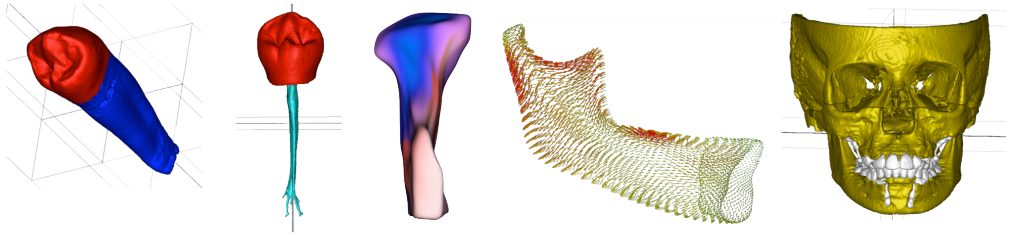
CMF Extensions

NAMIC Project Week 2016

Slicer Extensions Birds of a Feather

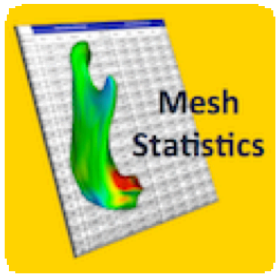
Beatriz Paniagua, Jean-Baptiste Vimort, Laura Pascal



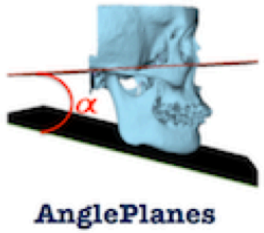
Dental and Craniofacial Bionetwork for Image Analysis- DCBIA

UNIVERSITY OF MICHIGAN

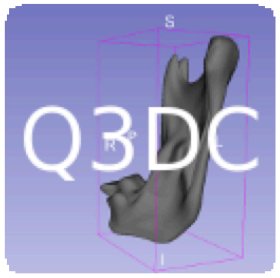
Science and technology in Slicer



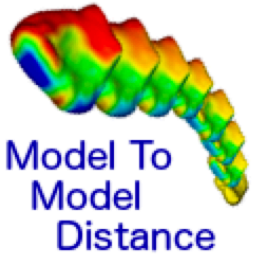
MeshStatisticsExtens..
Lucie Macron (Universi...



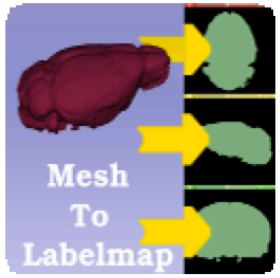
AnglePlanesExtension
Julia Lopinto (Universit...



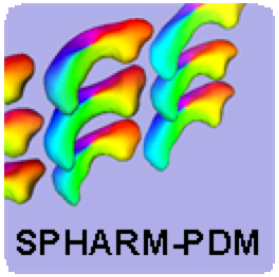
Q3DC
Lucie Macron (Universi...



ModelToModelDistan..
Francois Budin (UNC), ...



MeshToLabelMap
Francois Budin (UNC)

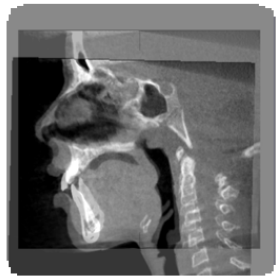


SPHARM-PDM
Beatriz Paniagua (UNC...

ShapePopulationView..
Alexis Girault (NIRAL, U..

PickAndPaintExtensi...
Lucie Macron (Universi...

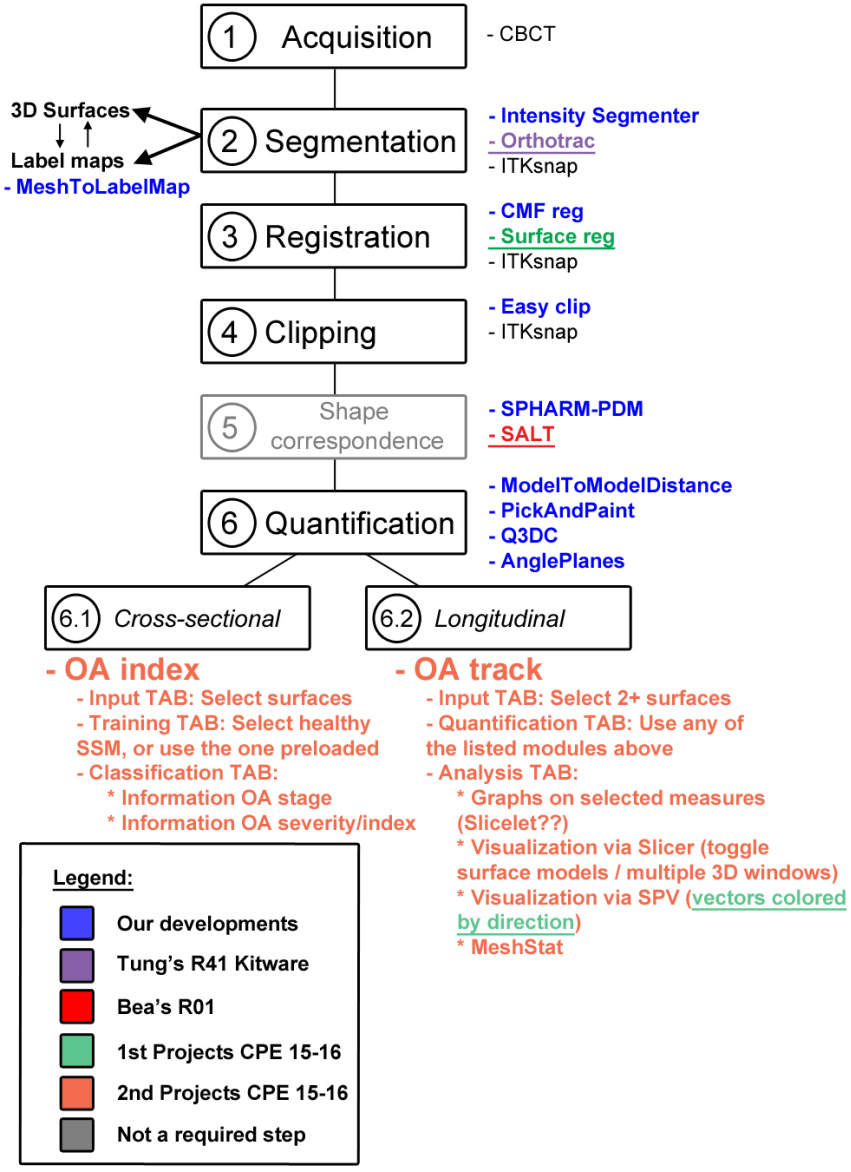
EasyClip
Julia Lopinto (Universit...



CMFreg
Vinicius Boen (Univ of M.

