2dFdr Pipeline As a Web Service (PAWS):
On Demand Reduction of Archival 2dF-AAOmega Observations

Brent Miszalski, Simon J. O'Toole, Kate Sheng and James Tocknell

Australian Astronomical Optics, Macquarie University, NSW 2109, Australia

Australis Instrumentation Consortium, Australia

brent.miszalski@mq.edu.au

Introduction

Millions of spectra have been captured with the 2dF facility on the Anglo-Australian Telescope (AAT, **Fig 1**). Each field of radius 1.05° can observe up to 392 spectra. Apart from the data releases of large surveys, the majority of 2dF spectra are only accessible as raw data in the AAT archive hosted by Data Central at archives.datacentral.org.au.

Traditionally, 2dF data are reduced using the purpose-built 2dFdr package. We have developed a Pipeline As a Web Service (PAWS) that applies 2dFdr to archival 2dF-AAOmega data, allowing users the ability to invoke on demand reductions from the AAT archive query results page (**Fig 2**). Users can follow the status of requests online.

The PAWS model we have developed is a highly effective solution that helps to unlock the full scientific potential of otherwise dormant archival data.
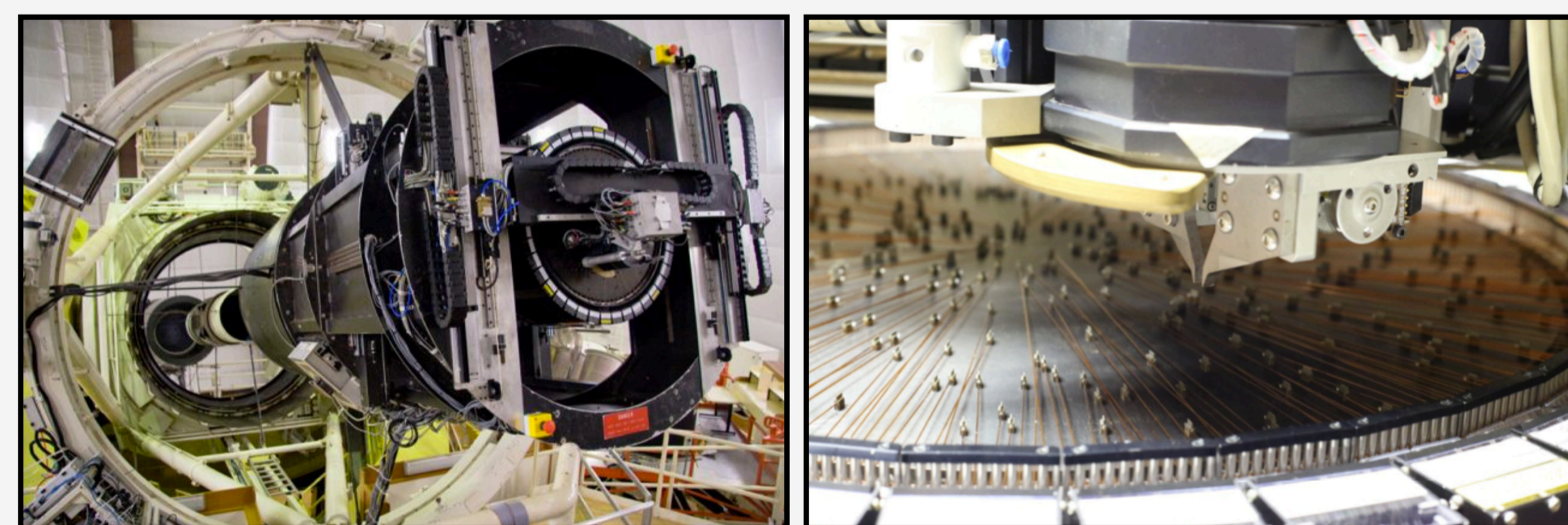
Figure 1. Left: The 2dF facility at prime focus on the AAT. **Right:** The focal plane filled with robotically placed buttons that redirect light to spectrographs. Image credit: 2dF-AAOmega manual.

