

Beyond the Horizon:

Navigating Reproducible Research Practices in MRI with MRM Highlights

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What is MRM Highlights?

**MAGNETIC RESONANCE
IN MEDICINE**

ISMIRM

ONE
COMMUNITY
FOR CLINICIANS
AND SCIENTISTS



Three Pillars of Highlights



Regular Interviews



Annual Magazine



ISMRM Afterparty

A brief history 2015-2019



Nikola Stikov
Polytechnique Montréal



Erika Raven
New York University School of Medicine



Atef Badji
Polytechnique Montréal



2020-2023: New Leadership

Digital Content



Mathieu Boudreau
Polytechnique Montréal



Atef Badji
Polytechnique Montréal

Magazine



Mark Chiew
University of Oxford



Maria Eugenia Caligiuri
Magna Graecia University

Current Format

- **MRM publication** chosen based on exemplary reproducible research practices.
- **Two blog posts**
 - Q&A blog post about authors and their paper.
 - *Reproducible Research Insights* blog post about their reproducible research practices.
- **Annual magazine** containing the interviews from the past year and some additional special features/interviews related to ISMRM.

EDITORIAL |  Free Access

Reproducibility and the future of MRI research

Nikola Stikov✉, Joshua D. Trzasko, Matt A. Bernstein

First published: 10 August 2019 | <https://doi.org/10.1002/mrm.27939> | Citations: 7 SECTIONS PDF  TOOLS  SHARE

Most would agree that transparency in science is an essential goal, but there are differing opinions on how open our science really should be. The questions surrounding open science and research transparency are particularly relevant for fields like magnetic resonance, in which much of the innovation over the past 50 years has been driven by intellectual property, including patents and copyrighted software, and there is a tight link between industry and academia.

Stikov, N., Trzasko, J.D. and Bernstein, M.A. (2019), *Reproducibility and the future of MRI research*. *Magn Reson Med*, 82: 1981-1983. <https://doi.org/10.1002/mrm.27939>

EDITORIAL |  Free Access

On the open-source landscape of *Magnetic Resonance in Medicine*

Mathieu Boudreau✉, Nikola Stikov, Peter Jezzard

First published: 28 July 2022 | <https://doi.org/10.1002/mrm.29366>[Click here](#) for author-reader discussions SECTIONS PDF  TOOLS  SHARE

Abstract

[Click here](#) for author-reader discussions

Boudreau, M, Stikov, N, Jezzard, P. *On the open-source landscape of Magnetic Resonance in Medicine*. *Magn Reson Med*. 2022; 88: 1495-1497. <https://doi.org/10.1002/mrm.29366>

TABLE 1 Summary of the reproducible research analysis of *Magn Reson Med* papers

% of total papers that shared ...	2019	2020	2021
code OR data	11	14	31
code	9	12	24
data	5	6	18

