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Quantitative MRI with the *hMRI toolbox*, A toolbox story.

fnrs
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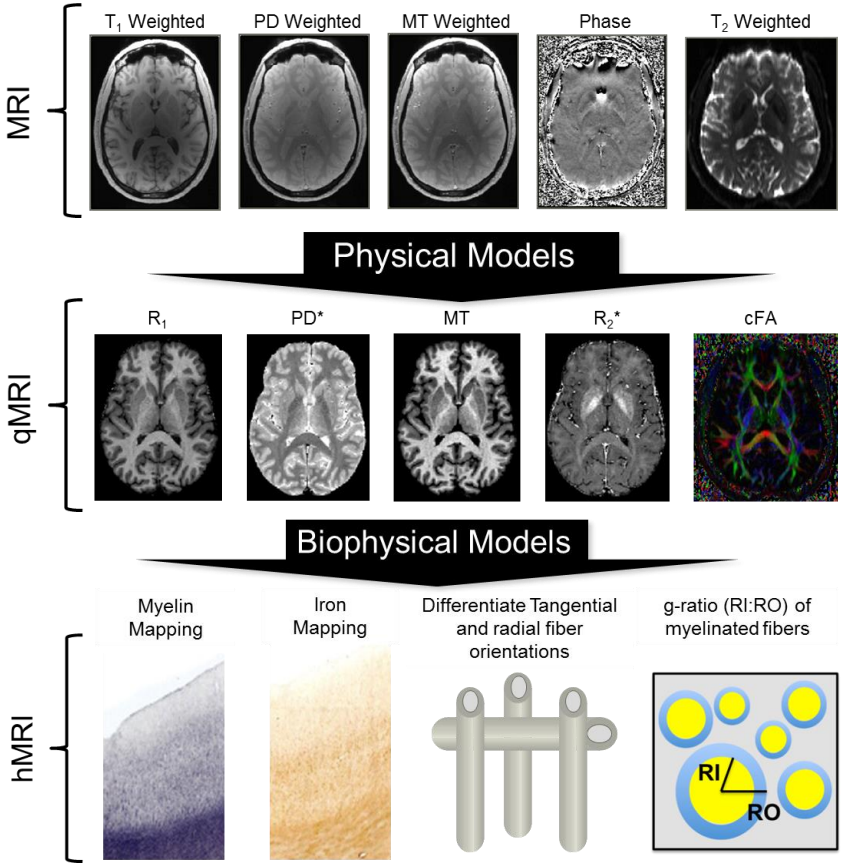
In vivo histology using MRI (hMRI)