- 3D Slicer as dissemination vehicle for tools needed for 3D imaging dental research: fast quantification, cropping, registration

Clinical workflow for Dental Image Analysis

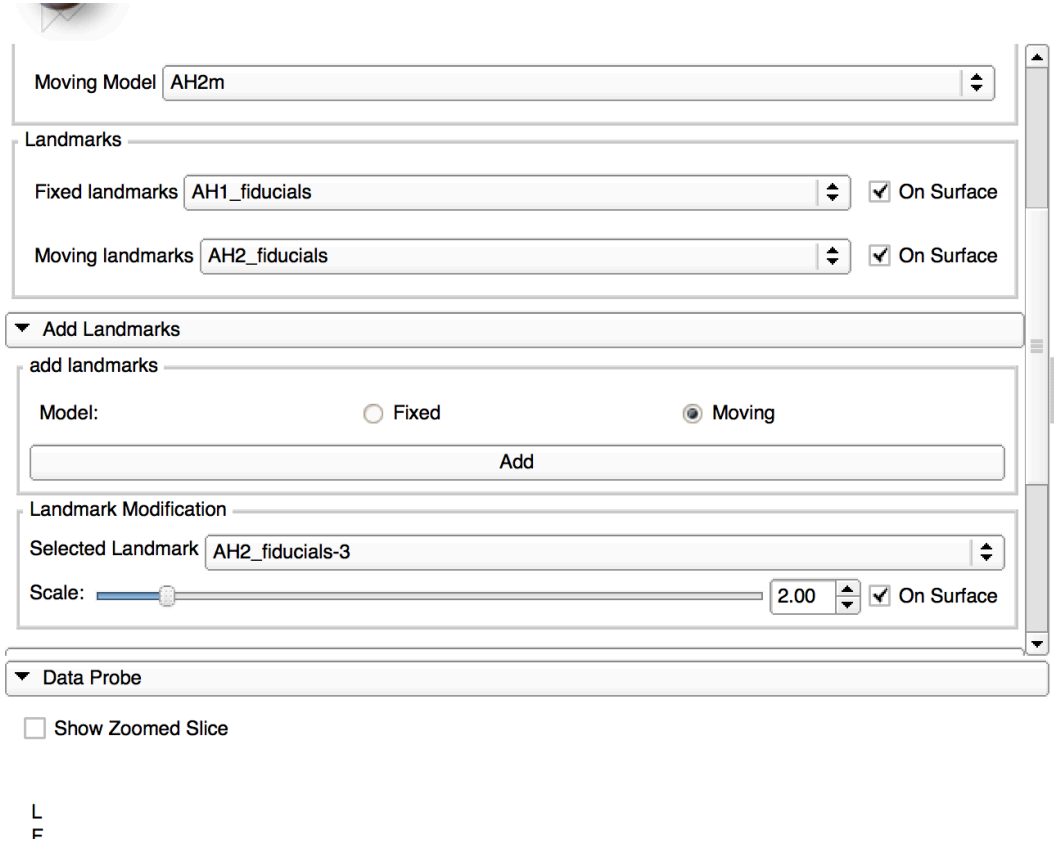


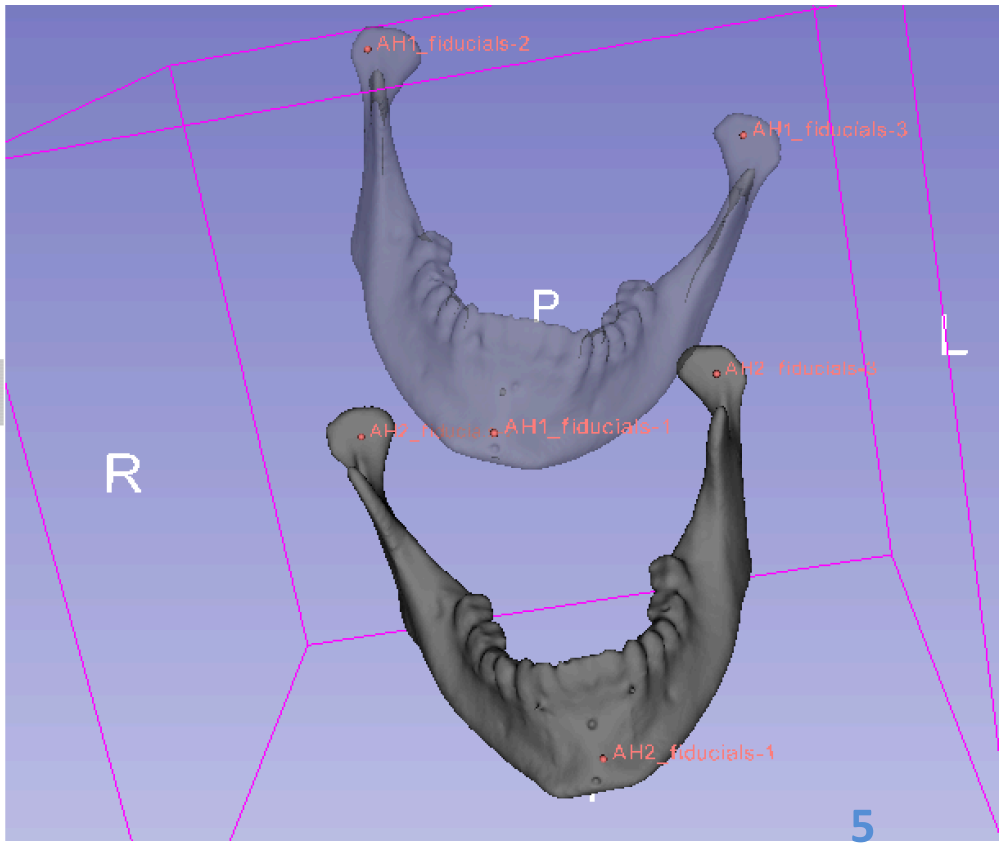
CMF Registration

- Packaging existing Slicer functionality into a new module
- Uses BRAINSFit as registration core
- Easy way for clinicians to do region-based registration
  - Apply masks
  - Calculate and apply transforms for afine and rigid registration
  - Familiar terminology

CMF Registration

- Surface registration module
- Packaging existing functionality and adding some features to improve usability