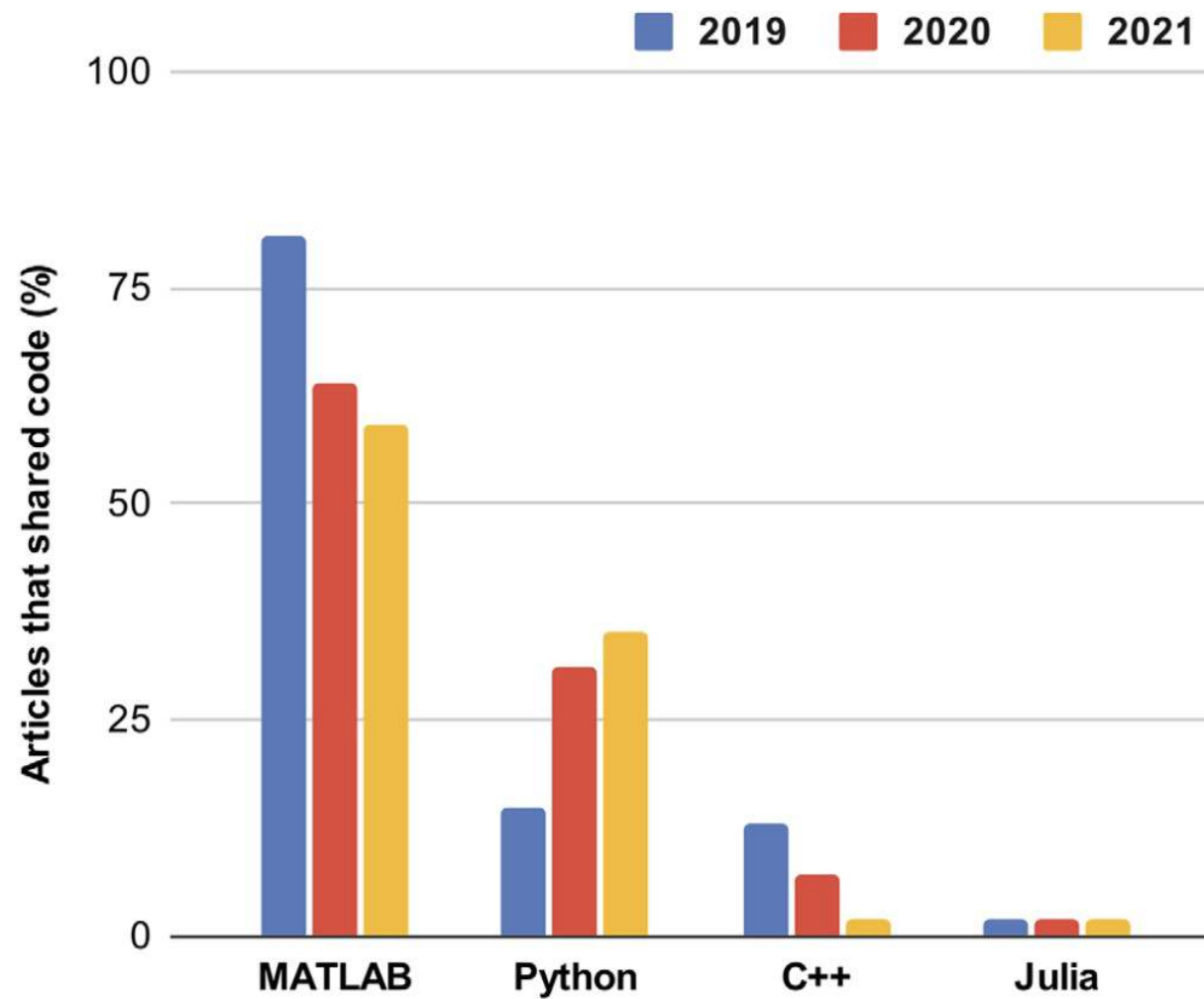


FIGURE 1 Of the articles that shared code, this chart shows what percentage of them used a given programming language. Reported here are the trends for the four most commonly used languages in *Magn Reson Med*. Note that some projects used more than one language, so the sum is not 100% for each year

Recent MRM Changes

Open Research



DATA AVAILABILITY STATEMENT

The code that supports the findings of this study is openly available in GitHub at <https://github.com/korbinian90/ROMEO.jl/tree/publication> . We plan continuous support and development of the software with the newest version available in <https://github.com/korbinian90/ROMEO> . The MRI data are available in Harvard Dataverse at <https://dataverse.harvard.edu/dataverse/ROMEO> .

Recent MRM Changes

Code Review	
* For initial submissions only: If you have provided code in a Data Availability Statement, do you wish to have it reviewed by a member of the ISMRM Reproducible Research Study Group (details of this scheme and its benefits can be found here)?	Select... ▼

MRM Code Review Instructions for Authors

Code Review Scheme Details:

In support of Magn Reson Med's Reproducible Research goal, we are now offering an optional Code Review for any code that is provided by the authors in a Data Availability Statement. This Code Review would be conducted by a member of the ISMRM Reproducible Research Study Group. Some FAQs about this scheme are provided below:

Q: Is a Code Review mandatory if I provide code in a Data Availability Statement?

A: No, requesting a Code Review is entirely optional (but encouraged). If you request a Code Review then your code would be sent to the Code Review Coordinator at the ISMRM Reproducible Research Study Group after the first scientific review decision. They will arrange for a Code Reviewer to inspect the code.

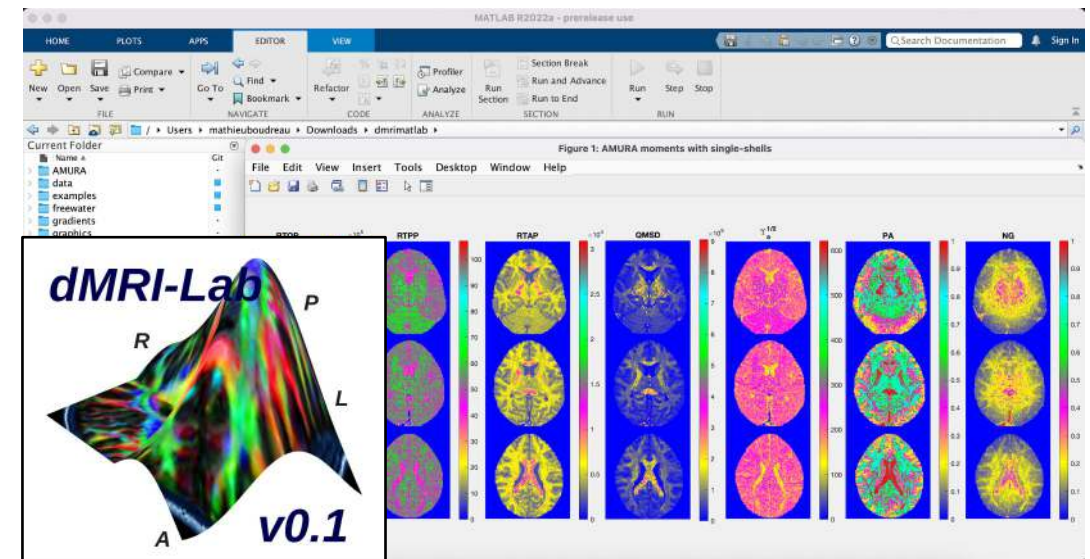
2022 Interviews

Accurate free-water estimation in white matter from fast diffusion MRI acquisitions using the spherical means technique