Overview

A control node runs the Python web framework **Starlette** which accepts requests from the AAT archive and coordinates communication with a compute node. The compute node (a powerful multi-core system) hosts a **Docker** image with 2dFdr. We use **pandas** and the task manager **Celery** to build data reduction workflows based on user supplied 2dFdr preferences (**Fig 3**). Workflows consist of individual 2dFdr commands executed remotely on the compute node using **docker-py**. The control node includes web pages to visualise the status of requests stored in a MongoDB database (**Fig 3**). Reduction of proprietary data is facilitated by Data Central authentication services.

Benefits

The main benefits of the **soon to be released** 2dFdr PAWS:

✦ **No local install of 2dFdr** with its unusual dependencies is required,

✦ **No data downloads** as reductions access the archival data directly on disk,

✦ **Fast reduction of large data volumes** (e.g. 960 separate exposures in 48 min),

✦ **Individual reduction tasks are restarted automatically** in case of failure (e.g. due to heavy system load),

✦ **Viewing of reduced spectra** either interactively (click-to-view web page, **Fig 4**) or manually (generated PDF plots).

Figure 2. The **Reduce with 2dFdr PAWS** button in the AAT archive (circled).
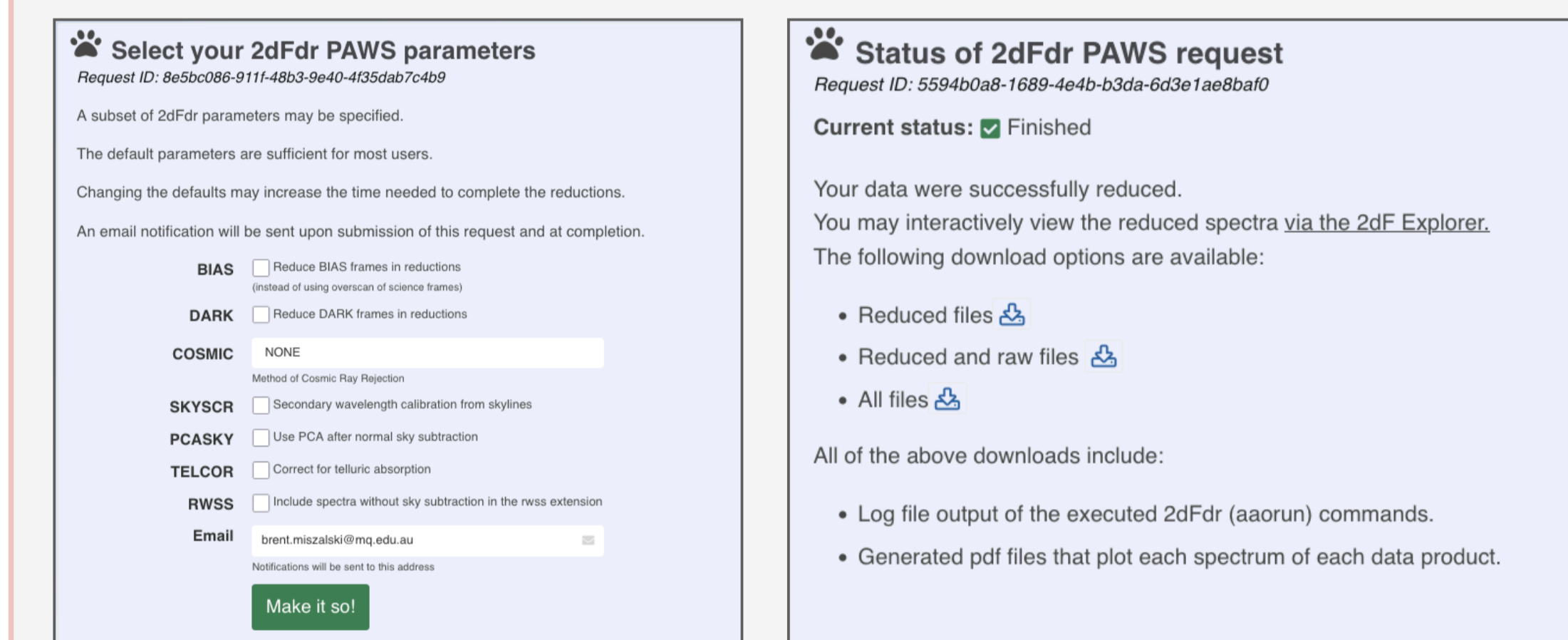
Figure 3. Left: User selection of 2dFdr parameters. **Right:** Status upon successful completion including download links and a link to the 2dF explorer (Fig 4).
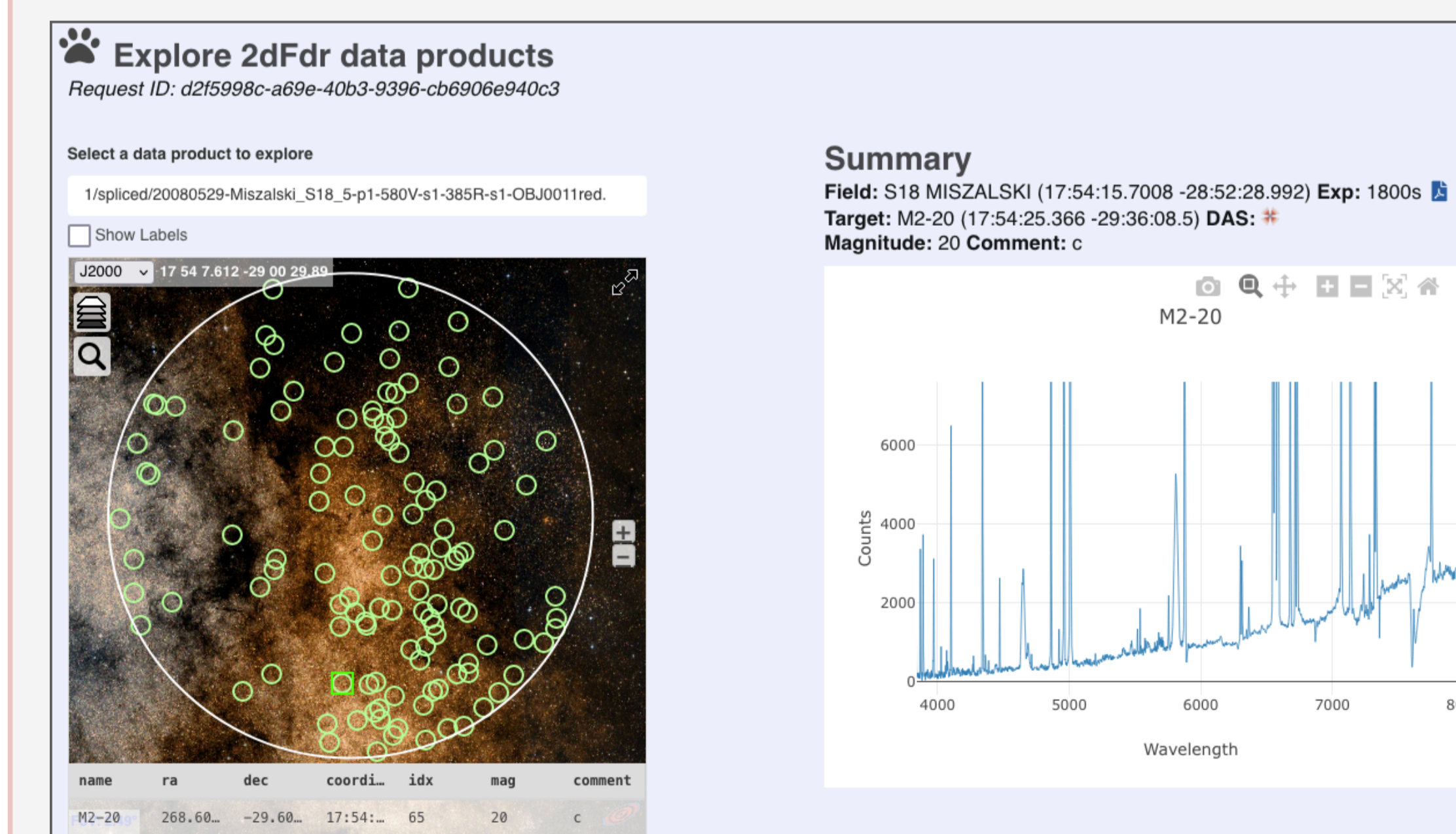
Figure 4. Visualisation of freshly reduced spectra. **Left:** Aladin Lite view of the 2dF field and fibres. **Right:** A spliced final spectrum loaded after clicking a fibre marker.

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