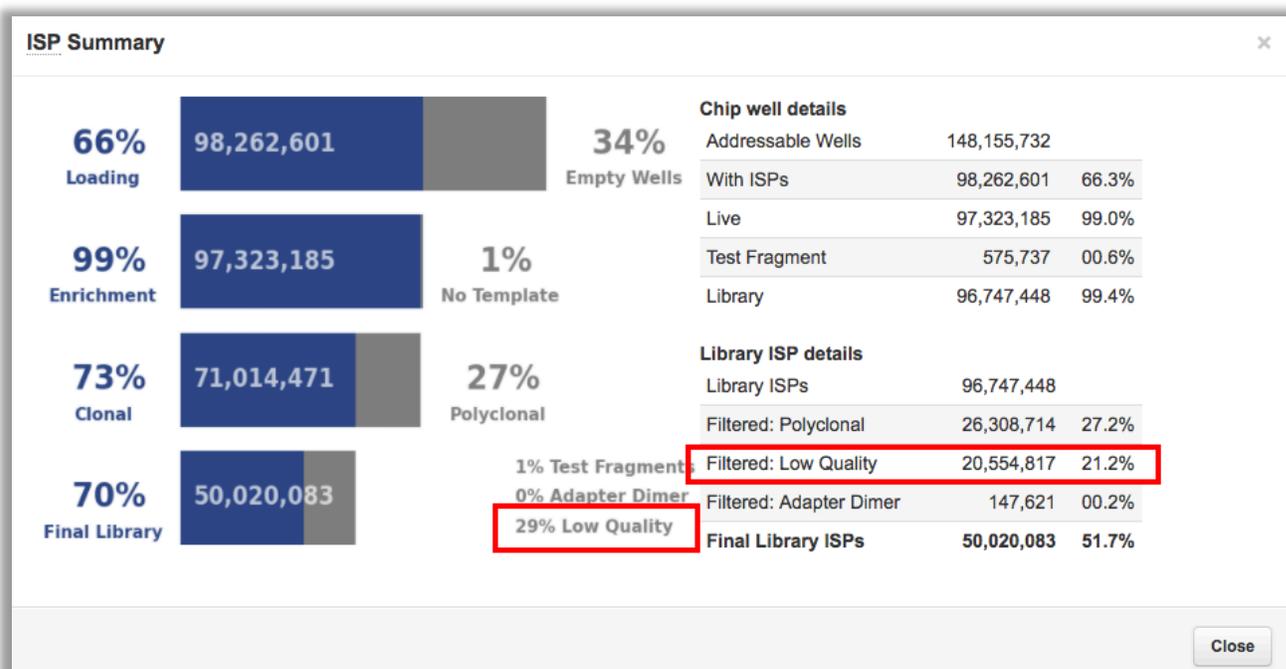
If a USB device contains multiple versions of the Torrent Suite™ Software installation package, it is possible that the wrong version will be installed during an update. The current workaround is to have only a single version of Torrent Suite™ Software installation package on the USB device. The issue will be fixed in the next release.

Issue with searches that use multiple keywords

If users enter more than one keyword when they search on the Planned Runs, Templates or Completed Runs & Reports screens, the search uses the exact combination of keywords as entered. It will not search for individual keywords when a combination is entered. For example, "Oncomine Comprehensive" will search for all templates containing the two words together in that order; it will not search for all occurrences of both words. This issue will be corrected in the next release.

Low quality percent mismatch

There is a mismatch in numbers reported in the ISP summary block on run report:



- In the image (29%): Each segment of the picture takes the segment above as the 100% base line. The 100% base line for the last line is the total number of clonal beads in the run. The percent low quality should be derived as the fraction of low all clonal beads that are filtered as low quality beads. ("Low Quality Lib" + "Low Quality TF") / ("Clonal beads Lib" + "Clonal Beads TF").
- In table next to the image: Here the 100% base line is the total number of library beads in the run, including polyclonal library beads. The percent low quality is the fraction of the library beads that are filtered as low quality. "Filtered: Low Quality" / "Library ISPs".