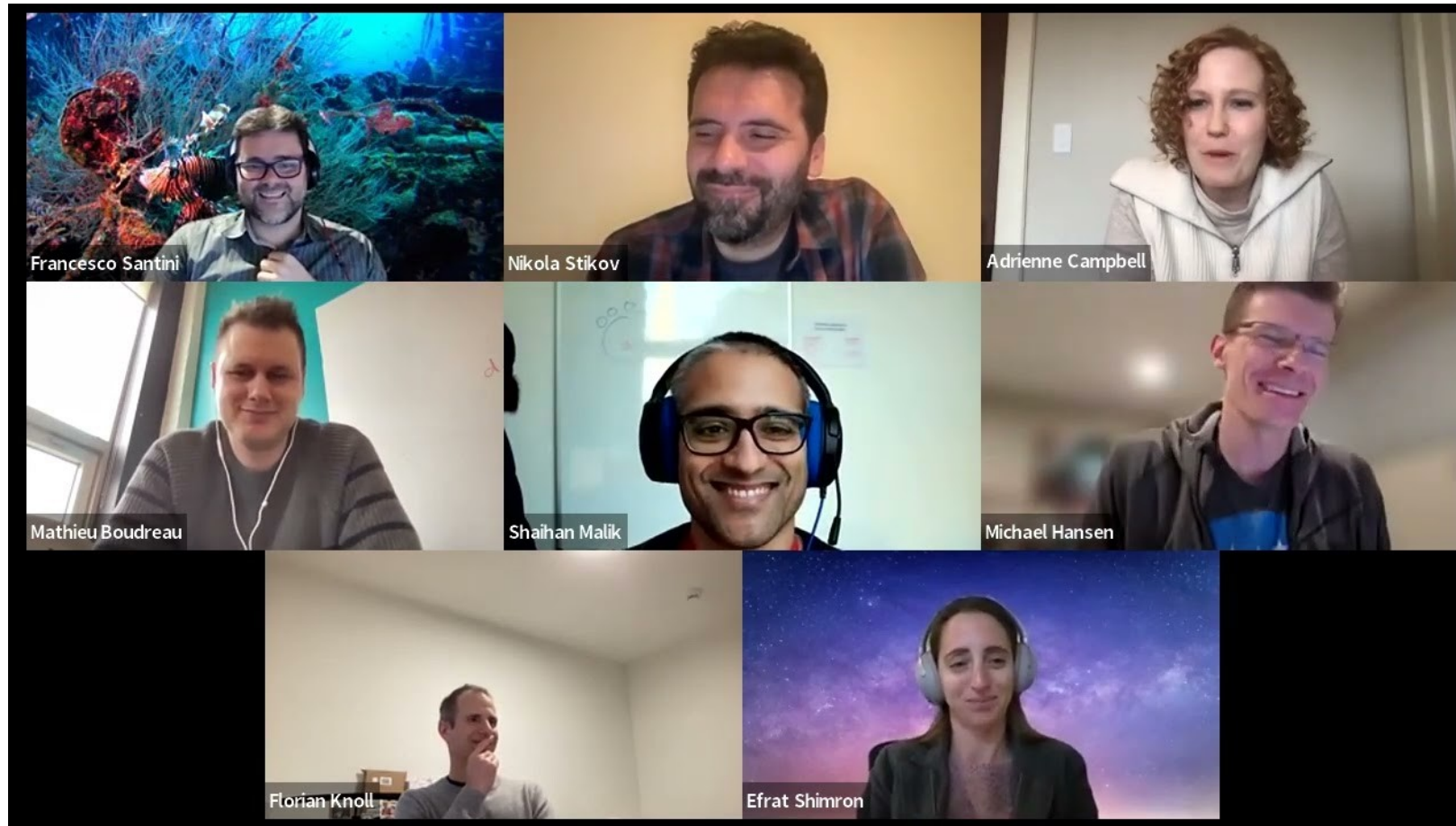
Q&A with Antonio Tristán-Vega and Santiago Aja-Fernández



Reproducible Research Insights:
Integration into dMRI-Lab



Special MRM Highlights feature: RRSg roundtable discussion on the MR Raw Data format (MRD/ISMRMD), with Adrienne Campbell-Washburn and Michael Hansen

