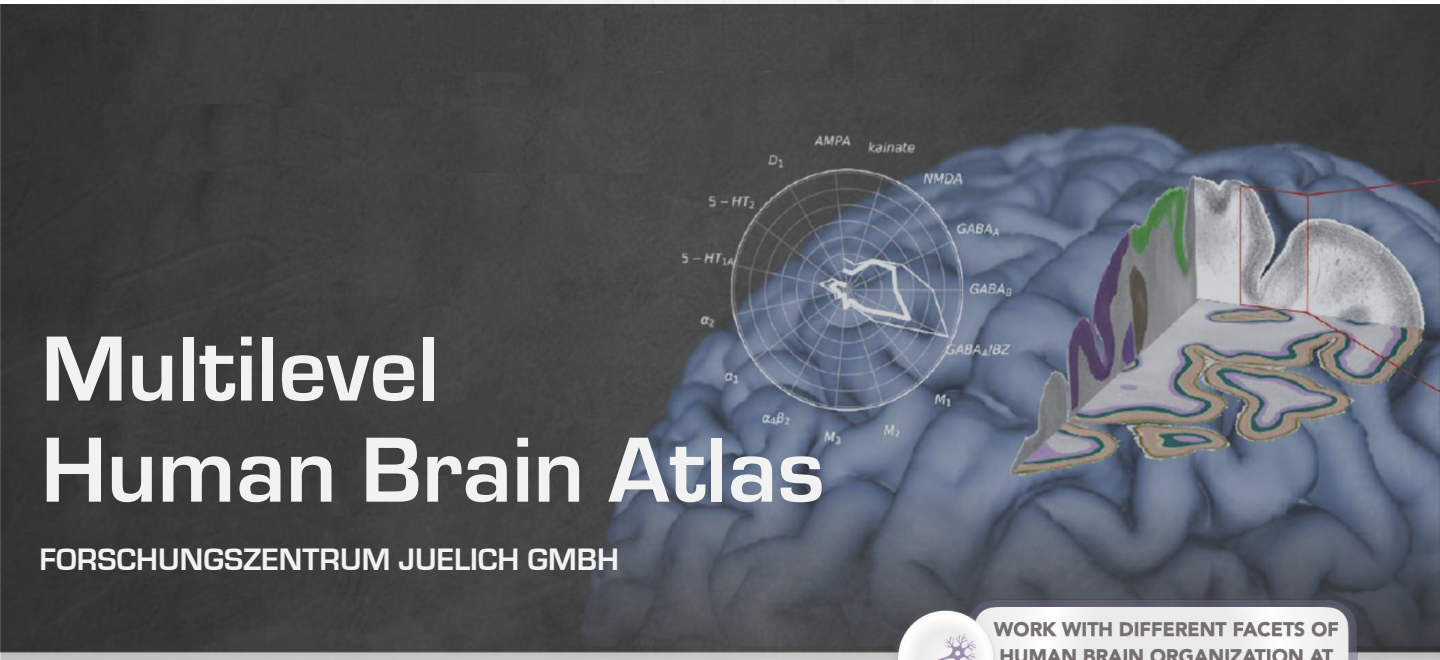
JÜLICH Forschungszentrum



Multilevel Human Brain Atlas

FORSCHUNGSZENTRUM JUELICH GMBH

WORK WITH DIFFERENT FACETS OF HUMAN BRAIN ORGANIZATION AT MULTIPLE SCALES

TECHNOLOGY DESCRIPTION

The Human Brain Project offers a multilevel human brain atlas that integrates information on cytoarchitecture, connectivity, chemoarchitecture, genetics and brain function from the macroscopic and cellular levels into a common framework. This includes large datasets such as BigBrain, a 3D model at microscopic resolution which resolves individual cortical layers and large cells. Working with this multilevel framework is facilitated by the *siibra* toolsuite, which includes the interactive 3D atlas viewer "*siibra-explorer*" to navigate 3D maps and reference models in a web browser. Users can select different parcellations, navigate to specific brain regions, and interactively zoom and rotate to arbitrary viewpoints. The Python library "*siibra-python*" further allows the embedment of the atlas framework into scripts and computational workflows. Users can also map their own data to the atlases to analyze them contextually.