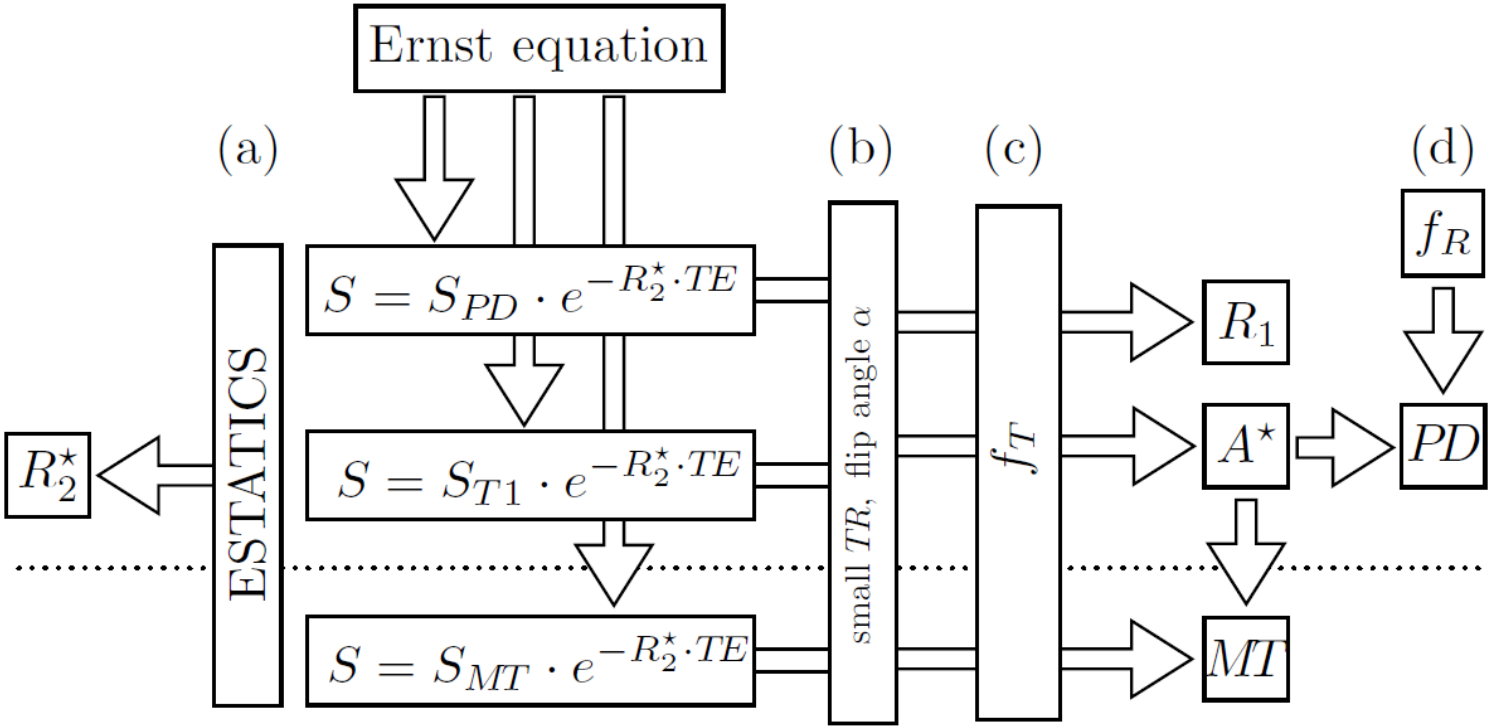


Begin by getting quantitative maps of specific parameters

The ultimate target is biological mapping

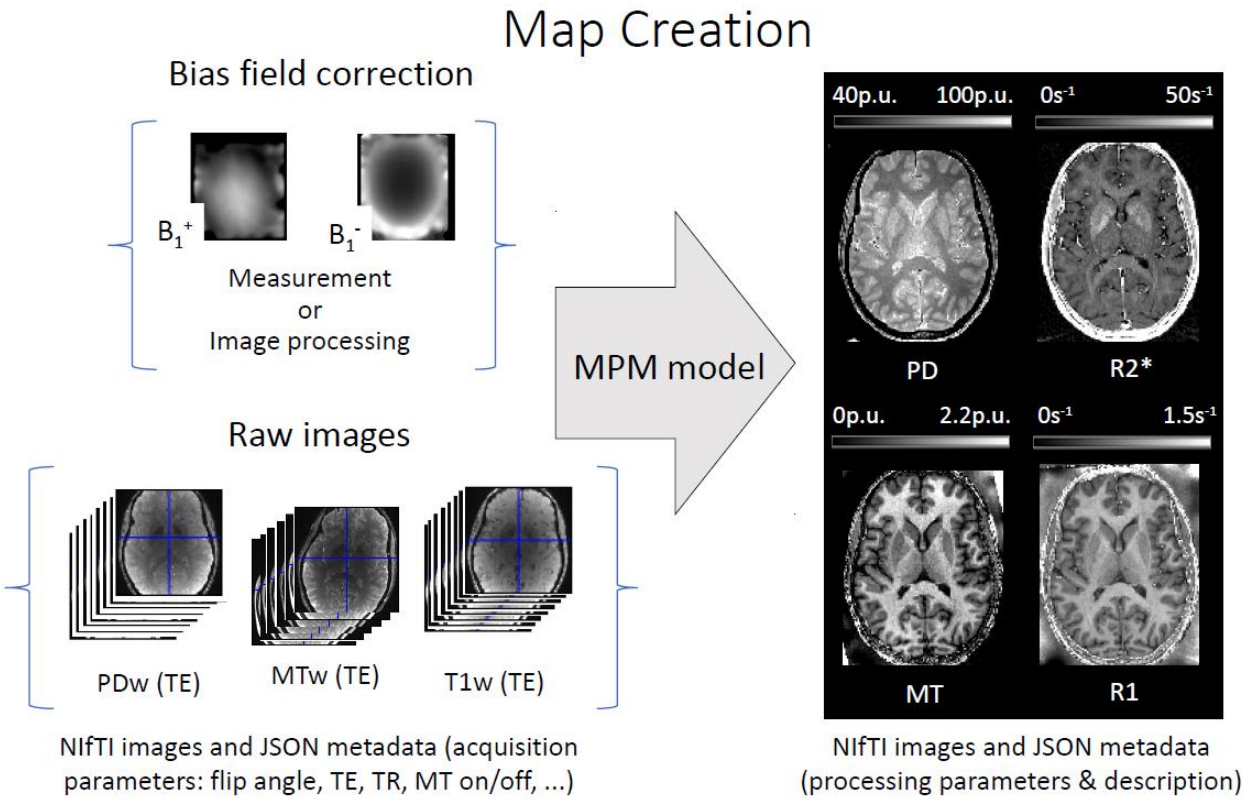
Weiskopf *et al.*, https://doi.org/10.1097/WCO.0000000000000222