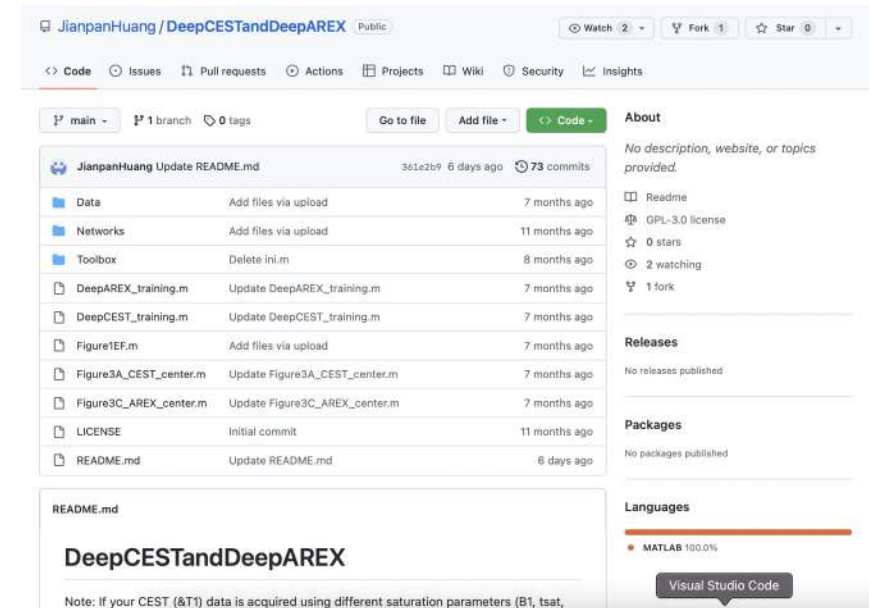


Deep neural network based CEST and AREX processing: application in imaging a model of Alzheimer's disease at 3 T

Q&A with Jianpan Huang and Kannie WY Chan



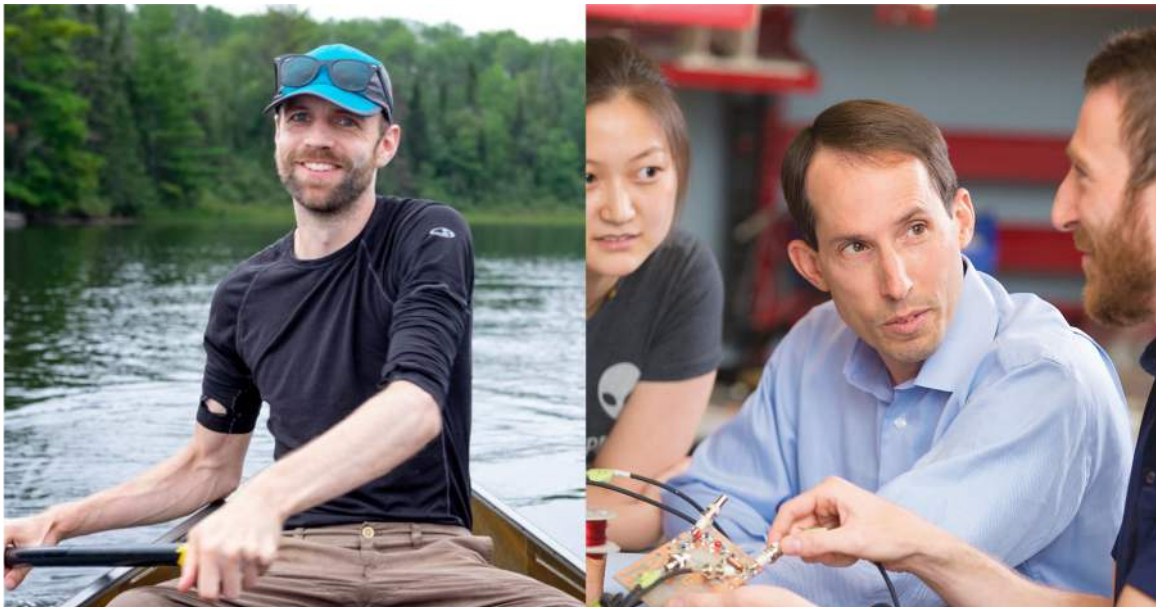
Reproducible Research Insights:
Shared code that reproduced figures



