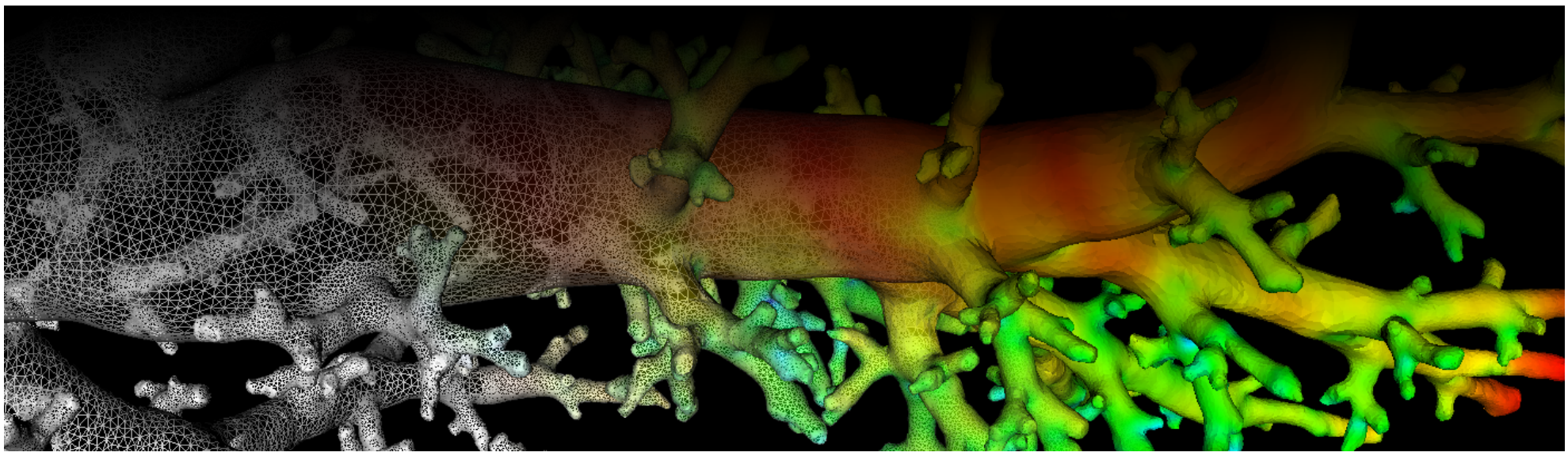
Lung Anatomy + Particle Deposition (lapd) Mouse Archive

for Modeling and Computational Toxicology



Overview

The lapdMouse archive provides for each mouse:

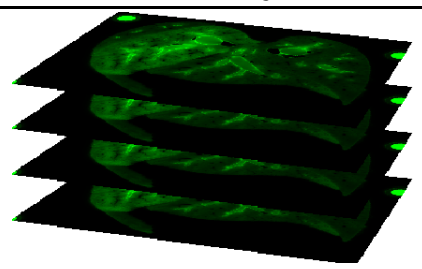
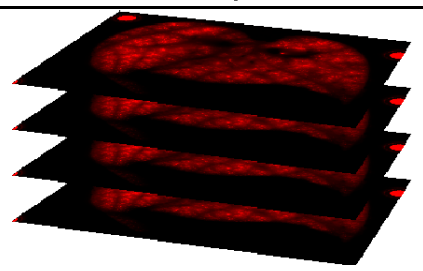
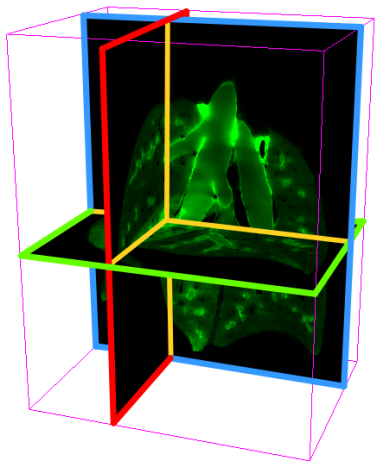
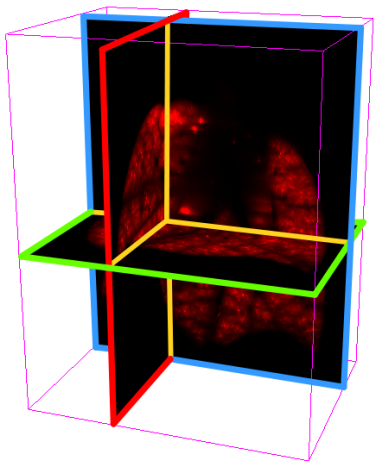
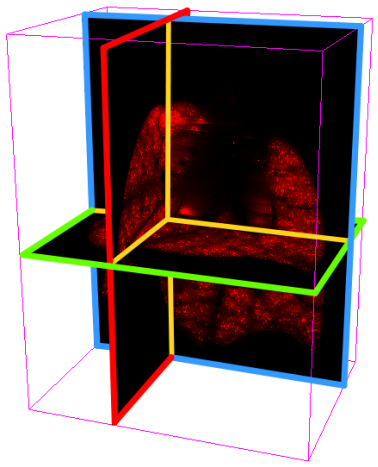
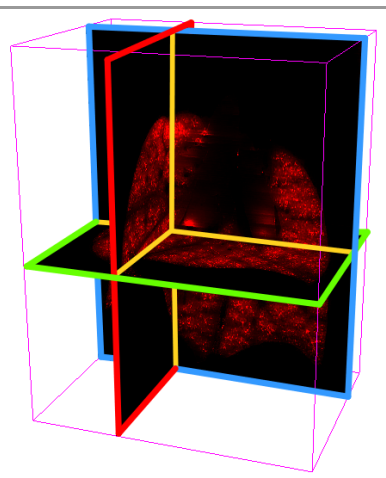
- Image data
- Airway models
- Lung regions
- Physiological parameters and aerosol dosing