Multi-Parameter Mapping (MPM) Protocol



Weiskopf *et al.*, https://dx.doi.org/10.3389%2Ffnins.2013.00095

Multi-Parameter Mapping (MPM) Protocol



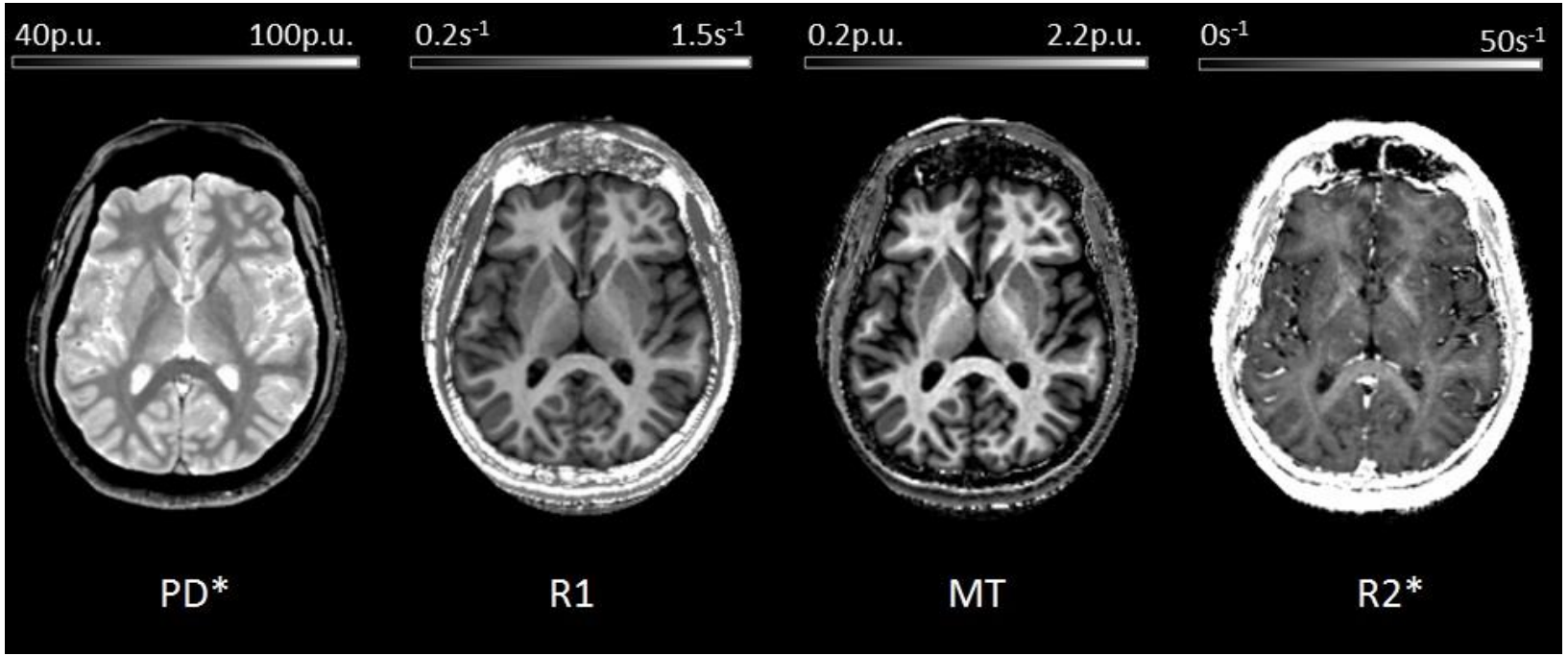
NIfTI images and JSON metadata (acquisition parameters: flip angle, TE, TR, MT on/off, ...)

