# **Project:**

**Title:** [The Reading Palaeofire Database: an expanded global resource to document changes in fire regimes from sedimentary charcoal records](https://researchdata.reading.ac.uk/cgi/users/home?screen=EPrint::View&eprintid=319)

**Dates:** 2021

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# **Dataset**

**Title:** The Reading Palaeofire Database: an expanded global resource to document changes in fire regimes from sedimentary charcoal records

**Summary description:** Wildfires have major impacts on terrestrial ecosystems, the global carbon cycle, atmospheric chemistry and climate. Charcoal records from sedimentary sequences provide a way to reconstruct palaeofire regimes at different temporal and spatial scales and are a key resource to improve our understanding of the drivers of wildfires. The RPD version 1 is an updated and expanded database of global charcoal records, accompanied by new Bayesian age models. The first version of the RPD contains 1681 charcoal records from 1477 sites worldwide. New age models have been run for 714 of the charcoal records.

**Publication year:** 2021.

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**Rights Holders:** University of Reading, David Kesner, Esmeralda Cruz-Silva, Luke Sweeney and Daniel Gallagher.

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In order to assure traceabililty, any presentation, report, or publication that uses the RPD version 1 should cite the dataset (Harrison, Sandy, Villegas-Diaz, R., Lincoln, P., Kesner, D., Cruz-Silva, E., Sweeney, L., Shen, Y. and Gallagher, D. (2021): The Reading Palaeofire Database: an expanded global resource to document changes in fire regimes from sedimentary charcoal records. University of Reading. Dataset. doi to be added when database is finalised) along with the following publication: Harrison et al. (in review). If using individual sites, original literature citations provided in the database should also be cited.

# **Contents**

**Abstract:** Wildfires have major impacts on terrestrial ecosystems, the global carbon cycle, atmospheric chemistry and climate. Charcoal records from sedimentary sequences provide the potential to reconstruct palaeofire regimes at different temporal and spatial scales and are a key resource to improve our understanding on the drivers of wildfires. The Global Palaeofire Working Group (GPWG) was established in 2006 to coordinate the compilation and analysis of charcoal data globally, through the construction of the Global Charcoal Database (GCD: Power et al., 2008). There have now been several iterations of the GCD (Power et al., 2008; Power et al., 2010; Daniau et al., 2012; Blarquez et al., 2014; Marlon et al., 2016), which since 2020 has been managed by the International Palaeofire Network as the Global Palaeofire Database (GPD; https://paleofire.org).

There are however several limitations to the use of the GCD for analyses of palaeofire regimes. Firstly, the database does not include many recently published records and needs to be updated. Secondly, there are inconsistencies among the various versions of the database, including duplicated and/or missing sites, differences in the metadata included for each site or record, and missing metadata for some sites or records. Perhaps most crucially, the age models included in the database were made at different times, using different radiocarbon calibration curves and different age-modelling methods. The disparities between the archived age models preclude a detailed comparison of changes in wildfire regimes across different regions.

The Reading Palaeofire Database (RPD) is an updated and expanded archive of charcoal records, accompanied by new age models based on recalibration of radiocarbon ages using the new radiocarbon carbon calibration curves from the IntCal working group (Reimer et al., 2020; Hogg et al., 2020; Heaton et al., 2020) and using a consistent Bayesian approach for age-model construction with Bacon (Blaauw. et al., 2021).

**Access to the RPD:** The RPD is stored as a single MySQL database file (RPDv1.sql). Please check https://dev.mysql.com/downloads/ to download and install MySQL. Once MySQL Community Server and MySQL Workbench are installed, the database can be imported and visualised. A schema must be created upon import. To import the SQL file, you follow:

1. Open MySQL Workbench

2. Connect to the connection you would like to store your database in. A connection is usually created during the installation process (usually root@localhost with the password defined during the installation process)

3. Server>Data Import>Import from Self-contained file

4. Browse to the SQL file you have downloaded

5. Press New, next to the default target schema to create a new schema (name this as appropriate: e.g. RPDv1)

6. Press Import

**File structure:** The data are stored in a relational database (MySQL), which consists of 10 linked tables, specifically "site", "entity", "sample", "date info", "unit", "entity link publication", "publication", "chronology", "age model", and "model name". The different fields included in the database are summarised in Table 1. For further information on the structure and data types included in the database, refer to Harrison et al. (in review).