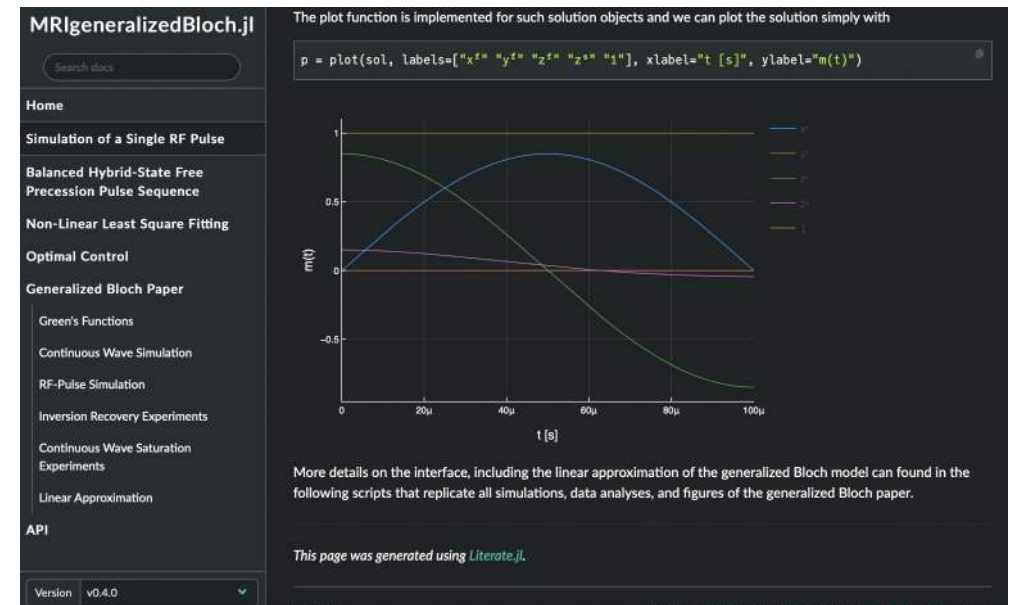
Contributor: Mathieu Boudreau

Generalized Bloch model: A theory for pulsed magnetization transfer

Q&A with Jakob Assländer and Daniel Sodickson

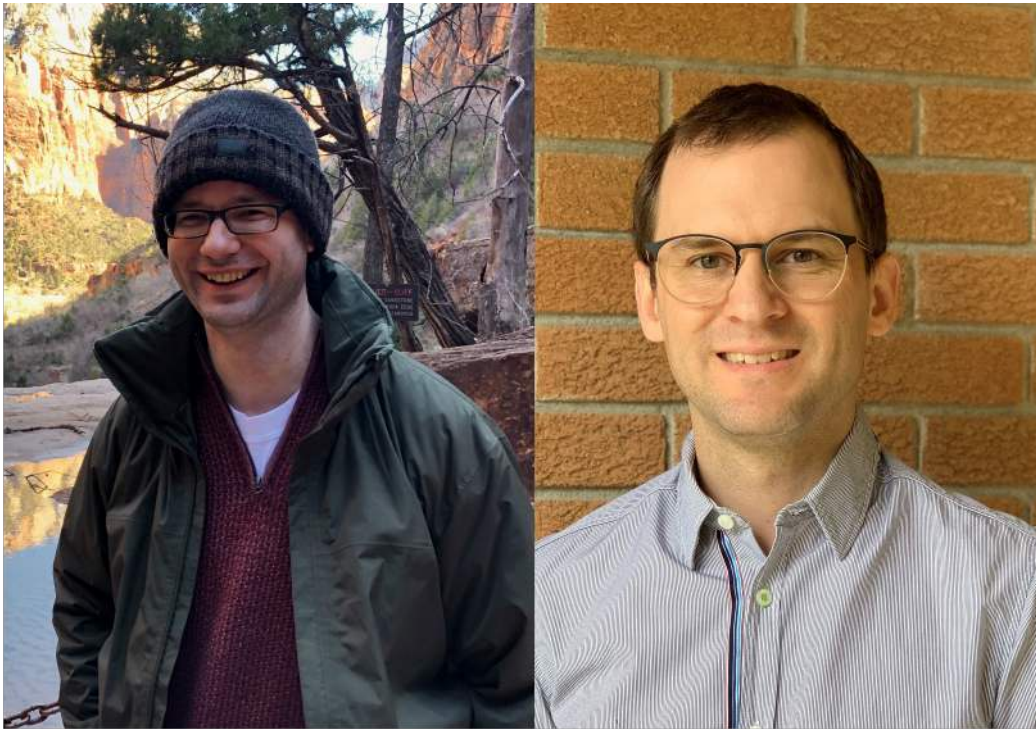


Reproducible Research Insights:
Code, data, scripts to reproduce all figures, and
interactive web tutorial



Integration of an RF coil and commercial field camera for ultrahigh-field MRI

Q&A with Kyle Gilbert and Corey Baron



Reproducible Research Insights:
Shared CAD coil designs and image
reconstruction code



VESPA ASL: VELOCITY and SPATIALLY Selective Arterial Spin Labeling

Q&A with Joseph Woods and Divya Bolar



Reproducible Research Insights:
Shared data, simulation code, and analysis code
on Zenodo

The screenshot shows the Zenodo repository page for the project "VESPA ASL: VELOCITY and SPATIALLY Selective Arterial Spin Labeling". The page is dated June 1, 2022, and has 134 views and 37 downloads. It lists the authors: Joseph G. Woods, Eric C. Wong, Emma C. Boyd, and Divya S. Bolar. The description states that the repository contains simulation code, in vivo data, preprocessing code, and analysis code used in a Magnetic Resonance in Medicine article. It also lists software requirements: BASH, FSL6, and MATLAB. A file list is provided under the "VESPA_ASL_Code_and_Data.zip" file, showing various MATLAB scripts and their sizes. The page is indexed in OpenAIRE and has a publication date of June 1, 2022, with a DOI of 10.5281/zenodo.6870683. Keywords include "VESPA, arterial spin labeling, cerebral blood flow, arterial transit time". It is published in "Magnetic Resonance in Medicine" and is associated with the "Arterial Spin Labeling Magnetic Resonance Imaging" community.

Special MRM Highlights feature: RRSg roundtable discussion on open science, with Cassandra Gould Van Praag