NIfTI images and JSON metadata (processing parameters & description)

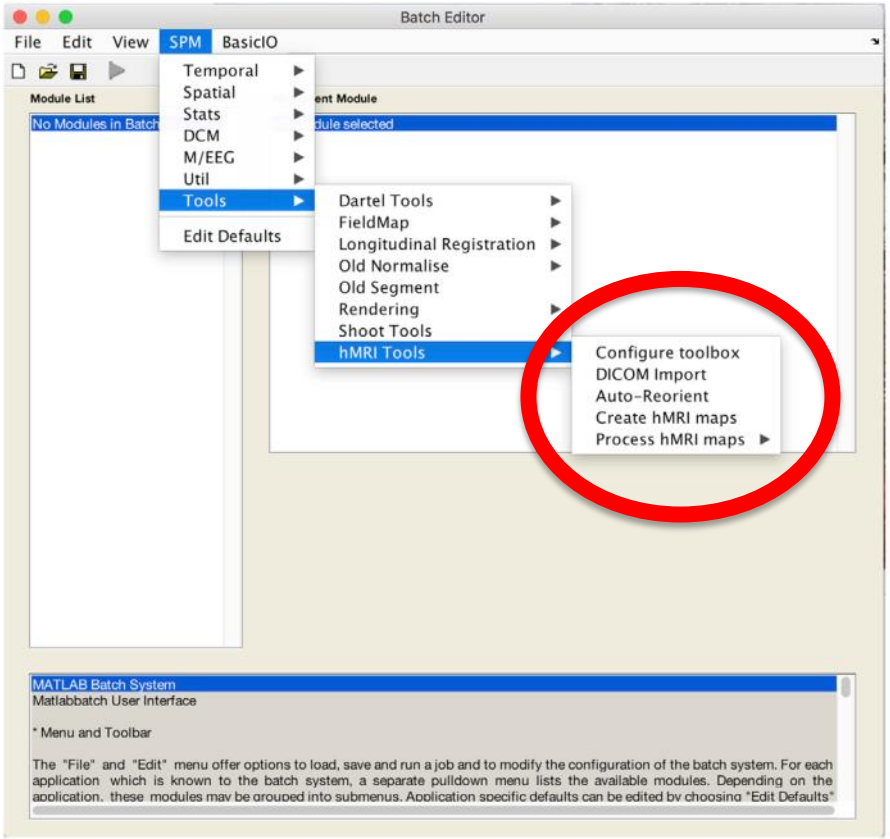
Weiskopf *et al.*, https://dx.doi.org/10.3389%2Ffnins.2013.00095

