



Emma Johnston

Deputy Vice-Chancellor (Research)

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Professor Gábor Toth, Dr Bart van der Holst and Professor Ward Manchester
The University of Michigan

By email: gtoth@umich.edu; bartvand@umich.edu; chipm@umich.edu

PRIVATE & CONFIDENTIAL

Dear Professor Toth, Dr van der Holst and Professor Manchester,

Outcome of investigation into allegations relating to the “Explaining a Type II Burst” Manuscript

I am writing in relation to the investigation into concerns raised with the Research Integrity Office in late 2019, relating to Figure 1b of the abovementioned manuscript. I understand that this manuscript had originally been sent to you as potential co-authors by Professor Iver Cairns and his former post-doctoral research associate, Dr Joachim Schmidt (the “**Respondents**”).

At the outset, I do wish to acknowledge the time taken in finalising this matter and recognise the frustration this may have caused. However, as I hope you will appreciate, there were a variety of factors which contributed to the substantial complexity in managing this matter, including the need to obtain expert advice at multiple points during the process, including the engagement of a digital forensics expert to analyse electronic evidence, challenges in identifying researchers to sit on the panel who had appropriate experience and who did not have any conflicts of interest with any parties, the challenges associated with scheduling meetings around the immovable international travel obligations of those involved in the matter, and the significant volume of material to be considered.

Investigation

You will recall that Professor Laurent Rivory, Pro-Vice-Chancellor (Research) conducted a preliminary assessment of your complaint as designated officer under the University’s process for managing research integrity related matters. Professor Rivory found that there may have been a breach of the *Research Code of Conduct 2013* (the “**Research Code 2013**”, which applied at the time of the events in question) but determined that the potential breach was a minor breach and that a full investigation was not required. The preliminary assessment outcome was communicated on 11 December 2020.

Following receipt of additional information relating to the concerns about Figure 1b Professor Rivory decided to reopen the matter. He determined that the appropriate course was to engage a digital forensics expert to analyse the electronic evidence relating to Figure 1b and that this forensic analysis should be received in the context of a research integrity investigation conducted in accordance with the requirements of the *Research Code of Conduct 2019* (the “**Research Code 2019**”) and the *Australian Code for the Responsible Conduct of Research 2018*.



Professor Rivory appointed a panel to conduct the investigation (the “**Panel**”) in accordance with a Terms of Reference in March 2022. The Panel was comprised of:

- Professor Richard de Grijs, School of Mathematical and Physical Sciences, Macquarie University
- Professor Rob Wittenmyer, Centre for Astrophysics, University of Southern Queensland

The Panel was asked to make findings in relation to the following:

- (i) Whether Dr Schmidt ran simulations using the Block-Adaptive-Tree-Solarwind-Roe-Upwind-Scheme (“**BATS-R-US**”) model;
- (ii) Whether the simulation referenced above was able to be used to generate Figure 1b of the Explaining a Metric Type II Burst manuscript; and
- (iii) Whether Adobe Photoshop or another image editing tool was used to create or alter Figure 1b of the Explaining a Metric Type II Burst manuscript.

The Panel were also asked to make findings as to whether any changes applied in the creation or alteration of Figure 1b were acceptable, having regard to applicable disciplinary practices or standards; and if not, whether the changes involved fabrication or falsification. The Panel was informed that it could make recommendations arising from its findings if it considered it appropriate to do so.

I understand that in addition to your initial complaint and responses to Professor Rivory, you were invited to meet with the Panel and did so on 8 July 2022, and that you provided a supplementary response to the Panel on 12 July 2022. A digital forensics expert was engaged to analyse the electronic evidence in the Respondents’ computers, and the Panel also interviewed the Respondents and sought additional written information from them.

Findings

The Panel determined that Dr Schmidt ran simulations using the BATS-R-US model and confirmed that Professor Cairns was not involved in running the simulations. Dr Schmidt was also found to have been responsible for generating and assembling the images present in the Explaining a Metric Type II Burst manuscript.

The Panel found that while the BATS-R-US model was capable of producing simulations of a coronal mass ejection (“**CME**”), there was compelling evidence to support a conclusion that Figure 1b of the Explaining a Metric Type II Burst manuscript was not generated, and could not be generated, from BATS-R-US simulation data. The digital forensic analysis of Dr Schmidt’s computer suggested Figure 1b was derived directly from Figure 1a of the Explaining a Metric Type II Burst manuscript. The Panel agreed with this analysis and found the presence of shapes in Figure 1b which correspond to artefacts present in the corresponding white light CME image (Figure 1a) to be particularly compelling evidence in support of this conclusion. No evidence of image development was present on Professor Cairns’ computer.

The use of Adobe Photoshop in generating Figure 1b was not contested by Dr Schmidt in either his written submissions or at interview. Professor Cairns confirmed to the Panel that, prior to concerns being raised, he was unaware that Adobe Photoshop had been used to alter or create Figure 1b. While Dr Schmidt stated that he had merely adjusted or modified a Tecplot image to generate Figure 1b, this was not accepted by the Panel, given the inability of either Dr Schmidt or the digital forensics experts to reproduce an image resembling Figure 1b from the Tecplot visualisation of the BATS-R-US simulation output. The Panel concluded that Adobe Photoshop was used by Dr Schmidt to alter or create Figure 1b.