all with site-specific particle deposition measurements

Data files follow the convention **{DatasetID}_{FileDescription}.{Extension}** and are stored in commonly utilized file formats. C++ and Python code examples are provided to demonstrate how to work with and interlink these data files.

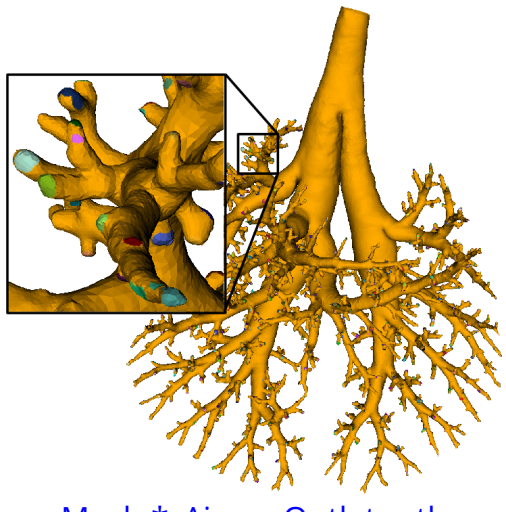
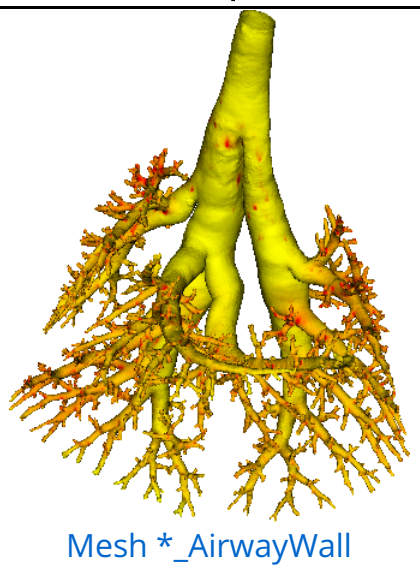
Image Data

