

Histological reference atlas and coordinate system for a 21 gestational week fetal brain

December 9, 2024

Corresponding manuscript: Jai Jayakumar, et al. "A three-dimensional histological cell atlas of the developing human brain"

Demographic information: Specimen ID: S1/ FB10 AP (cms): 6.6 Bi temporal diameter (cms): 5.1 Brain weight (gms): 56.24 Age (GW): 21 Sex: M

This atlas includes serial section histology data, with neighboring sections aligned. Sections are 20um thick and collected in a series of three, alternating between Nissl, H&E, and various antibody stains (not shown), so that sections corresponding to a individual stain type are 60 um apart.

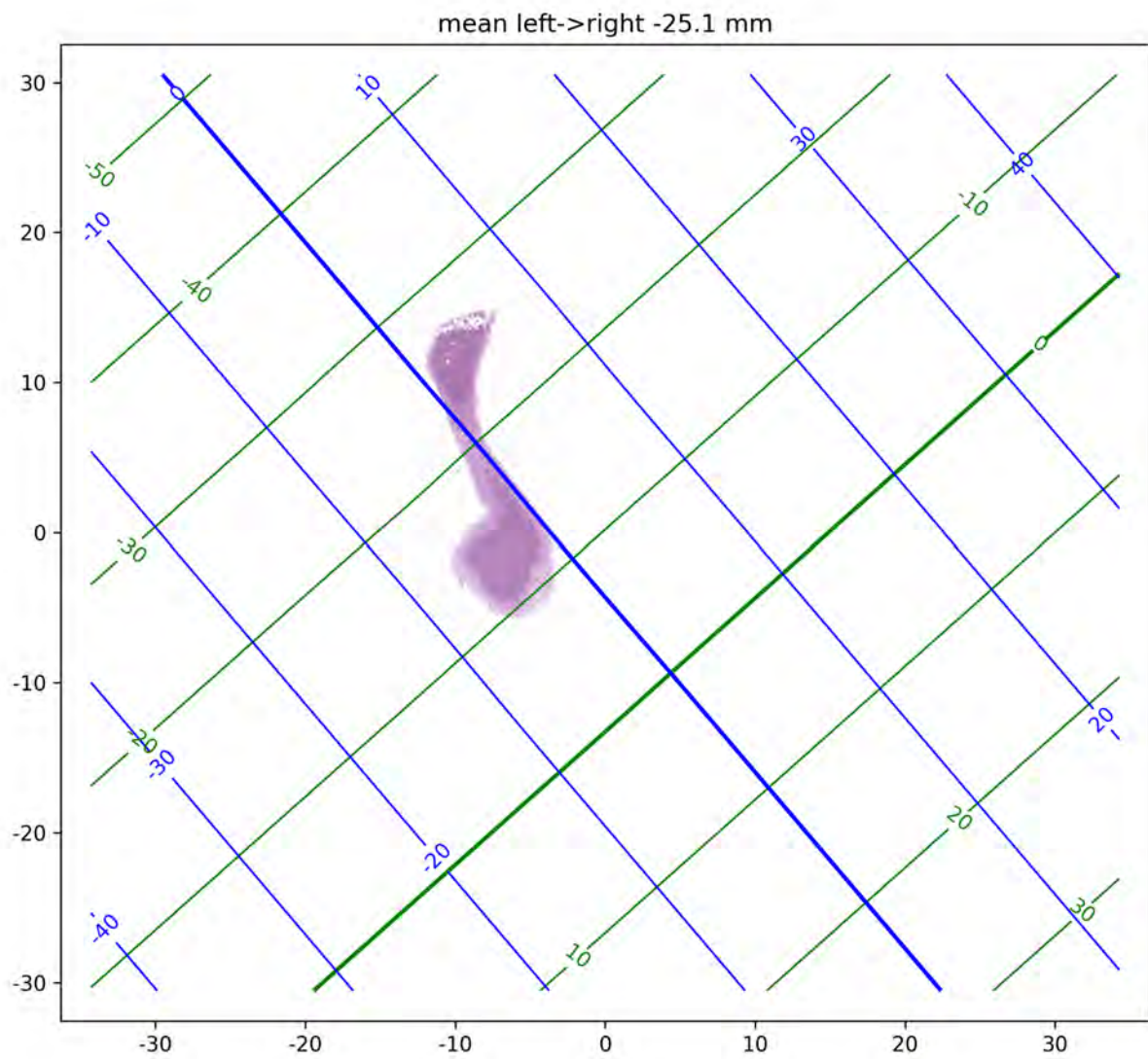
We have developed a standard RAS (x=Right, y=Anterior, z=Superior) coordinate system described as shown below. Please refer to figure 2 in the manuscript.

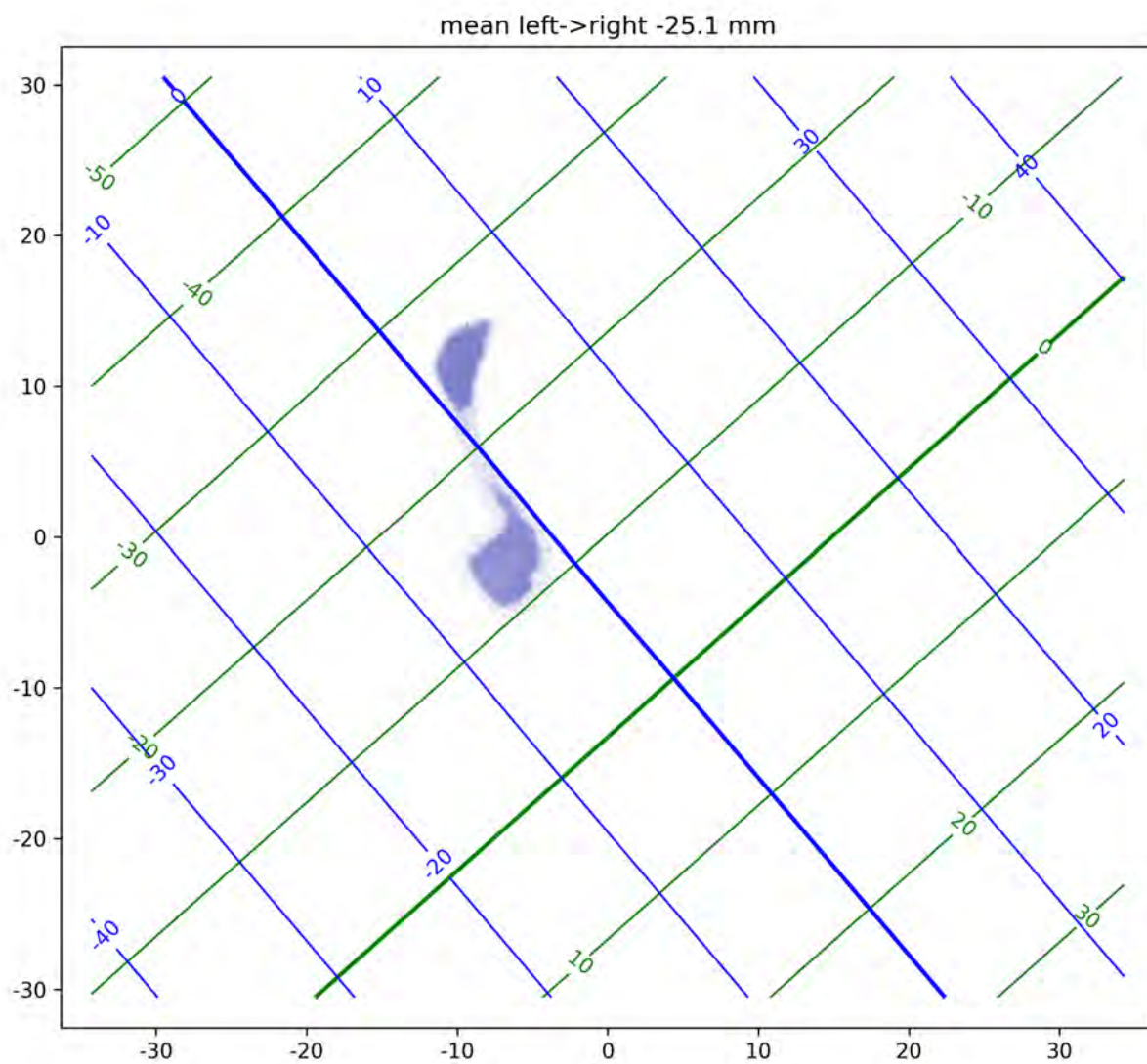
The data below shows this coordinate system as a curvilinear grid, with 10mm spaced isocontours, labeled in mm. Red lines correspond to the left-right axis with right positive. Green lines correspond to the posterior-anterior axis with anterior positive. Blue lines correspond to the inferior-superior axis with superior positive. The x=0, y=0, and z=0 lines are drawn thicker. Note that our sagittal histology sections are nearly perpendicular to the left right axis, and so red lines appear more curved.

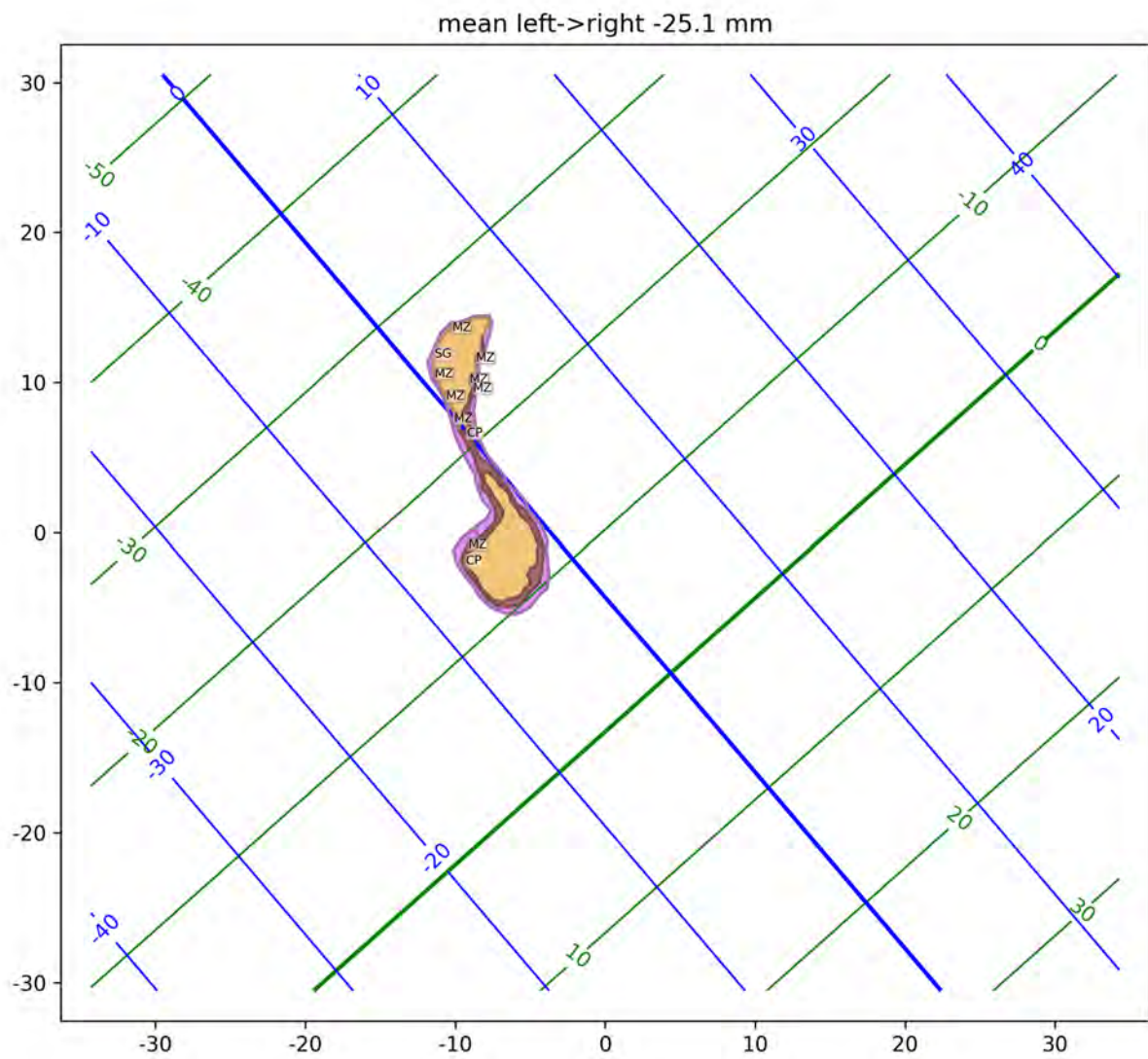
Below we show alternating pages with manually drawn annotations with median spacing between annotations of 0.66mm. Corresponding Nissl stained sections on which annotations were drawn are also included, here downsampled to 64 micron in plane resolution. Finally where neighboring tissue sections are available with H&E stain, these sections are also shown also at 64 micron resolution.

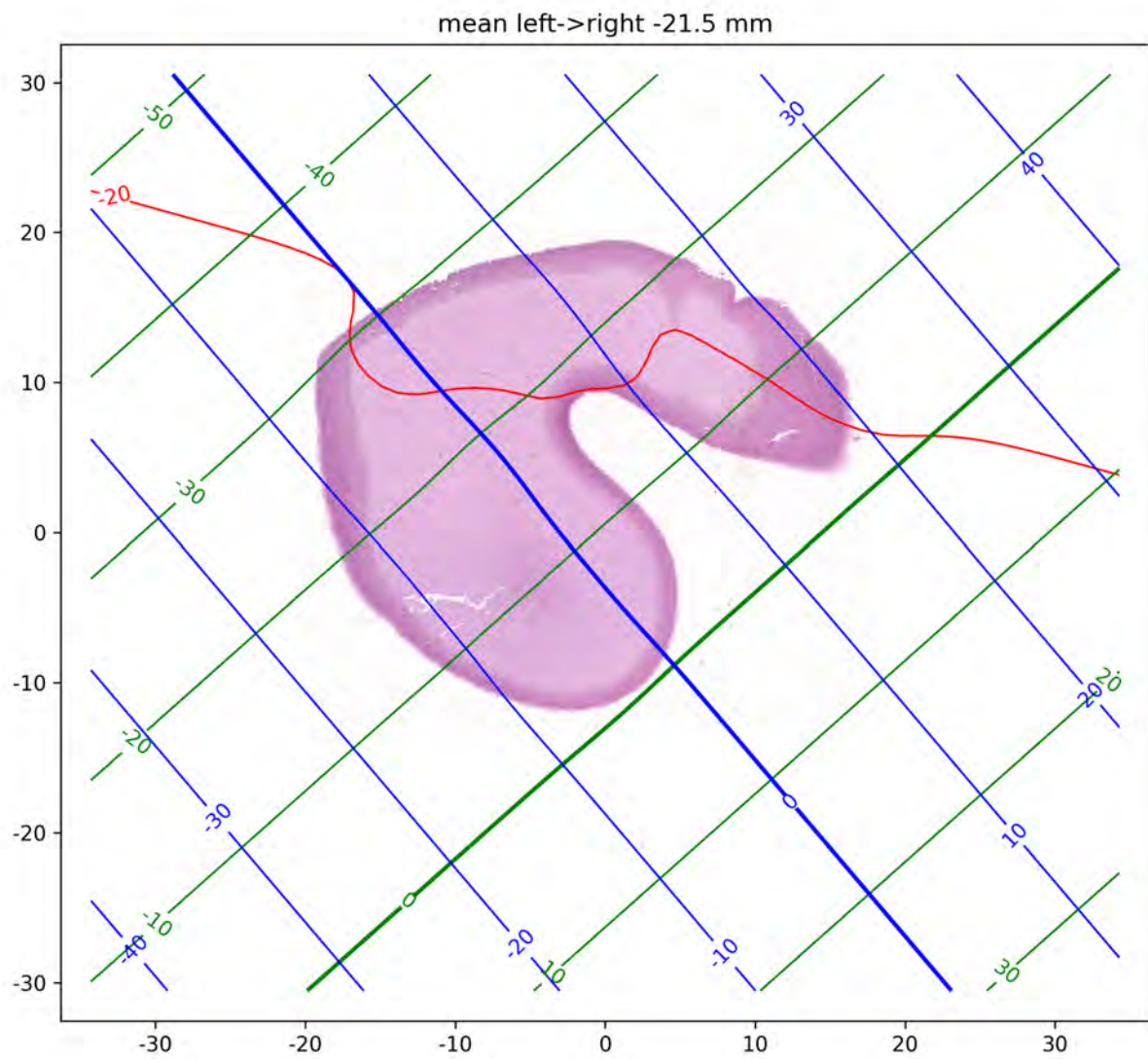
The horizontal and vertical axes of the image in each section also labeled with tick marks in mm, with 10 mm spacing to help with understanding scale.

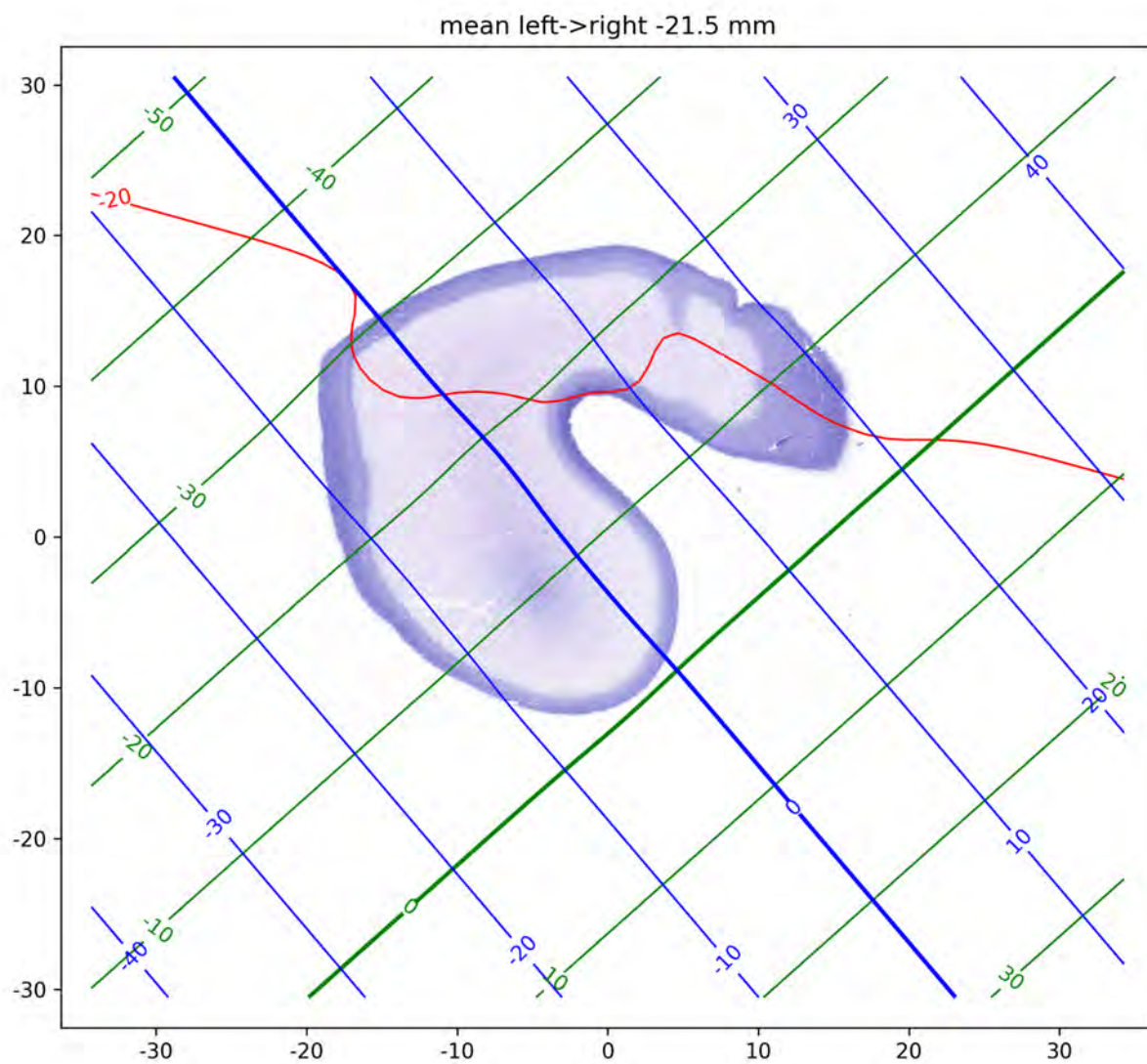
Abbreviation	Full Name	Color
FGM	gray matter of forebrain	gray
ICX	insular neocortex	light blue
HIP	hippocampus (hippocampal formation)	light green
IG	indusium griseum	light green
OT	olfactory tubercle	light green
PIr	piriform cortex	light green
PEA	piriform-entorhinal-amygdaloid area	light green
EC	entorhinal cortex	light green
BN	basal nuclei (basal ganglia)	light green
STR	striatum	light green
Ca	caudate nucleus	light green
CaH	head of caudate	light green
Pu	putamen	light green
NAC	nucleus accumbens	light green
CaPu	caudate-putamen cell bridges	light green
GP	globus pallidus	light green
Cla	claustrum	light green
BF	basal forebrain	light green
SI	substantia innominata	light green
AMY	amygdaloid complex	light green
BNST	bed nucleus of stria terminalis	light green
THM	thalamus	light green
DTH	dorsal thalamus	light green
MNC	medial nuclear complex of thalamus	light green
Pul	pulvinar of thalamus	light green
CeM	central medial nucleus of thalamus	light green
ETH	epithalamus	light green
FF	nucleus of the field of Forel	light green
ZI	zona incerta	light green
R	reticular nucleus of thalamus	light green
SubTH	subthalamus	light green
STH	subthalamic nucleus	light green
HTH	hypothalamus	light green
FTS	transient structures of forebrain	light green
MZ	marginal zone	light green
alMZ	MZ in allocortex	light green
MZsub	MZ in subicular cortex	light green
IMZ	MZ in insular neocortex	light green
CP	cortical plate	light green
CSub	CP in subicular cortex	light green
CPEC	CP in entorhinal cortex	light green
CPas	CP in parasubicular cortex	light green
ICP	CP in insular neocortex	light green
SP	subplate zone	light green
SPsub	SP in subicular cortex	light green
IZ	intermediate zone	light green
alIZ	IZ in allocortex	light green
IZsub	IZ in subicular cortex	light green
SZ	subventricular zone	light green
VZ	ventricular zone	light green
GE	Ganglionic eminence (VZ in basal nuclei)	light green
RMS	rostral migratory stream	light green
SG	subpial granular zone	light green
SGsub	SG in subicular cortex	light green
alSG	SG in allocortex	light green
ScG	subcallosal gray zone	light green
PFG	perifornical gray zone	light green
FWM	white matter of forebrain	white
ac	anterior commissure	white
cc	corpus callosum	white
extC	external capsule	white
fx	fornix	white
ic	internal capsule	white
ot	optic tract	white
st	stria terminalis	white
ox	optic chiasm	white
on	optic nerve	white
PHG	parahippocampal gyrus	light blue
HiF	hippocampal gyrus (formation)	light blue
ChL4V	choroid plexus of lateral ventricle	light blue
Ch3V	choroid plexus of 3V	light blue
PTR	pretectal region	light blue
MTg	midbrain tegmentum	light blue
MRF	midbrain reticular formation	light blue
RN	red nucleus	light blue
SN	substantia nigra	light blue
IP	interpeduncular nucleus	light blue
SC	superior colliculus	light blue
IC	inferior colliculus	light blue
MWM	white matter of midbrain	white
poc	posterior commissure	white
cpd	cerebral peduncle (crus cerebri)	white
cpn-m	corticopontine fibers, midbrain portion	white
MSS	surface structures of midbrain	light blue
HGM	gray matter of the hindbrain	gray
CBH	cerebellar hemisphere	light blue
CbDN	cerebellar deep nuclei	light blue
Pn	pons	light blue
PnBa	basilar part of pons	light blue
PN	pontine nucleus	light blue
PnTg	pontine tegmentum	light blue
7N	facial nucleus	light blue
PnAN	afferent nuclei of cranial nerves in pons	light blue
Mo	myelencephalon (medulla oblongata)	light blue
MoPy	pyramidal part of medulla oblongata	light blue
IO	inferior olive	light blue
VeTe	external granular (germinal) zone of the vermis	light blue
VeTm	marginal zone of the vermis	light blue
VeTp	Purkinje cell zone of the vermis	light blue
VeTi	inner granular cell zone of the vermis	light blue
VeTv	ventricular (germinal) zone of the vermis	light blue
CbTe	external granular (germinal) zone of lateral hemisphere	light blue
CbLTm	marginal zone of lateral hemisphere	light blue
CbLTp	Purkinje cell zone of lateral hemisphere	light blue
CbLTI	inner granular cell zone of lateral hemisphere	light blue
CbLTv	ventricular (germinal) zone of lateral hemisphere	light blue
HWM	white matter of hindbrain	white
xpy	pyramidal decussation	white
Ch4V	choroid plexus of the fourth ventricle	light blue
ma4V	median aperture (foramen of Magendie)	light blue
SpC	spinal cord	gray
SWM	white matter of spinal cord	white