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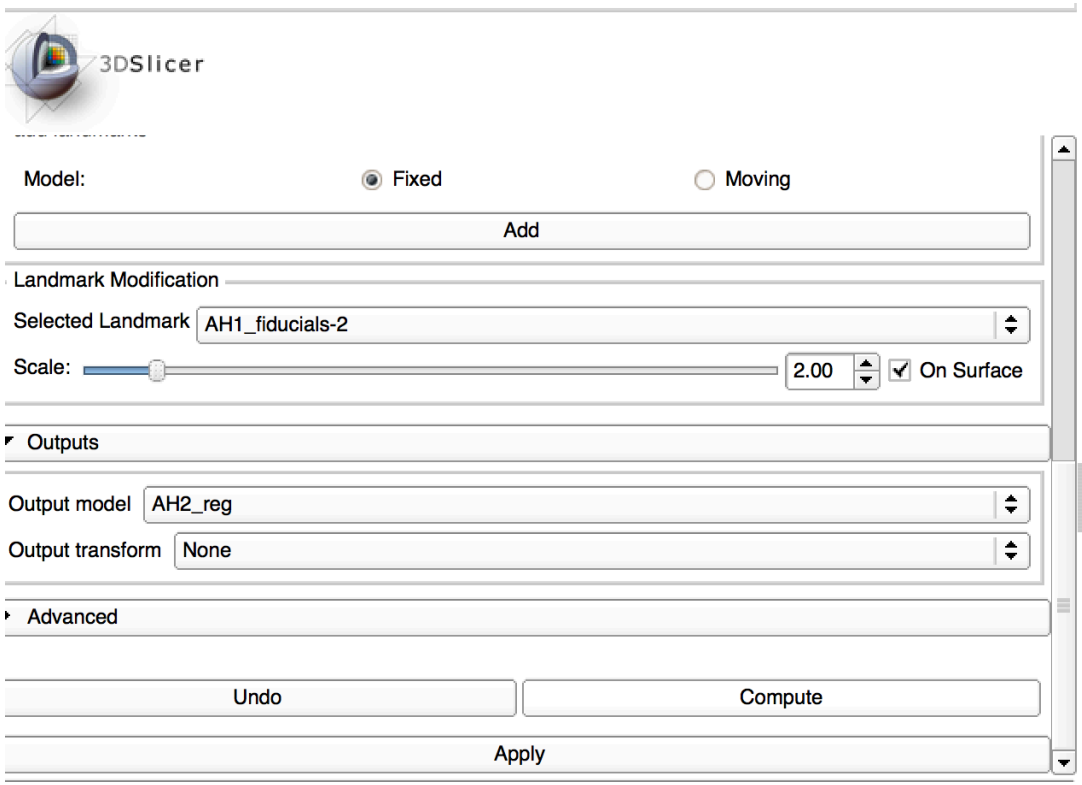
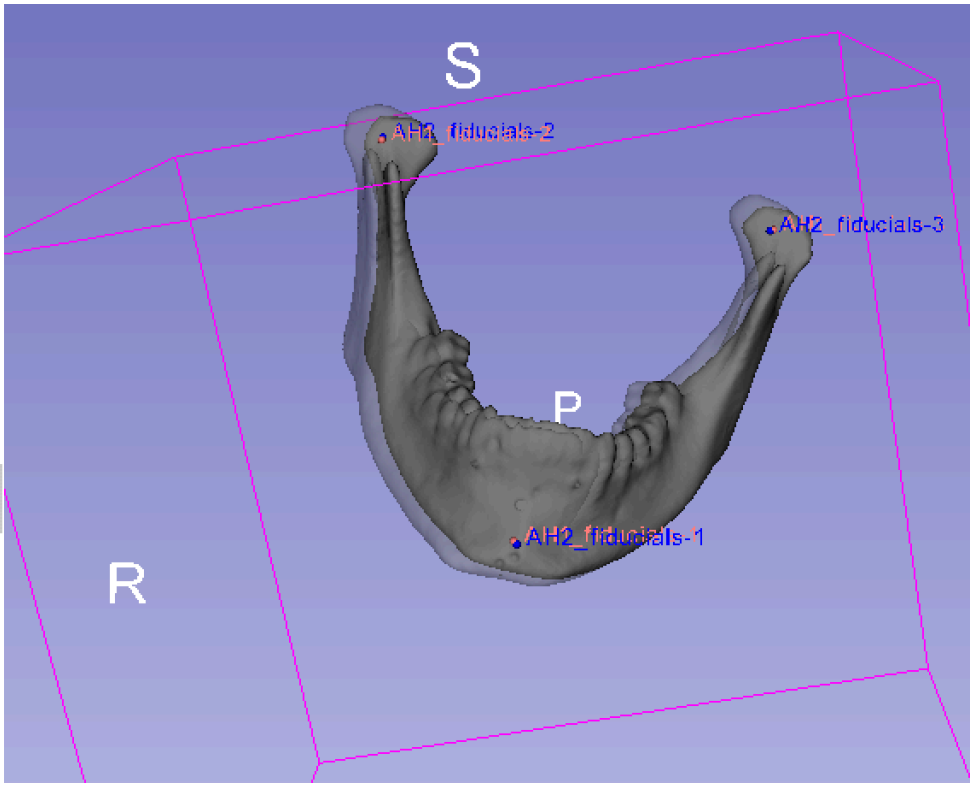
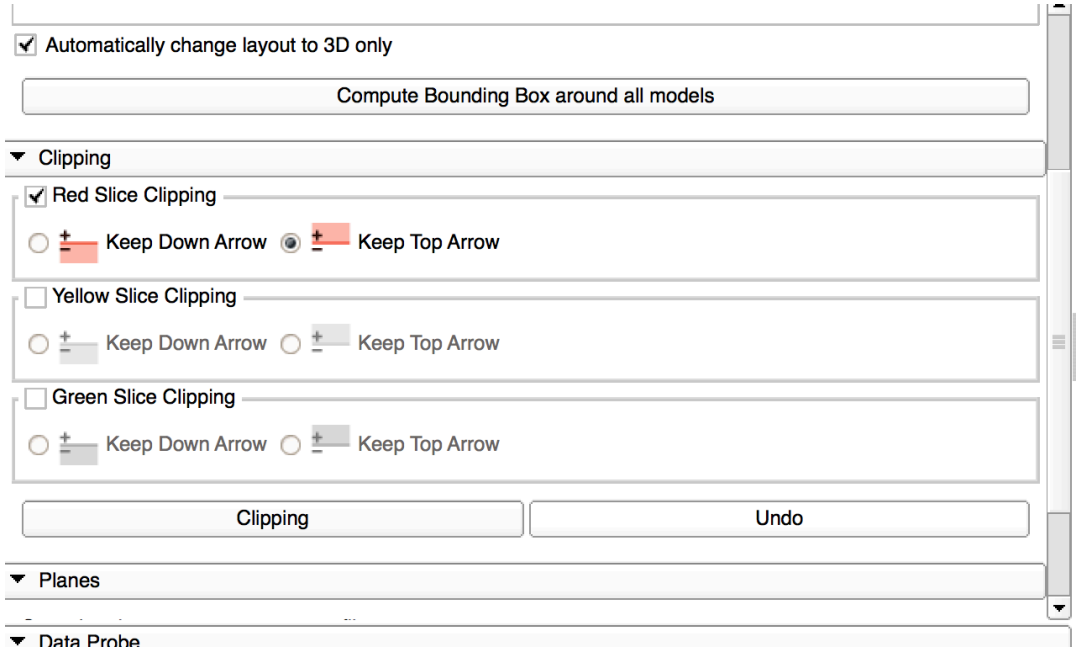
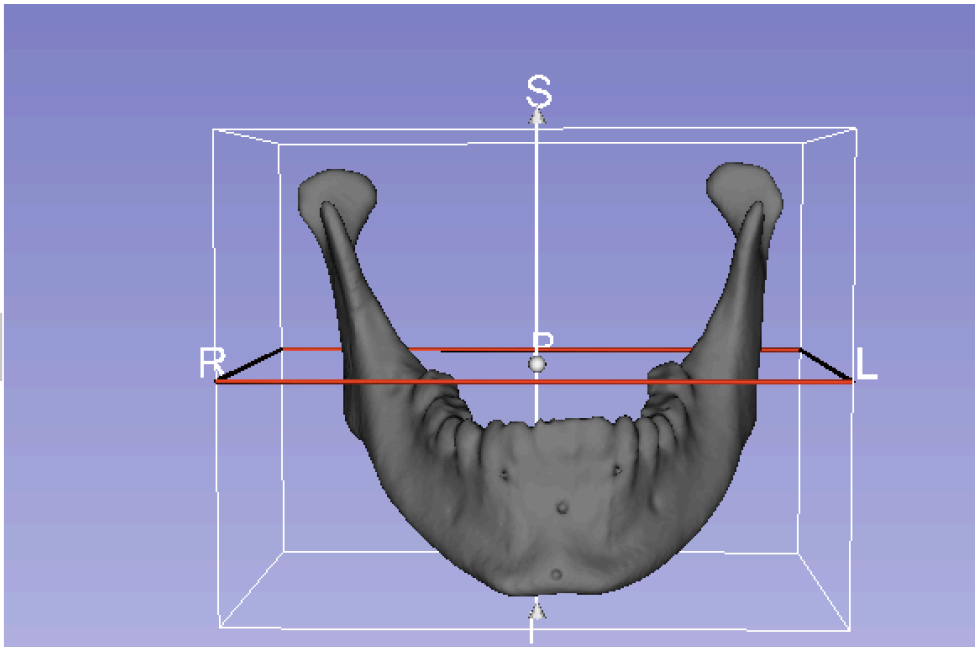




