Summary

AMBER is a compartment modelling software tool developed by Quintessa Ltd.

This is the Release Note for the AMBER 6.5.1 software. AMBER 6.5.1 is a flexible software tool that allows the user to build their own dynamic compartment models to represent the migration and fate of contaminants in a system.

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1 About AMBER

AMBER is a flexible software tool that allows the user to build their own dynamic compartment models to represent the migration and fate of contaminants in a system, for example in the surface and sub-surface environment. Contaminants in solid, liquid and gaseous phases can be considered. AMBER gives the user the flexibility to define:

▲ any number of compartments;

▲ any number of contaminants and associated rates of degradation/decay;

▲ any number of transfers between compartments and the uptake of contaminants by humans and other biota;

▲ non-linear transfer processes (e.g. solubility-limited leaching); and

▲ deterministic, probabilistic, and complex time-varying parameter values.

This flexibility means that the user can implement models specific to their context and tailor generic models to their specific needs.

Key features incorporated into AMBER include:

▲ powerful, user friendly graphical interface;

▲ spatial awareness and 3D visualisation;

▲ fast and accurate Laplace transform and numerical time-step solvers;

▲ time-varying source terms and transfer processes;

▲ unit awareness;

▲ Monte Carlo and Latin Hypercube Sampling options;

▲ built-in graphing of results and Excel export capabilities; and

▲ tailoring of results format.

The primary user documentation for AMBER 6.5.1 consists of two volumes: the ‘User Guide’ manual and the ‘Reference Manual’. The User Guide introduces AMBER through a series of tutorial exercises and also contains a knowledge base of studies involving AMBER together with guidance on compartment modelling. The Reference Manual provides detailed information on all of the capabilities and functions included in AMBER.
2 Developments included in AMBER 6.5.1

The main new features included in AMBER 6.5.1 are described in the sub-sections below, including a summary of minor developments and bug fixes.

2.1 Remote Licencing

AMBER 6.5.1 introduces the option for remote licencing alongside the current local licencing system. This is still handled through USB hardware security keys (‘dongles’), however AMBER 6.5.1 can now search the local network for a remote licence dongle in addition to searching for a local licence dongle attached to the machine. A remote licence also permits AMBER to be run via a Remote Desktop (RDP) connection.

Remote licences can be added to existing local licence dongles. Please contact the AMBER support team (amber@quintessa.org) for further details of remote licence options.

2.2 Other Developments and Bug Fixes in AMBER 6.5.1

AMBER 6.5.1 includes a number of bug fixes and improvements to usability, as detailed below.

▲ Improved the behaviour of context menus in the expression editor.

▲ Improved the default high DPI behaviour of the application.

▲ Fixed an issue with font styling in the model window after reopening a previously saved case file.

▲ Fixed an occasional issue with automatic positioning of split and joined transfers on the model window.

▲ Fixed a crash when opening a case file with an invalid nameset order.

▲ Fixed an issue with check parameter errors in the non-spatial tutorial example case files.
3 Issues of relevance to users (from 6.5 release note)

Two potential calculation issues have been identified in AMBER, and guidance has been issued to users on how to avoid any potential calculation errors while AMBER developers investigate further.

- Guidance regarding the use of sum, largest and smallestPositive functions in expressions (see Section 3.1).
- Guidance regarding the use of user units for amounts when using availability schemes (see Section 3.2).

3.1 Use of sum, largest and smallestPositive functions

The sum function finds the sum across the components of a parameter, and can act over all or just a single dimension of the parameter. User feedback has highlighted some unexpected behaviour of this function when used in expressions for parameters with multiplicity, whereby if sum was used in conjunction with binary operators (e.g. +, -, etc.) to evaluate a specific instance of the parameter (rather than the default value) it sometimes evaluates to zero. This issue has been found to affect other contraction nodes (functions that reduce the dimensions of the output as compared to the input), i.e. largest and smallestPositive. This issue is under investigation by AMBER developers. We are therefore issuing the following guidance.

Avoid using the sum, largest and smallestPositive functions in combination with binary operators in expressions for parameters that have multiplicity. Instead create a separate intermediary parameter which contains the sum (or largest or smallestPositive) function only and call upon that intermediary parameter in the original expression.

For example, consider ParamA = ParamB + sum(ParamC*ParamD). Users should avoid writing ParamA in that manner, instead breaking it down to have intermediary parameters as follows:

```
SumOverParam = ParamC*ParamD
SumParam = sum(SumOverParam)
ParamA = ParamB + SumParam
```

3.2 Use of user units with Availability Schemes

Availability schemes in AMBER allow solubility limitation and sorption to be modelled. User feedback has highlighted some incorrect behaviour with availability schemes when using user units (grams, kilograms or Becquerels) for amounts. Specifically, under the following set of circumstances the availability limit will be incorrectly applied:

- there are no decays at all in the case file, and
- the units for Amount are grams, kilograms or Becquerels, and
- an availability limit is given in moles.
In this case the availability limit will be applied with in the wrong units. This will occur for all four availability schemes: Limit, Unavailable Limit, Langmuir, Unavailable Langmuir.

This issue is under investigation by AMBER developers. We are therefore issuing the following guidance. If you have a case with no decays ensure that the units of amount and availability scheme are the same, for example moles and moles, or grams and grams.

If you have any queries about these issues, please contact the AMBER support team (amber@quintessa.org).
4 Videos of AMBER tutorials

Following user requests, we are producing videos of the tutorials that can be found in the AMBER 6.5.1 User Guide. Videos currently available for the tutorials are published on Quintessa Limited’s YouTube page [https://www.youtube.com/channel/UCzyaK7z5HABWNEDSIAvHmg].
5 Feedback

AMBER is developed in response to user feedback; therefore the AMBER support team encourages users to provide any feedback about the software, especially if you identify a new feature that would enable AMBER to better address your modelling needs, and/or if you have a suggestion to enhance existing AMBER features.

The spatial awareness and 3D visualisation capabilities included in AMBER 6.5.1 represent key functions that are unique in this calibre of contaminant transport and risk assessment codes. The capabilities provide a basis for further enhancement, we therefore particularly welcome feedback and ideas for how to extend and further enhance these aspects of the software.

The AMBER support team is here to help to address any questions that you have about the use of the software and would be interested to hear if you have any questions. In addition, support agreements entitle existing users to help from AMBER experts if they encounter any problems with developing cases.

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