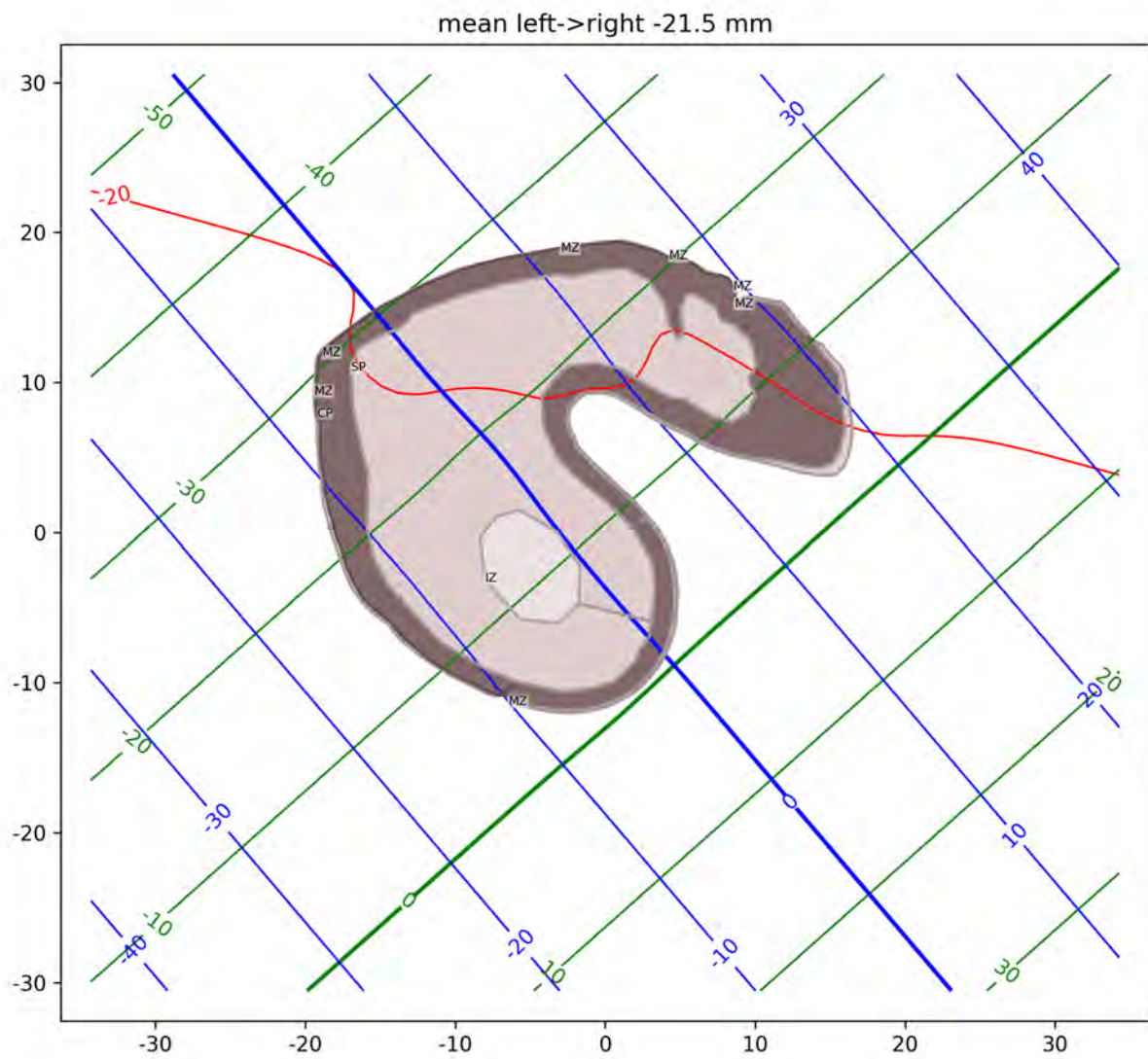


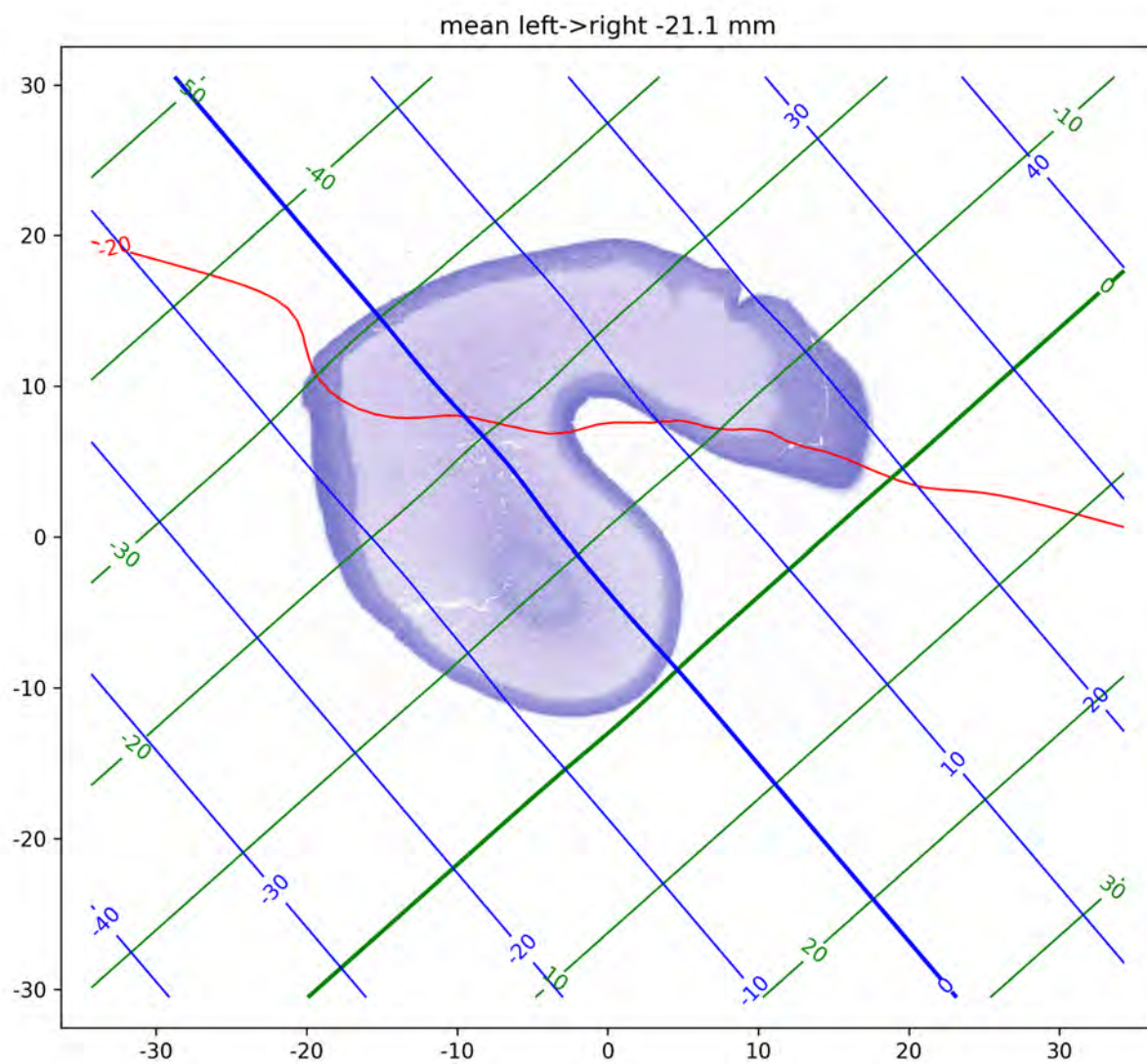


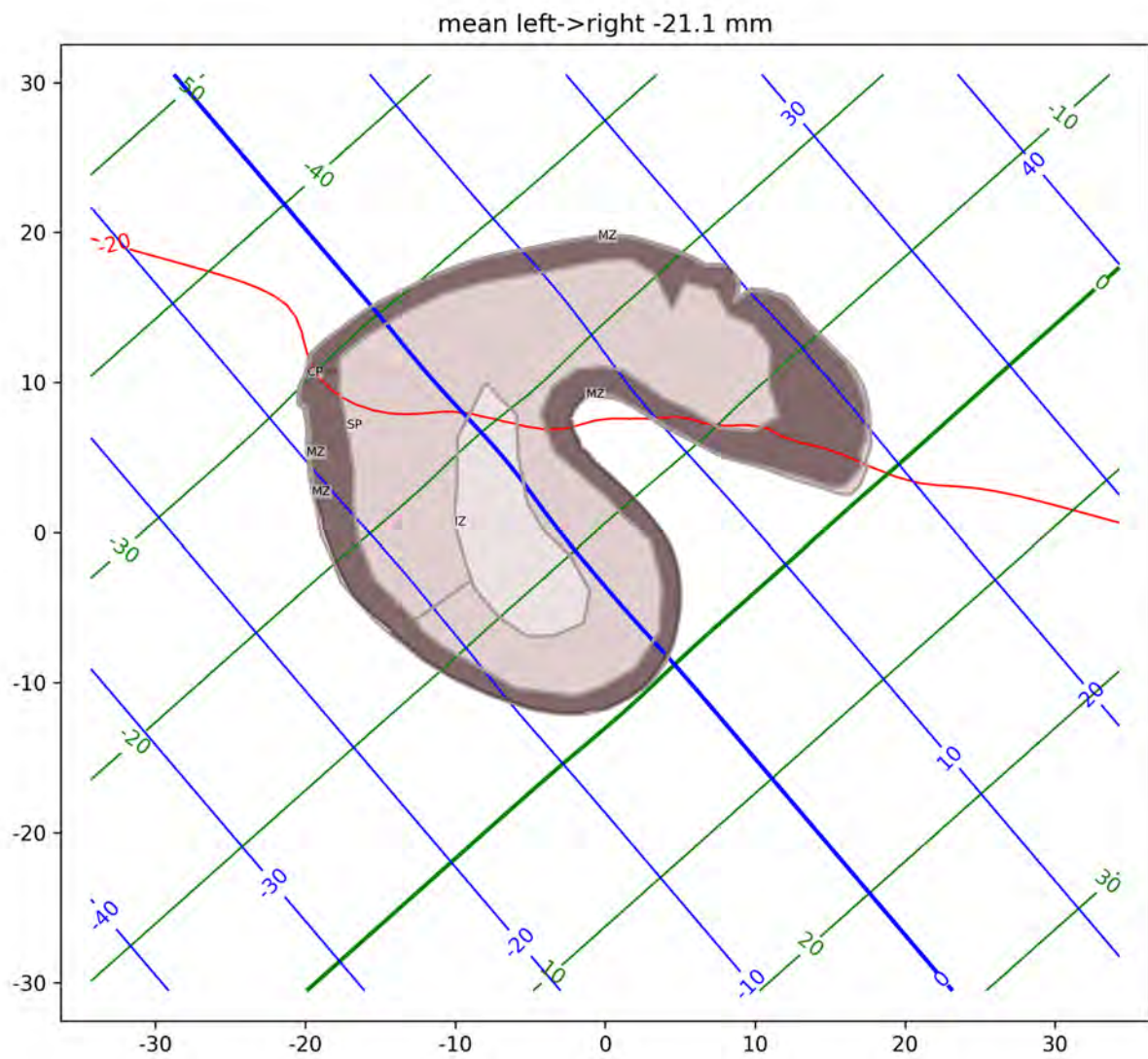


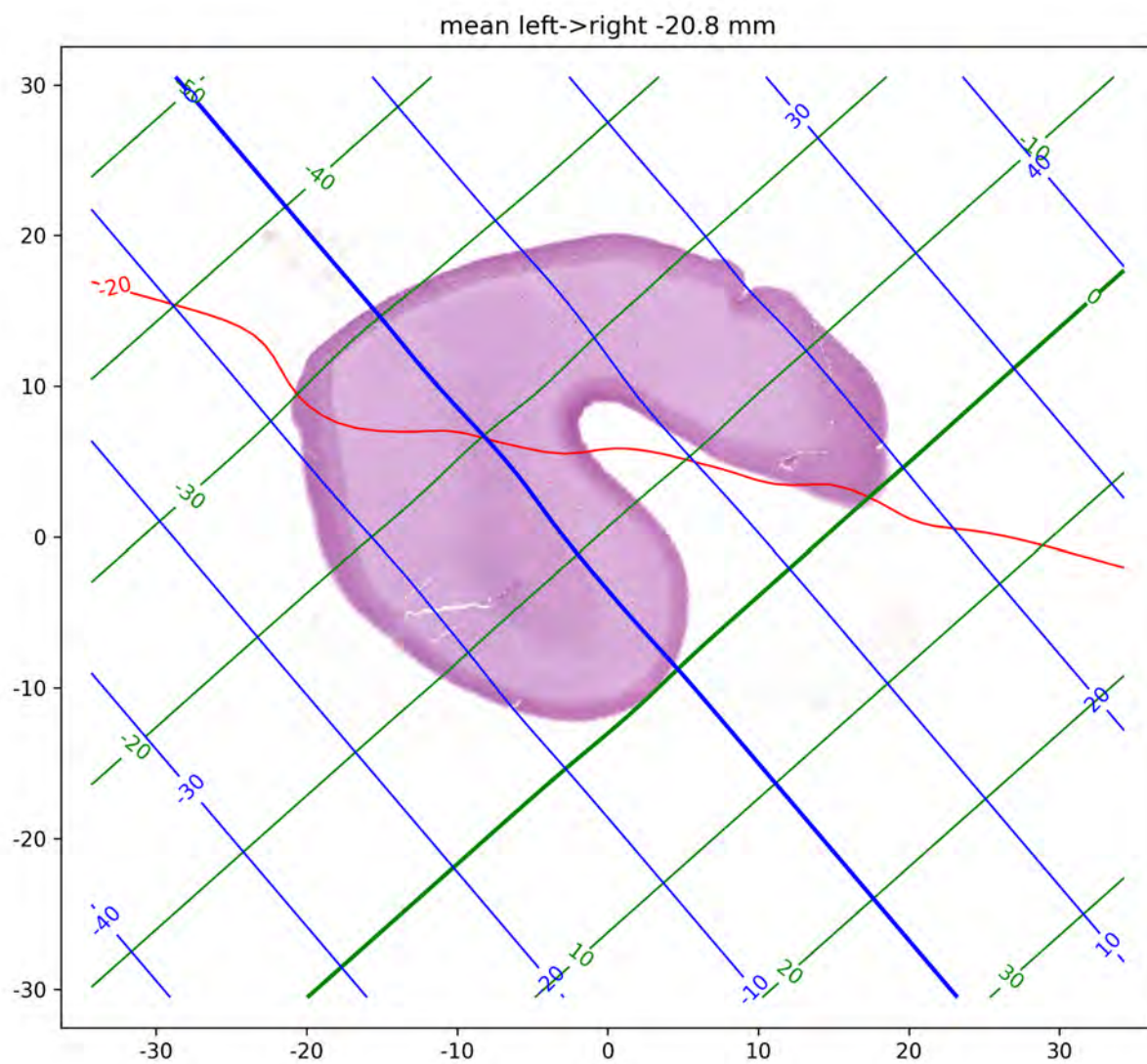


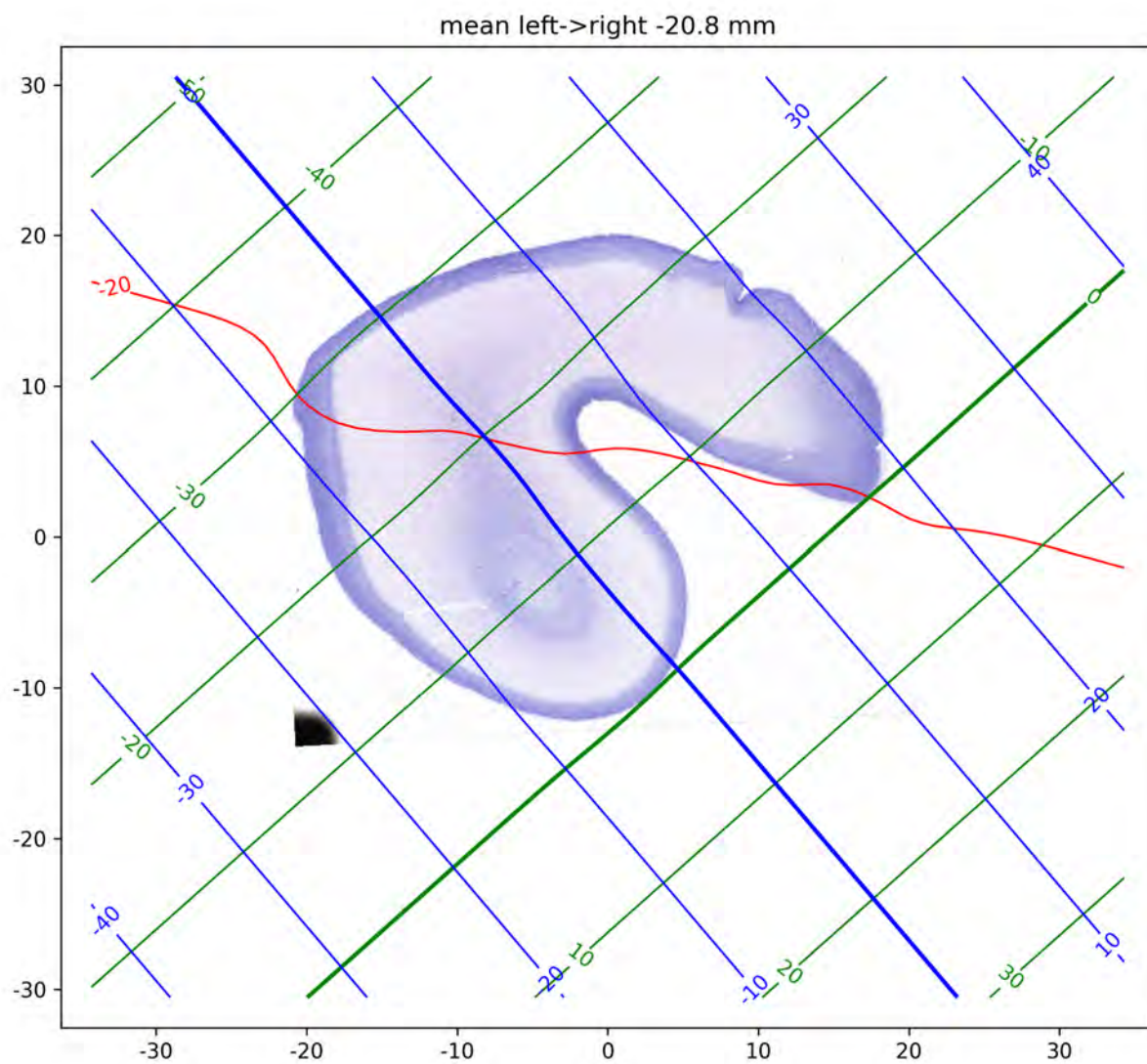


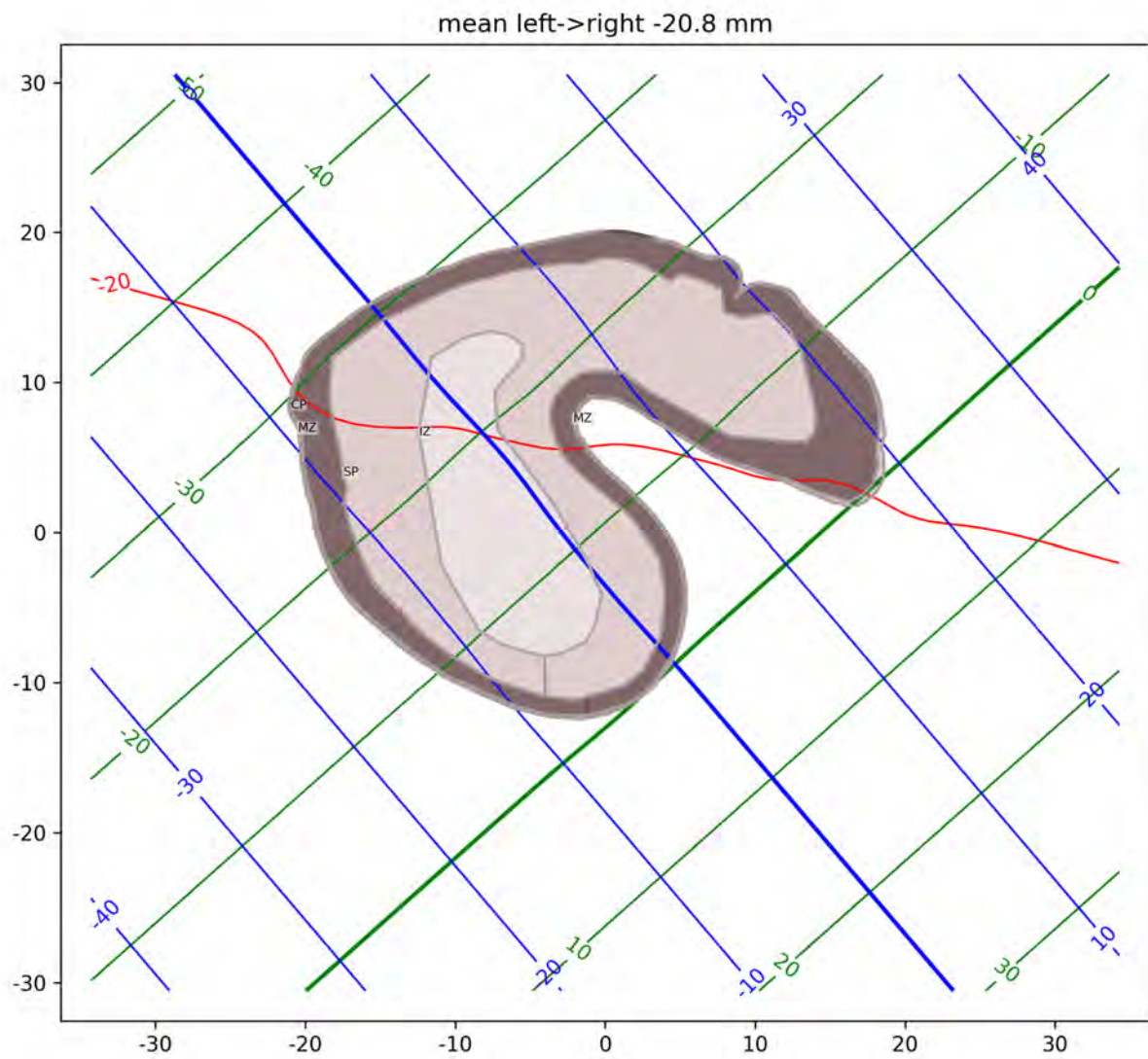


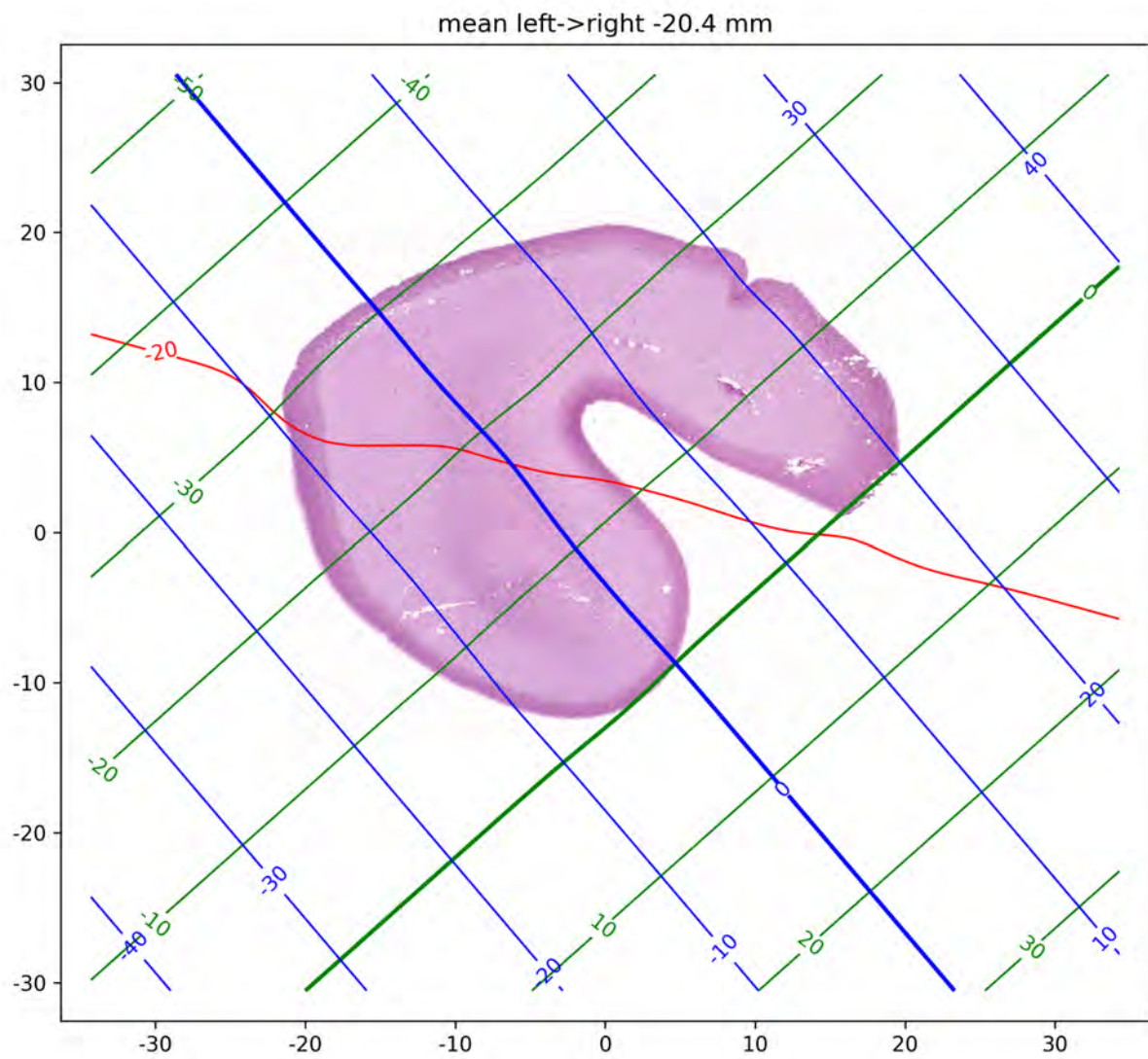


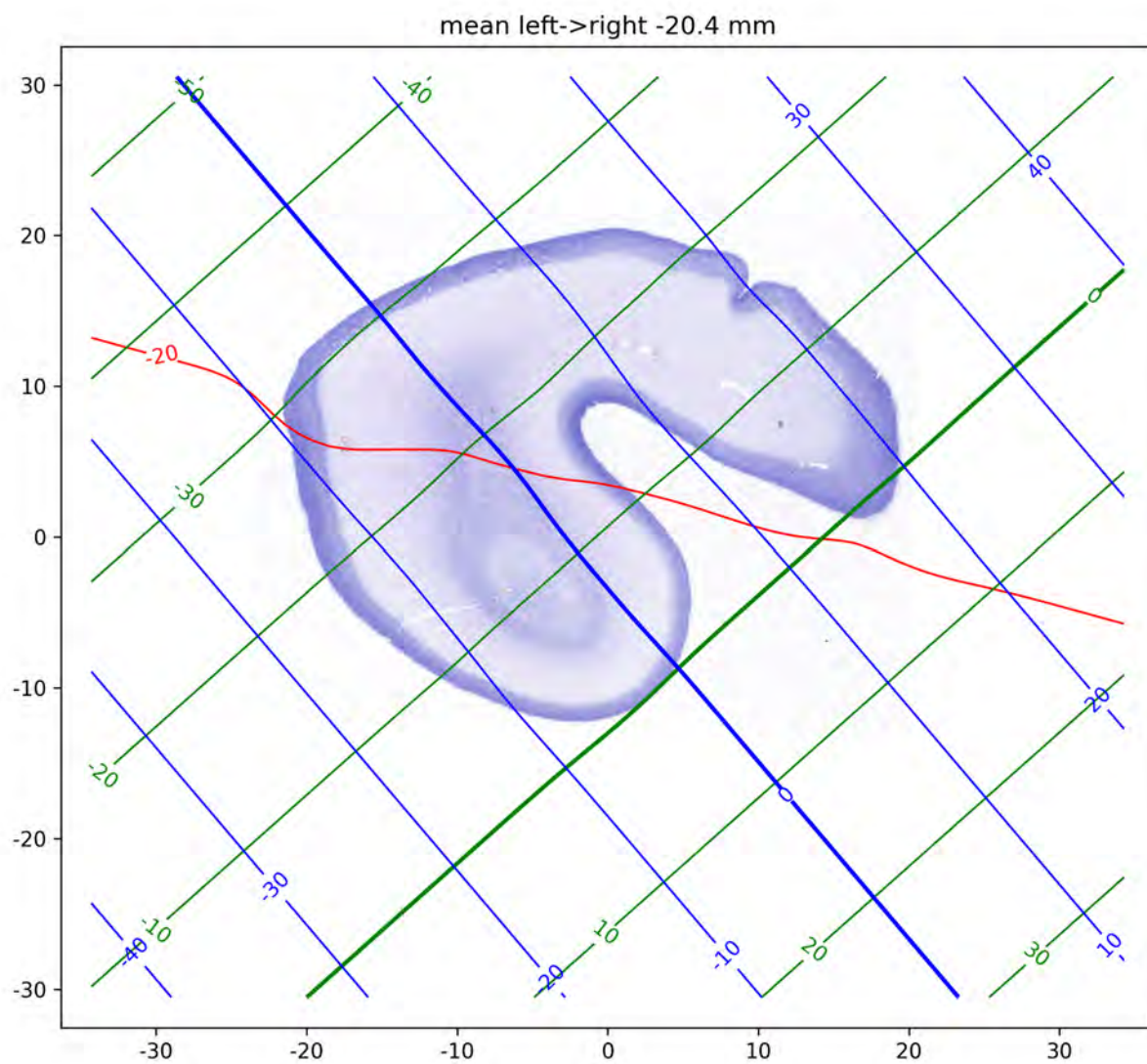