Rerun mode in variantCaller plugin

The Rerun mode in the variantCaller plugin has a bug. The bug may appear if the rerun started from

1. Auto start mode with barcode specific Reference, and Target and Hotspot files.
2. Manual start mode using configuration

In this version of plugin, this feature has been disabled. This bug will be fixed in the next release.

variantCaller plugin issue with Tag Sequencing Assays runs

In rare cases, variantCaller plugin fails to reproduce exactly the same VCF records for Tag Sequencing Assays runs, although the program, input data set and parameters are identical. The bug primarily affects the VCF fields "RO", "SRR" and "SRF". The bug will not affect other values of the VCF records including the variant evaluation results. This bug affects variantCaller plugin 5.4 and variantCaller plugin 5.6; it will be fixed in the next release of Torrent Suite™ Software. variantCaller plugin issue with Tag Sequencing Assays at target ends

In Tag Sequencing Assays runs, the variantCaller plugin may fail if there are reads starting at the end of a target region. This bug affects variantCaller plugin 5.4 and variantCaller plugin 5.6. The issue will be fixed in the next release of Torrent Suite™ Software.

Plugin scroll issue in Macintosh™ operating systems

In Macintosh™ operating systems, the scroll bar for plugins listed on the Run Report screen does not appear until you move the cursor to plugins section and scroll. This issue is not seen in other operating systems. The issue will be fixed in the next release of Torrent Suite™ Software.

IMPORTANT! You cannot roll back to a previous version of Torrent Suite™ Software and Ion Torrent™ instrument software after you perform the upgrade described in this document.

When updating Torrent Suite™ Software, it is critical that you update both the software on the instrument and the software on the Torrent Server. Beginning with Torrent Suite™ Software 4.0, the instrument will not retrieve the proper on-instrument analysis if both systems are not updated.

If you are using the Ion Chef™ Instrument

As of Torrent Suite™ Software 4.4, the Ion Chef™ instrument only sees one Torrent Server connection. This change does not affect instruments that are directly connected to one server. That connection remains unchanged. However, if the Ion Chef™ Instrument is configured to see more than one Torrent Server™ connection, follow the guidelines in the Ion Chef-TS network setup guide (<https://www.thermofisher.com/order/catalog/product/4484177>) to verify that the configuration meets your needs. From the primary Torrent Server, you can enable Planned Run sharing to bring additional Torrent Server™ connections online. All Ion Chef™ Instrument logs remain on that primary server.

Ubuntu Security Updates

Torrent Suite Software 5.6 includes all Ubuntu security updates and patches as of 30 August 2017.

Install the Torrent Suite™ Software 5.6 Update

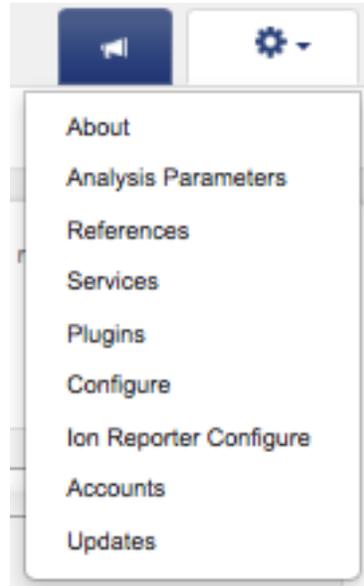
IMPORTANT! During this upgrade, you must use the same user account for both Torrent Server™ and the Ion instruments (Ion PGM™ Instrument, Ion Chef™ Instrument, Ion Proton™ Sequencer, and Ion S5™ and S5™XL Sequencers.)

Use these steps to install Torrent Suite™ Software 5.6:

1. Log on to the Torrent Browser as **ionadmin** user.
2. Click Settings (⚙) > **Services**. Ensure that there are no active jobs running.
3. Click Settings (⚙) > **Configure** > **Admin Interface**.
4. Click **Update Server**.
5. Click **Check** to check for updates.
6. When the **Available** message appears, click **Update Server** to start the update process.
7. On the EULA screen, scroll down to read, and then accept the EULA to begin update.
8. When finished, ensure that the “**Upgrade completed successfully!**” message appears.

Install the Torrent Suite™ Software (Torrent Variant Caller plugin) Update

1. Click **Settings** (⚙️) > **Plugins**.



On the plugins screen, find the row that lists the variantCaller plugin. Click Settings (⚙️) in the **Manage** column, then click on the latest update that is listed in the dropdown menu.