Easy Clip

- All new functionality
- Clip and close models using Slicer planes





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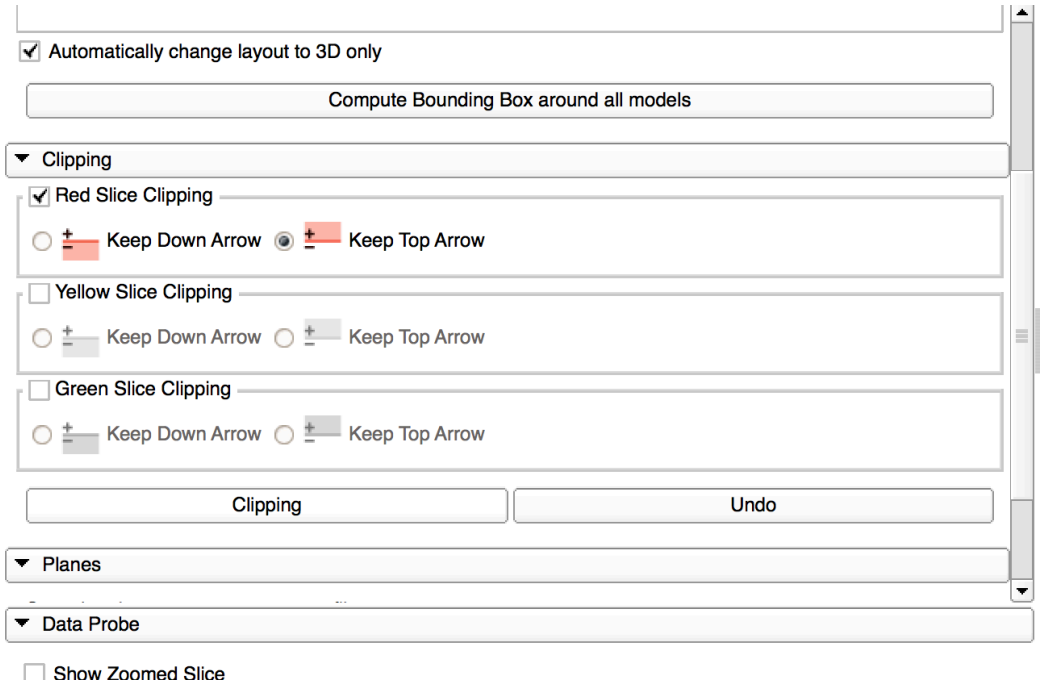
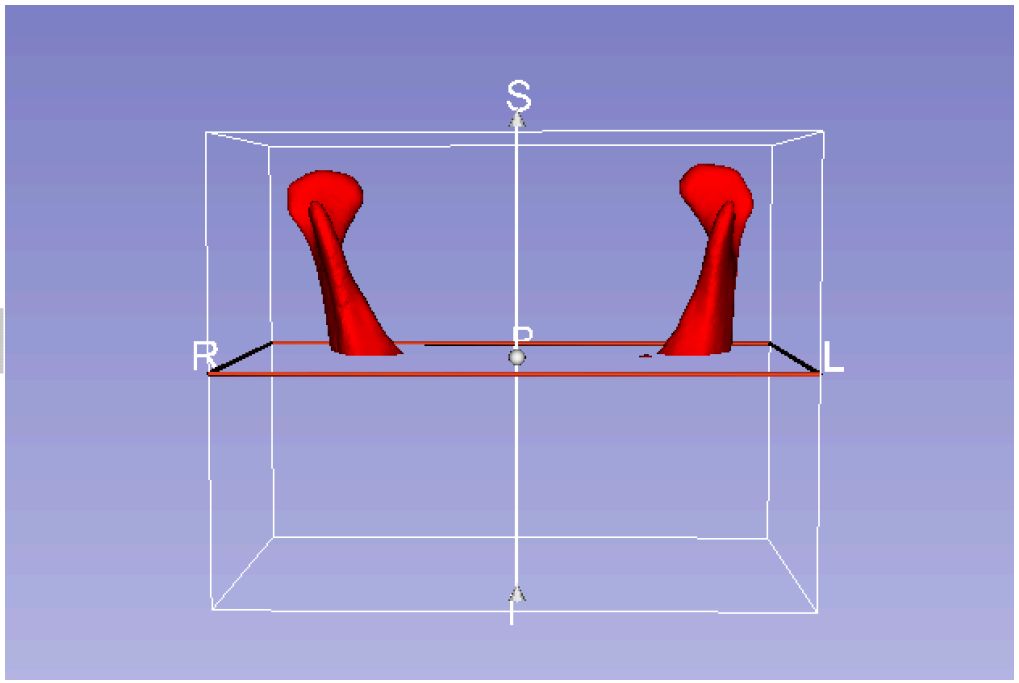