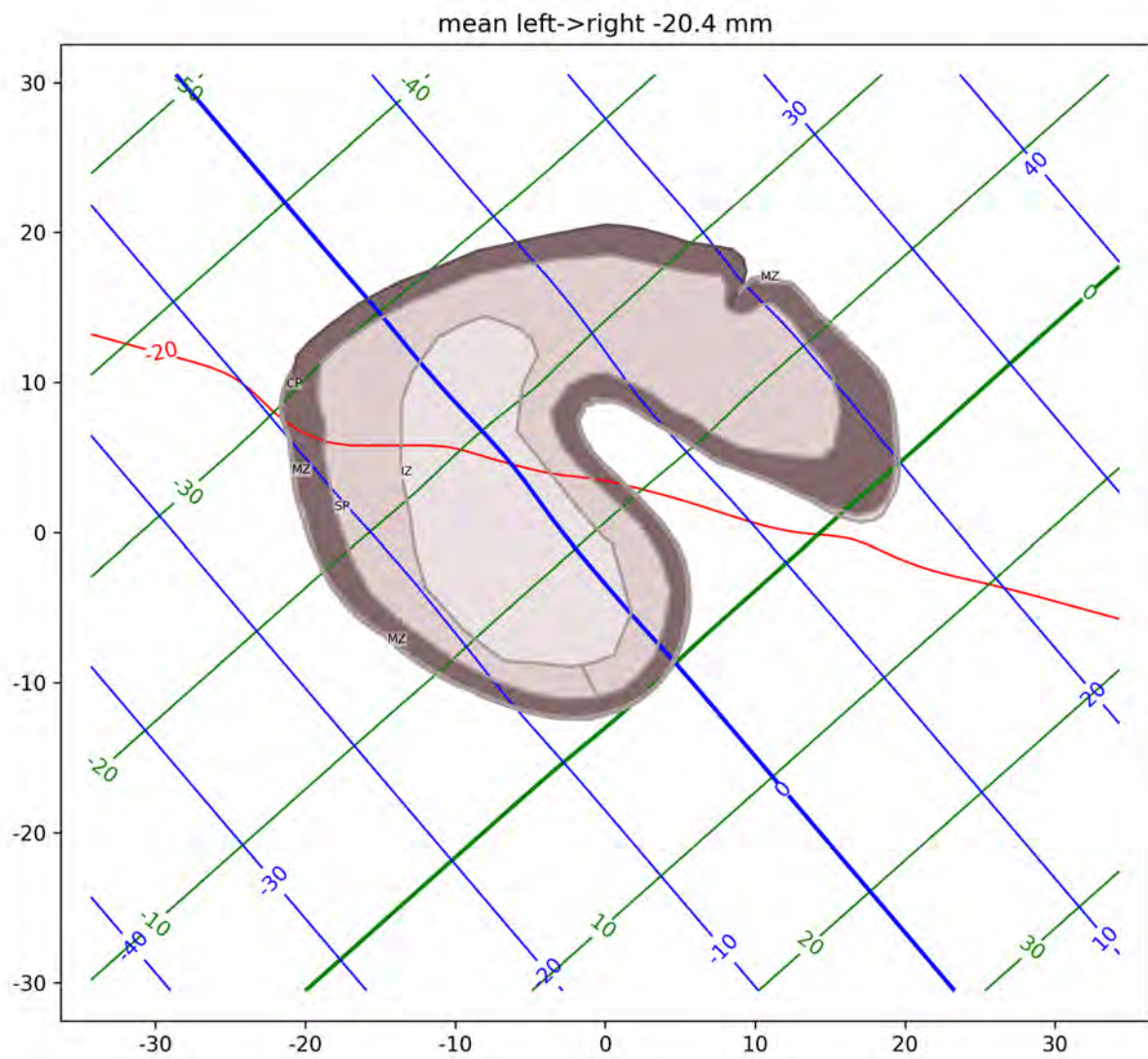


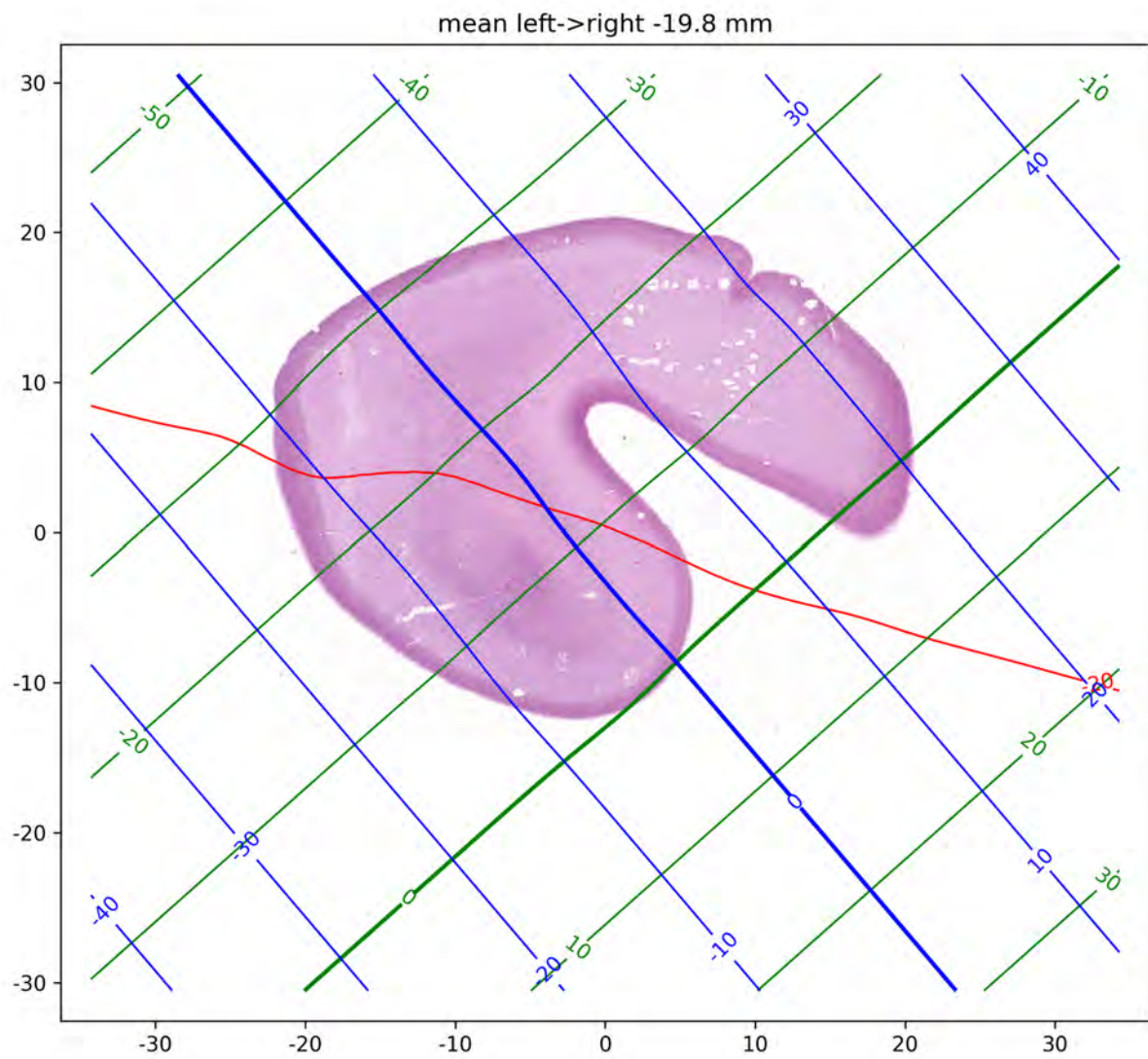


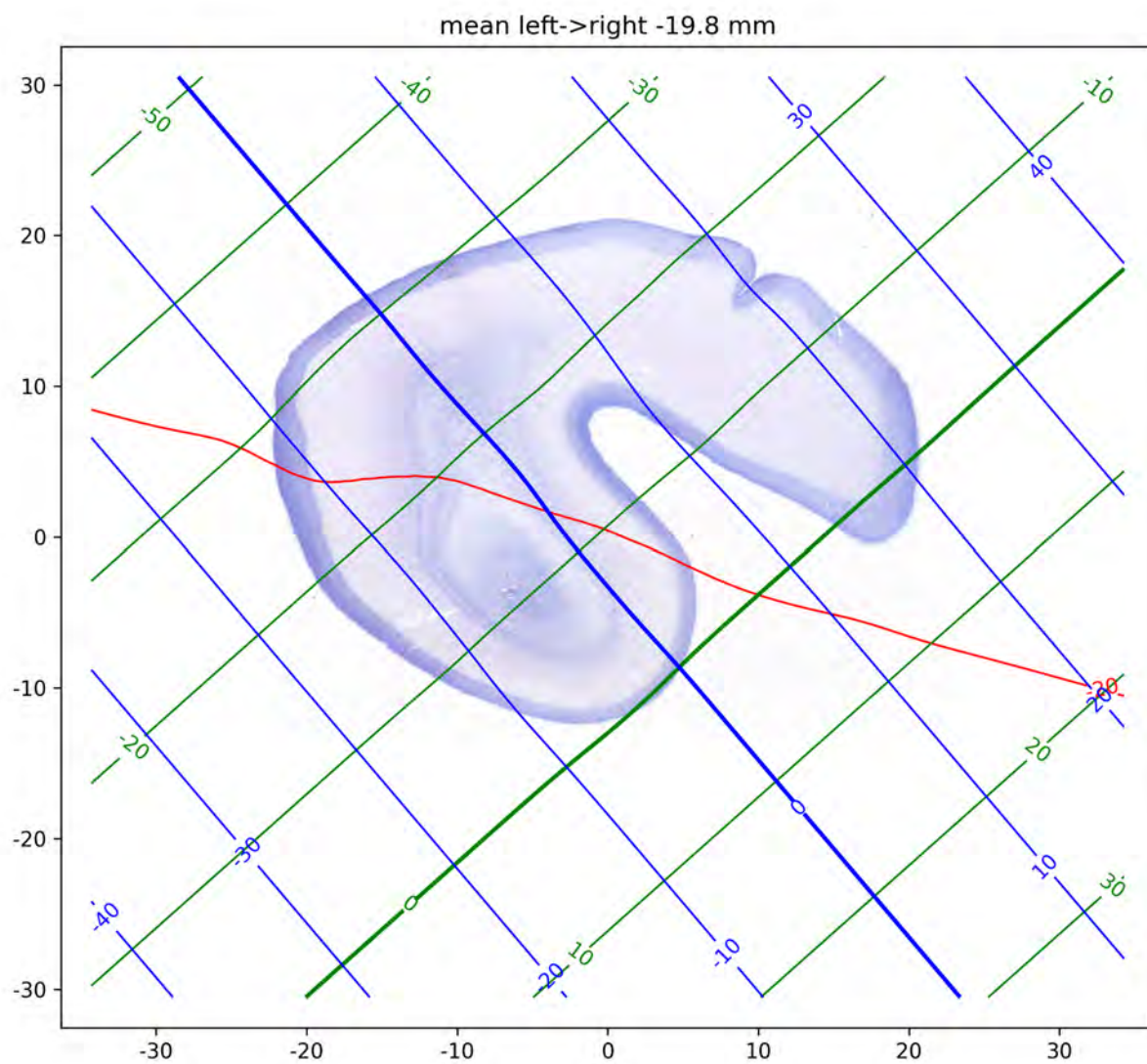


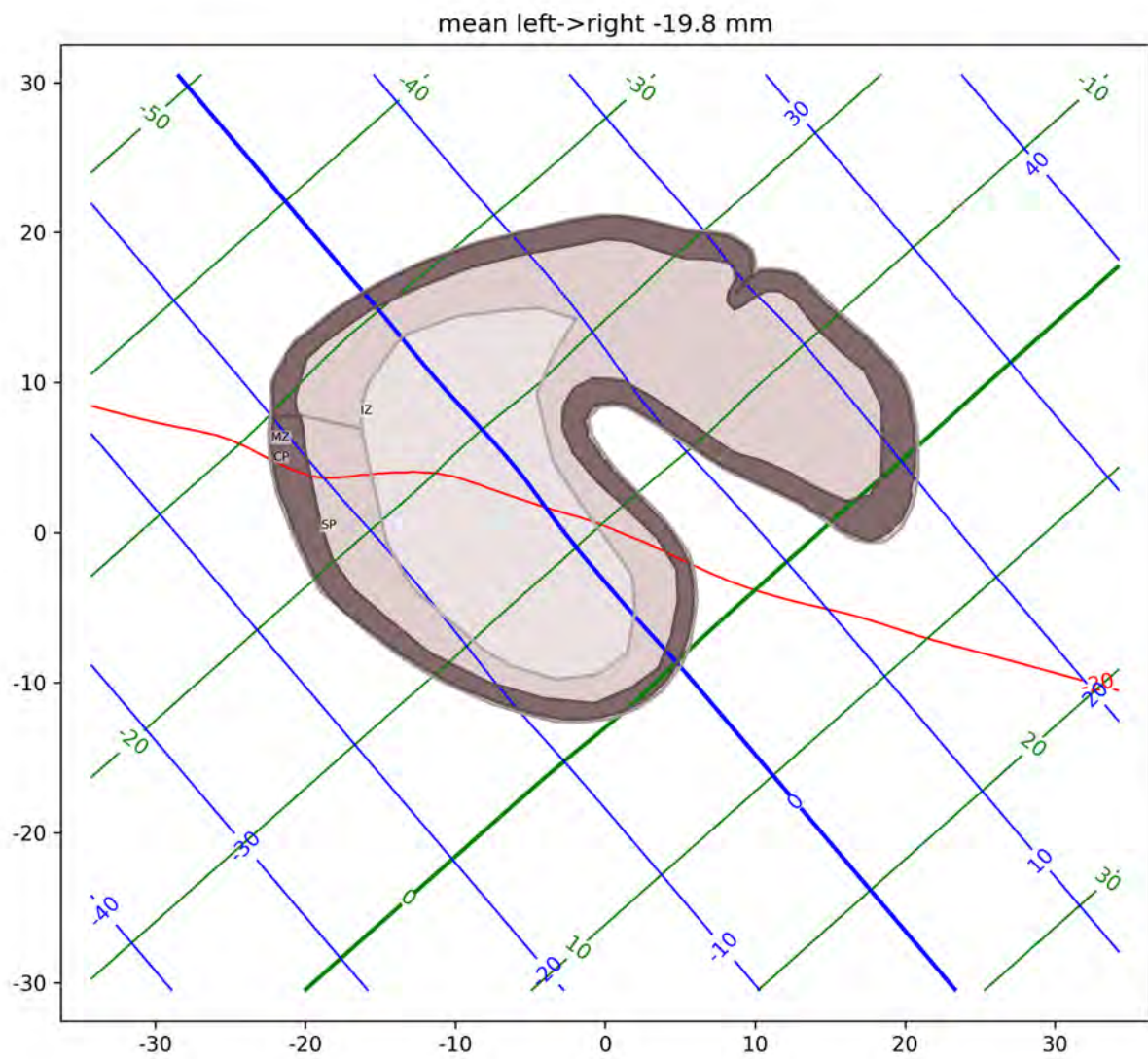


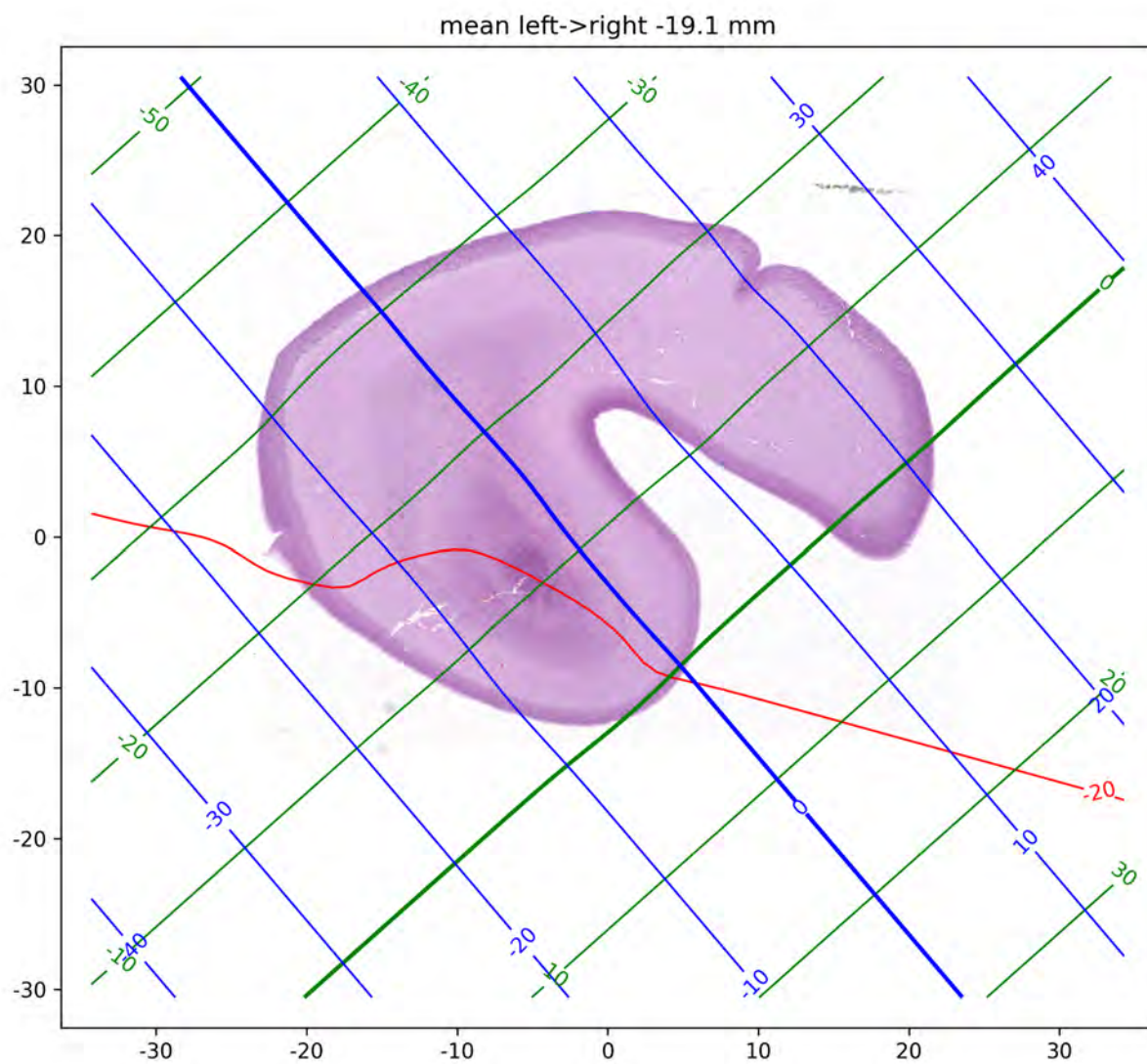


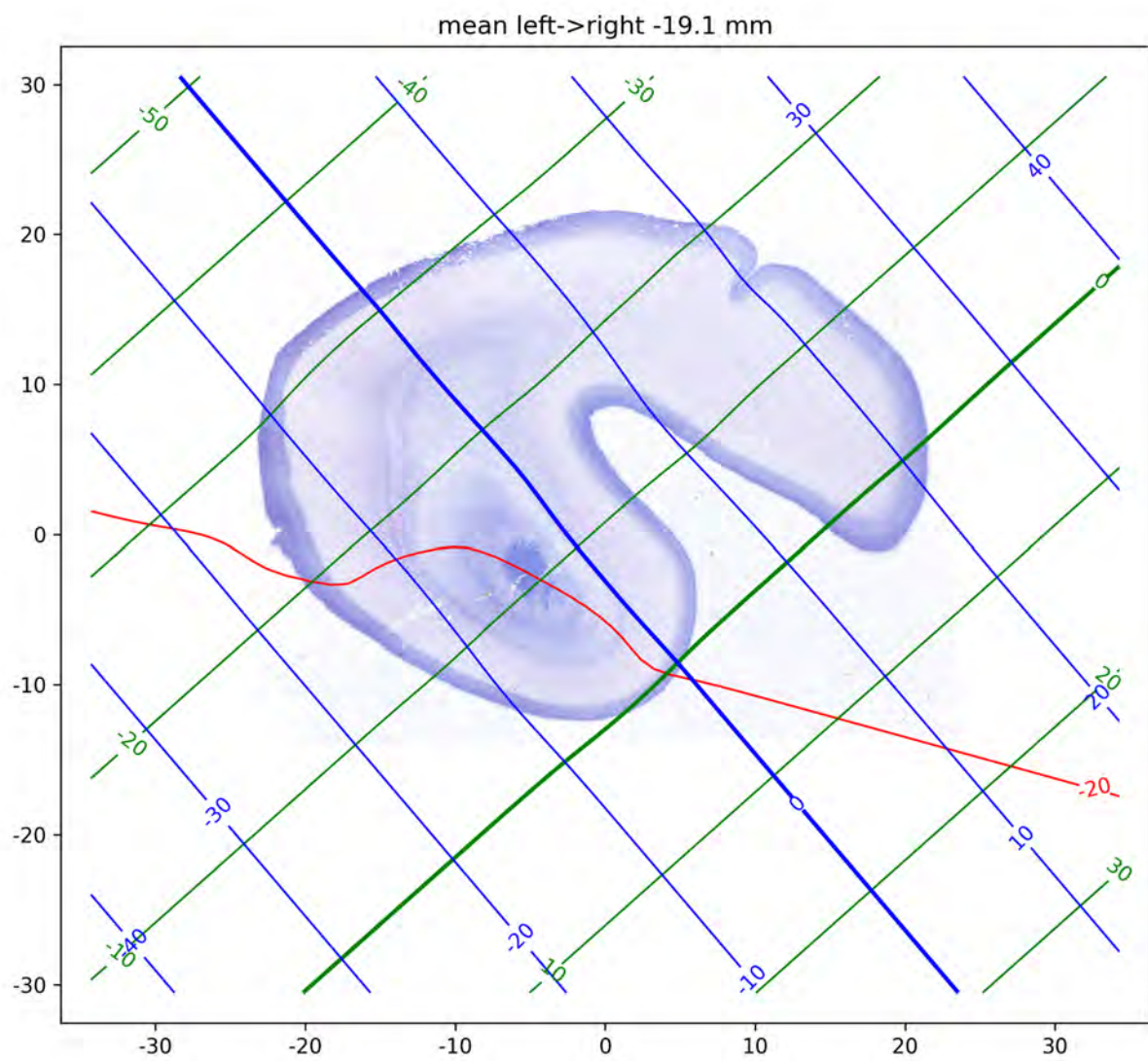


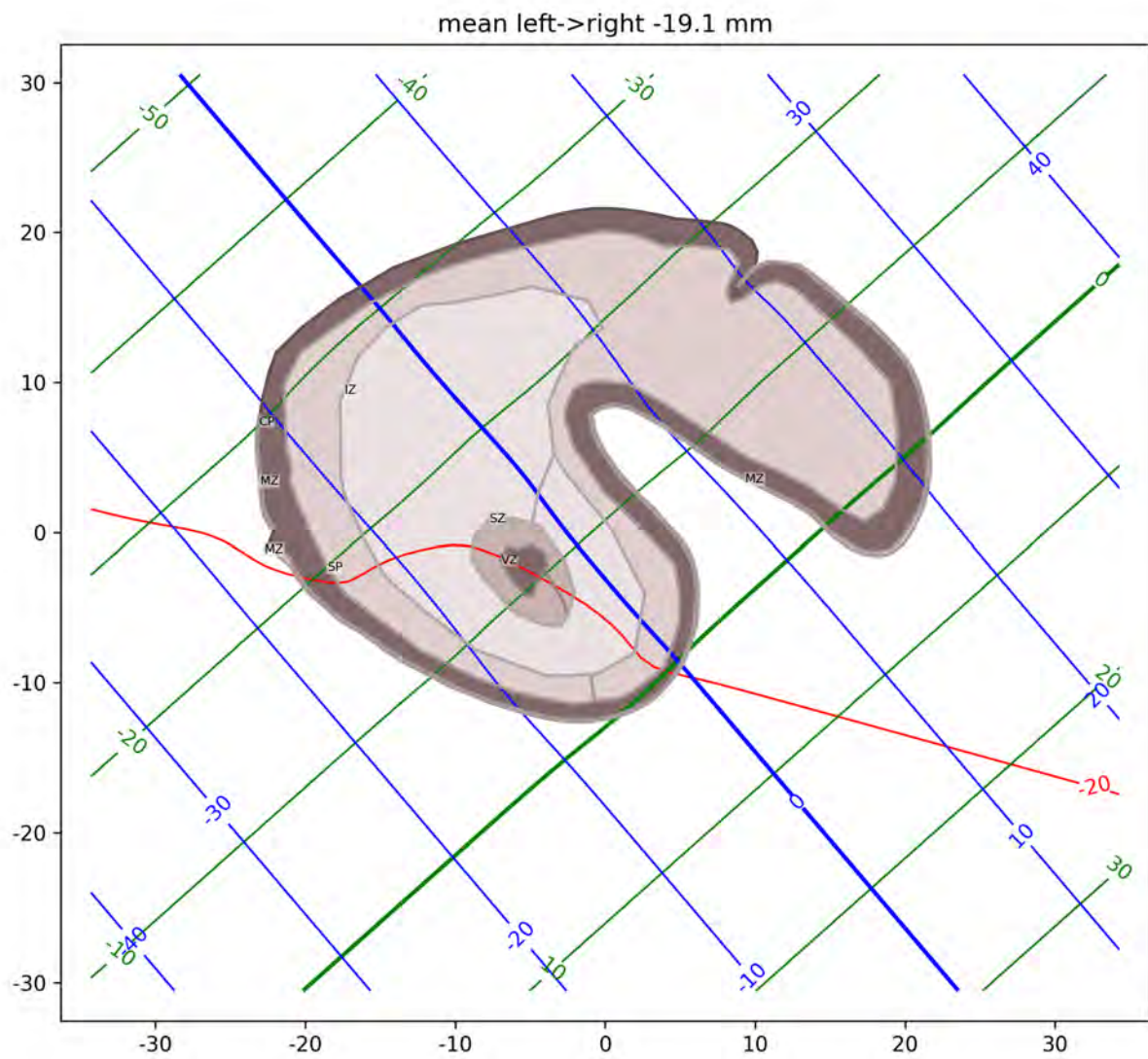


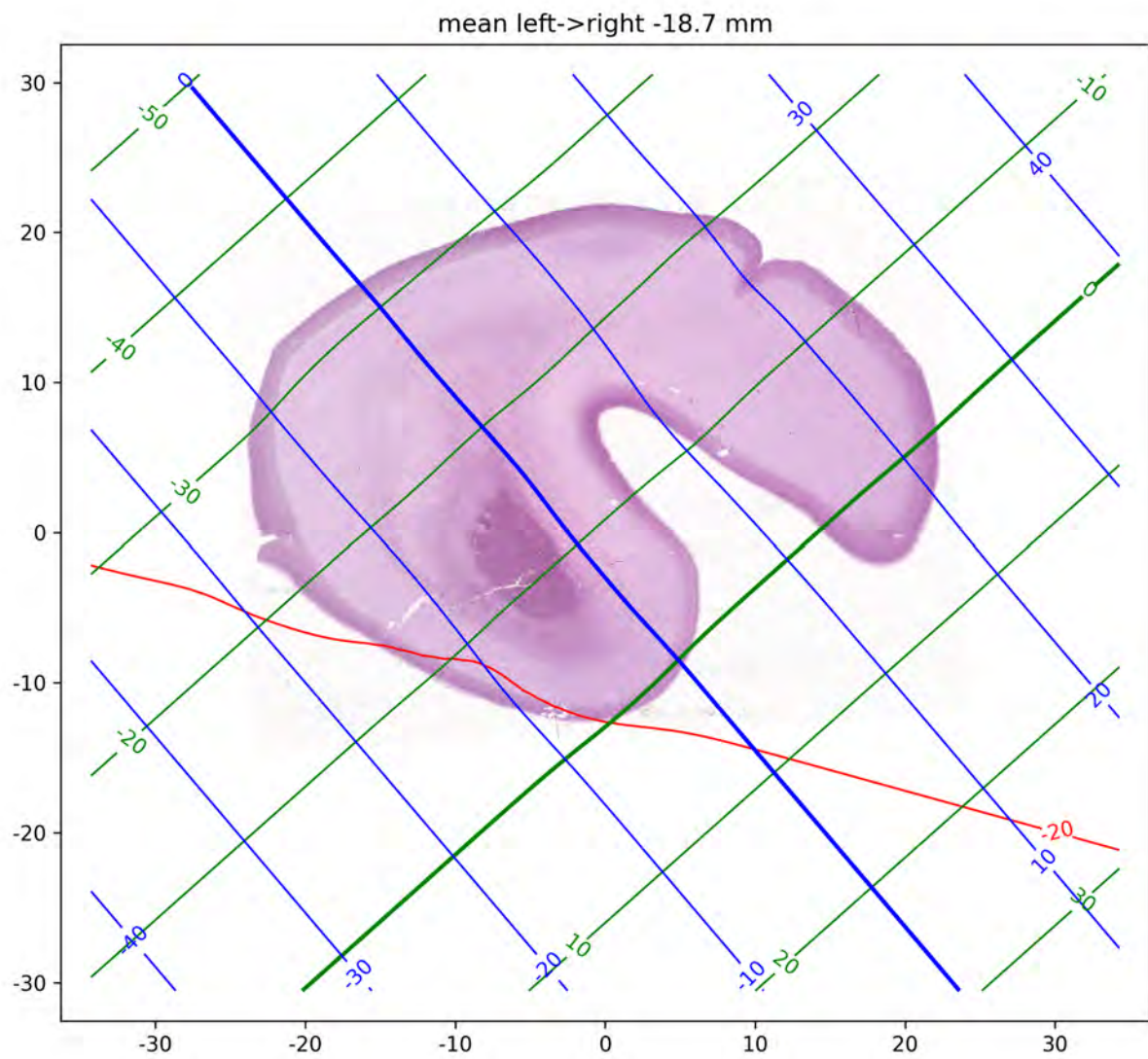