In considering whether the changes made by Dr Schmidt to Figure 1b were acceptable, the Panel noted that minor, cosmetic changes, such as increases to font sizes, the addition of



labels and/or arrows, or excising parts of an image, which do not alter the data presented in a figure, would be permissible, while more extensive, material changes would be unacceptable. The Panel determined that the nature of the changes resulting in Figure 1b amounted to material changes which altered the substance of the image and substantially exceeded what might be regarded as minor, cosmetic changes.

The Panel noted that the text of the Explaining a Metric Type II Burst manuscript, which Dr Schmidt confirmed he had primarily drafted, contains no reference to any amendments to the simulation output being applied in Adobe Photoshop, and that the image is presented in the manuscript in a way that suggests the output of the BATS-R-US simulation can directly result in Figure 1b. The Panel considered that even if mere adjustments or modifications were made to the Tecplot output in order to generate Figure 1b, it would have been necessary to have included an explanatory note to this effect in the manuscript. It was the Panel's view that this should have been done at the draft stage so that Professor Cairns and other prospective authors would have been aware of the adjustments made for the purposes of their consideration of the draft manuscript.

It was noted that the terms 'fabrication' and 'falsification' are not defined in either the University of Sydney *Research Code of Conduct* or the *Australian Code for the Responsible Conduct of Research*. The Panel resolved to adopt the definition of the terms in the UK Research Integrity Office's *Concordat to Support Research Integrity*, which are as follows:

Fabrication: "making up results, other outputs (for example, artefacts) or aspects of research, including documentation and participant consent, and presenting them and/or recording them as if they were real"

Falsification: "inappropriately manipulating and/or selecting research processes, materials, equipment, data, imagery and/or consents"

The Panel found that found that Dr Schmidt utilised Adobe Photoshop to make up results and presented them to Professor Cairns (and others) as if they were real, thereby engaging in fabrication of results. The way in which Adobe Photoshop was used to manipulate Figure 1b was inconsistent with accepted scientific practice, was therefore inappropriate, and amounted to falsification.

Given the above, the Panel found there had been breaches of the Research Code on the part of Dr Schmidt. The breaches were viewed as serious, and the Panel considered them to be sufficiently serious to warrant a finding of research misconduct as defined in the *Australian Code for the Responsible Conduct of Research*.

Professor Cairns was not found to have breached any policies. The Panel were satisfied that Professor Cairns had no part in the creation of, or adjustment to, Figure 1b, and were also satisfied that he was unaware that Dr Schmidt had fabricated and falsified the image. They noted that Dr Schmidt was an experienced researcher, who had a history of performing simulations and visualising their results, and the Panel considered that Professor Cairns was entitled to rely on Dr Schmidt's expertise. It was the Panel's view that science, and research more broadly, naturally rely on a degree of trust in one's colleagues and co-authors, and the Panel noted that it appeared Professor Cairns' trust in his former postdoctoral researcher may have been taken advantage of in this instance.

Next steps

I have accepted the investigation findings and recommendations, and in so doing I have had regard to your submissions to, and your interview with, the Panel. I have also been appraised of your email communications with the Panel, Research Integrity Office staff and senior officials of the University of Sydney.



Should the researchers wish to submit the Explaining a Metric Type II Burst manuscript for publication, they will be required to omit Figure 1b and any analysis that relies on or is related to Figure 1b; and ensure that any modifications applied to figures in future manuscripts are consistent with accepted scientific practices and standards, and are fully disclosed.

The University of Sydney will also arrange a review of images included in publications authored or co-authored by Dr Schmidt during the last 5 years of his University employment (noting he is no longer associated with the University of Sydney) to ensure that any images are supported by the research data, and any amendments to those images are consistent with accepted scientific practices and standards and appropriately declared in the relevant publication. Action will be taken to correct the public record if required.

I wish to make clear that this letter represents the conclusion of the matter concerning Figure 1b in the Explaining a Metric Type II Burst manuscript.

Confidentiality

You will recall that to protect the interests of all involved in the matter, the investigation was conducted on a confidential basis, and I ask that you continue to keep confidential the fact of the investigation and all information in relation to its conduct and outcome. Other affected parties, including the University of Michigan, will be separately informed of the outcome of this investigation.

Please contact the Research Integrity Office (research.integrity@sydney.edu.au) if you have any questions about this letter or the investigation more generally.

Yours sincerely,

Professor Emma Johnston

Deputy Vice-Chancellor (Research)

CC: Dr Susan Maastricht, Director, Research Integrity and Ethics Administration
Research Integrity Office

Attachments: Research Code of Conduct 2013
Research Code of Conduct 2019
Australian Code for the Responsible Conduct of Research 2018