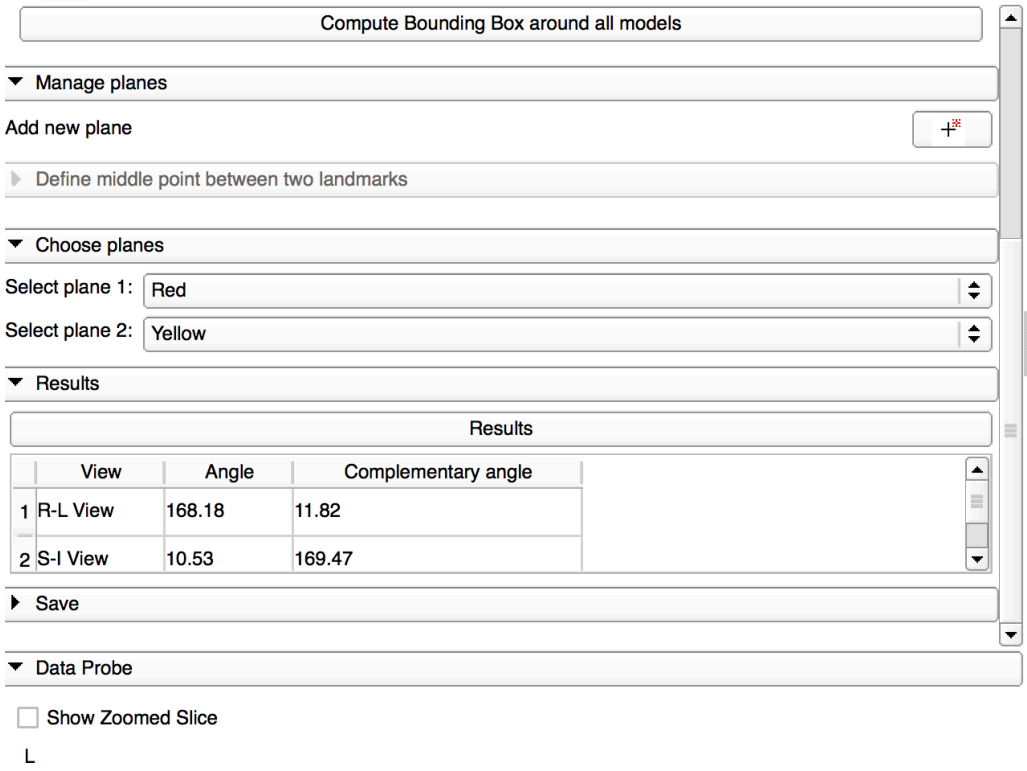
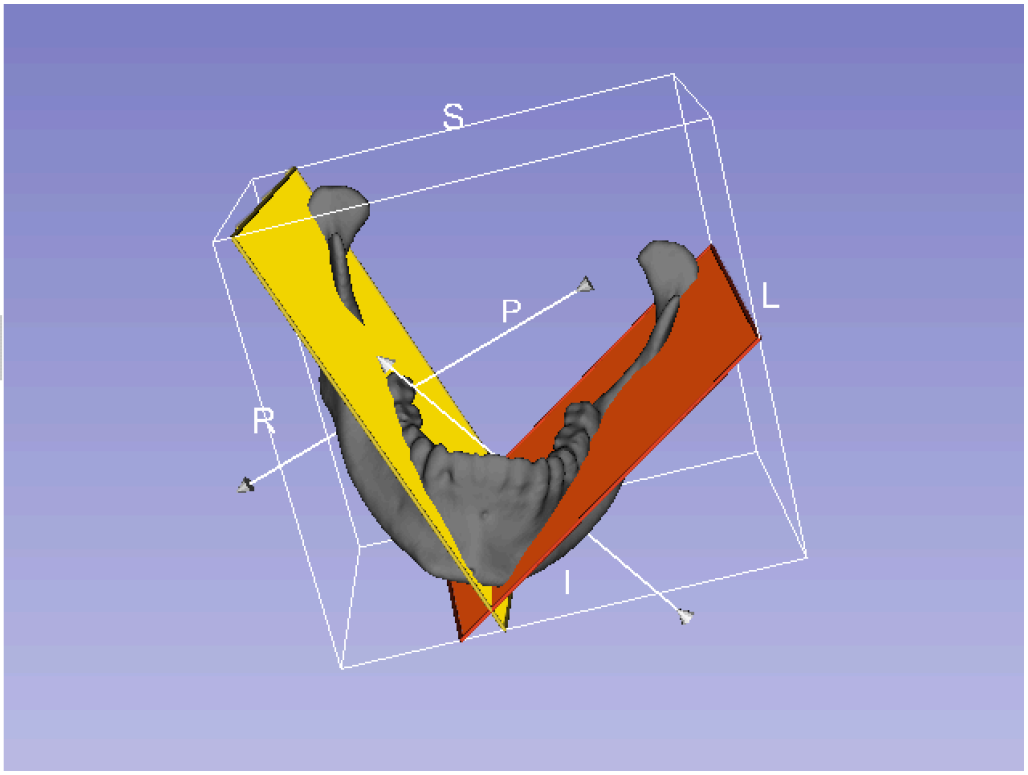




Angle Planes

- Measuring distances between anatomically designed landmarks is crucial in cephalometrics
- No existing software to do it in 3D