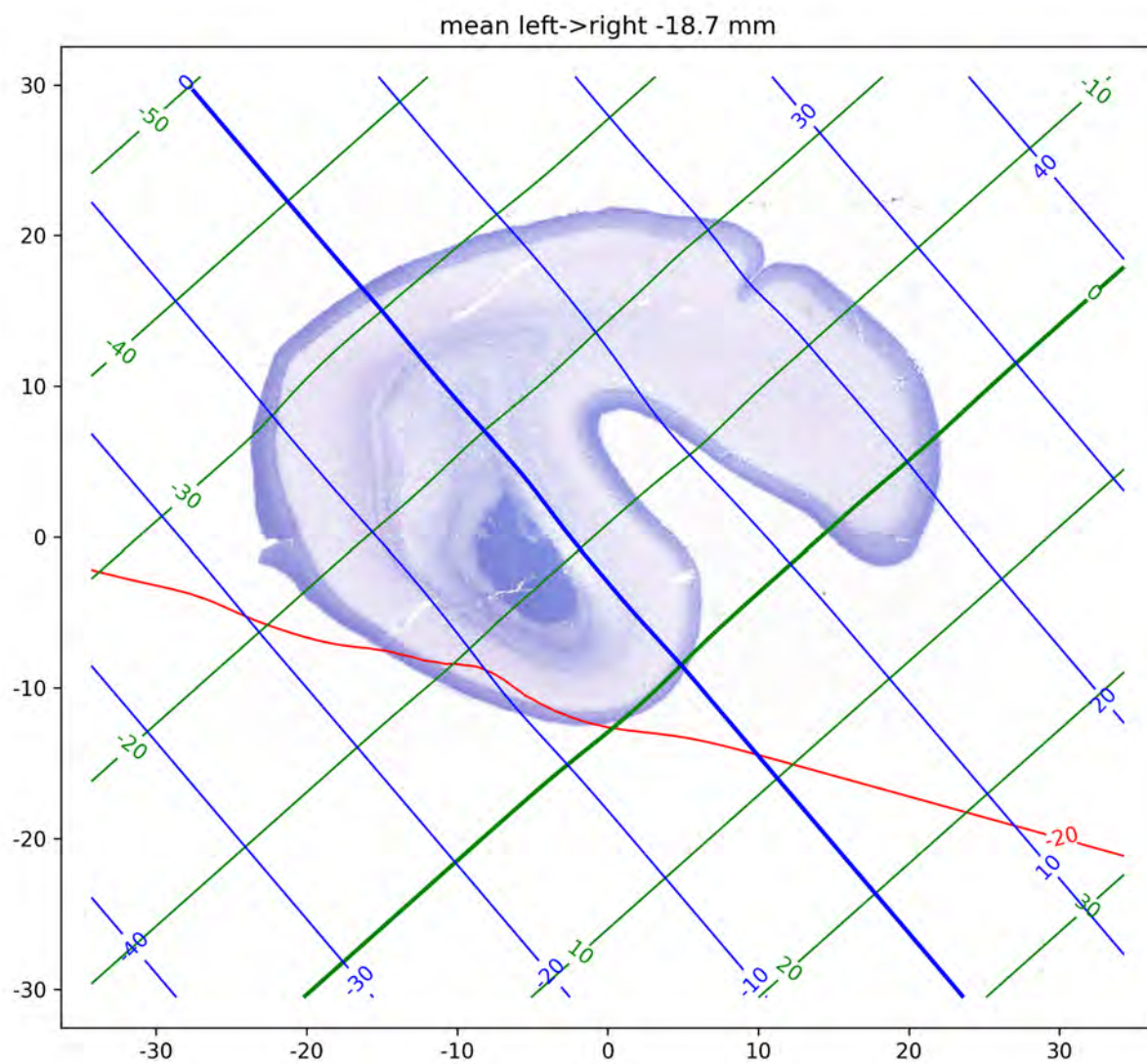


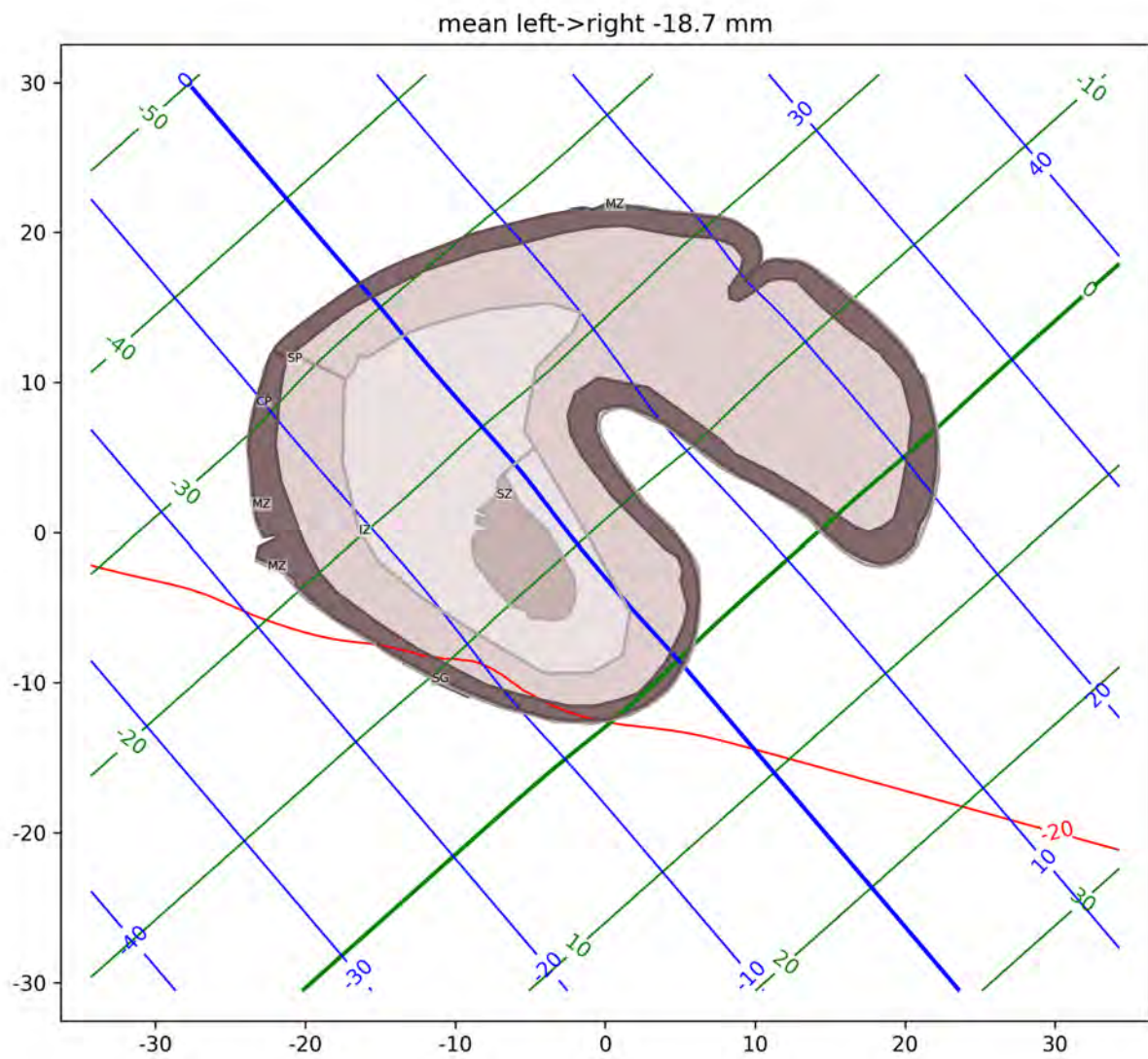


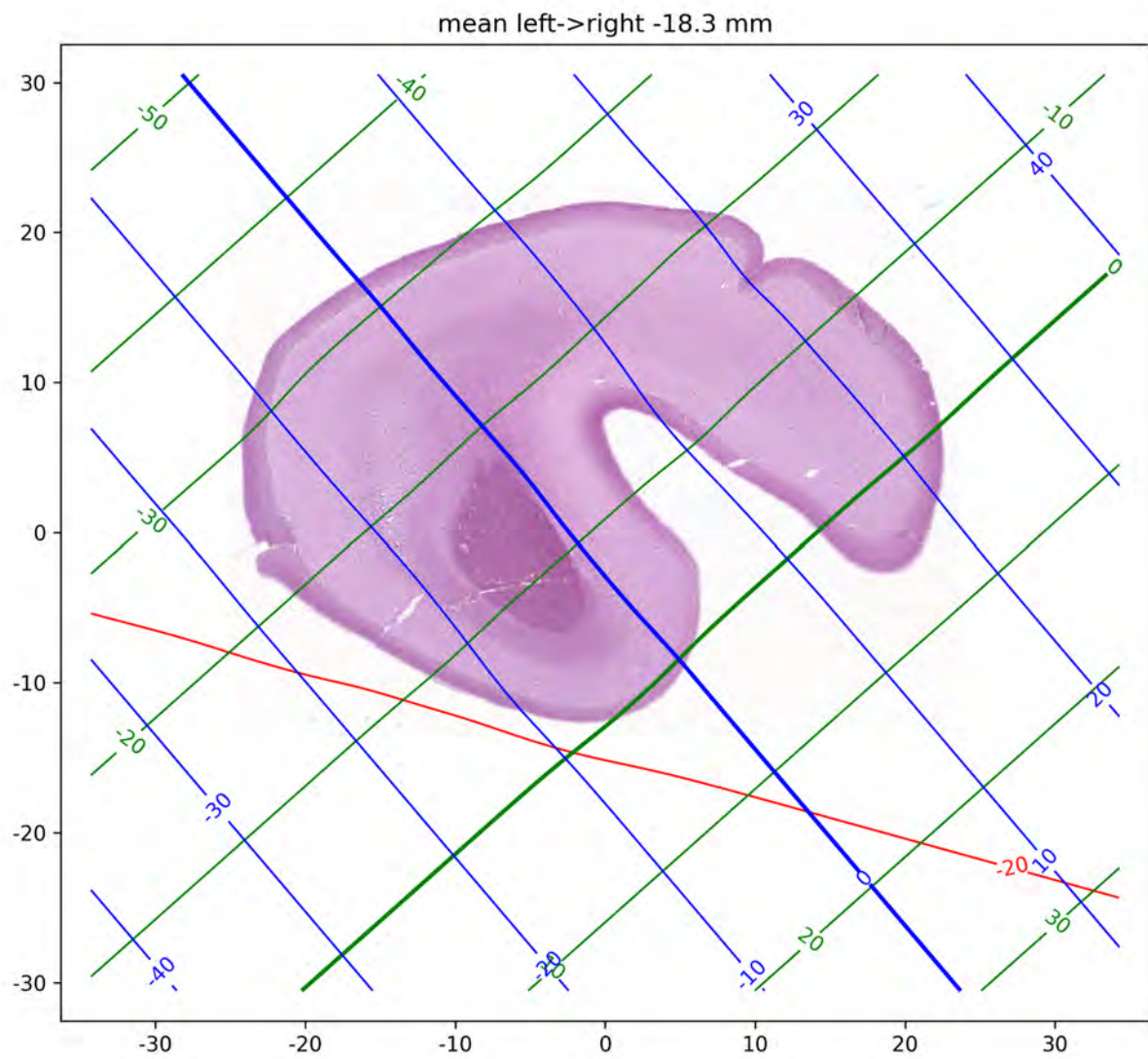


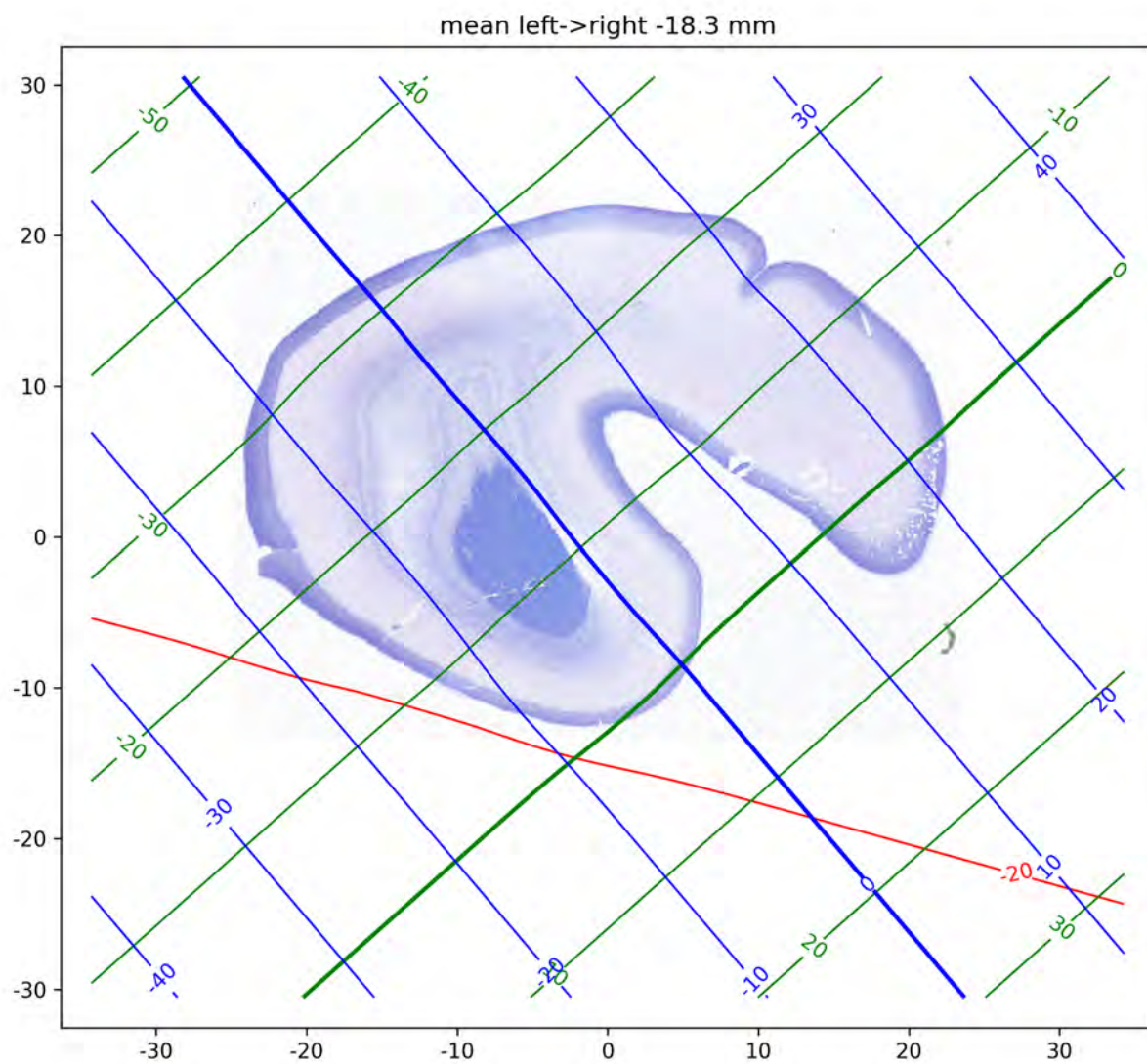


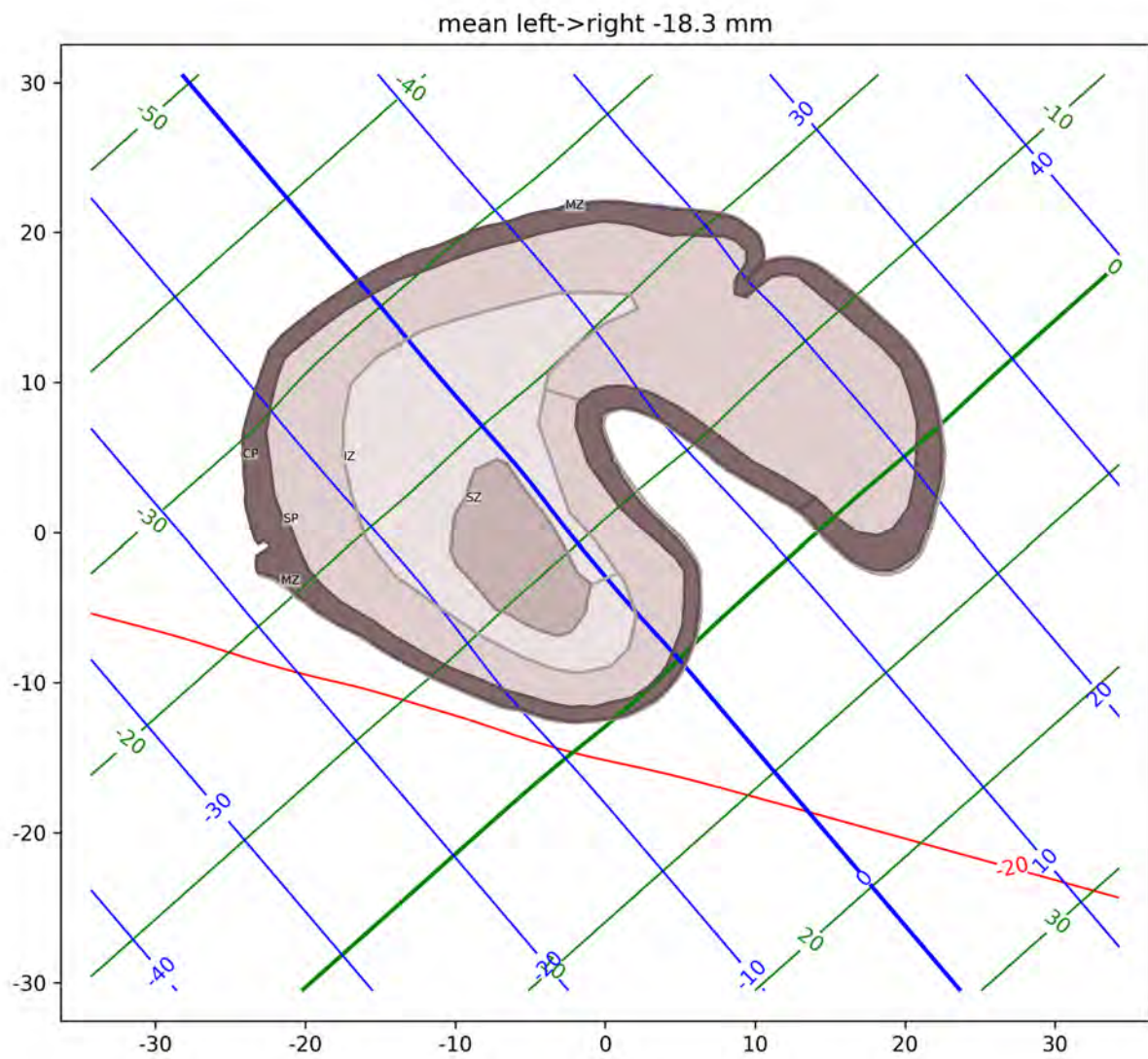


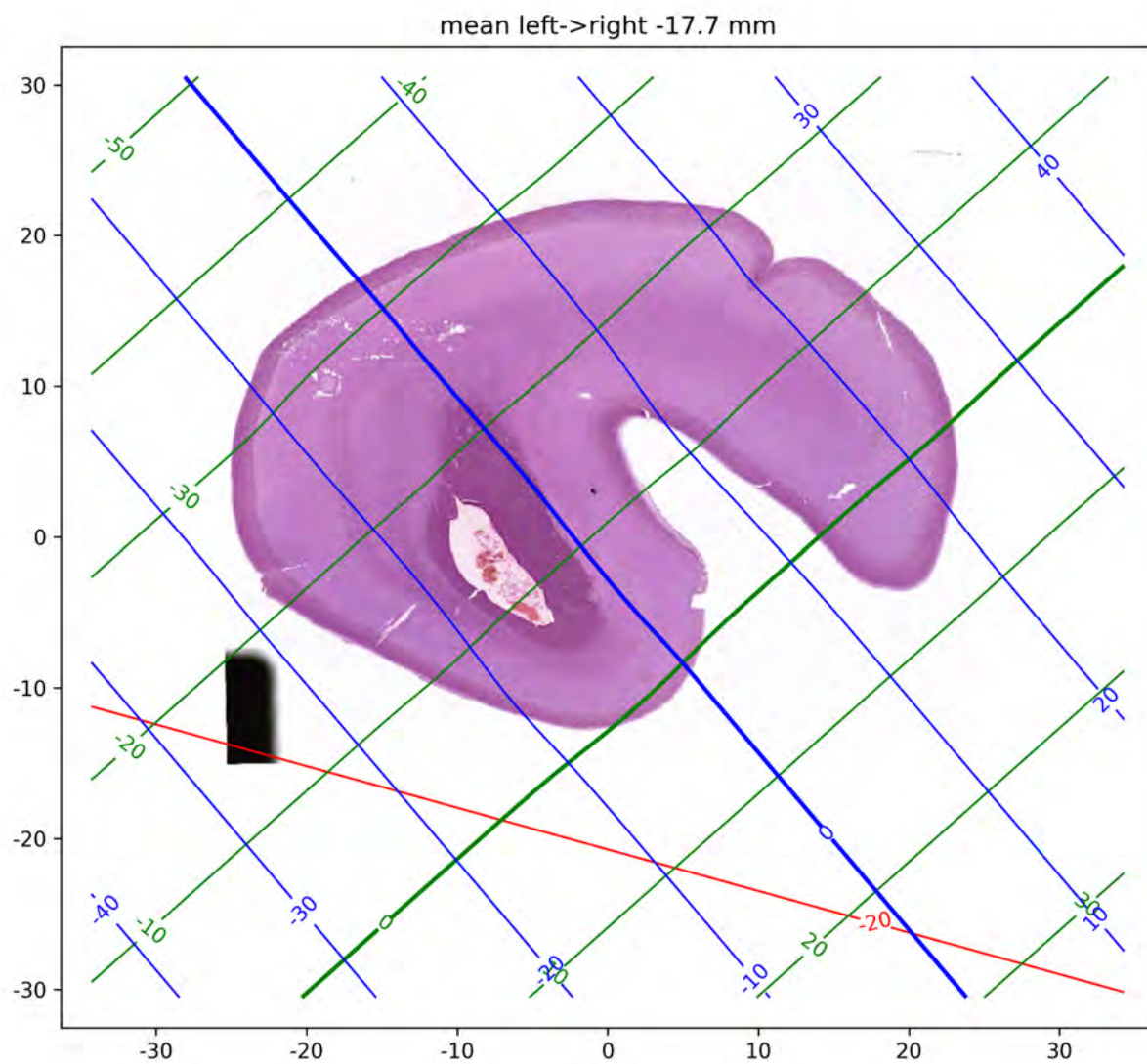


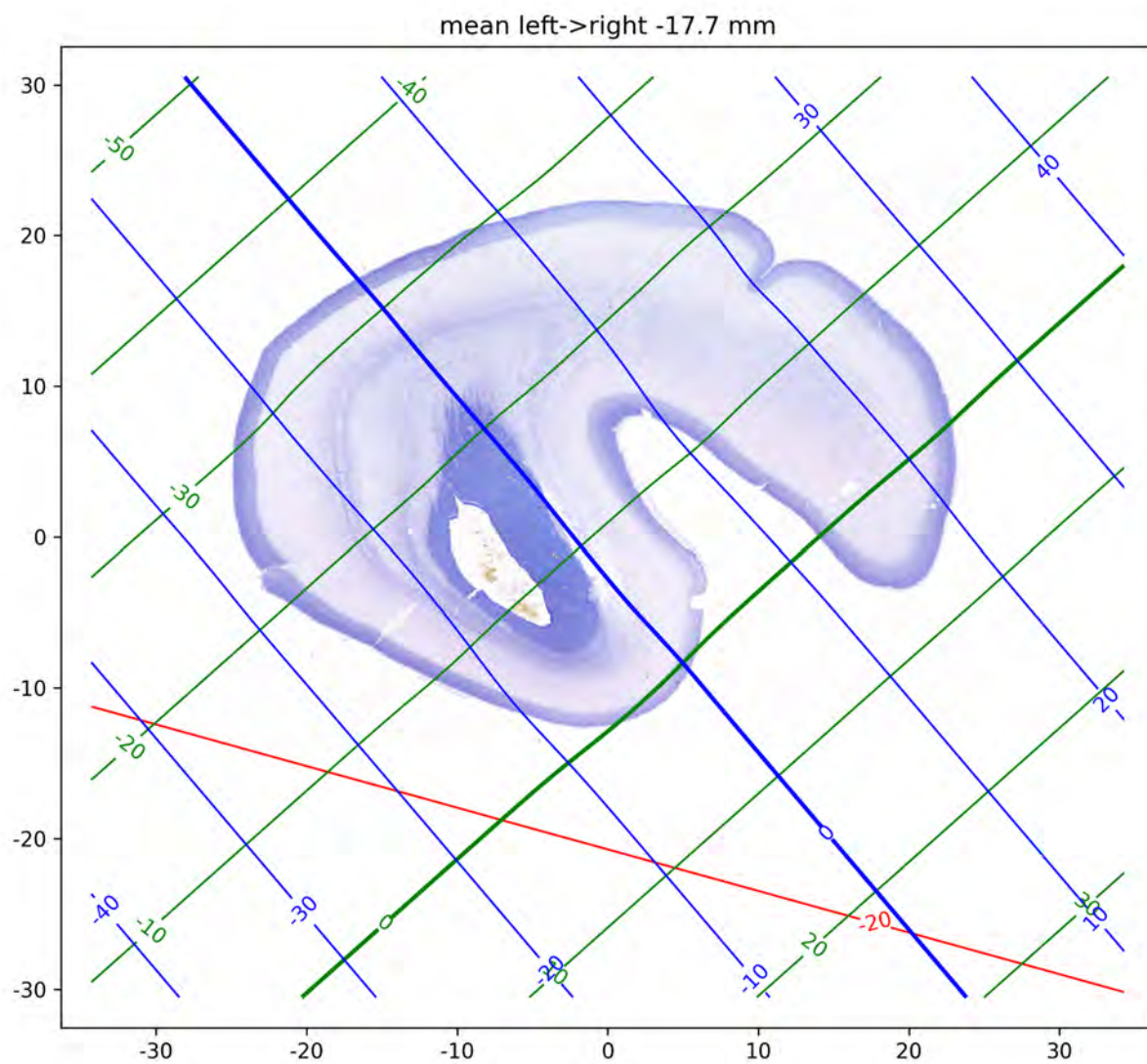


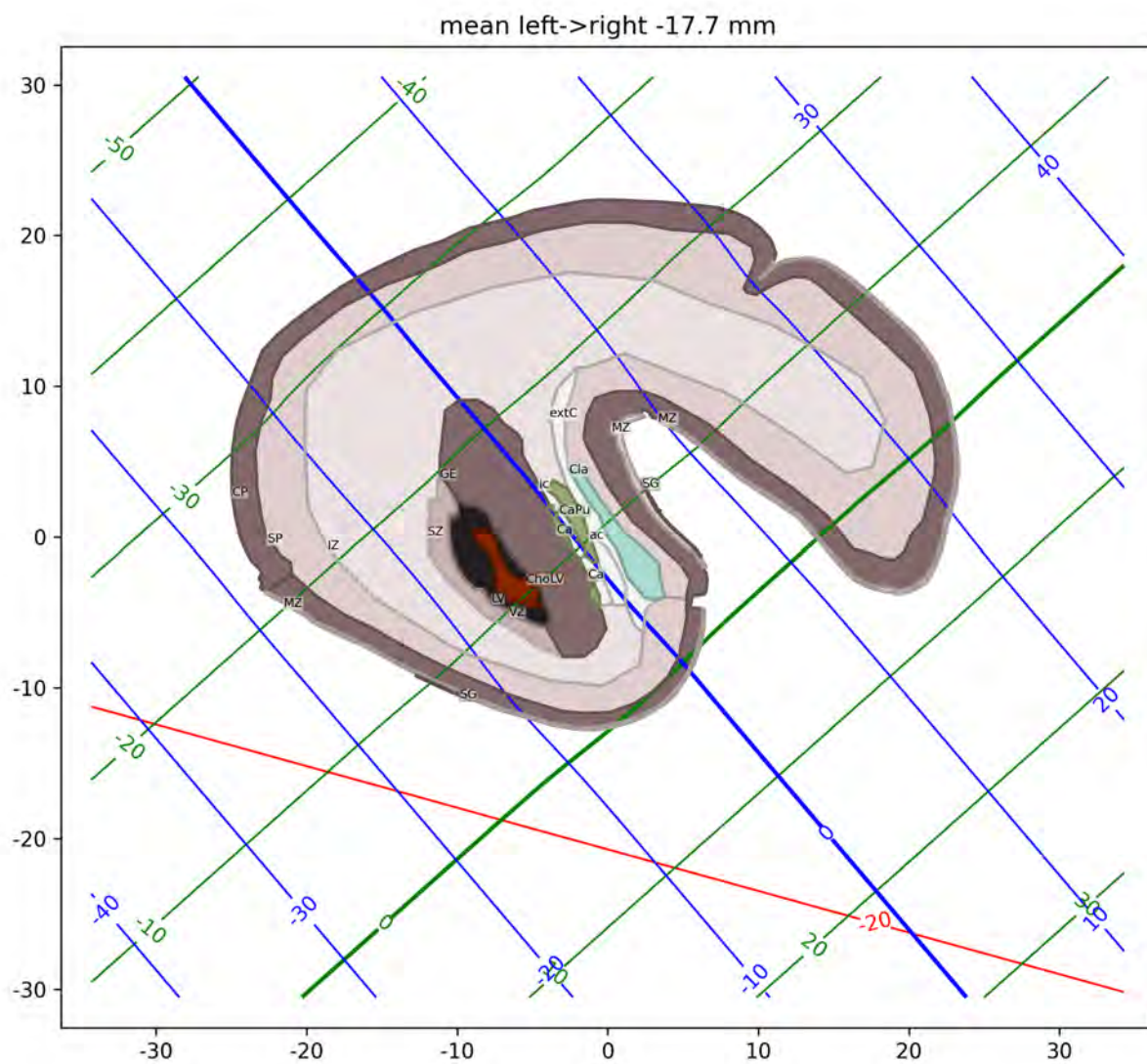