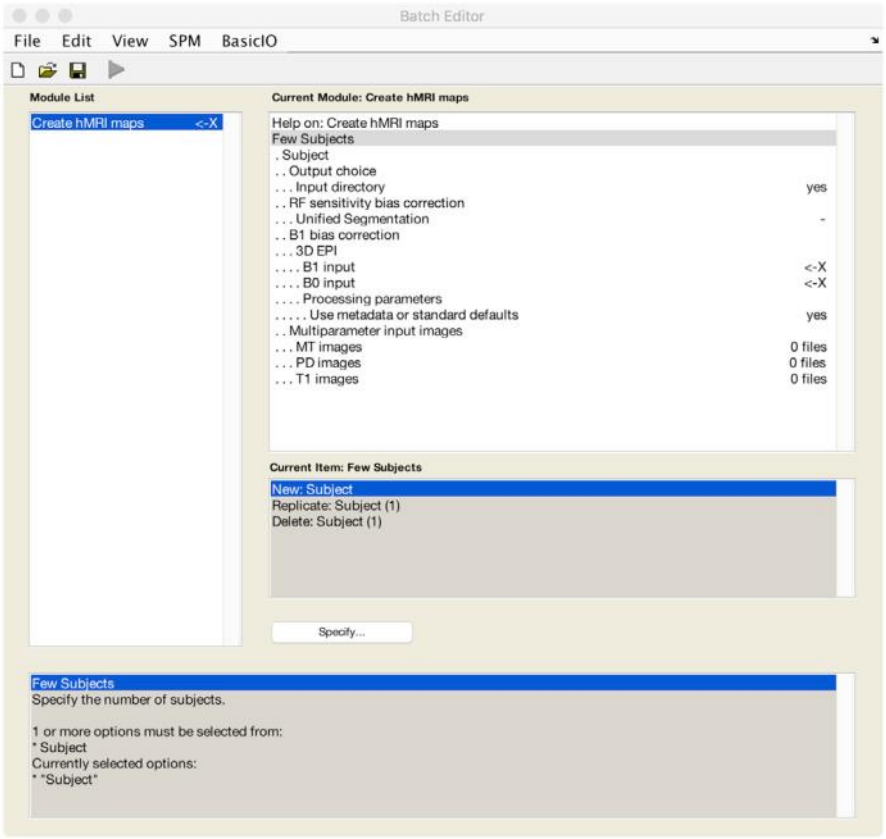
qMRI interpretation

Water Content	Water Content; Macromolecules, e.g. myelin; Iron	Macromolecules e.g. myelin	Iron



Toolbox implementation





Code & other resources, http://hmri.info

Some hMRI references

- Toolbox with code, help, and example data,
  http://hmri.info
- Main paper,
  https://doi.org/10.1016/j.neuroimage.2019.01.029
- MPM protocol & Multi-centre study,
  https://doi.org/10.3389/fnins.2013.00095
- hMRI review,
  https://doi.org/10.1097/WCO.0000000000000222
- Ageing studies,
  https://doi.org/10.1016/j.neuroimage.2011.01.052
  https://doi.org/10.1016/j.neurobiolaging.2014.02.008

Team

- Tobias Leutritz, Enrico Reimer, **Nikolaus Weiskopf** (Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany)
- **Evelyne Balteau**, Christophe Phillips (University of Liege, Liege, Belgium)
- **Siawoosh Mohammadi** (Medical Center Hamburg-Eppendorf, Hamburg, Germany)
- **Martina F Callaghan**, John Ashburner (University College London, London, United Kingdom)
- Bogdan Draganski, Ferath Kerif, **Antoine Lutti** (LREN, DNC - CHUV, University Lausanne, Lausanne, Switzerland)
- **Karsten Tabelow** (Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany)
- Maryam Seif (University of Zurich, Zurich, Switzerland)
- Gunther Helms (Department of Medical Radiation Physics, Lund University, Lund, Sweden)
- Lars Ruthotto (Emory University, Atlanta, GA, United States)
- Gabriel Ziegler (Otto-von-Guericke-University Magdeburg, Magdeburg, Germany)

How did we do it ?

Background & social aspect

- Common source & experience (WCHN, UCL, UK)
  → “it all started there” feeling…
  → trust and respect of each other’s complementary expertise

- Common interest & objective (open science ☺)
  → will to share resources & expertise
  → trade short-term for long-term efficiency

How did we do it ?

Organizational & practical aspect

- Work distributed in teams lead by a “captain”
  → hierarchy based on sub-project management
  → easier communication and responsabilization

- Common development platform
  → Github or Gitlab obviously
  → training & support…

How did we do it ?

Difficulties

- Synchronization & communication
  → slow and time consuming
- Code integration and validation
  → slow and time consuming

In-person meeting required to readjust expectations and help decision making.

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Apply asap and before July 8th

More info: c.phillips@uliege.be

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Thank you for your attention!


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