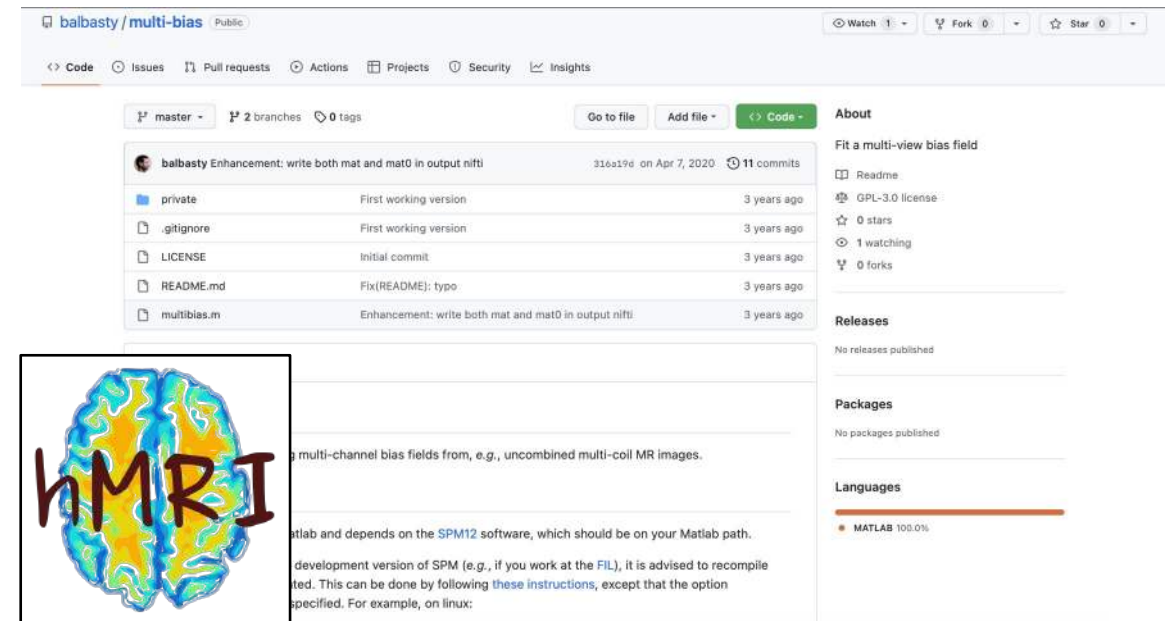


Correcting inter-scan motion artifacts in quantitative R1 mapping at 7T

Q&A with Yaël Balbastre and Martina F. Callaghan

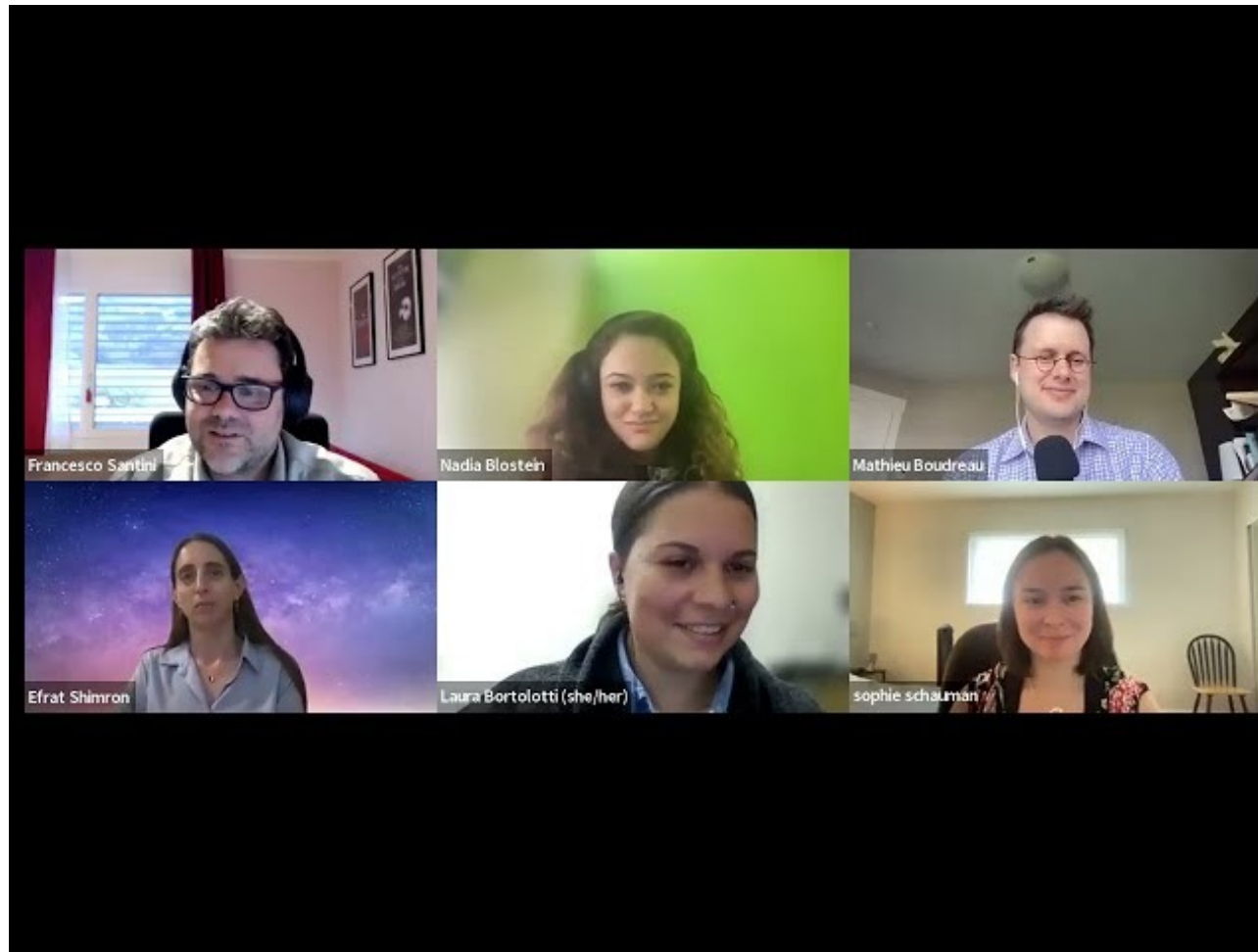


Reproducible Research Insights:
Integration into a larger toolbox (hMRI) and scripts to reproduce all simulation figures