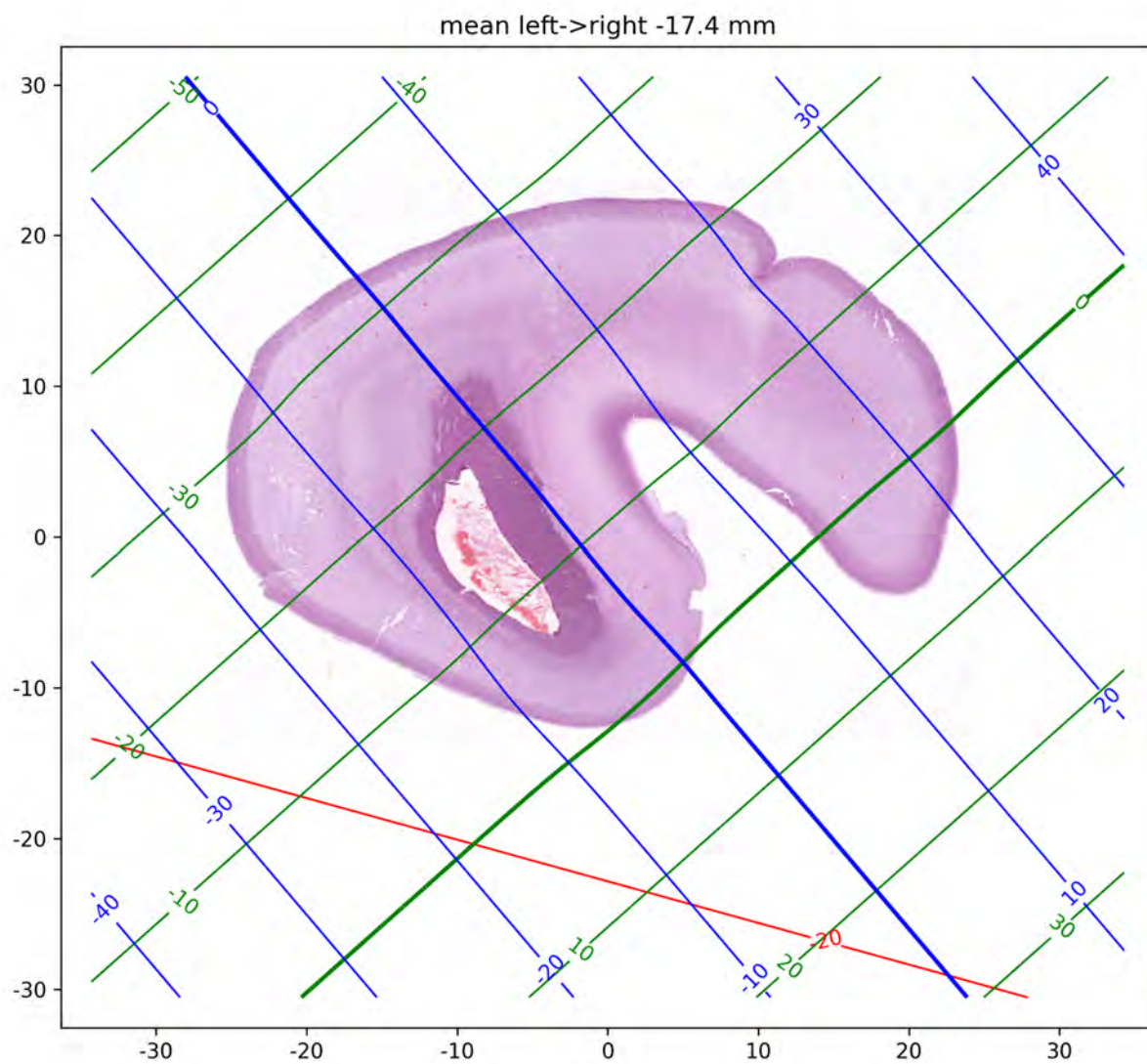


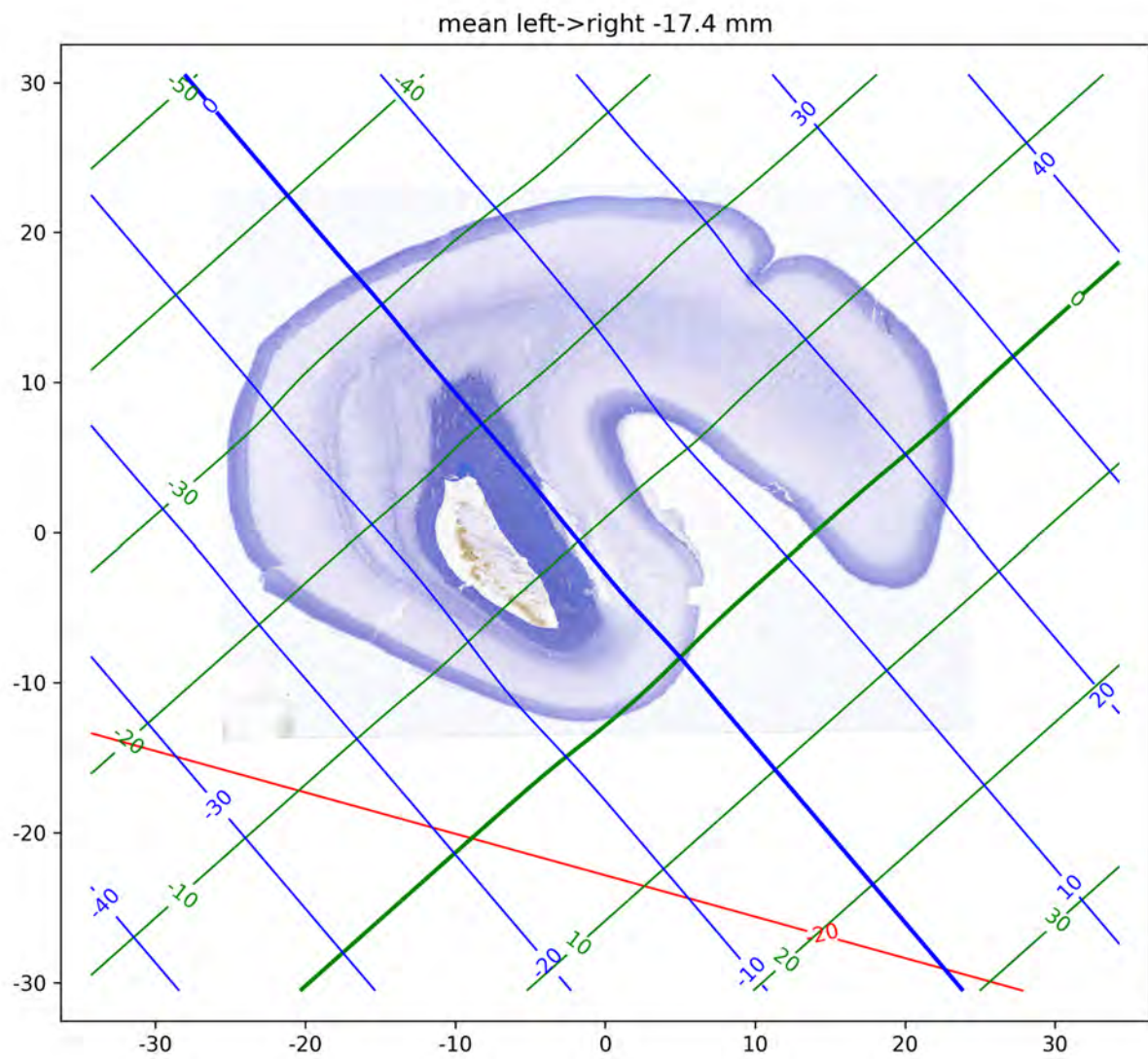


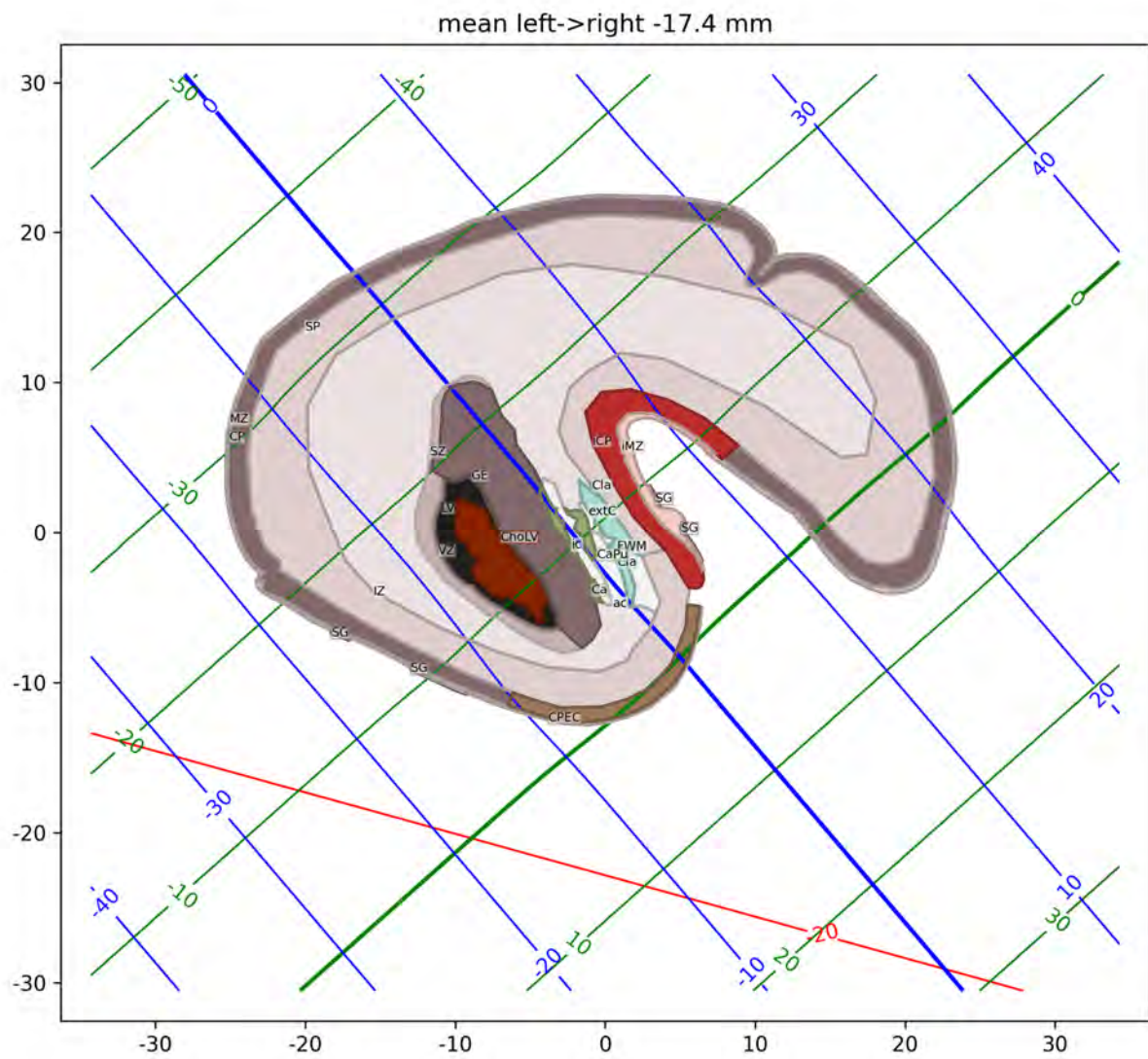


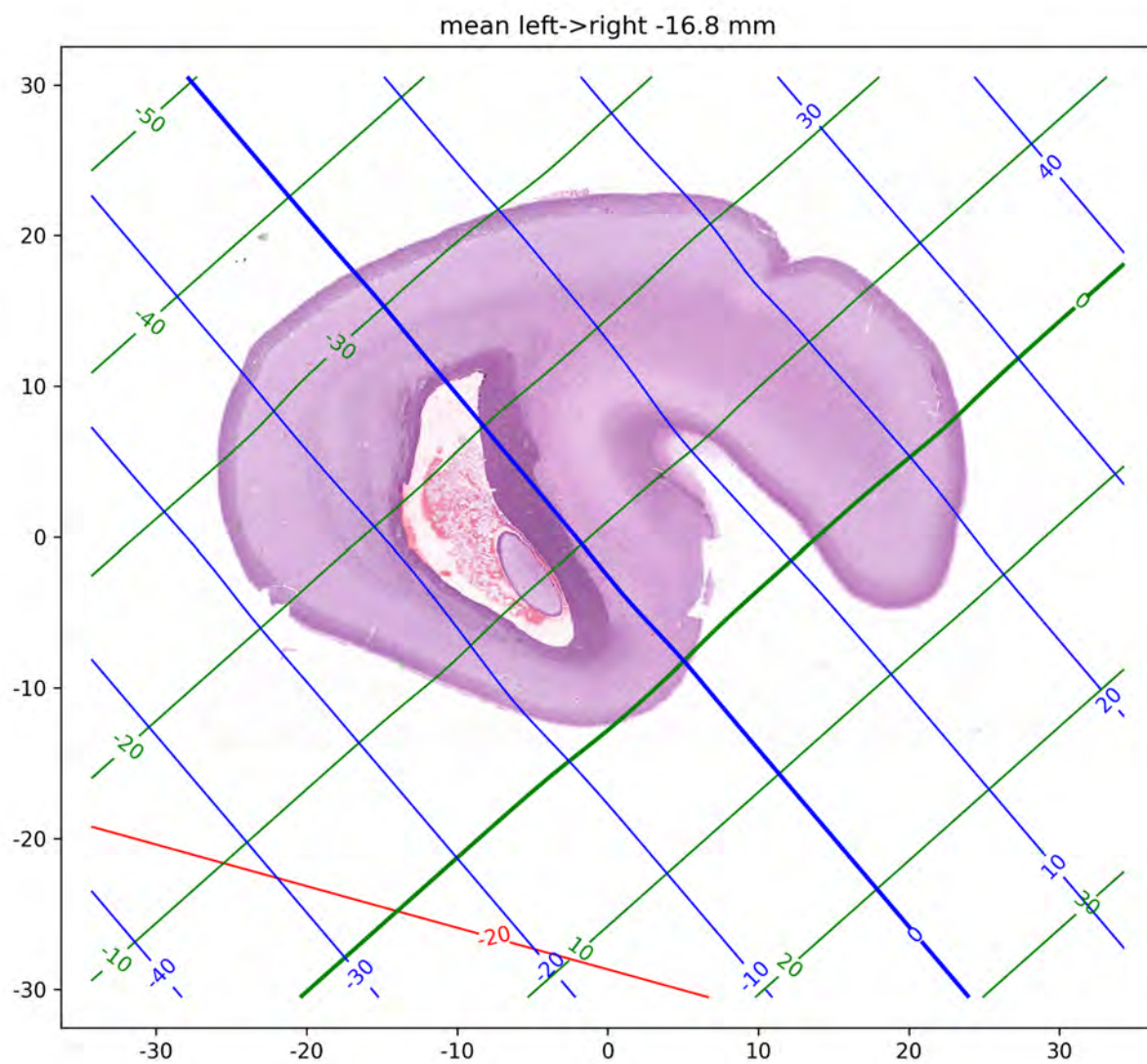


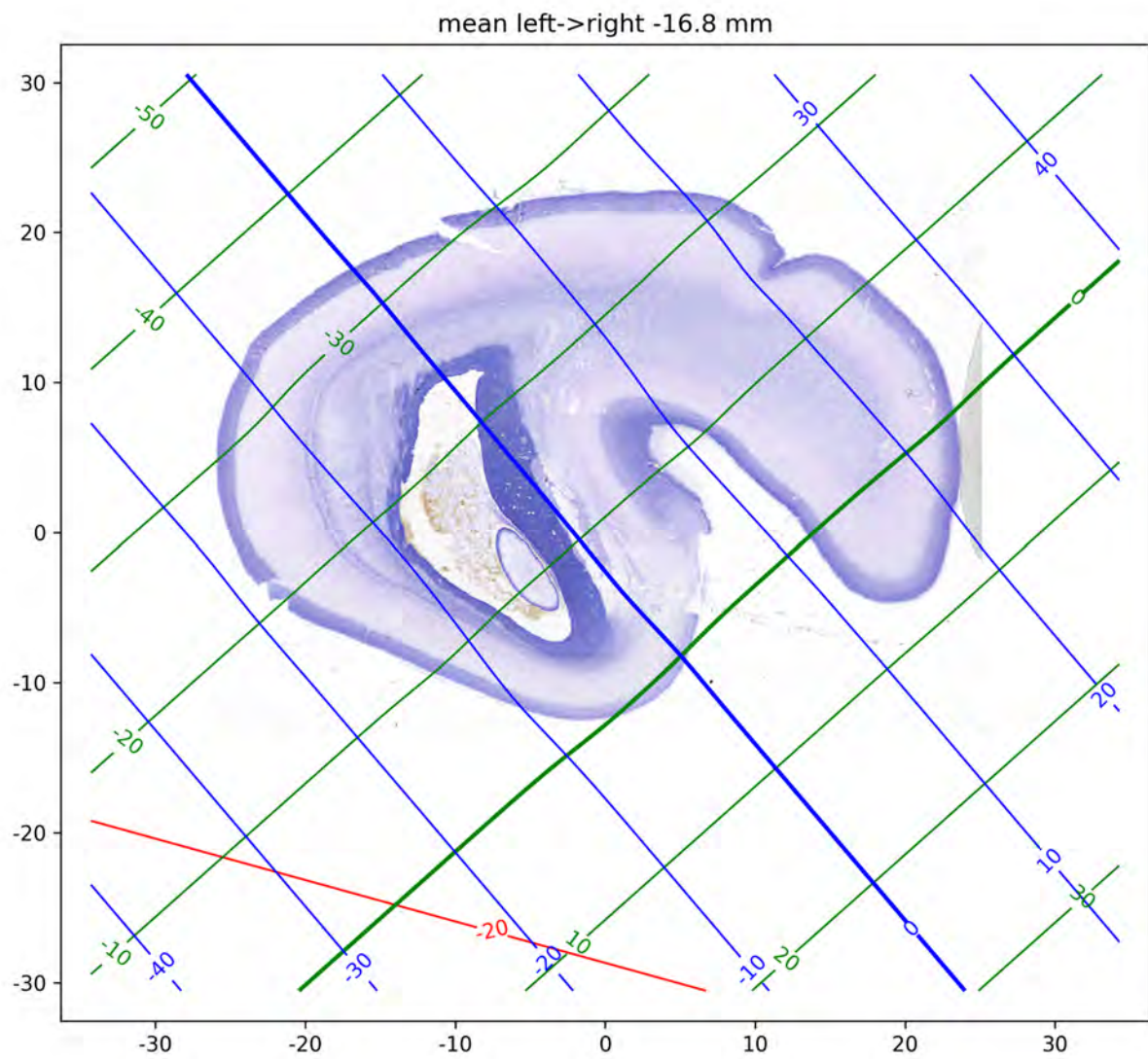




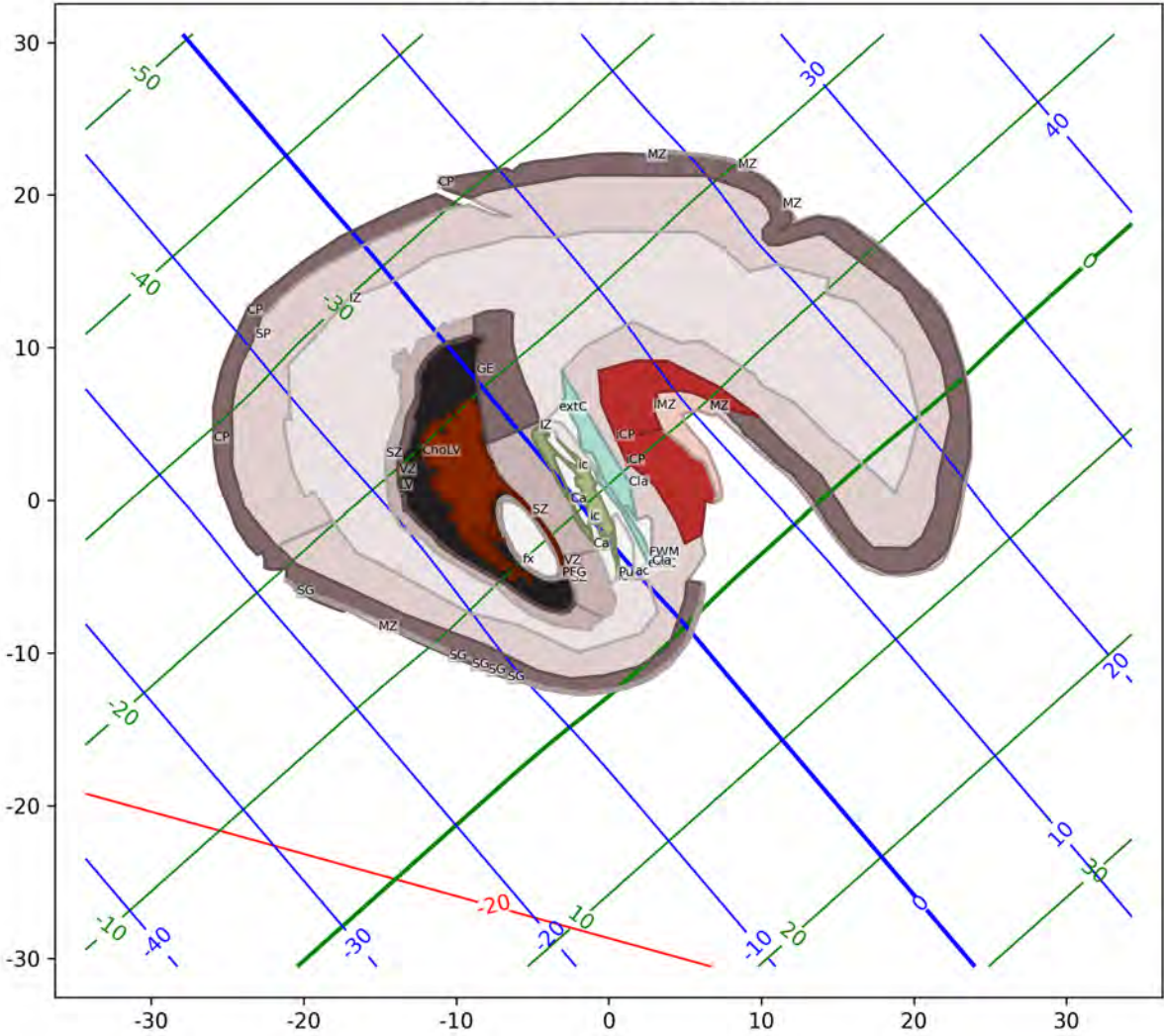


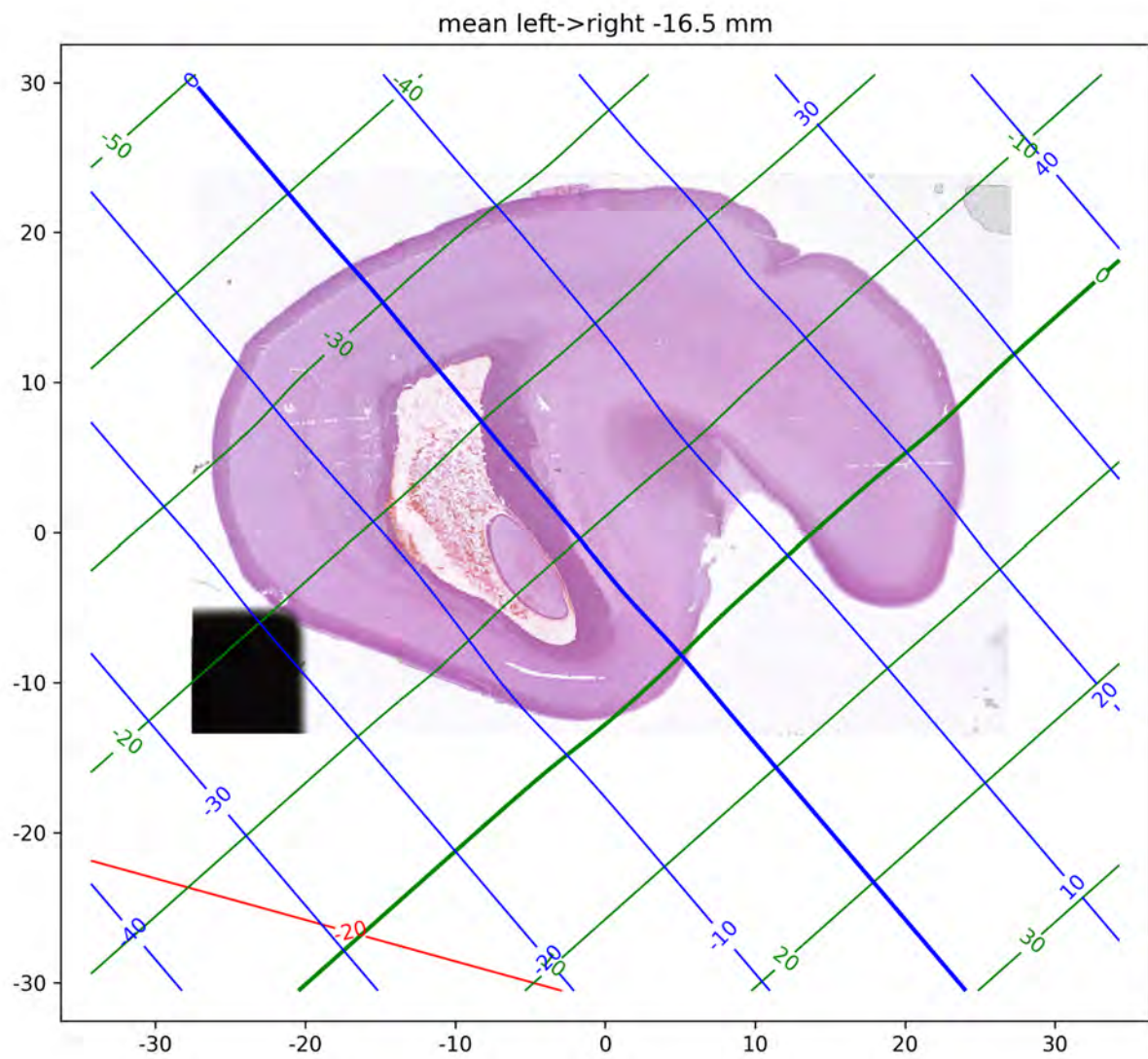


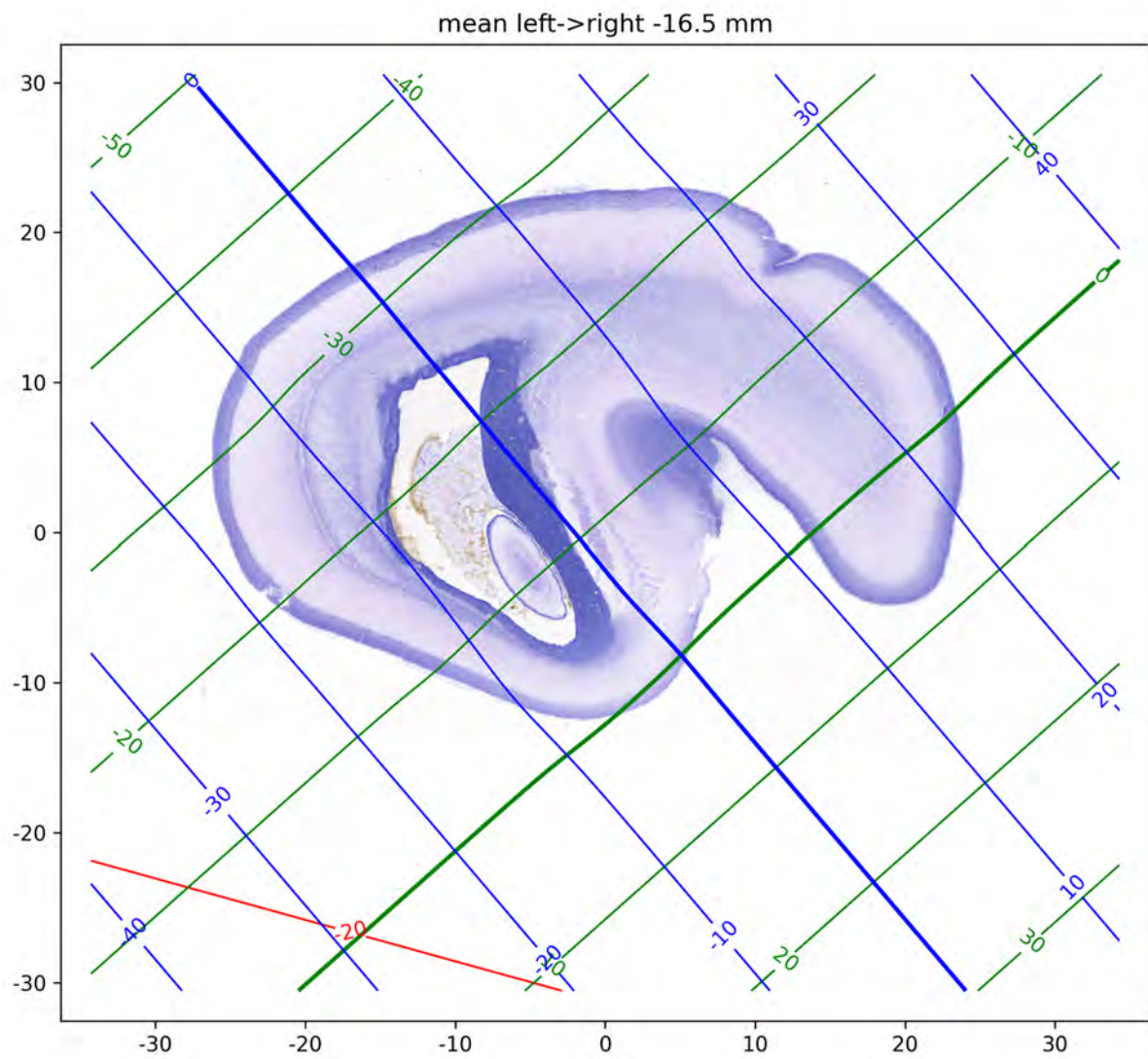