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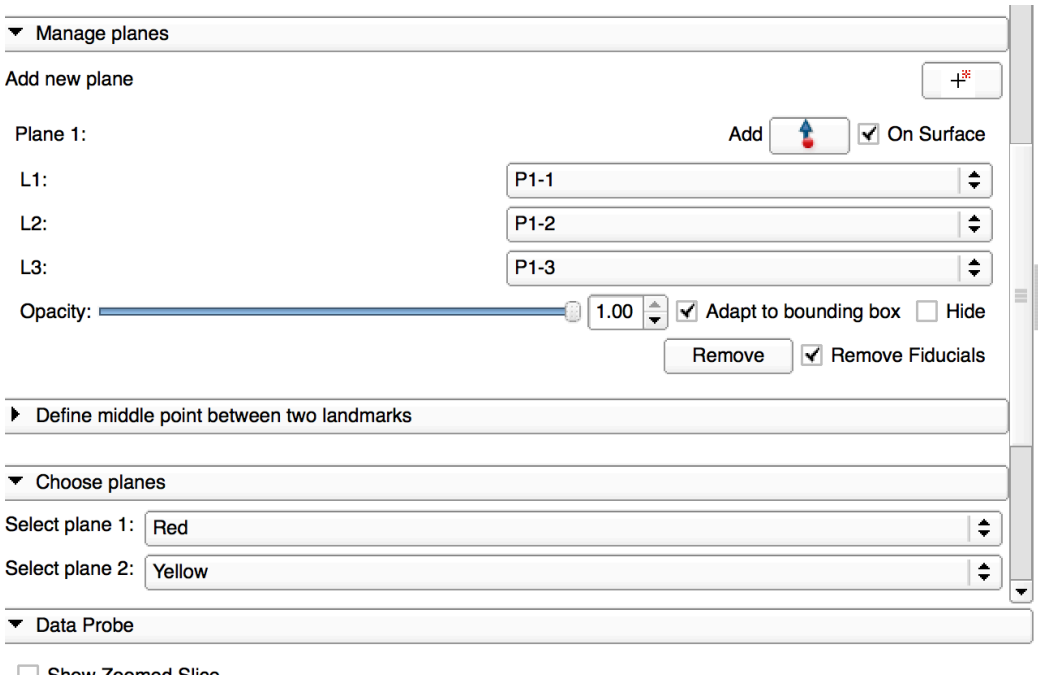
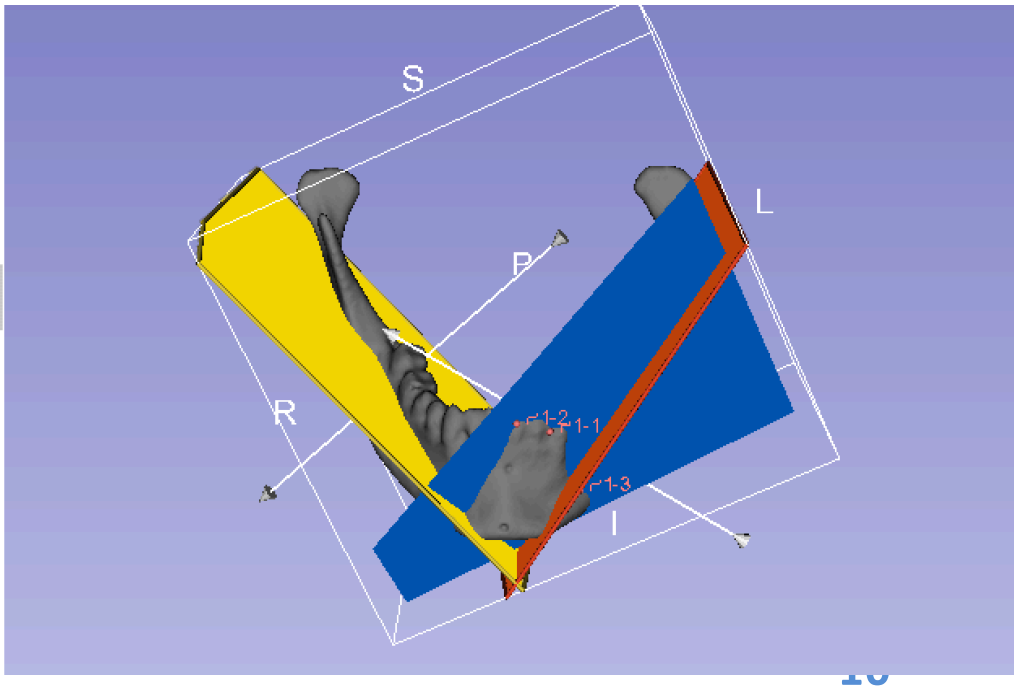
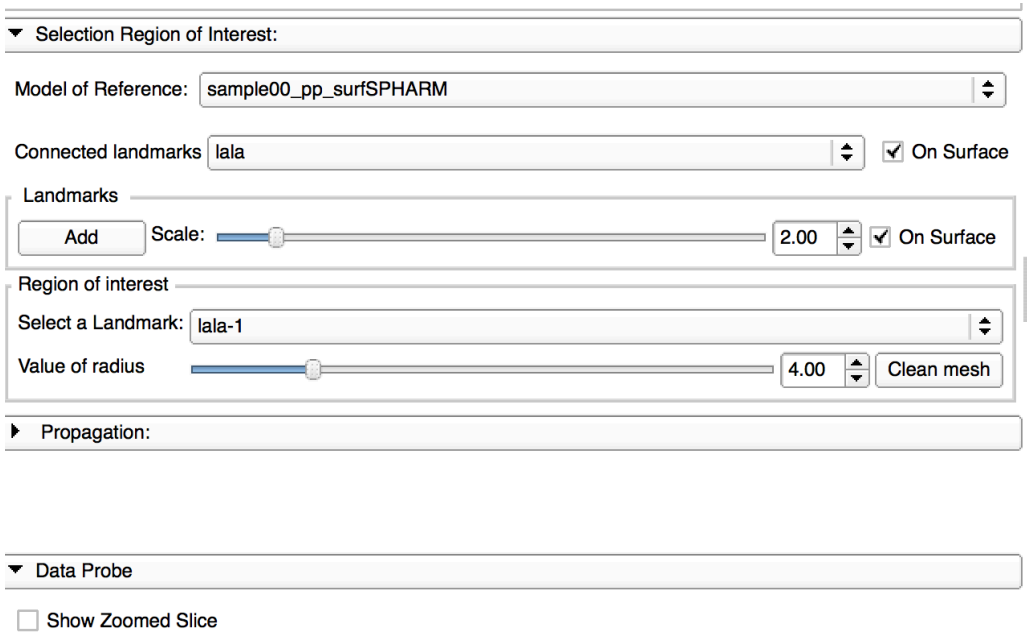
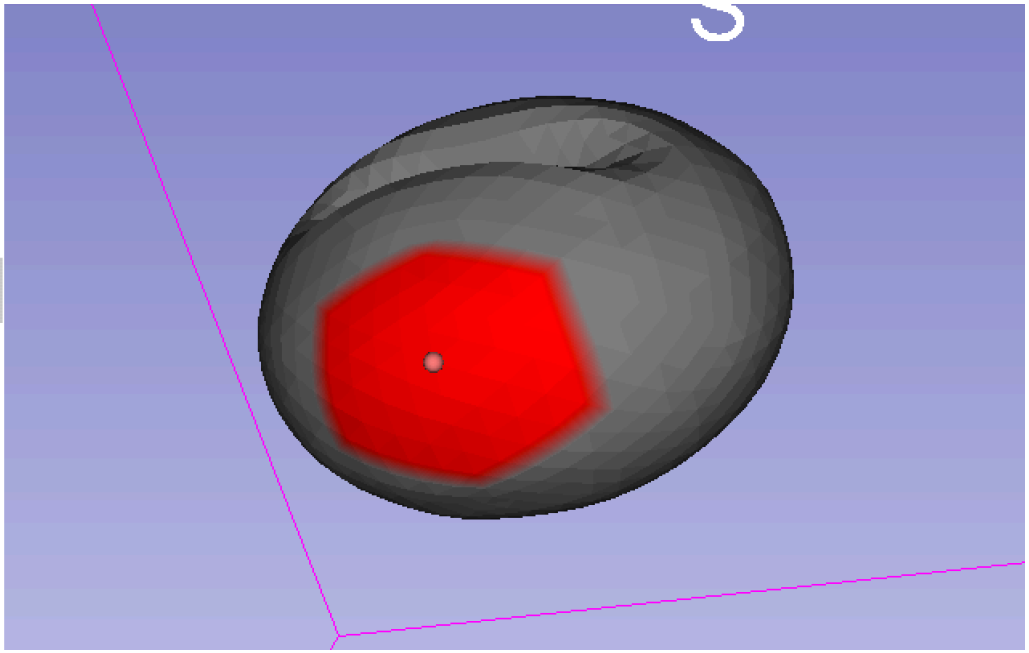