Enabled	Name	Selected by Default	Version	Installed Date ▾	Ion Supported	Manage
<input checked="" type="checkbox"/>	variantCaller	<input checked="" type="checkbox"/>	5.2.2.41	2017/01/25 11:35 AM	Yes	⚙️ ▾
<input checked="" type="checkbox"/>	FileExporter	<input type="checkbox"/>	5.2.0.1	2016/09/23 09:50 AM		Usage Install 5.2.1.39 Install 5.2.2.40 Uninstall
<input checked="" type="checkbox"/>	immuneResponse...	<input type="checkbox"/>	5.2.1.2	2016/09/23 09:50 AM		

Updates through a command-line user interface

Note: This procedure is typically performed by Thermo Fisher Scientific field service engineers. Most users will instead use the procedure above for updates through the Torrent Browser.

New in this release, for Ubuntu™ 14.04 systems, the command-line interface update procedure has an additional TSconfig step of TSconfig --configure-server. The complete command-line interface update procedure is:

- 1 sudo apt-get update
- 2 sudo apt-get install ion-tsconfig
- 3 When prompted to accept EULA acceptance, press “Tab”, then “Return” to proceed with update
- 4 sudo TSconfig -s
- 5 sudo TSconfig --configure-server

Verify the software update on the Torrent Server™

To verify that the server is running Torrent Suite™ Software 5.6, click **Settings** (⚙) > **About** in the Torrent Browser and review the version number.

Update the instrument software

Update the software on any Ion instruments in use:

- Ion Proton™ Sequencer
- Ion S5™ and S5™ XL Sequencer
- Ion Chef™ Instrument
- Ion OneTouch™ 2 Instrument

Appendix: Torrent Suite™ Software 5.6 Release Notes

Release Summary

Release Date	15 September 2017
Release Version	5.6

Software Version

These tables list the versions for each of the latest software packages for Torrent Suite™ Software plugins and Ion Torrent™ instruments.

Packages	Version
ion-analysis	5.6.8-1
ion-dbreports	5.6.37.1
ion-gpu	5.6.0-1
ion-pipeline	5.6.12-1
ion-plugins	5.6.16-1
ion-publishers	5.6.1-1
ion-rsmts	5.6.1-1
ion-sampleddata	1.2.0
ion-torrentpy	5.6.8-1
ion-torrentr	5.6.8-1
ion-tsconfig	5.6.4-1
Plugins	Version
ion-plugin-ampliseqrna	5.6.0.3
ion-plugin-assemblerspades	5.6.0.0
ion-plugin-coverageanalysis	5.6.0.1
ion-plugin-dataexport	5.6.0.1
ion-plugin-erccanalysis	5.6.0.0
ion-plugin-fieldsupport	5.6.0.1

Packages	Version
ion-plugin-fileexporter	5.6.0.0
ion-plugin-filterduplicates	5.6.0.0
ion-plugin-immuneresperna	5.6.0.0
ion-plugin-ionreporteruploader	5.6.0.39
ion-plugin-pgxanalysis	5.6.0.0
ion-plugin-runtransfer	5.6.0.6
ion-plugin-sampleid	5.6.0.1
ion-plugin-variantcaller	5.6.0.4

Chef Instrument Control Software

Update Package	Version
ion-chefupdates	5.6.0

Internal Release Notes IC.5.6.0.RC.1

Package	Version
GUI	080011
IS	611
SC	609
GM	23
OS	61
TsLink	4.3.9

Proton Instrument Control Software

Update Package	Version
ion-protonupdates	5.6.0
Package	Version
LiveView	2334
datacollect	3536
Scripts	2.1.42
Graphics	89
rsmagent	30
OS	30
OIA	5603

Ion S5™ and S5™XL Sequencers Control Software

Update Package	Version
ion-s5updates	5.6.0
Package	Version
RaptorScripts	131
RsmAgent	30
RfidMgr	29
ReaderFpga	10b
OS	33
OIA	5603
LiveView	2334
Graphics	89
DataCollect	3536

Ion PGM™ Control Software

Update Package	Version
ion-pgmupdates	5.6.1
Package	Version
LiveView	654
DataCollect	489
HW8560	134
Scripts	220000
OS	21
Graphics	36
TSLink	1.0.4

Ion OneTouch2™ Control Software

Update Package	Version
ion-onetouchupdater	5.0.2

No change since TSS 5.0.2

Package	Version
OneTouch	803
BoardControl	800
UpdateAgent	800
Scripts	802
Psplash	800

Revision	Date	Description
A.0	15 Sept. 2017	New release notes for Torrent Suite™ Software 5.6

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15 September 2017