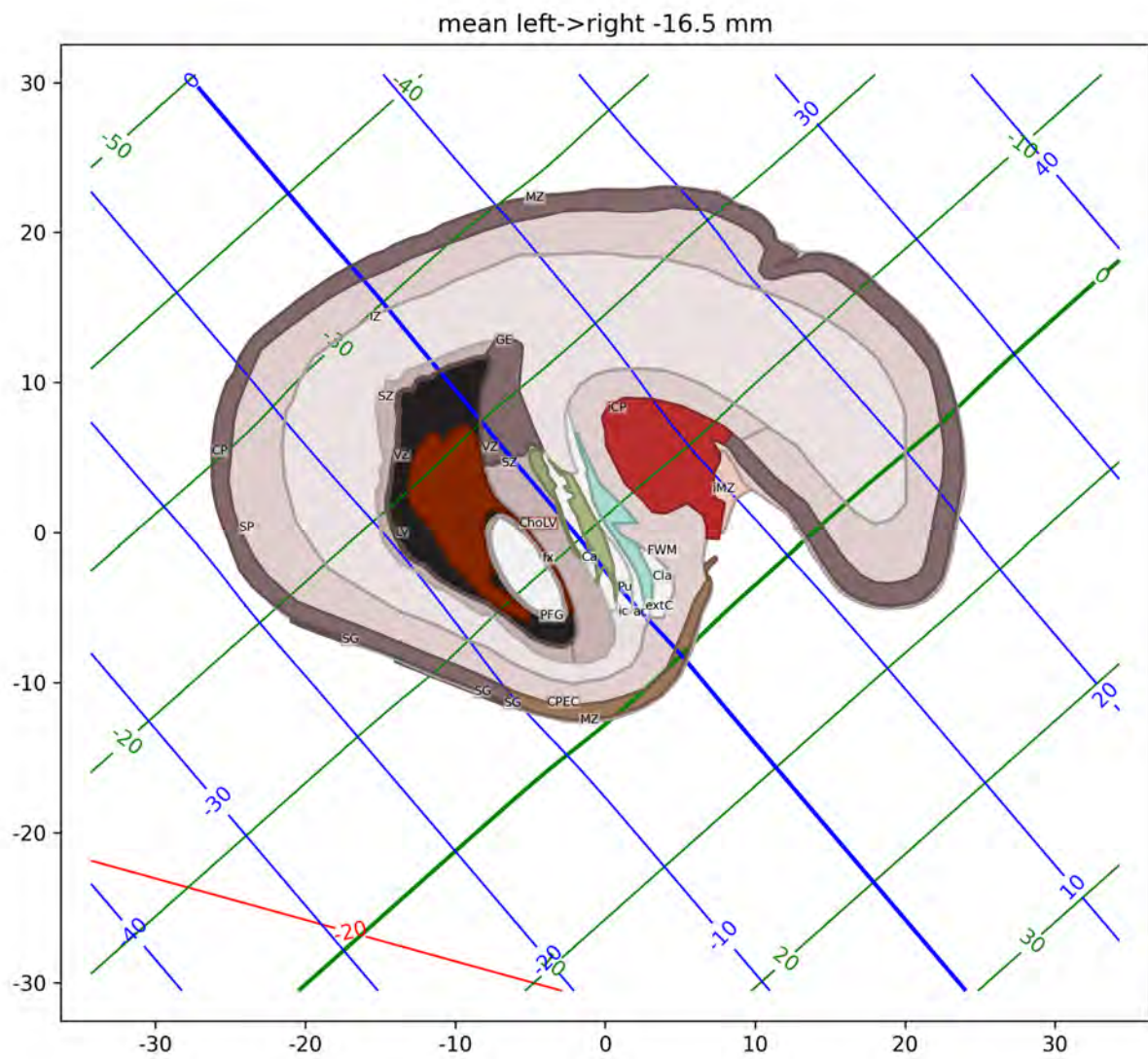


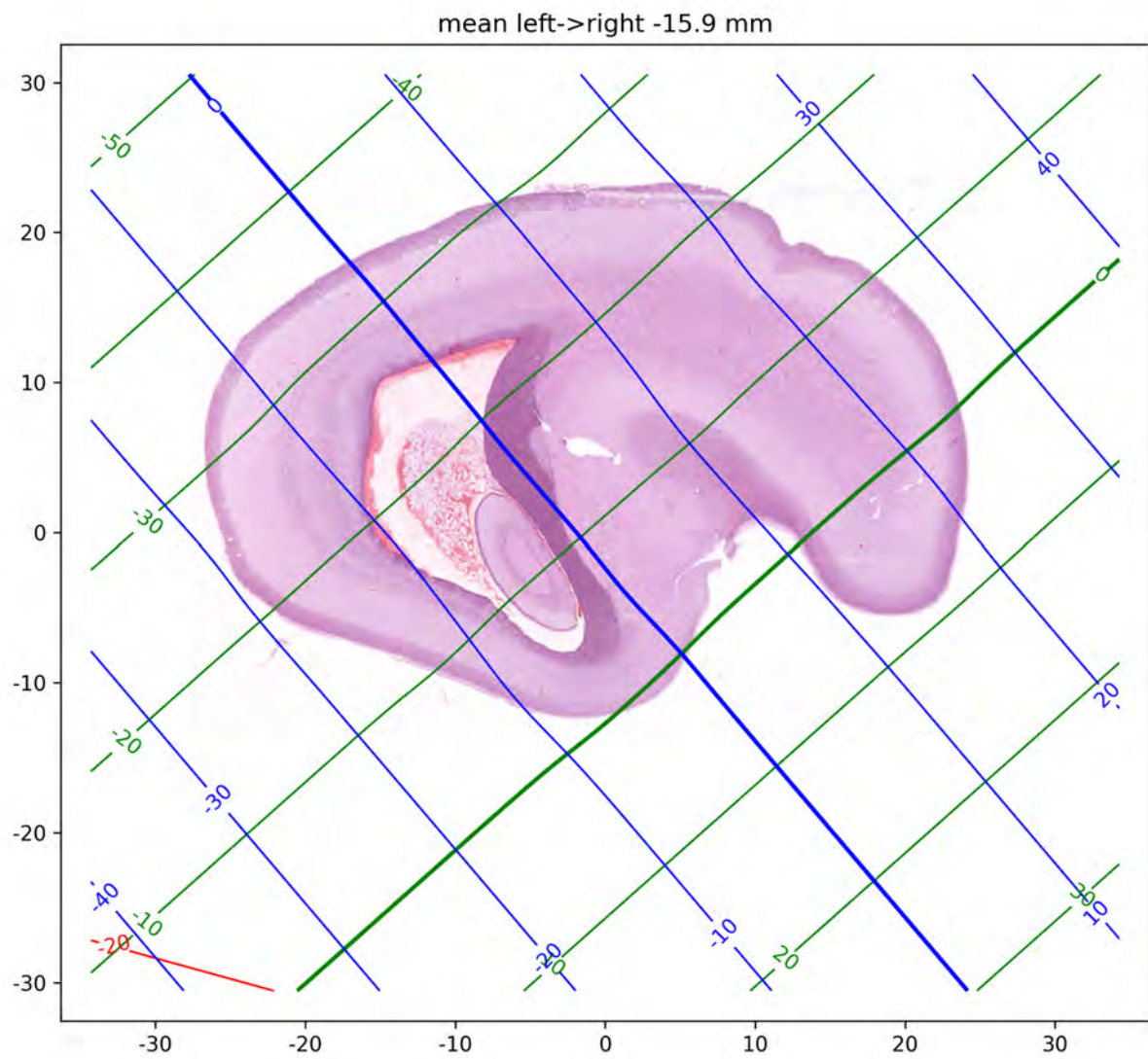
mean left->right -16.8 mm

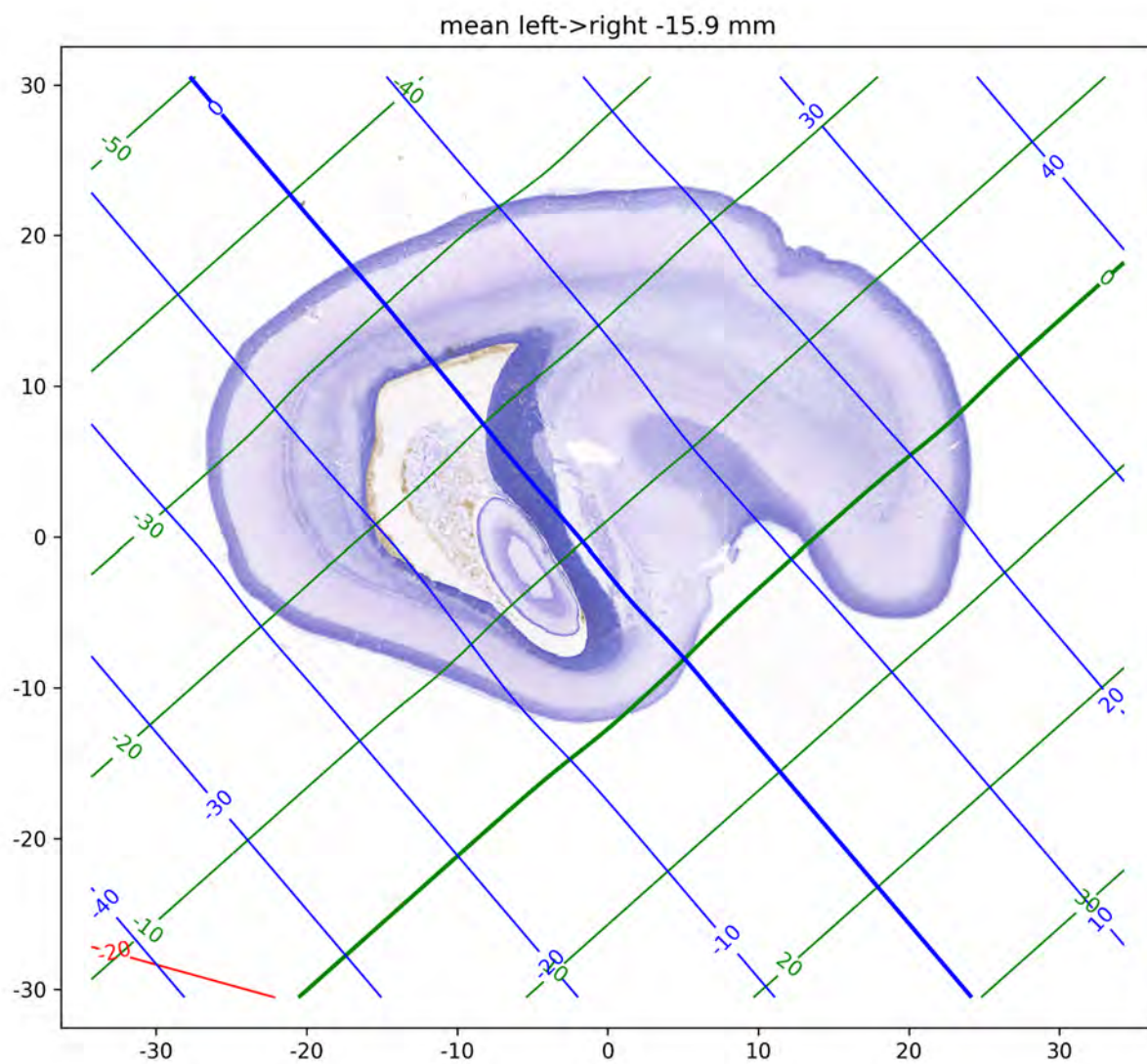


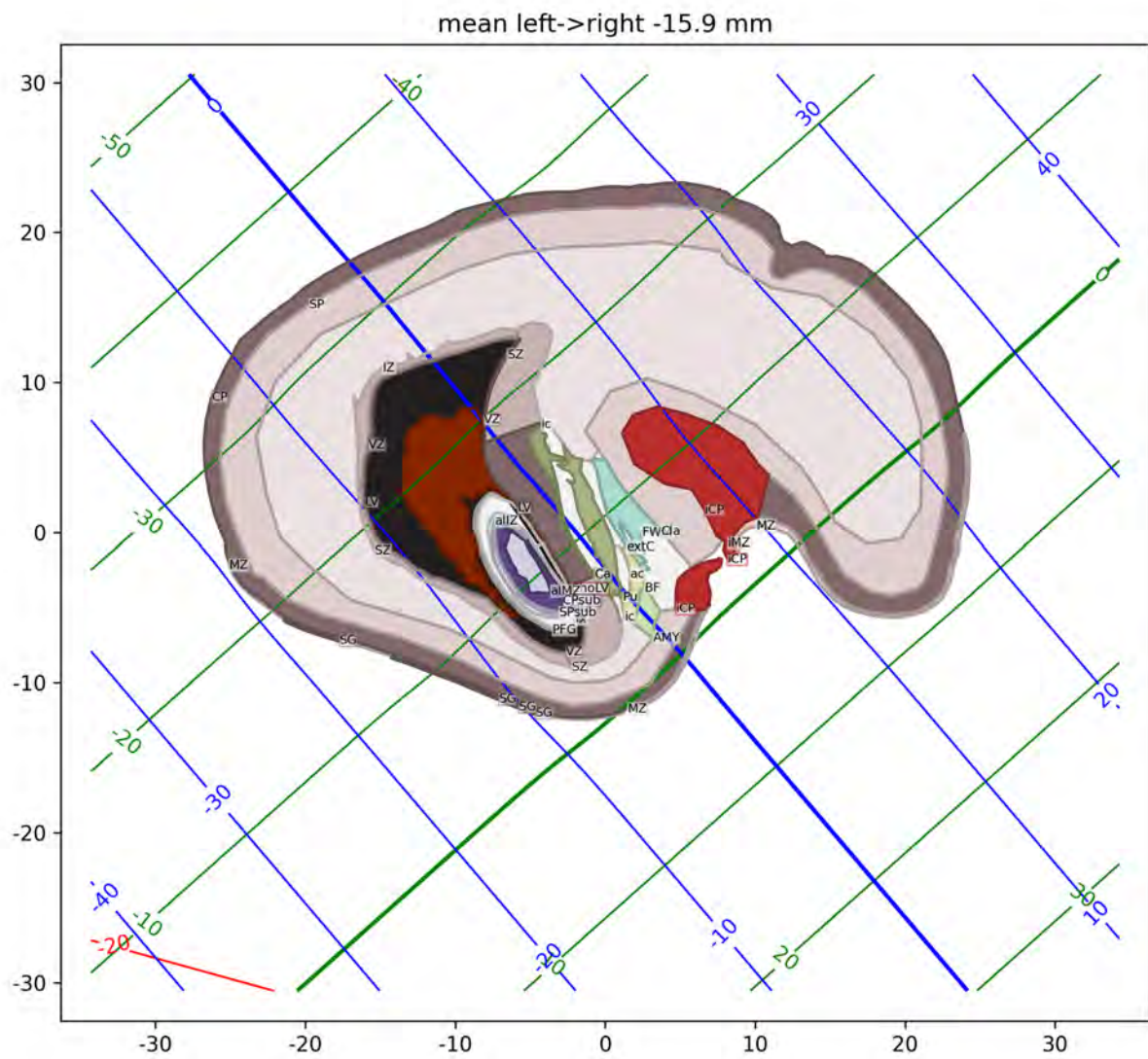


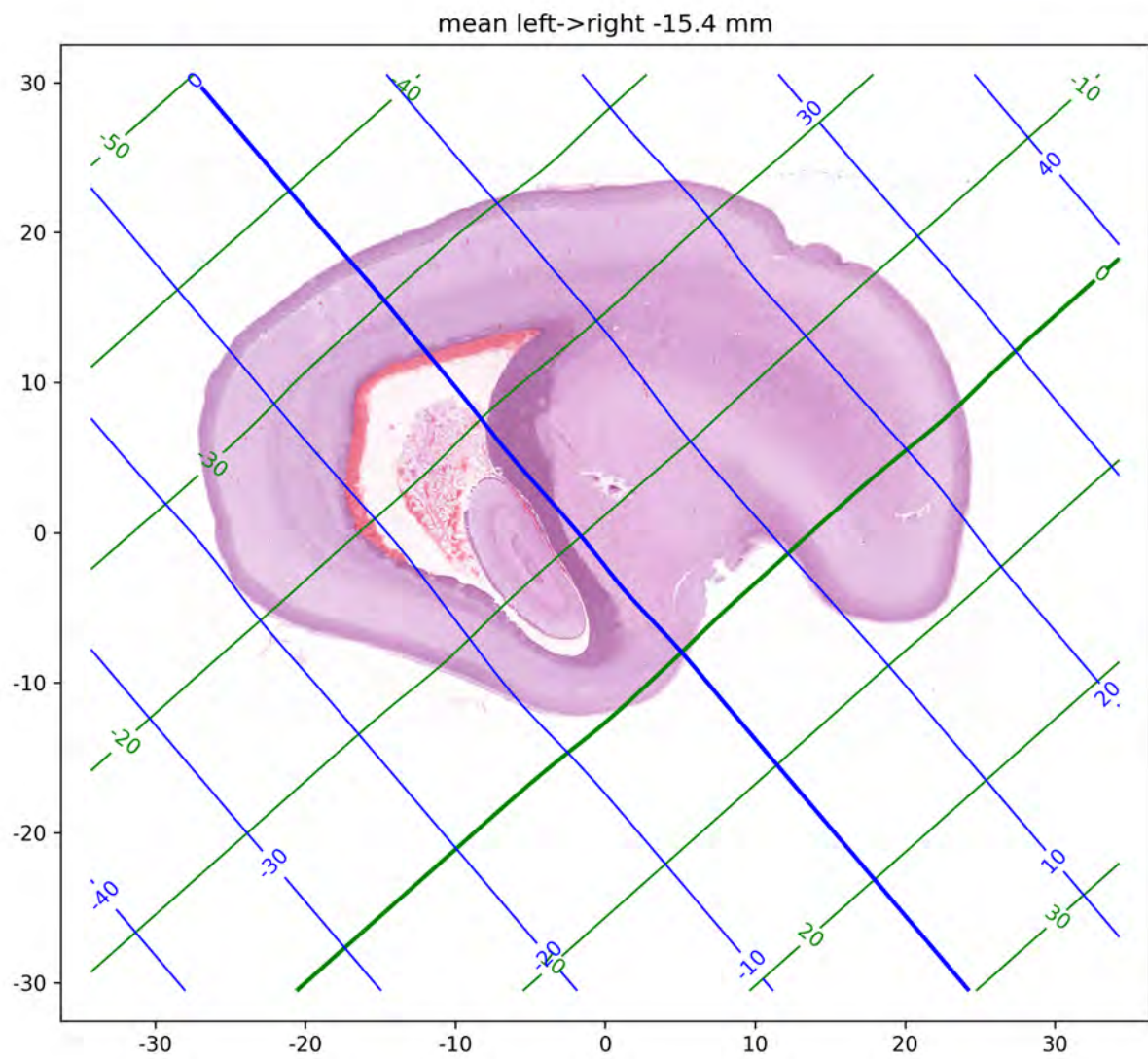


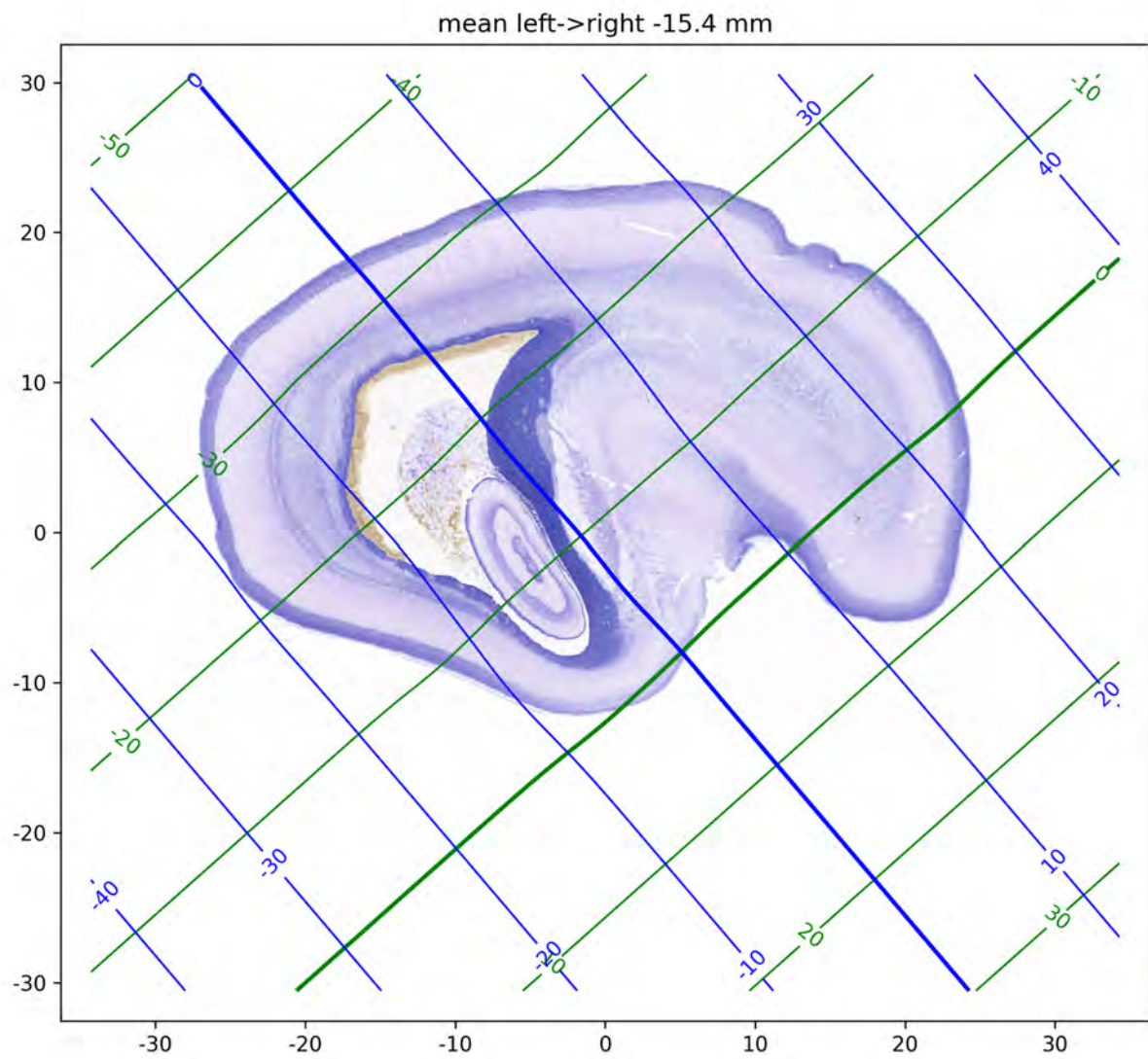


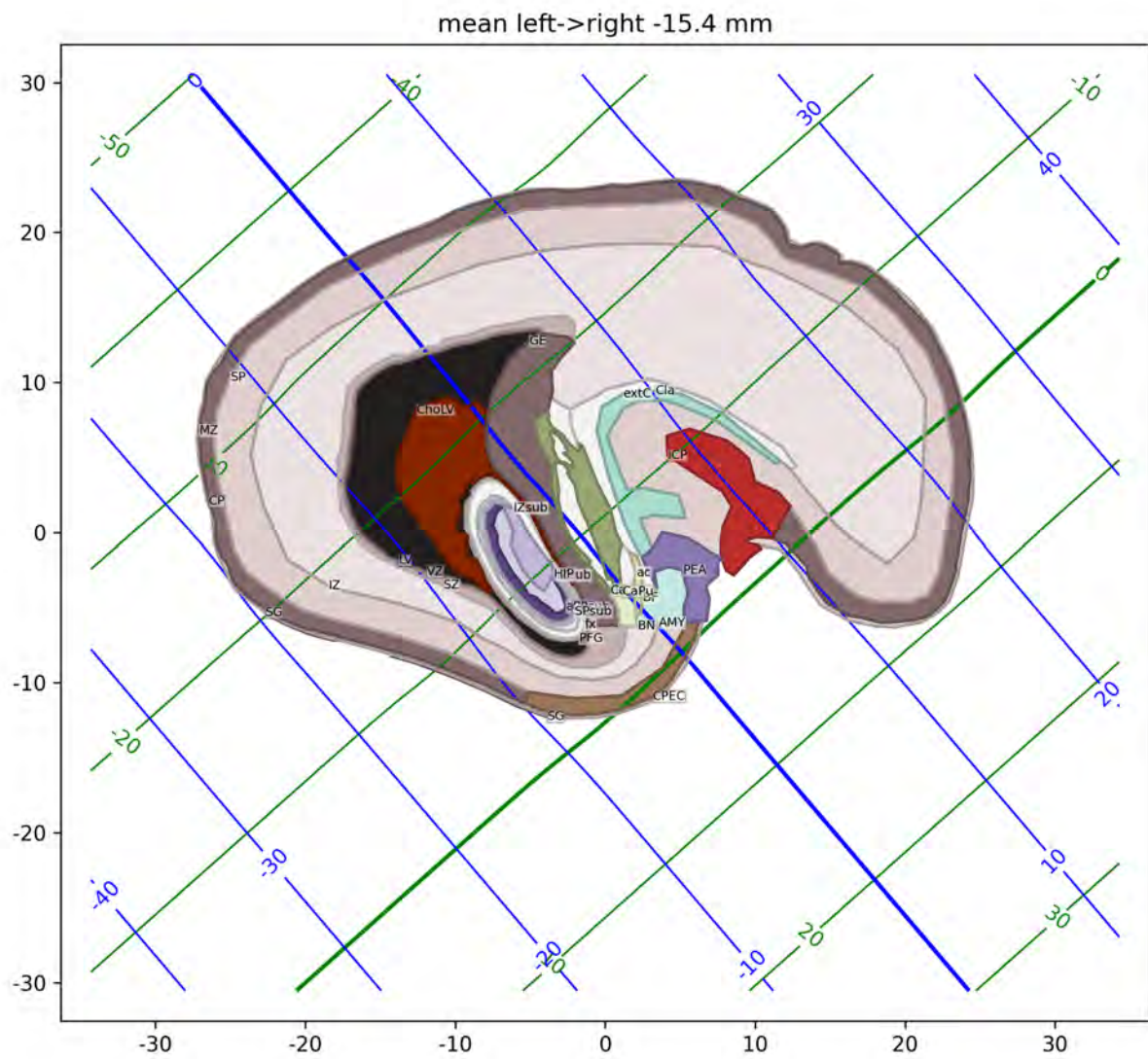


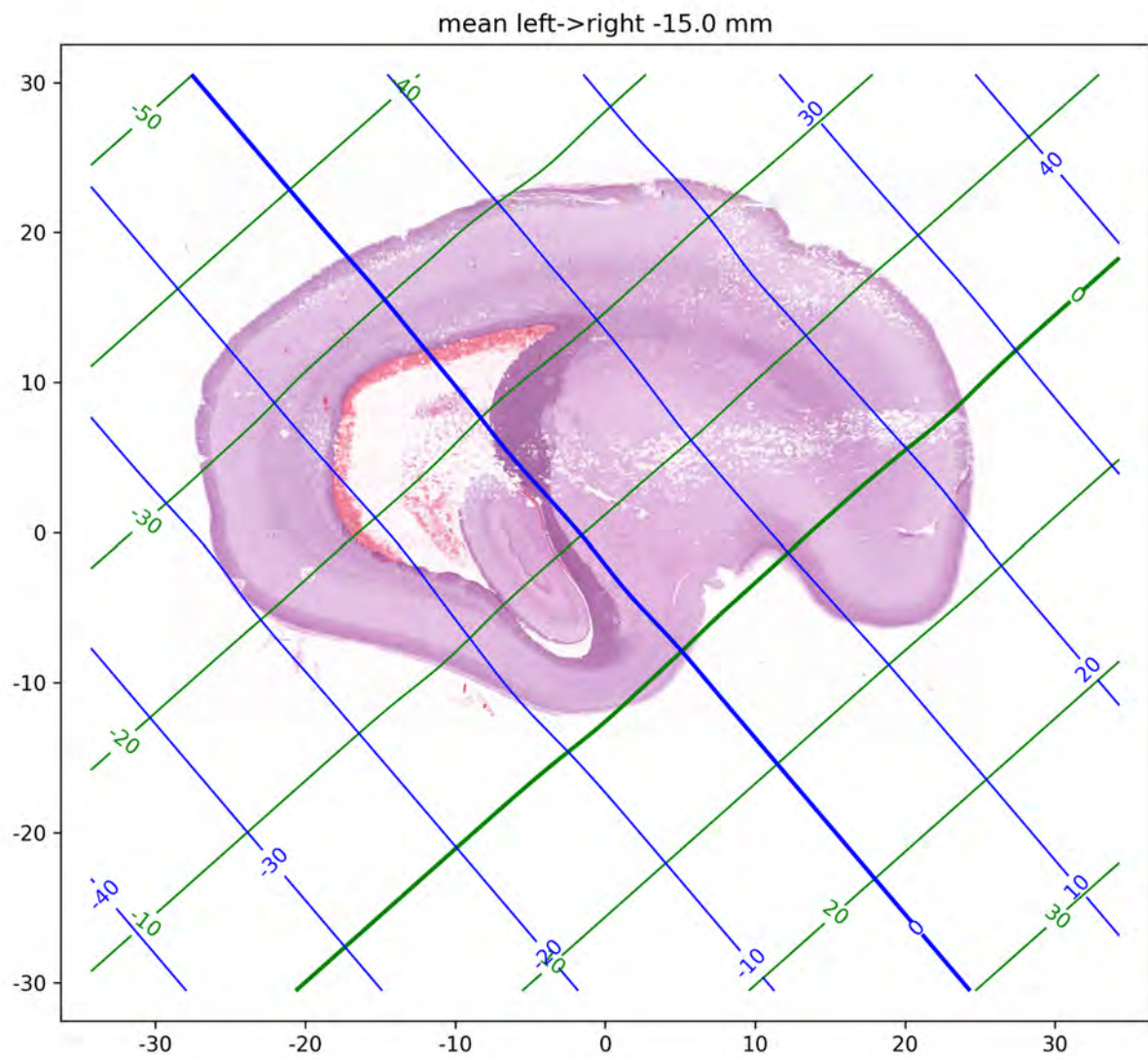