Contributor: Mathieu Boudreau and Nadia Blostein

Special MRM Highlights feature: RRSg podcast on the ISMRM Challenge and reproducibility, with Laura Bortolotti and Sophie Schauman

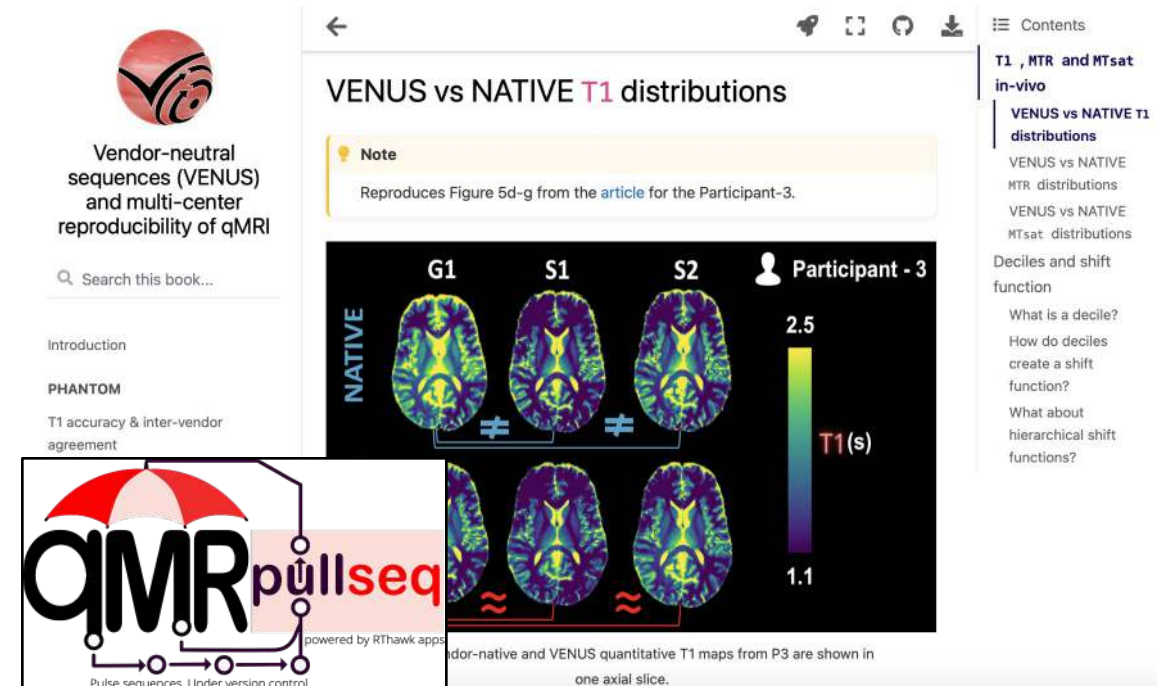


Vendor-neutral sequences and fully transparent workflows improve inter-vendor reproducibility of quantitative MRI

Q&A with Agah Karakuzu and Nikola Stikov



Reproducible Research Insights:
Open-source pulse sequences, Docker container, BIDS-compliant data, Jupyter book



Contributor: Pinar S. Özbay

Fourier-based decomposition for simultaneous 2-voxel MRS acquisition with 2SPECIAL

Q&A with Layla Tabea Riemann and Ariane Fillmer



Reproducible Research Insights: Sample data, algorithm code, and demo scripts

PTB Register Sign in

Layla Riemann > vGRAPPA MATLAB code

vGRAPPA MATLAB code Project ID: 1106

11 Commits 1 Branch 0 Tags 32.3 MB Project Storage

Matlab Code for vGRAPPA decomposition after multi-banded two voxel acquisition for MRS.
[Read more](#)

LICENSE file Layla Riemann authored 1 year ago 9e43fc64

master vgrappa-matlab-code Find file Clone

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Name	Last commit	Last update
GRAPPA_MB2aa_asy...	Update main, c_str.m, README....	1 year ago
LICENSE.txt	LICENSE file	1 year ago
README.txt	Update README.txt	1 year ago
Recon_Spectro_MB.m	Update Recon_Spectro_MB.m	1 year ago