EXPLORING THE 3D STRUCTURE OF THE HUMAN BRAIN, DOWN TO THE LEVEL OF 20 MICRONS FROM A WEB BROWSER

FINDING AND SELECTING BRAIN REGIONS, AND USING THEM TO EXPLORE THE HUMAN BRAIN PROJECT'S COMPREHENSIVE REPOSITORY OF BRAIN DATA AND MODELS

INTEGRATING THE ATLAS FRAMEWORK INTO SCRIPTS AND COMPUTATIONAL WORKFLOWS FOR ADVANCED DATA ANALYSIS AND MODELING

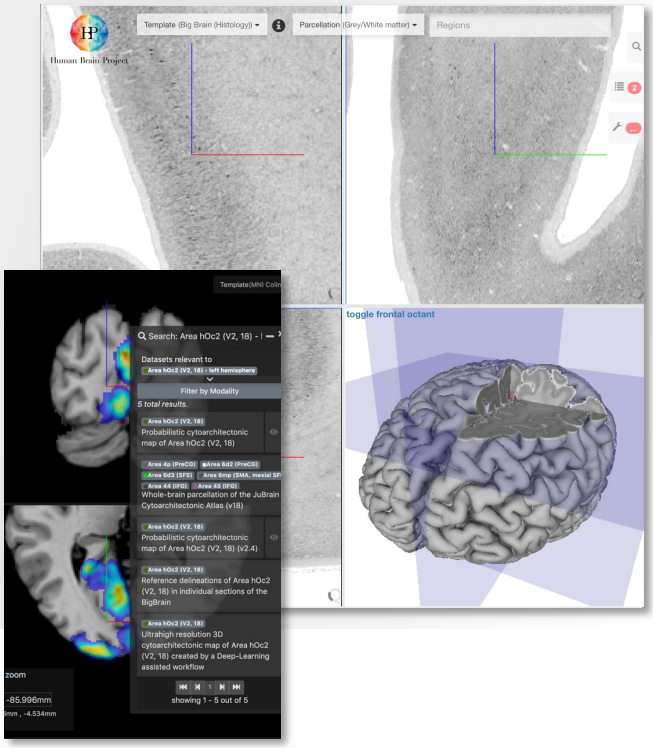
AREAS

Brain atlases | Neuroanatomy | Data repositories | 3D visualization

Human Brain Project
EBRAINS
Co-funded by the European Union

COMPETITIVE ADVANTAGES

- Efficient 3D navigation of a microscopic resolution brain atlas in a web browser
- Fully programmable use through a comprehensive Python library
- Access to probabilistic maps that capture human brain variability, coupled with 3D maps at microscopic resolution
- Interactive access to a growing range of spatially organized multimodal brain data **- a spatial brain information system**
- Functionality to project custom datasets to reference atlases for localizing and assessing neuroscientific findings



APPLICATION & MARKET POTENTIAL

Clinical applications: Localize clinical findings, perform probabilistic assignment to brain regions, support planning of surgical interventions

Education: Explore the anatomy of the brain in 3D, and learn more about different brain areas

Simulation: Construct and constrain simulation models from anatomical parameters

Neuroimaging: Use different reference atlases to aggregate and assess results from neuroimaging studies

Brain-inspired AI: Extract detailed information about biological networks for designing novel AI models

REFERENCES

- Atlas used by neuroanatomists, neuroimaging researchers, clinicians, and, increasingly, computational neuroscientists
- Includes access to the "BigBrain" high-resolution human brain model (Amunts/Evans et al., Science 2013) and the "Julich-Brain" probabilistic cytoarchitectonic atlas (Amunts et al., Science 2020)

CONTACT

Timo Dickscheid
Forschungszentrum Juelich | Germany
t.dickscheid@fz-juelich.de

TECHNOLOGY READINESS LEVEL

1 2 3 4 5 6 7 **8** 9

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