

The New York Head (ICBM-NY) – description of the provided data

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Here we provide the New York Head, a highly detailed finite element volume conductor model of the average human head introduced in [1].

- [1] Huang, Y., Parra, L. C., Haufe, S., 2015. The New York Head—A precise standardized volume conductor model for EEG source localization and tES targeting, *NeuroImage*, 2015, doi:10.1016/j.neuroimage.2015.12.019
- [2] Haufe, S., Huang, Y., Parra, L. C., 2015. A highly detailed FEM volume conductor model of the ICBM152 average head template for EEG source imaging and tCS targeting. In: *Conf Proc IEEE Eng Med Biol Soc*, 2015

The data are provided at <http://www.parralab.org/nyhead/>.

- `NYHead.zip` contains a template to be used with the `brainstorm` package (see <http://neuroimage.usc.edu/brainstorm/>). This includes the 5 mm resolution MR image of the ICBM152 v2009b template originally obtained from <http://www.bic.mni.mcgill.ca/ServicesAtlases/ICBM152NLin2009>, a surface of the head, a highly detailed (75K nodes) surface of the cortex, names and locations of 231 electrodes, and the FEM lead field evaluated for all 75K cortical locations and 231 electrodes.
- `sa_icbmny.mat` contains a Matlab structure `sa` that can be used independent of any toolbox. It contains the following fields.

sa	
<code>.cortex75K</code>	Structure containing a high-resolution (75K nodes) triangular mesh of the cortical surface (gray matter/CSF interface).
<code>.vc</code>	MNI coordinates of mesh vertices.
<code>.vc_smooth</code>	Vertex coordinates of a spatially smoothed mesh with identical topology.
<code>.tri</code>	Indices of nodes forming the triangles (faces) of the mesh.
<code>.tri_left</code>	(<code>.tri_right</code>) Face indices for left and right hemispheres separately.
<code>.normals</code>	Normal vector for each vertex.
<code>.curvature</code>	Curvature for each vertex.
<code>.sulcimap</code>	Binary mask indicating for each vertex whether it is located in a sulcus.
<code>.V</code>	FEM lead field for 231 electrodes and source dipoles located at the 75K cortical mesh nodes along the three spatial dimension. As the lead field is provided in common average reference, its rank is 230.
<code>.V_normal</code>	FEM lead field assuming dipole orientations perpendicular to the cortical surface (the product of <code>.cortex75K.V</code> and <code>.cortex75K.normals</code>).
<code>.cortex10K</code>	Lower-resolution (10K nodes) triangular mesh of the cortical surface. Useful for efficient forward and inverse modeling.
<code>.in_from_cortex75K</code>	Vertex indices relative to the high-resolution mesh <code>cortex75K</code> , of which this mesh is a strict subset. MNI coordinates of mesh vertices of <code>cortex10K</code> are given by <code>cortex75K.vc(cortex10K.in_from_cortex75K,:)</code> and <code>cortex75K.vc_smooth(cortex10K.in_from_cortex75K,:)</code> .
<code>.tri</code>	(<code>.in_L</code> , ... , <code>.in_L_inner</code> , ... , <code>.in_LPS</code> , ... , <code>.in_LPS_inner</code>) Analogous to <code>cortex75K</code> , but indexing <code>cortex10K.in_from_cortex75K</code> . For example, MNI coordinates for mesh nodes located in the left hemisphere are obtained as <code>cortex75K.vc(cortex10K.in_from_cortex75K(cortex10K.in_L),:)</code> .
<code>.in_to_cortex75K_eucl</code>	Index vector used to interpolate functions defined on the 10K cortical mesh (such as inverse solutions) on the 75K mesh for plotting purposes. If <code>S</code> is a function defined on the 10K mesh, then <code>S(cortex10K.in_to_cortex75K_eucl)</code> is the function projected onto the 75K mesh. Here, interpolation is based on the Euclidean distance.
<code>.in_to_cortex75K_geod</code>	Interpolation indices based on the geodesic distance along the 75K mesh, using that the 10K mesh is a subset of the 75K mesh. To be used in the same way as <code>.in_to_cortex75K_eucl</code> .
<code>.cortex5K</code>	(<code>.cortex2K</code>) Lower-resolution mesh structures analogous to <code>.cortex10K</code>

sa (cntd.)	
<code>.head</code>	Triangulated head surface.
<code>.vc</code>	(<code>.tri</code> , <code>.normals</code> , <code>.curvature</code>) Analogous to <code>cortex75K</code> .
<code>.mri</code>	Structure containing the ICBM152 v2009b anatomical MRI data.
<code>.data</code>	3D MR image with enhanced brain to background contrast.
<code>.brainmask</code>	Binary brain mask.
<code>.clab_electrodes</code>	Cell array of EEG electrode labels.
<code>.locs_2D</code>	2D projection of the EEG electrodes to the x, y -plane. Useful for plotting 2D scalp maps.
<code>.locs_3D</code>	MNI coordinates of EEG electrodes, and normal vectors relative to the scalp surface.
<code>.mni2mri</code>	Affine transformation matrix to convert MNI coordinates into index vectors for the MR image <code>mri.data</code> . Consists of a scaling and a translation.
<code>.mri2mni</code>	Affine transformation to convert MRI coordinates into MNI space.
<code>.naspalparori</code>	MNI coordinates of Nasion (NAS), left and right pre-auricular points (PAL/PAR), and the origin (ORI) of the coordinate system defined by NAS, PAL and PAR.
<code>.acpcihori</code>	MNI coordinates of Anterior and Posterior Commissure (AC/PC), inter-hemispheric point (IH), and the origin of the coordinate system defined by AC, PC, and IH.

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