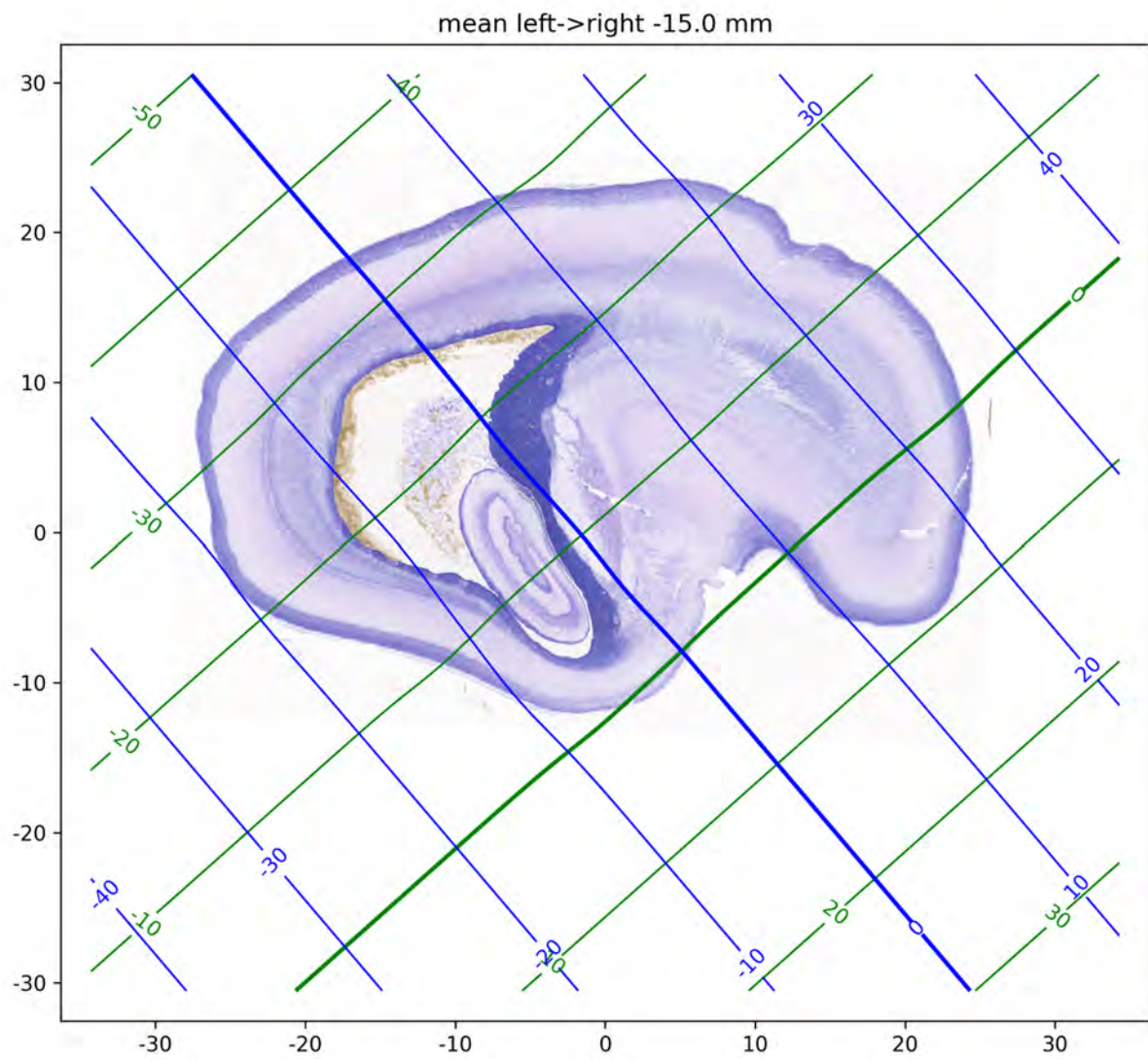


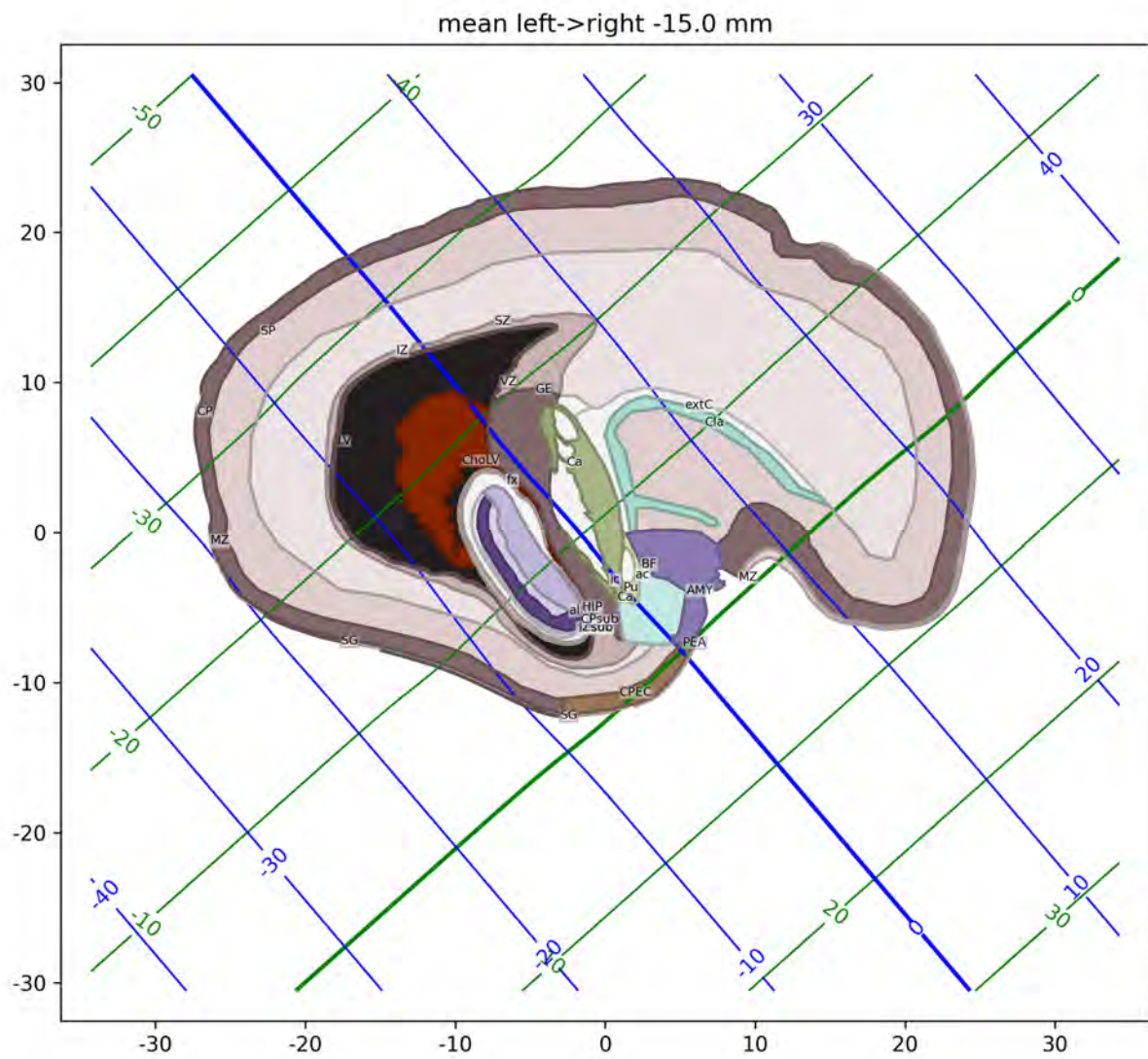


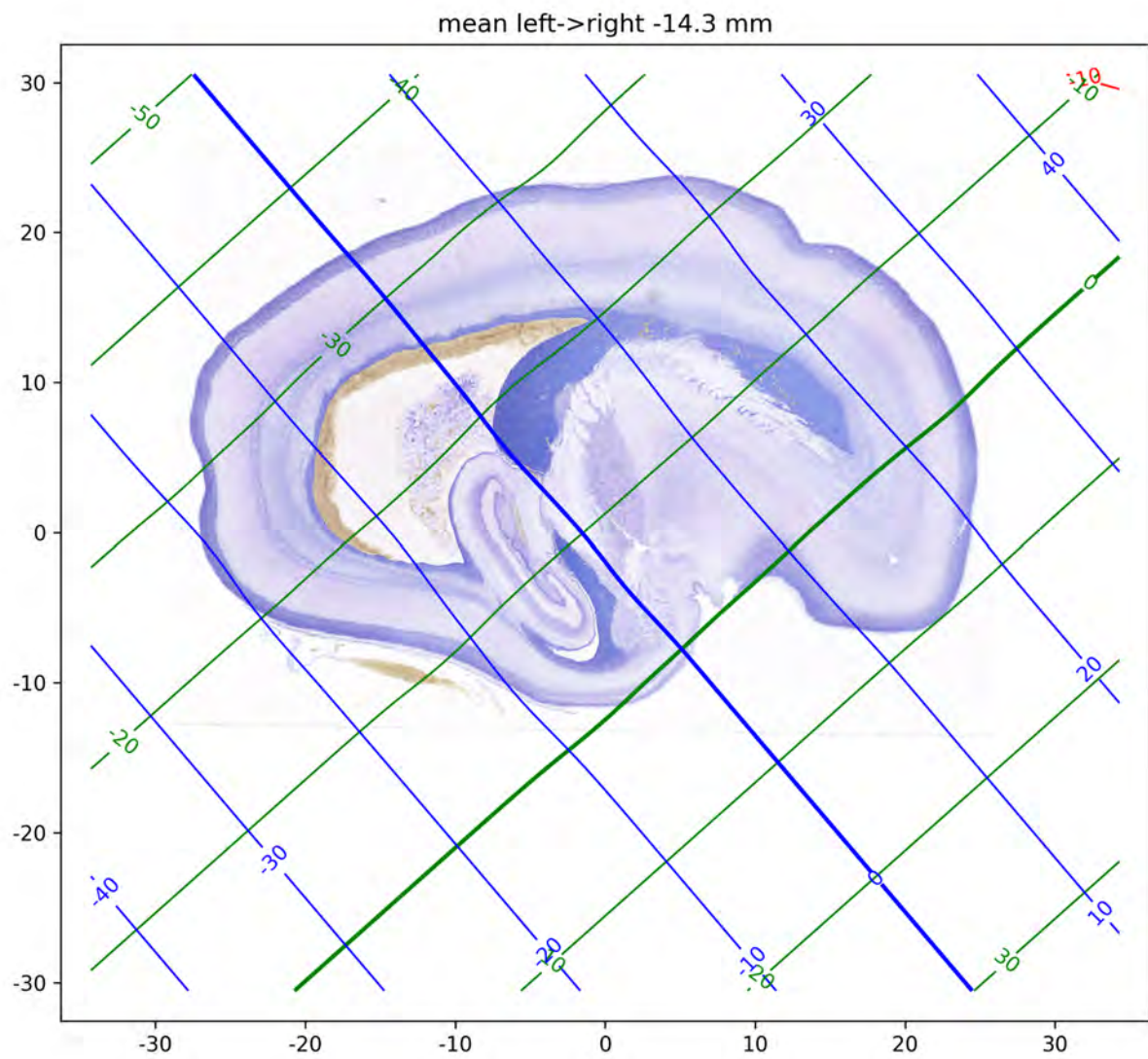


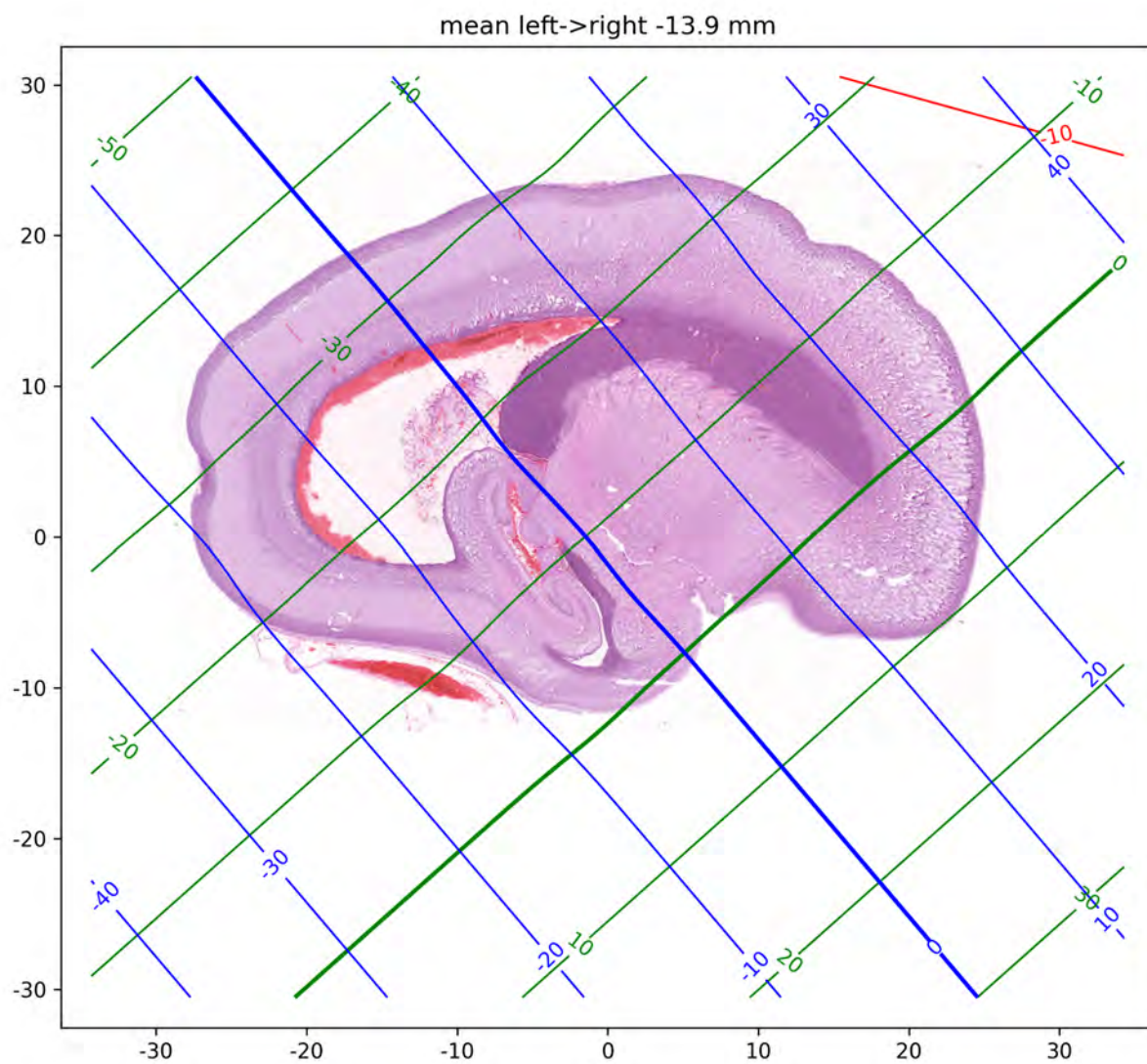


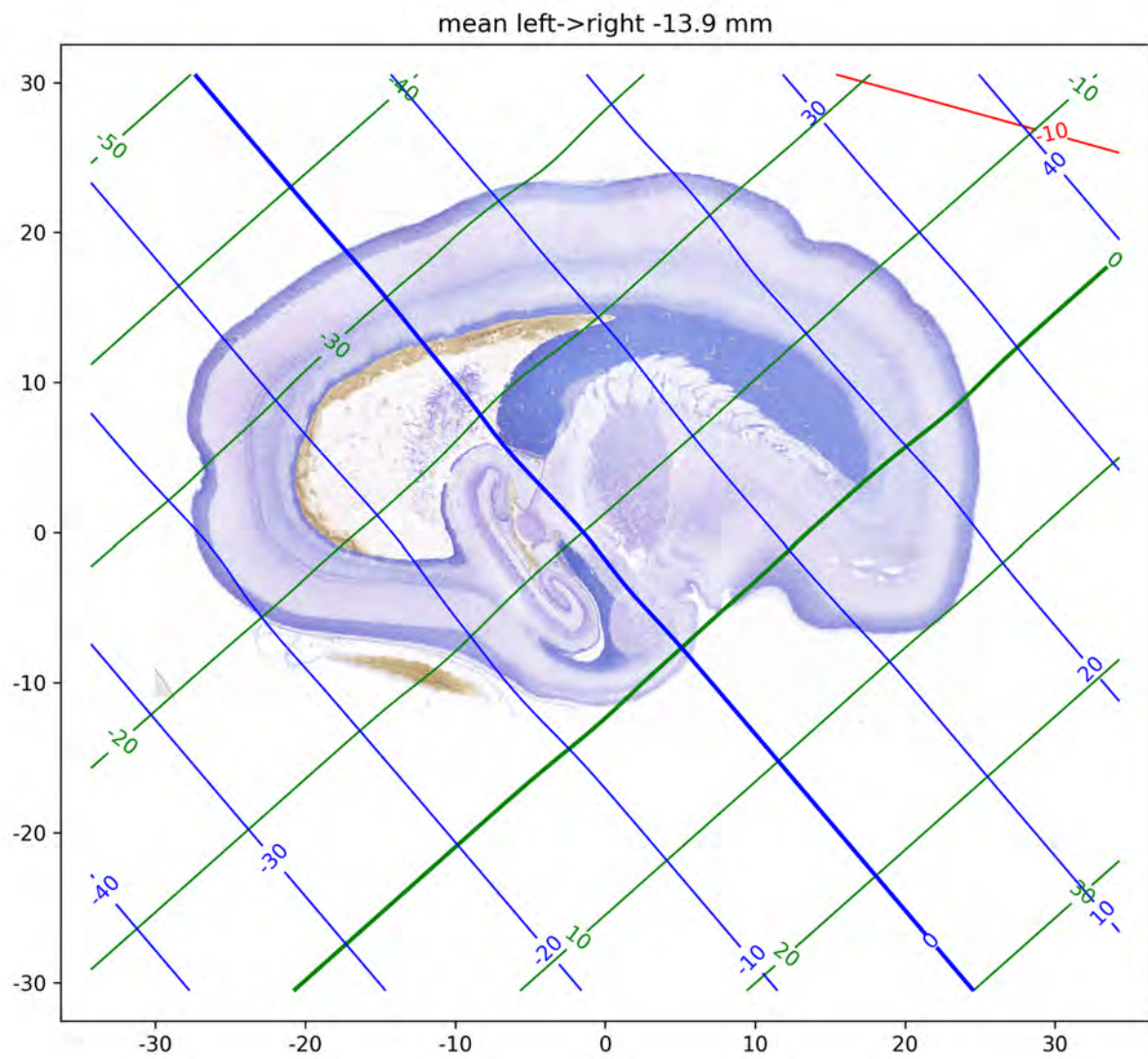


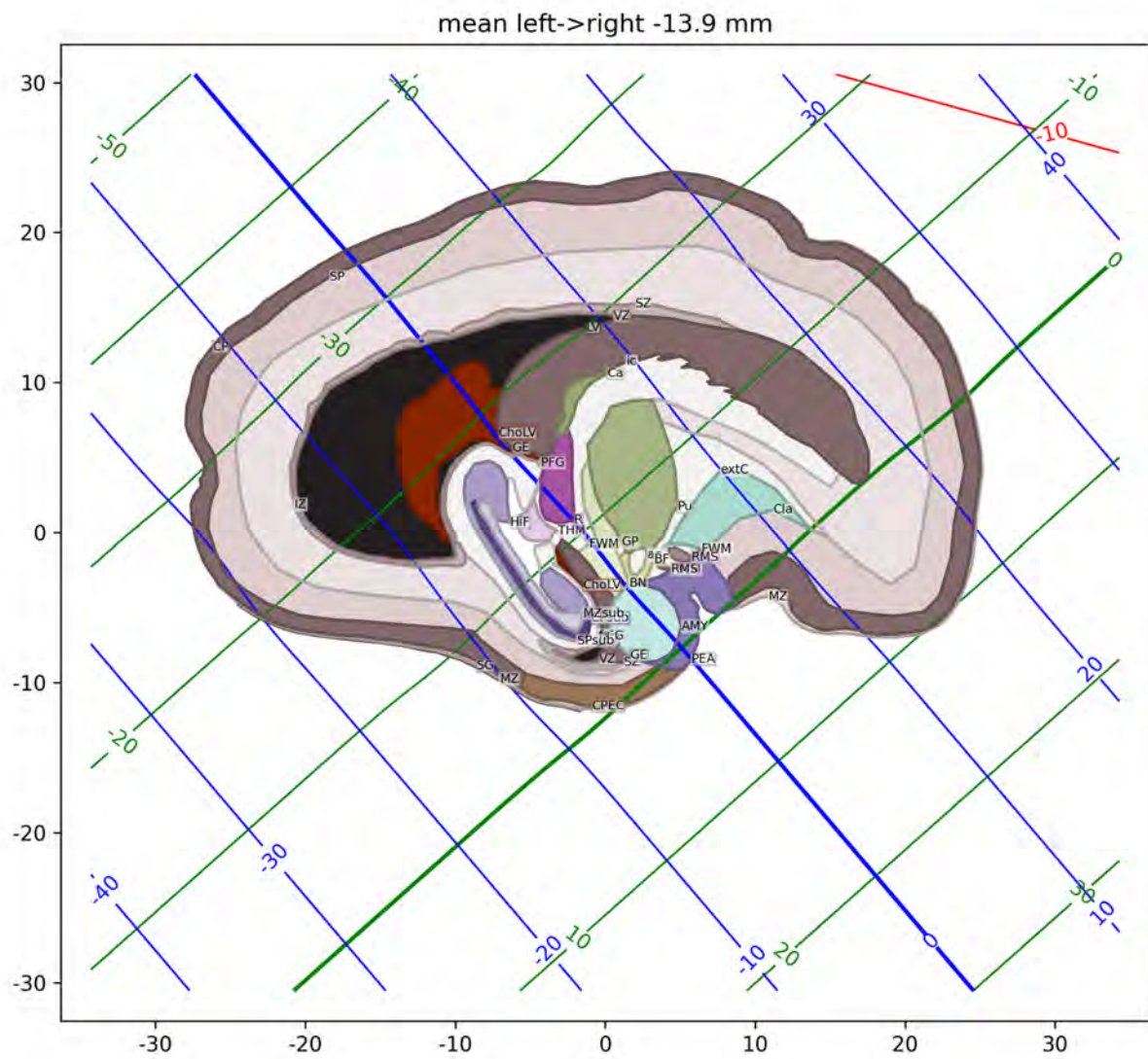


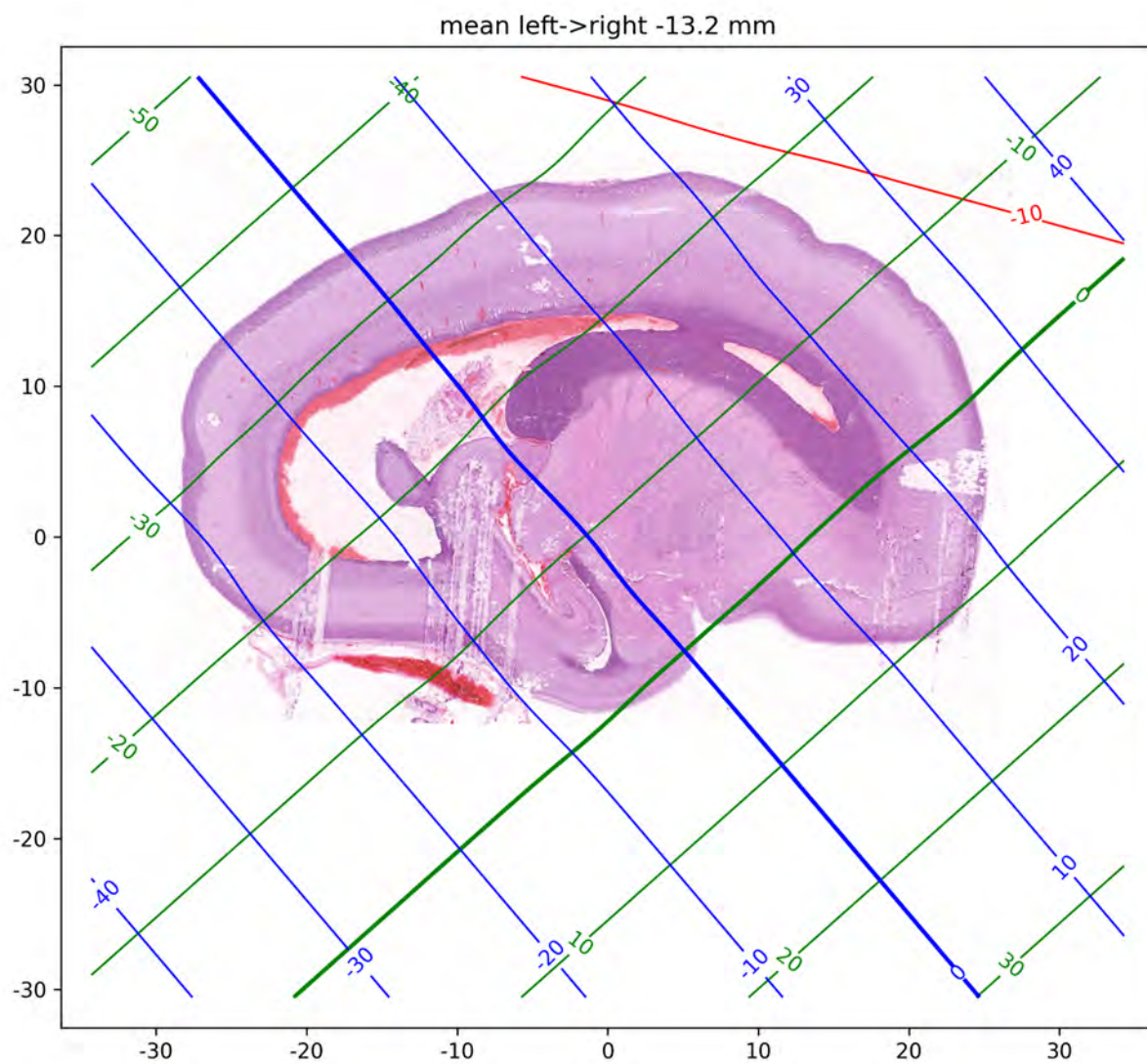


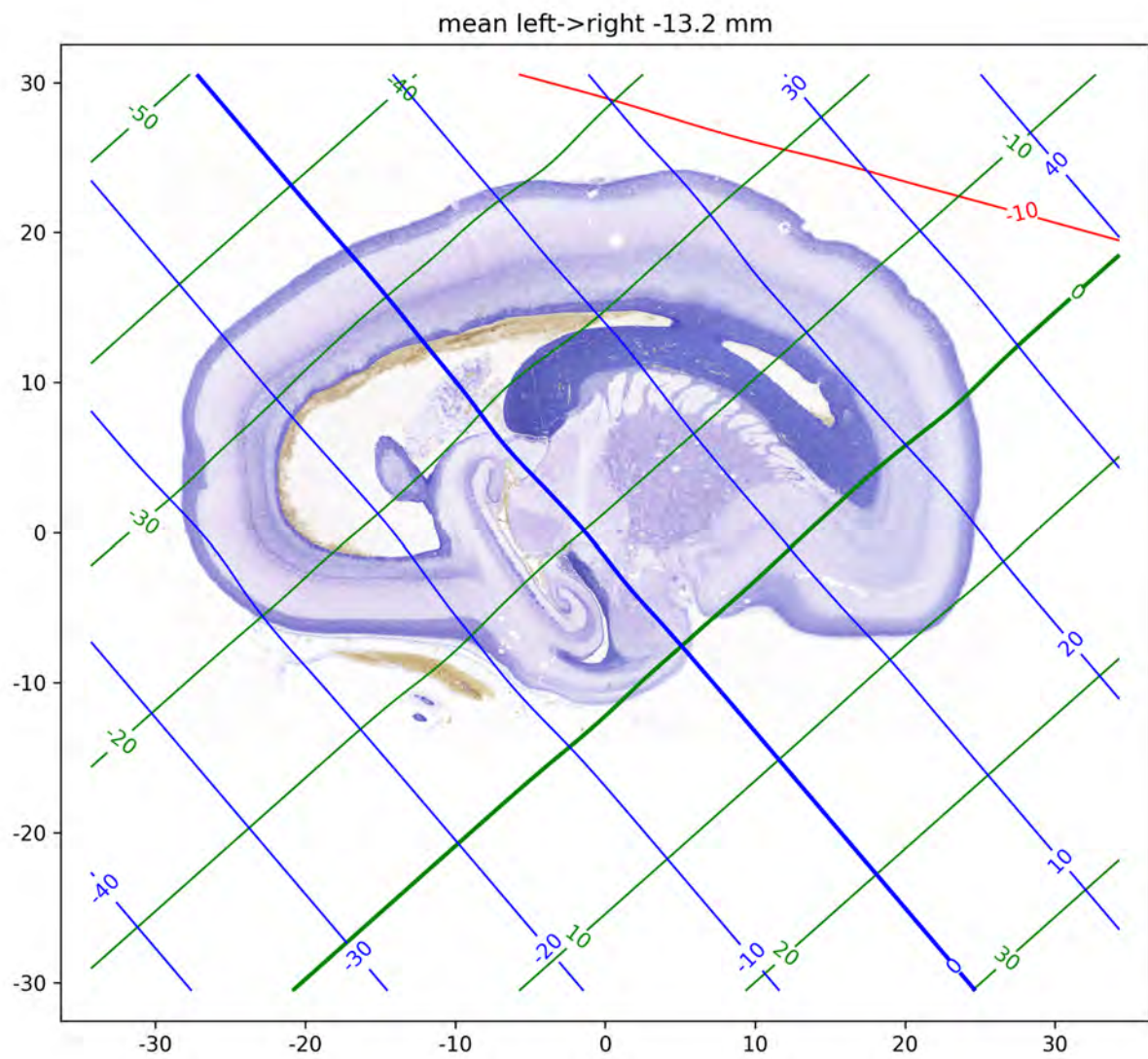