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Table 1. Summary of the different fields in the RPD and the tables in which they are found. Further information on the data types and the structure of the RPD are provided in Harrison et al. (in review).

|  |  |  |
| --- | --- | --- |
| **Table** | **Field name** | **Definition** |
| Site, Entity | ID\_SITE | Unique identifier for each site |
| Site | site\_name | Site name as given by original authors or as defined by us where there was no unique name given to the site |
| Site | latitude | Latitude of the sampling site, given in decimal degrees, where N is positive and S is negative |
| Site | longitude | Longitude of the sampling site in decimal degrees, where E is positive and W is negative |
| Site | elevation | Elevation of the sampling site in metres above (+) or below (-) sea level |
| Site | site\_type | Information about type of site (e.g. lake, peatland, terrestrial) |
| Site | water\_depth | Water depth of the sampling site in metres |
| Site | flow\_type | Indication of whether there is inflow and/or outflow from the sampled site |
| Site | basin\_size\_km2 | Size of sampled site (e.g. lake or bog) in km2 |
| Site | catch\_size\_km2 | Size of hydrological catchment in km2 |
| Site | basin\_size\_class | Categorical estimate of basin size |
| Site | catch\_size\_class | Categorical estimate of basin size |
| Entity, Sample, Date\_info, Entity link publication | ID\_ENTITY | Unique identifier for each entity |
| Entity | entity\_name | Name of entity, where an entity may be a separate core from the site or a separate type of measurement on the same core |
| Entity | latitude | Latitude of the entity, given in decimal degrees, where N is positive and S is negative |
| Entity | longitude | Longitude of the entity, given in decimal degrees, where E is positive and W is negative |
| Entity | elevation | Elevation of the sampling site, in metres above (+) or below (-) sea level |
| Entity | depositional\_context | Type of sediment sampled for charcoal |
| Entity | measurement\_method | Method used to measure the amount of charcoal |
| Entity | TYPE | The unit type of the measured charcoal values (e.g. concentration, influx) |
| Entity | source | Source of charcoal data |
| Entity | core\_location | Location of the entity within the site (e.g. central core or marginal core) |
| Entity | last\_updated | Date when the entity or its linked data was last updated |
| Sample, Chronology, Age model | ID\_SAMPLE | Unique identifier for each charcoal sample |
| Sample, Date\_info | avg\_depth | Average sampling depth, in metres (sample table). Average depth where date was measured in metres (date\_info table). |
| Sample | sample\_thickness | Sample thickness, in metres |
| Sample | charcoal\_measurement | Quantity of charcoal measured in the sample |
| Sample | analytical\_sample\_volume | Total amount of sediment sampled |
| Date\_info | ID\_DATE\_INFO | Unique identifier for the date record |
| Date\_info | material\_dated | Material from which the date was obtained, if applicable |
| Date\_info | date\_type | Technique used to obtain the date measurement |
| Date\_info | thickness | Thickness of the sample used for dating, in metres |
| Date\_info | lab\_number | Unique identifying code assigned by the dating laboratory |
| Date\_info | age\_C14 | Uncalibrated radiocarbon age |
| Date\_info | age\_calib | The calendar age of a date |
| Date\_info | error | Analytical or measurement error on the date |
| Date\_info | correlation\_info | Indication of basis for correlative dating (e.g. pollen, tephra or stratigraphic correlations) |
| Date\_info | age\_used | Indicates whether date was used by the author(s) in the construction of the original age model |
| Date\_info | reason\_age\_not\_used | Indication of why a date was not used in the original age model. Blank if dates were used in original model |
| Date\_info | notes | Additional comments regarding a date record |
| Unit | ID\_UNIT | Unique identifier for the unit record |
| Unit | UNIT | Charcoal measurement unit |
| Publication, Entity link publication | ID\_PUB | Unique identifier for the publication (as in the publication table) |
| Publication | citation | The citation for the publication |
| Publication | Pub\_DOI\_URL | The digital object identifier (doi) for the publication |
| Publication | Bibentry | The publication citation in bibtex format |
| Model name, Chronology, Age model | ID\_MODEL | Unique identifier for the technique used to generate the original age model |
| Chronology | original\_est\_age | The charcoal sample age used in the original publication |
| Age model | mean | Mean age of the sample |
| Age model | median | Median age of the sample |
| Age model | UNCERT\_5 | Lower bound of the 95% confidence interval for the median age |
| Age model | UNCERT\_95 | Upper bound of the 95% confidence interval for the median age |
| Age model | UNCERT\_25 | Lower bound of the 75% confidence interval for the median age |
| Age model | UNCERT\_75 | Upper bound of the 75% confidence interval for the median age |
| Model name | model name | Age modelling technique used in the original publication |