Pick and Paint & MeshStats

- Select ROIs in surface(s) meshes

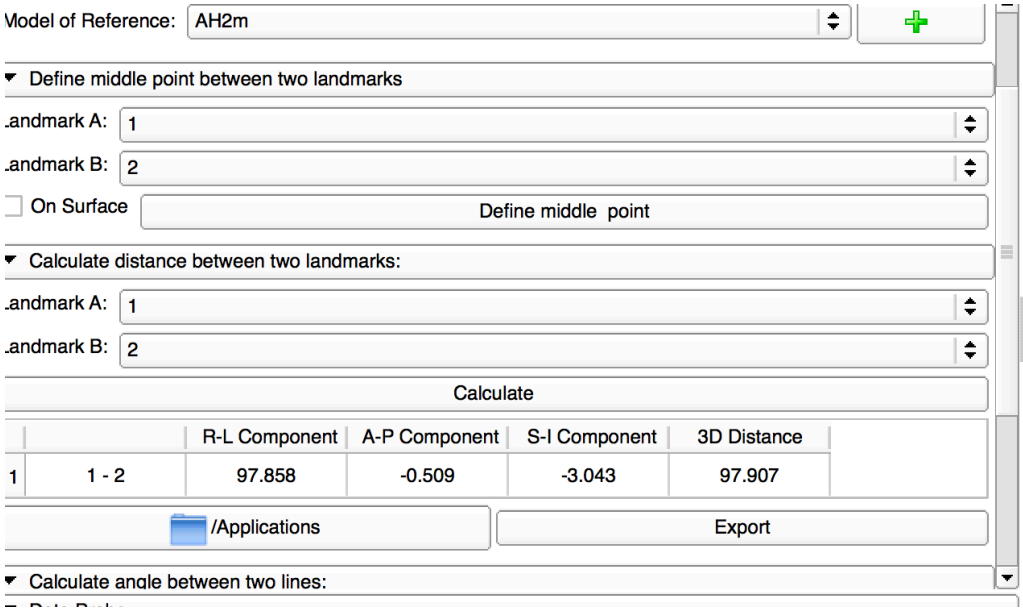


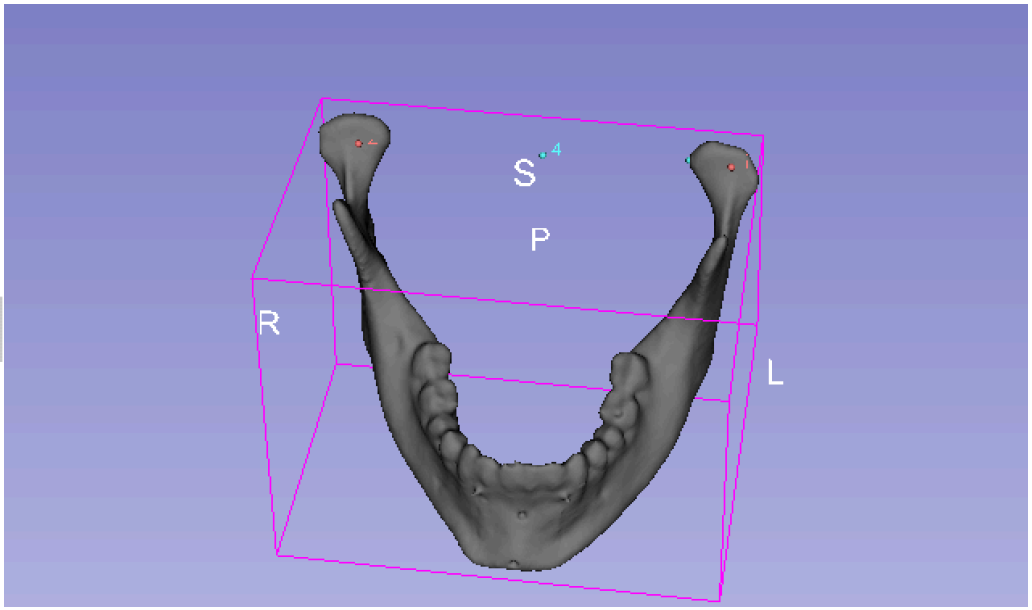


- Compute basic statistics

Q3DC

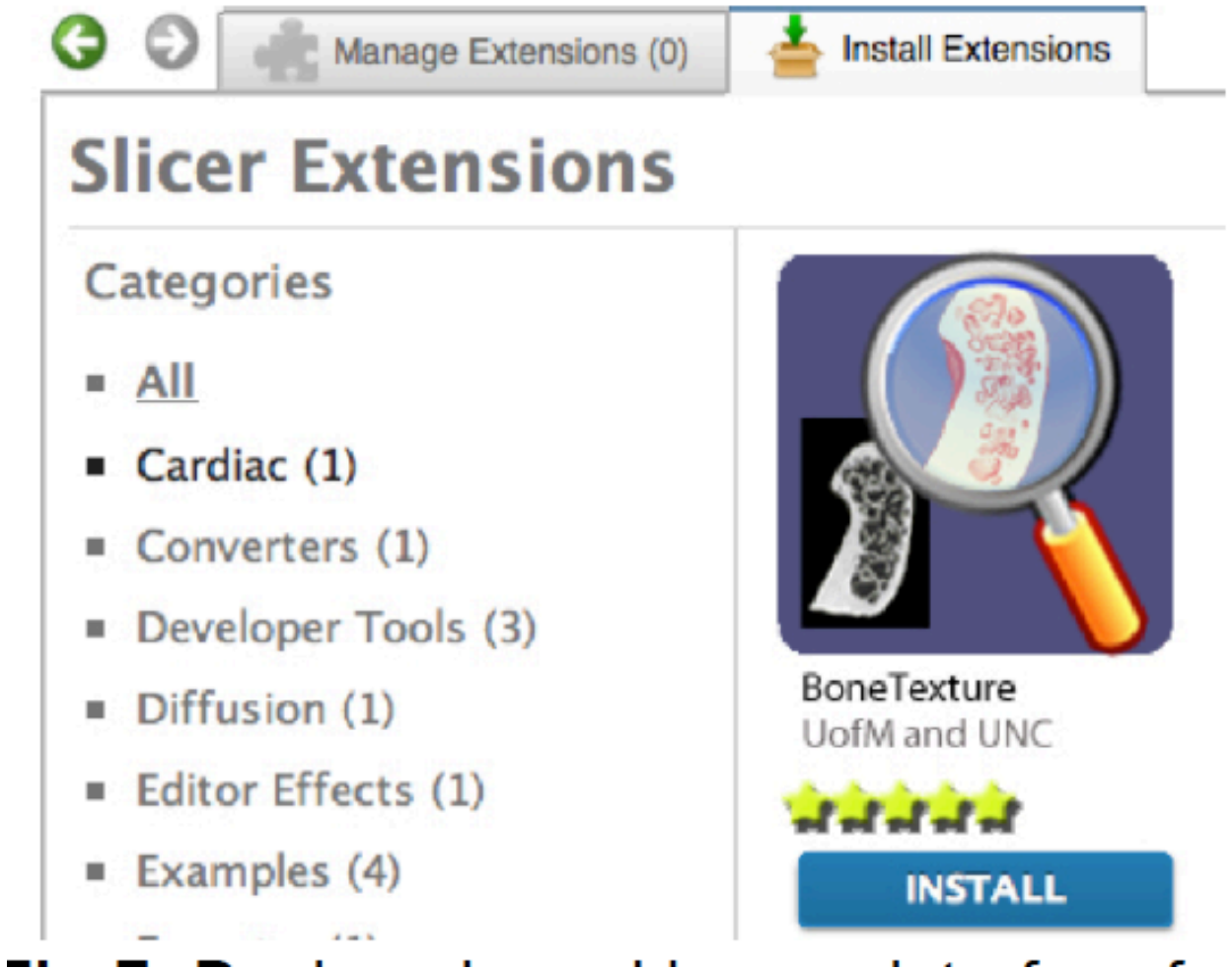
- Computing linear distances and angles in 3D





