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### Fluvial, Eolian & Shallow-Marine Research Group

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shinyDASA: A new webbased interface for interrogation of the **Database of Aeolian Sedimentary Architecture (DASA)** 



- deployed as a cloud-based application: can be opened in a web browser - no specialized software required;
- extensive set of analogue filters: select relevant analogues to subsurface successions by finding similar depositional systems and filtering on metadata;
- graphical charting capabilities: graphs and tables are updated in real time as analogues are filtered:
- access to data from ca. 100 analogue studies of aeolian successions and modern systems;
- modular design: the applications can be expanded through the addition of extra functionalities to suit user requirements (e.g., variogram modelling, volume calculations).

Access the new shinyDASA app here (Chrome or Edge recommended):

### https://shinydasa.azurewebsites.net/

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# DASA

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## The Database of Aeolian Sedimentary Architecture (DASA)

- DASA is the world's largest & most sophisticated relational database specifically designed to characterize the geomorphology, sedimentology, stratigraphic architecture & stratigraphy of modern & ancient aeolian systems, and their preserved successions.
- develop quantitative facies models, specifically tailored for parameters describing particular spatio-temporal and environmental contexts;
- instruct & constrain forward stratigraphic models and 3D geocellular models for enhanced characterization of subsurface aeolian successions;
- empirical assessment of how aeolian systems respond to

   and how associated architectures record allogenic
   and autogenic processes that dictate stratigraphy;
- make quantitative predictions of lithological heterogeneities across multiple scales for subsurface aeolian geobodies that cannot be examined directly;
- generate informed interpretations of aeolian lithologies observed in core, for prediction of three-dimensional sedimentary architecture away from boreholes.

## The All New shinyDASA App: A Quick Guide

The new shinyDASA interface is a cloud-based application developed in-house: the app can be opened on any device with a web browser; shinyDASA does do not require installation.

ShinyDASA allows users to browse DASA analogues, apply filters to the databases, and display analogue data

#### Step 1:

open app in a browser (https://shinydasa.azurewebsites.net/) and log on using your credentials

#### Step 2:

apply global filters to the database (e.g., on depositional setting), and check the resulting list of filtered analogues

#### Step 3:

select the scale and type of sedimentary unit of interest, and the type of output desired

#### Step 4:

apply filters to specific queries if needed (e.g., select outputs on particular element types)

#### Step 5:

adjust chart settings if necessary, and retrieve outputs from graphs and/or tables



DASA records the hierarchical and containment relationships between elements of different orders; DASA also records the nature of the juxtaposition of neighbouring elements

in summary tables and charts that are updated in real time.

This document demonstrates the functionalities of shinyDASA, and illustrates how to select analogues and produce database outputs quantifying sedimentary heterogeneity at different scales of observation.



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#### How to use shinyDASA

At the click of a button you can easily filter the analogues according to one or more specific boundary conditions.



global filters: these filters are used to select analogues of interest based on their classifications and metadata, and applied to all the database outputs throughout the app during the session

apply global filters to the database (e.g., on tectonic setting), and check the resulting list of filtered analogues summary table showing the analogues included in shinyDASA

# DASA

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# An example of analogue filtering



deposited under greenhouse climates are selected

## Select analogue output using shinyDASA

DASA	Step 1: Select the tab corresponding to the rank of genetic	DASA	Step 2: Select the type of database output you want to view: these are
🕅 Analogues	unit of interest; these are depositional	M Analogues	geometries, proportions, and transitions. See
년 Depositional complexes	complexes and, geomorphic, architectural, and	비 Depositional complexes	<ul> <li>overleaf for more information.</li> </ul>
岫 Architectural elements	facies elements.	네. Architectural elements	~
네 Geomorphic elements	<ul> <li>architectural elements are selected</li> </ul>	<ul><li>Geometries</li><li>Proportions</li></ul>	types of database output
Ш Facies units		↑ Transitions	
		ഥ Geomorphic elements	<
		ା Facies units	<



## Fluvial, Eolian & Shallow-Marine Research Group Database interrogation using shinyDASA: Depositional Complexes

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#### Example: filtering depositional complexes by primary and secondary type







Depositional-complex length type



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Example 1: architectural element geometries



#### Example 2: architectural element proportions



#### Example 3: architectural element transitions





## Fluvial, Eolian & Shallow-Marine Research Group http://frg.leeds.ac.uk/ Database interrogation using shinyDASA: Facies Elements

Example 1: facies geometries



#### Example 2: facies proportions



#### Example 3: facies proportions (interdune deposits)



#### Example 4: facies proportions (interdune deposits)





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#### Database interrogation using shinyDASA: Geomorphic Elements



#### **Example 1**: the width and relief of aeolian star dunes dunes



# **Example 3:** the length and width of all aeolian dunes deposited at latitudes of 30-45° **Example 4:** the relief of linear aeolian dunes





## Fluvial, Eolian & Shallow-Marine Research Group http://frg.leeds.ac.uk/ Database interrogation using shinyDASA: worked examples

Example application: choice of analogues for the Jurassic Norphlet Sandstone Formation (Eastern Gulf of Mexico)

using shinyDASA, we can apply sequential filters in order to synthesise relevant data that may help us make predictions about the architecture within the Norphlet Sandstone Formation of the Eastern Gulf of Mexico

Filter Option 1: Select analogues that reflect the tectonic setting of the Norphlet Formation; shinyDASA output is filtered to show case-studies from *ancient rift basins only* 



Filter Option 2: From the filtered analogues, select depositional complexes that reflect the depositional environment of the Norphlet Formation; output is filtered to show *depositional complex thickness* from *ancient rift basins* only that are *aeolian-dominated with a secondary alluvial- or fluvial- influence* 





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2D. pseudo3D or 3D

## Database interrogation using ShinyDASA: worked examples

Filter Option 3: From the filtered analogues, view data on the architectural elements that are found in comparable tectonic and depositional settings to the Norphlet Formation; shinyDASA output is filtered to show data on *architectural element proportions* from *A*) *ancient rift basins* only that are deposited in *B*) *aeolian-dominated depositional complexes with a secondary fluvial influence* and *C*) *aeolian-dominated depositional complexes with a secondary alluvial influence*.





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 Database interrogation using shinyDASA: Screenshot examples

 Example application: choice of analogues for the Permian Unayzah

 Formation (Greater Arabian Basin)

 using shinyDASA, we can apply sequential filters in order to synthesise relevant

 data that may help us make predictions about the architecture within the

Unayzah Formation Filter Option 1: Select analogues that reflect the tectonic setting of the Unayzah Formation; shinyDASA output is filtered to show case-studies from *the Gondwanan Supercontinent only* 



Filter Option 2: Choose depositional complexes that reflect the depositional environment of the Unayzah Formation; shinyDASA output is filtered to show *the proportions of architectural element* types within *Gondwanan Supercontinent analogues only* that were deposited in *aeolian-dominated depositional complexes with a secondary marine input* 





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#### Database interrogation using shinyDASA: Screenshot examples

Filter Option 3: From the filtered analogues, view data on the architectural elements that are found in comparable tectonic and depositional settings to the Unayzah Formation; shinyDASA output is filtered to show data on *dune-set architectural elements* from *ancient Gondwanan Supercontinents* 



Filter Option 4: Vertical transitions between architectural elements in ancient Gondwanan Supercontinental settings are summarized