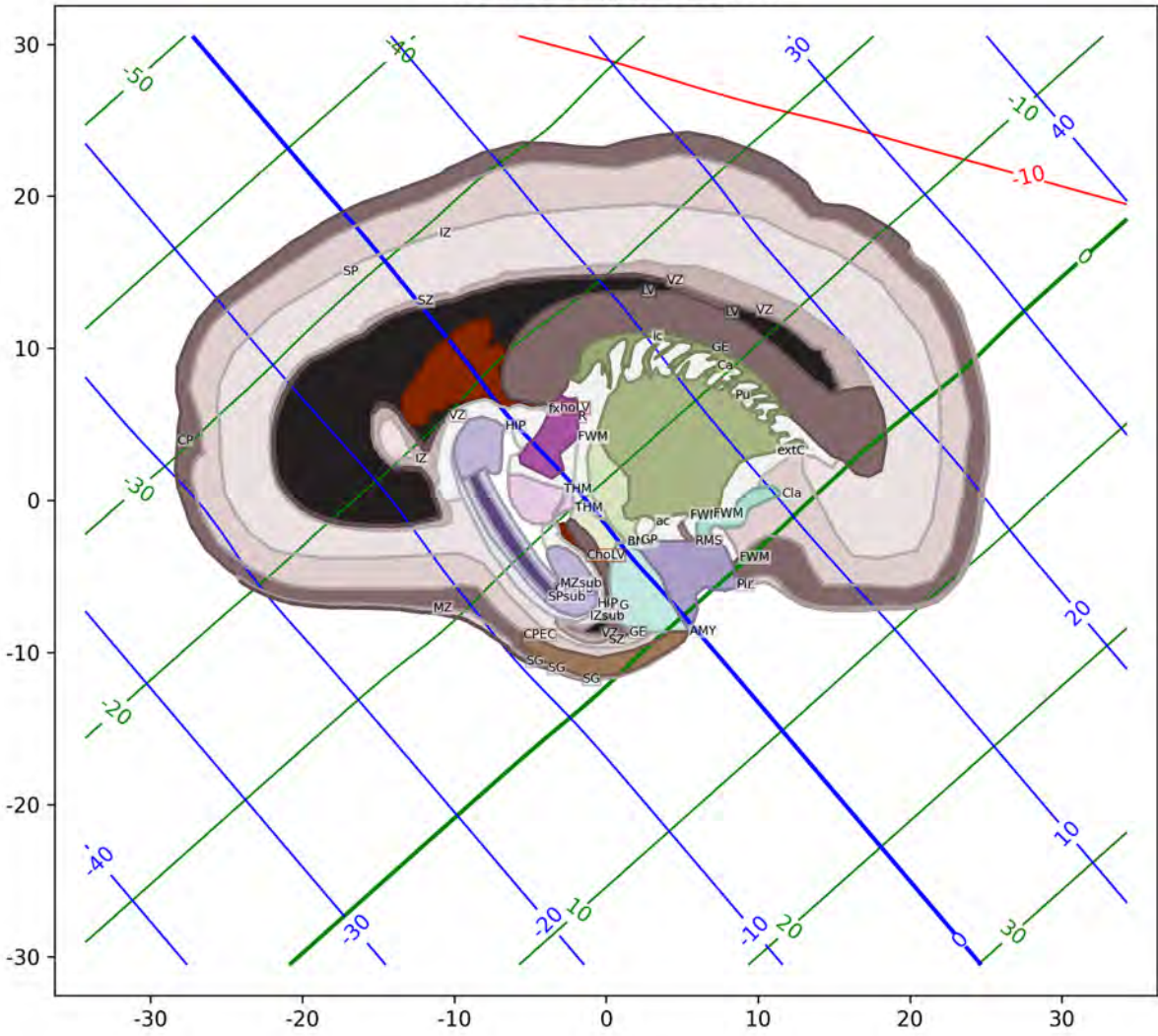


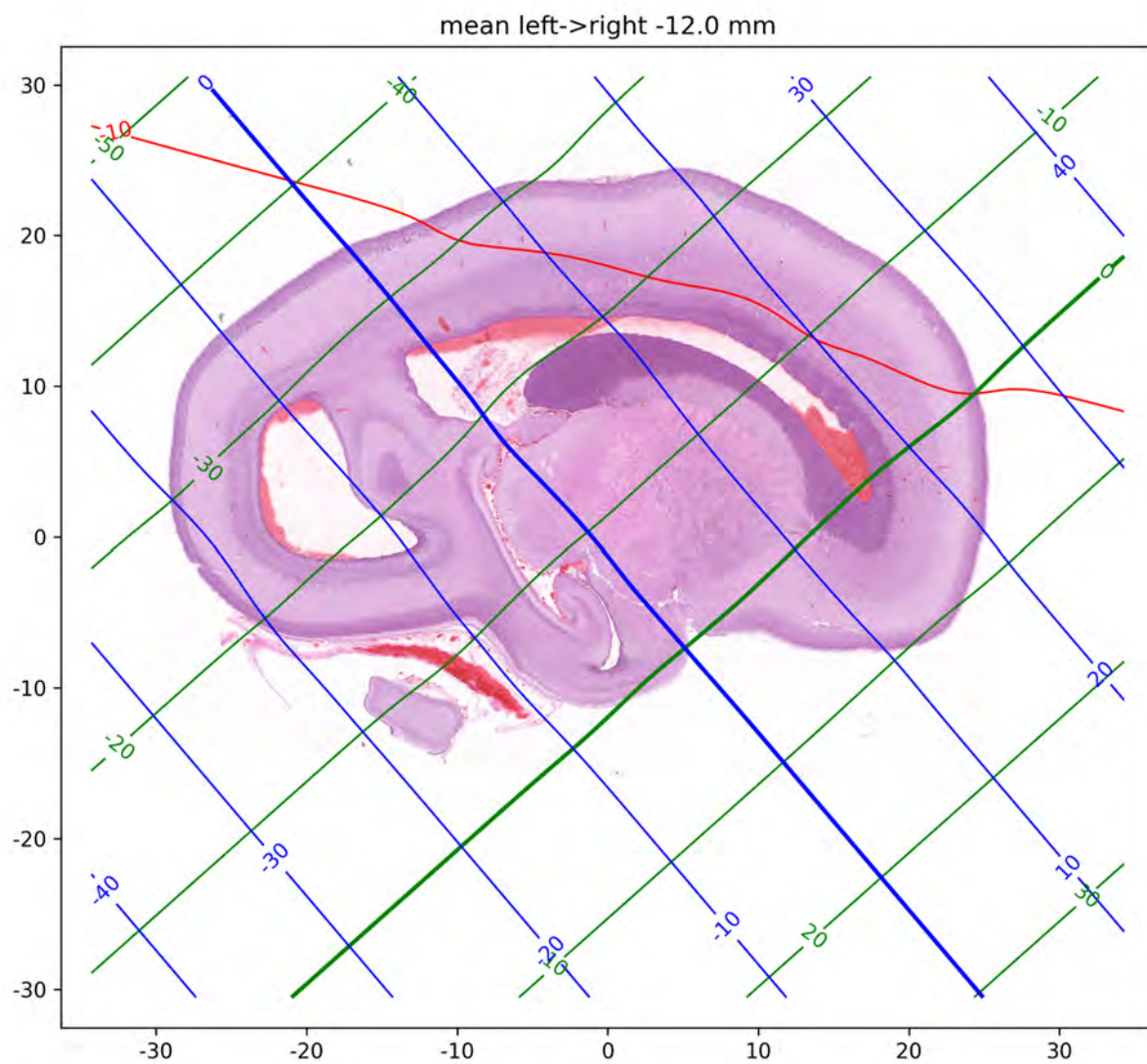


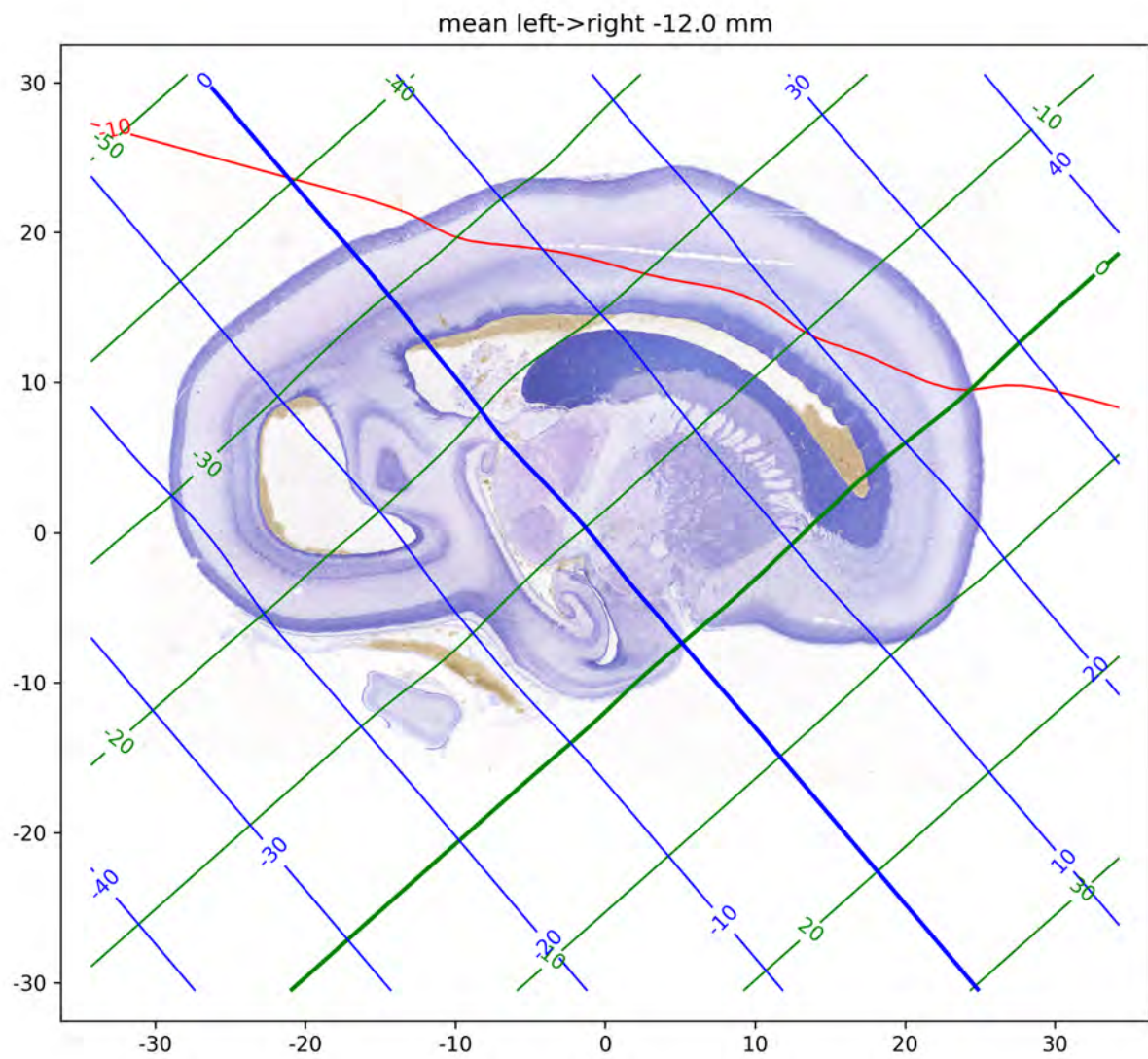


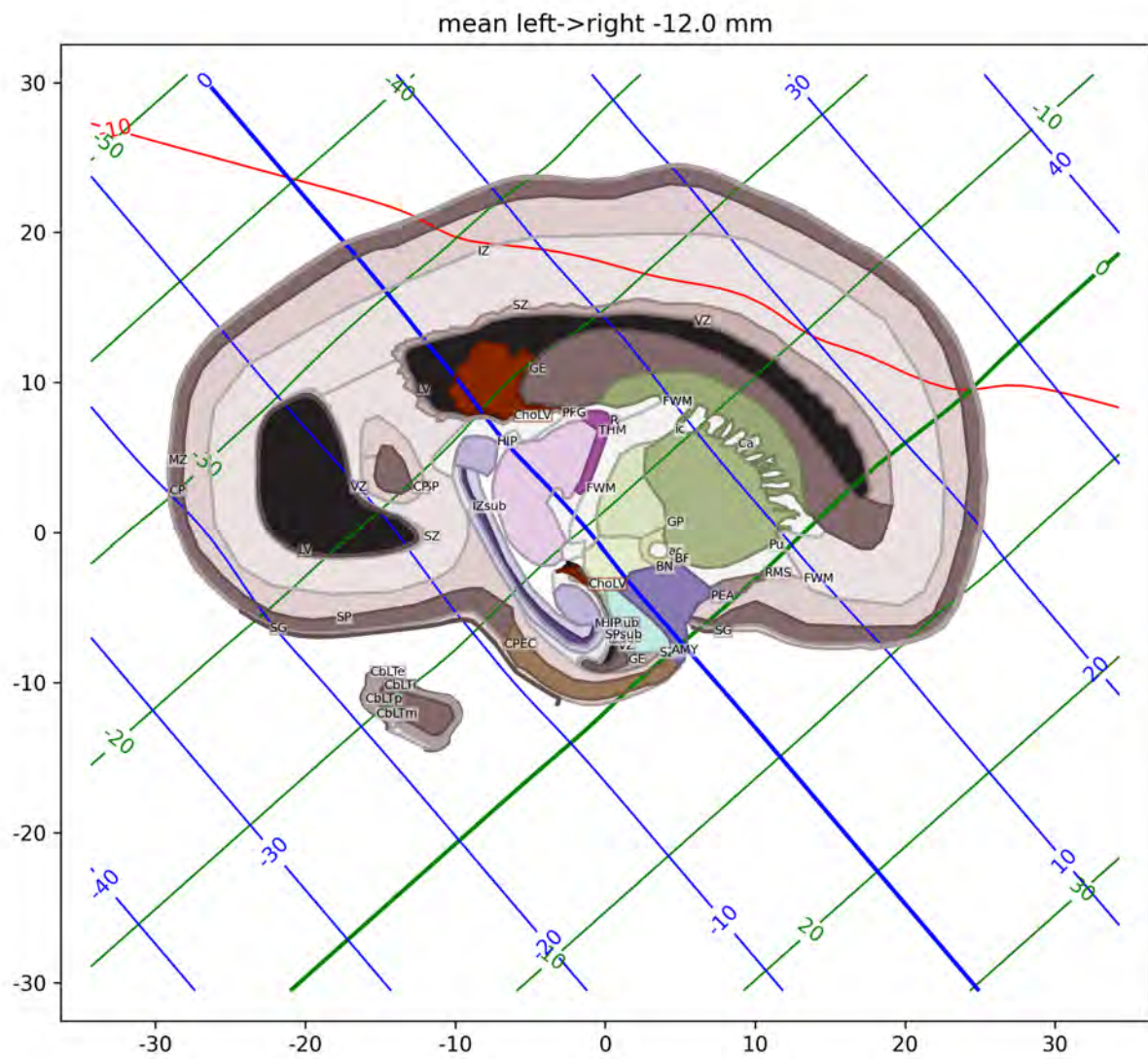


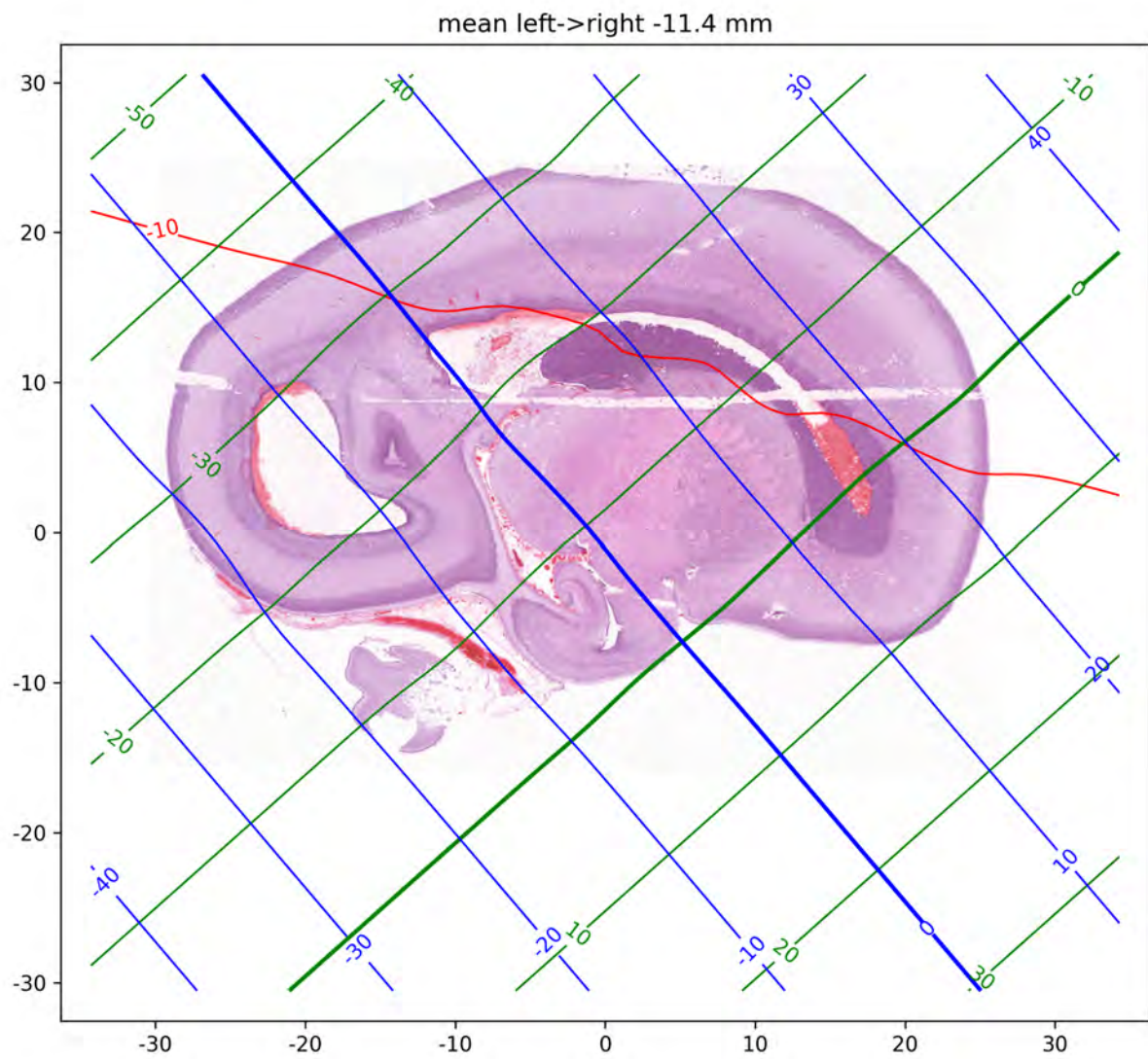
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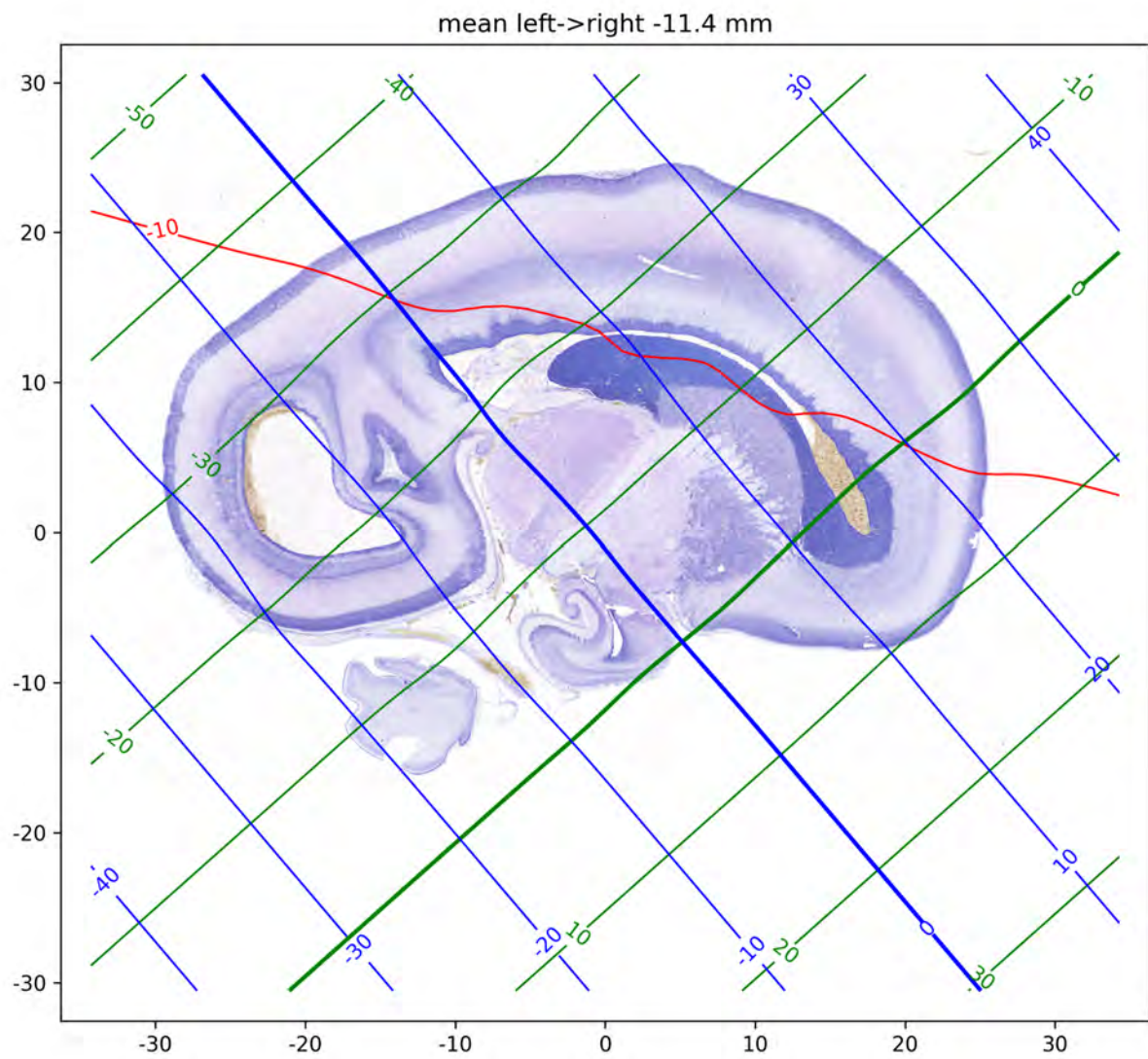












mean left->right -11.4 mm