- **Aim 1.** Determine a 3D morphology index for aiding diagnosis of TMJ osteoarthritis.
- **Aim 2.** Assess effectiveness of treatment in TMJ osteoarthritis longitudinal cohorts using imaging biomarkers.
- Tools for OA developed in 3D Slicer
- *"The successful completion of the proposed aims will provide a solid platform for wide applicability of this novel quantification methodology in dentistry"*

Bone texture extension

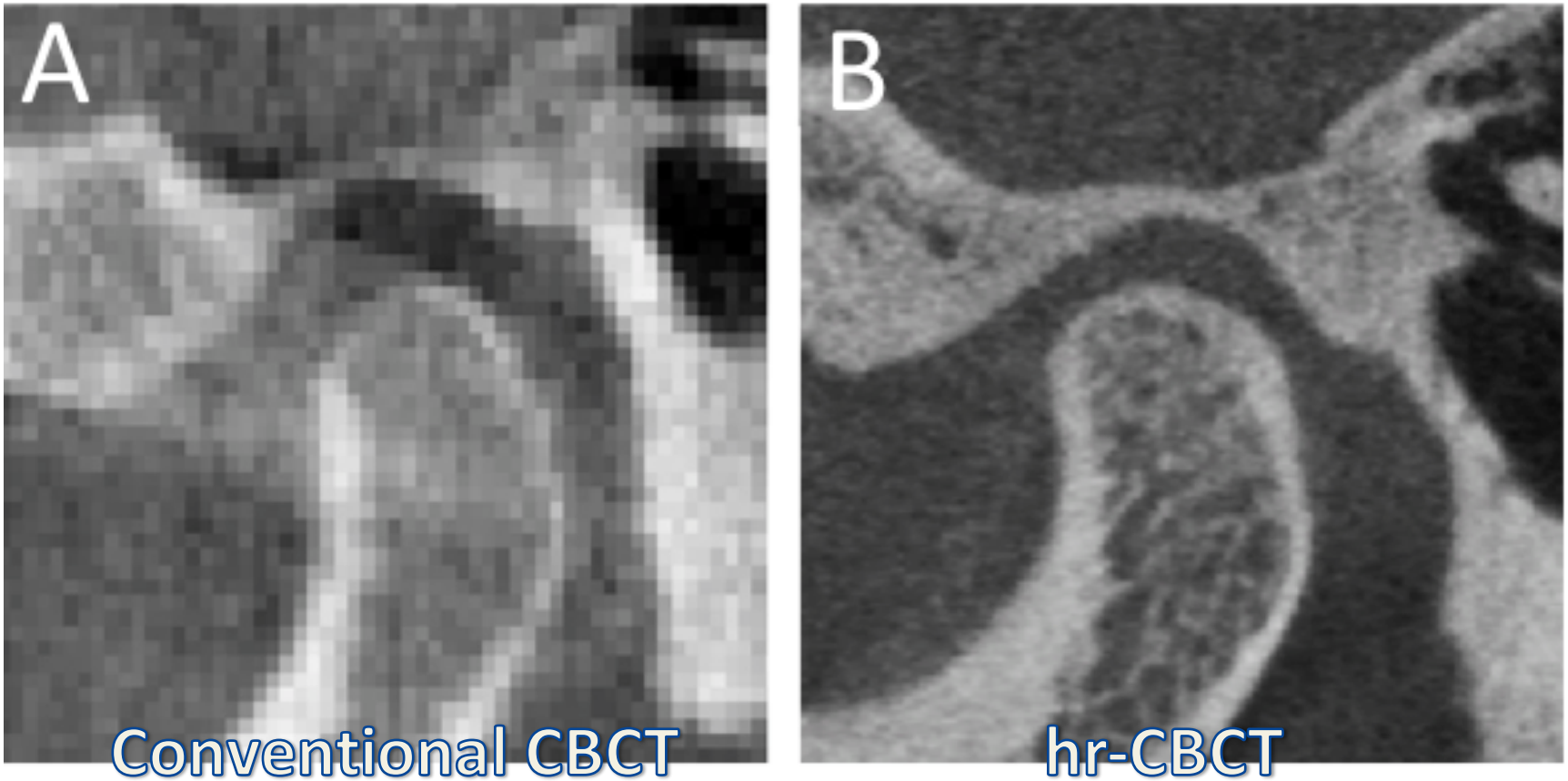


Imaging subchondral bone

- 3D imaging in dentistry has evolved:

Image modality	Advantages	Disadvantages
Computed tomography (CT)	Great contrast in low- and high-density bone	Higher radiation dose for the patient
micro-CT	Same than for CT Very high resolution (few microns)	High radiation doses make it suitable to scan bone specimens
Cone beam CT	High resolution Low radiation dose	Reconstruction algorithm introduces an averaging-blur effect
hr-CBCT	Low radiation dose Better contrast in low- and high-density bone	

Imaging subchondral bone



SlicerCMF

- Specialized and customized version of 3DSlicer for dental researchers that we named SlicerCMF (Cranio Maxillo Facial).
- Remove clutter from the user interface and only expose the set of functionality that is needed.
- *Available for download at our website.*