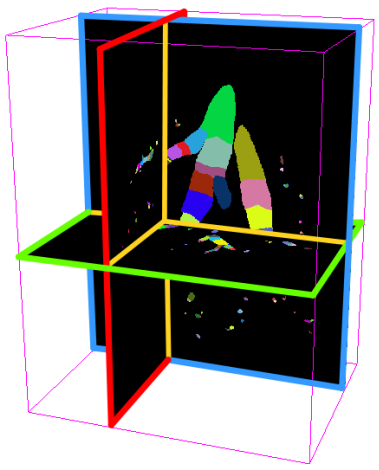
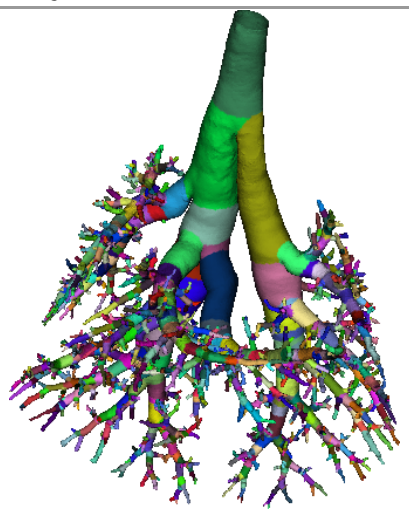
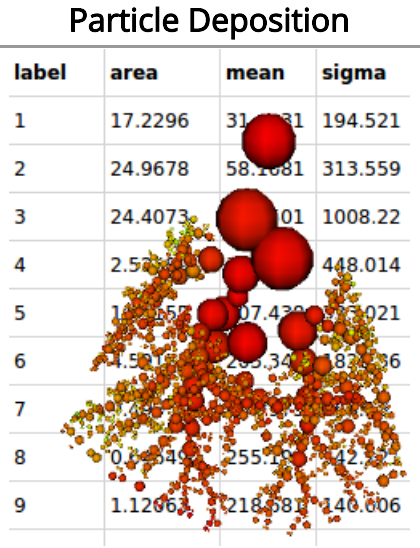
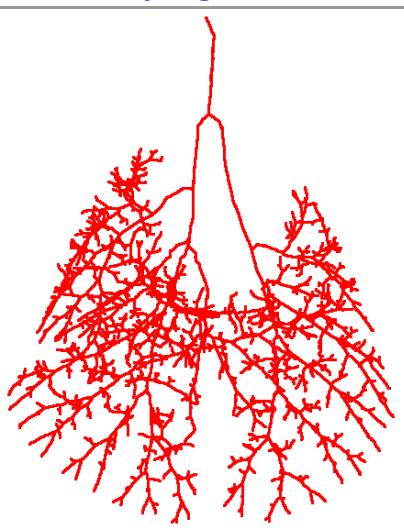
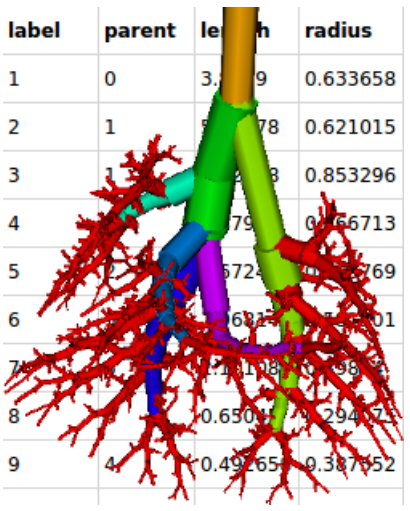
After exposure to aerosol particles (see protocol) the mice lungs are imaged with a thin-section cryomictome (see more information). The raw thin-section image data is cleaned and assembled into 3D image volumes showing anatomic structures and aerosol deposition. Deconvolution is applied to aerosol deposition volumes for higher resolution deposition measurements. The aerosol deposition image volumes are further processed: (a) to increase the resolution of particle measurements deconvolution is applied and (b) to allow better comparison of aerosol deposition between mice the voxel values are normalized.

Description	Anatomy	Particle Deposition
Cryomicrotome data	 *_RawCryomicrotomeData	 *_RawCryomicrotomeData
Preprocessed volume	 Image volume *_Autofluorescent*.mha	 Image volume *_Aerosol*.mha
Preprocessed volume after deconvolution		 Image volume *_AerosolDeconv*.mha
Preprocessed volume after deconvolution and normalization		 Image volume *_AerosolNormalized*.mha