2023 MRM Highlights Magazine



**Presidential
Interview**



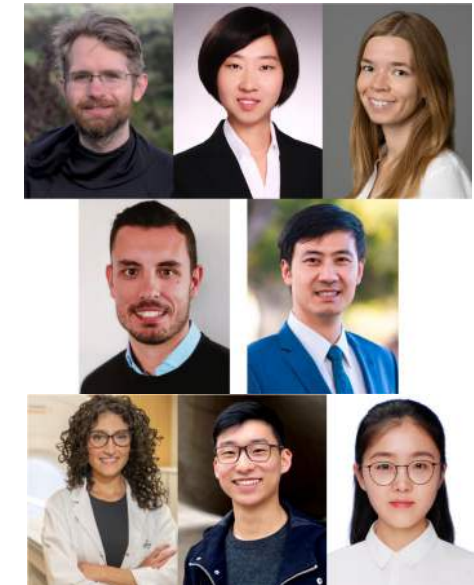
**Youngest ISMRM
presenter ever**



**Moving mountains. How to plan, reschedule,
and run a successful annual meeting despite
an epidemic.**



**Democratizing MRI: Helping everyone,
everywhere in the world, benefit from advances
in MRI technology**



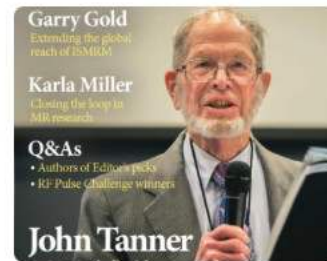
**Young Investigator Awards
finalists**

Magazine Archive

<https://blog.ismrm.org/highlights-archive/>



HIGHLIGHTS ARCHIVE



Do I **need** to....

- be a software engineer?
- have advanced coding skills?
- have well-commented documentation?
- have fancy things like unit tests?
- have scripts that reproduce all my data analysis?

...to share code with my papers?

On Reproducibility

Recurring questions we ask authors that we highlight

- **Why did you choose** to share your code/data?
- What is your **lab or institutional policy** on code/data sharing?
- **At what stage** did you decide to share your code/data?
- **How can we encourage researchers** in the MRI community to contribute more open-source code along with their research papers?
- Are there any **other reproducible research habits** that you haven't used for this paper but might be interested in trying in the future?

On Reproducibility

Why did you choose to share your code/data?

Commitment to transparency

Collaborative advancement

Lab culture

Maximize the impact of their work

On Reproducibility

What is your **lab or institutional policy** on code/data sharing?

It varies

Some labs share with all their publication, others had no policy

Certain institutions have new policies expecting open science
practices and data sharing

On Reproducibility

At what stage did you decide to share your code/data?

Most people decided early in the research process

Sometimes during peer-review

On Reproducibility

How can we encourage researchers in the MRI community to contribute more open-source code along with their research papers?

Offer incentives

More recognition

Institutional support

Advocate amongst peers

On Reproducibility

Are there any **other reproducible research habits** that you haven't used for this paper but might be interested in trying in the future?

Interactive notebooks

New data hosting platforms

Docker containers

Services that provide code review and/or DOIs (eg. Zenodo, NeuroLibre, etc.)

Where to find us



[@mrm_highlights](https://twitter.com/mrm_highlights)



blog.ismrm.org



linkedin.com/company/mrm-highlights

Where to find us

Youtube Channel

The screenshot shows the YouTube channel page for 'Magnetic Resonance in Medicine Highlights'. The left sidebar contains navigation links: Home, Shorts, Subscriptions, You, and History. Below these is a sign-in prompt and an 'Explore' section with categories like Trending, Music, Movies & TV, Live, Gaming, News, Sports, Learning, and Fashion & Beauty. The main header features the YouTube logo, a search bar, and a 'Sign in' button. The channel banner displays 'Magnetic Resonance in Medicine' with a large 'MRM' logo and a yellow highlighter pen. The channel name 'Magnetic Resonance in Medicine Highlights' is prominently displayed, along with the handle '@magneticresonanceinmedicin2188', 643 subscribers, and 110 videos. A 'Subscribe' button is visible. Below the channel info, there are tabs for Home, Videos, and Community. The 'Videos' tab is active, showing a grid of video thumbnails with their titles and view counts.

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Magnetic Resonance in Medicine

Highlights

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RRSG podcast on the ISMRM Challenge and reproducibilit...
103 views · 11 months ago

July 2022 MRM Highlights feature: RRSg podcast on...
85 views · 1 year ago

RRSG podcast on the MR Raw Data format (MRD), wit...
382 views · 1 year ago

Special Highlight: "On modeling"
443 views · 2 years ago

Joint MRM Highlights and Canadian Open Neuroscien...
223 views · 3 years ago

Where to find us

MRM Author-Reader Dialog Forum





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Categories

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Top



+ New Topic

Category	Topics	Latest
MRM Papers Author-reader discussions on papers published in Magnetic Resonance in Medicine. Volume 85(6) - June 2021 Volume 85(5) - May 2021 Volume 85(4) - April 2021 Volume 85(3) - March 2021 Volume 85(2) - February 2021 Volume 85(1) - January 2021 Volume 86(1)	59	 📌 Code of Conduct ■ Site Feedback 1 Jan 22  MRM Highlights Magazine – Volume 6 ■ MRM Highlights Magazine 0 4d  Parallel transmit optimized 3D composite adiabatic spectral-spatial pulse for spectroscopy ■ Volume 86(1) 0 6d  Unshielded bent folded-end dipole 9.4 T human head transceiver array decoupled using modified passive dipoles ■ Volume 86(1) 0 6d
MRM Highlights Monthly MRM Highlights author Q&As and reproducible research insights blog posts.	9	
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