Airways

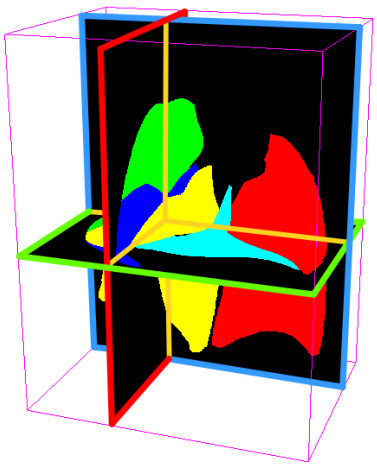
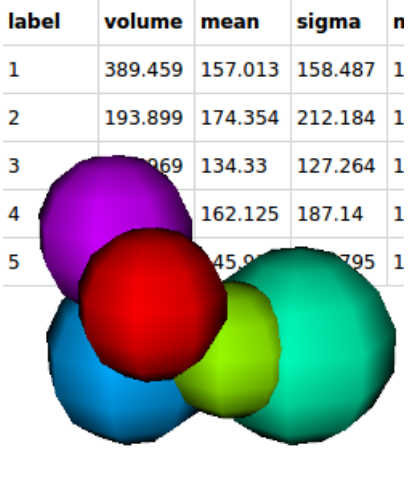
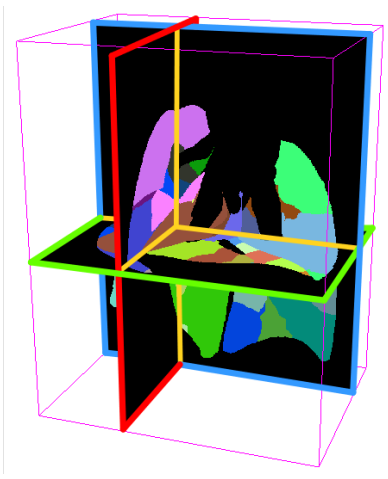
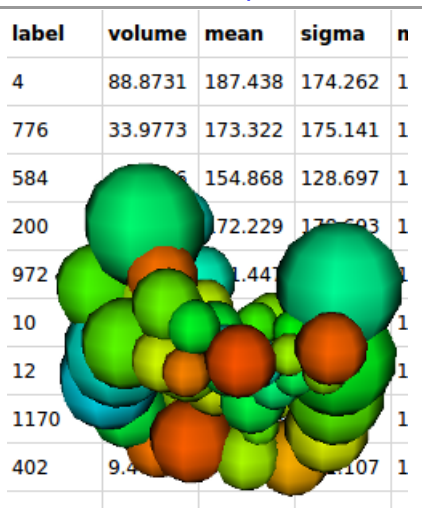
From the image data, detailed models of the airway tree with outlet regions and aerosol deposition at the airway wall are obtained. The airway tree is sectioned into hierarchially organized airway segments, for which centerline-based as well as tabular representations are provided. All airway tree representations use matching labels to refer to corresponding airway segments. Major airway branches are assigned names.

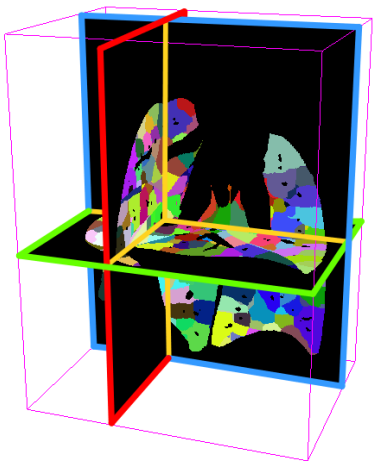
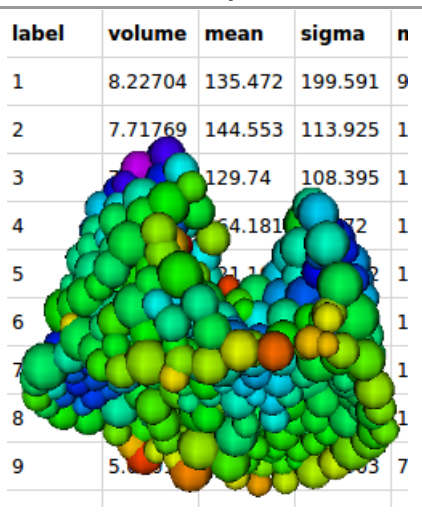
Description	Anatomy	Particle Deposition
Wall with outlets	 Mesh *_AirwayOutlets.vtk	 Mesh *_AirwayWall Deposition.vtk

Description	Anatomy	Particle Deposition
Segments	 Labelmap *_AirwaySegments.nrrd  Mesh *_AirwaySegments.vtk	 Table *_AirwaySegments Deposition.csv
Structural representation	 Structure *_AirwayTree.meta  Table *_AirwayTreeTable.csv	

Lung Regions

The lung is subvidided into functional anatomic units at different levels: Lobes, sublobes and near-acini structures. For each of these subdivsions the regions are represented by labelmaps, which have corresponding aerosol-deposition measurements tables.

Description	Anatomy	Particle Deposition
Lobes	 Labelmap *_Lobes.nrrd	 Table *_LobesDeposition.csv
Sublobes	 Labelmap *_Sublobes.nrrd	 Table *_SublobesDeposition.csv

Description	Anatomy	Particle Deposition
Near acini	 Labelmap *_NearAcini.nrrd	 Table *_NearAciniDeposition.csv

label	volume	mean	sigma	n
1	8.22704	135.472	199.591	9
2	7.71769	144.553	113.925	1
3		129.74	108.395	1
4		64.181	72	1
5				1
6				1
7				1
8				1
9	5.		63	7

Updated: 7/24/19
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