

Abstract: Adopting open and data-driven science could significantly advance the scientific understanding of bed form (BF) dynamics. These practices require well-structured data warehousing and proper metadata practices to ensure functionality. BedformsML0 is the first iteration of a metadata language for BF data, which is derived from the BF taxonomy presented herein. It comprises 3 levels denoting the genesis, descriptive facts and explanatory facts, respectively. We expect to improve BedformsML0 through the contribution of BF dynamics researchers. Currently, it can be easily implemented as a blueprint for RDBMS and noSQL.

Keywords: BedformsML0, database, metadata, taxonomy, bed forms.

Introduction

There is a need to collaboratively build a large, engineered and freely accessible bed form database (Gutierrez et al., 2020). Three data architectures exist: RDBMS, NoSQL, and NewSQL. They require designing a metadata structure representing the data taxonomy to develop a metadata language for data querying.

This contribution presents the first iteration of a metadata language (BedformsML0), which adopts the standards of the Earth Science Information Partners. An expert opinion-based approach was followed to build a first iteration of BF taxonomy, which names, identifies and enumerates the components of BF diversity.

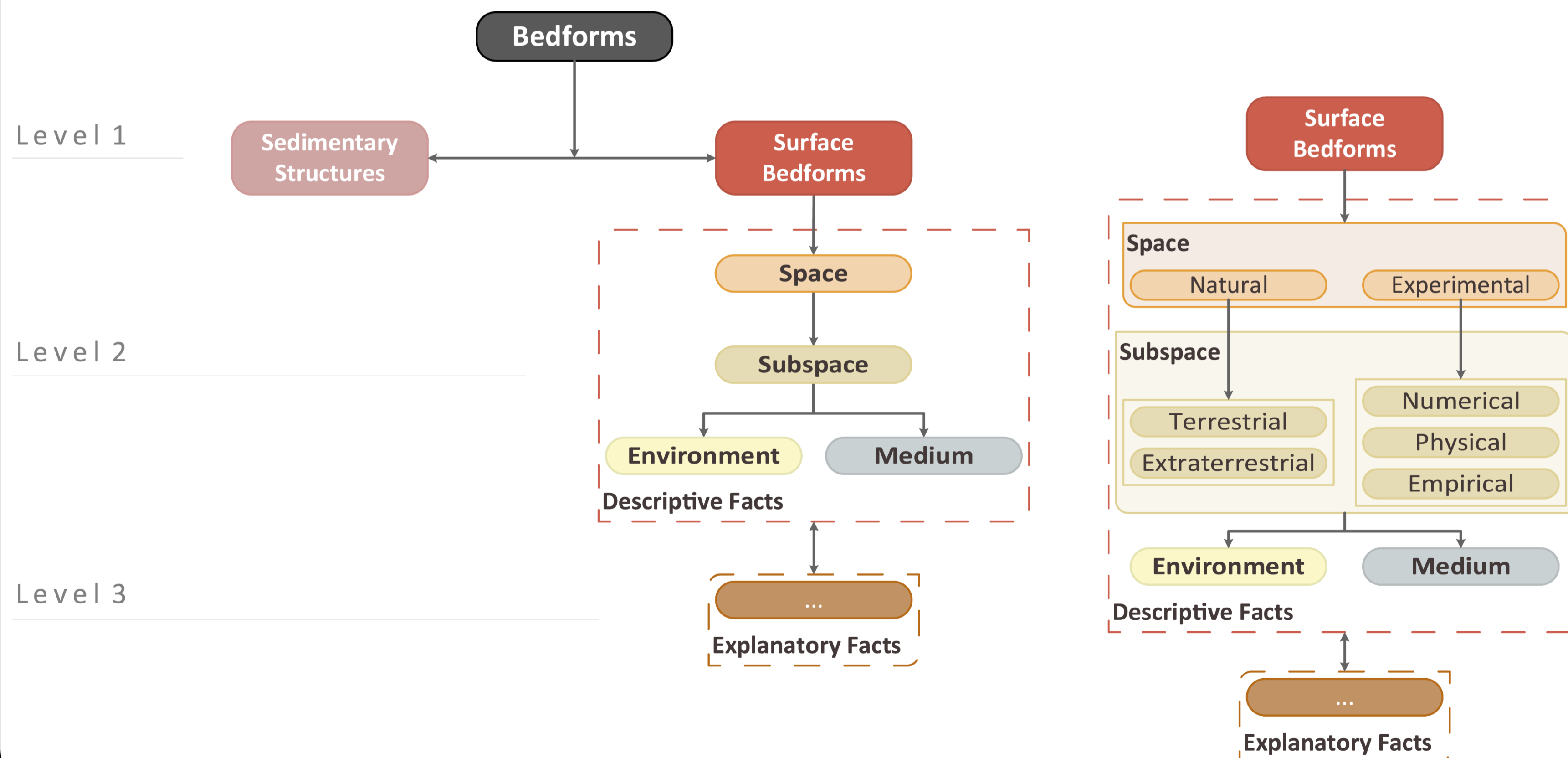
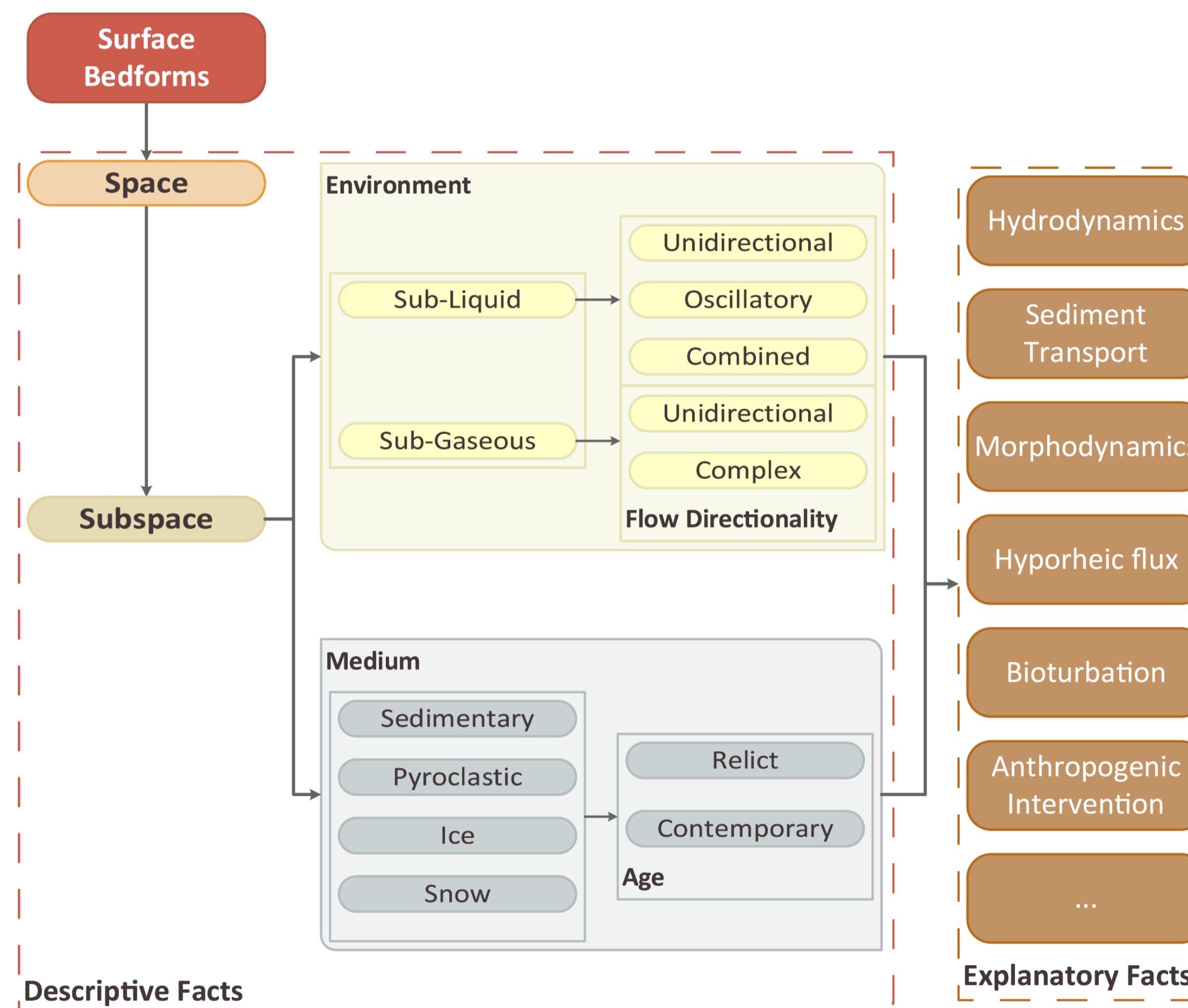


Fig. 1: Bed form data taxonomy at coarser (left), and finer resolution (right)



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1 <?xml version="1.0" encoding="UTF-8" ?>
2 <!DOCTYPE Metadata SYSTEM "Sample_01.bfml0">
3 <Taxonomy>
4   <Genesis>Surface_Bedform</Genesis>
5   <Descriptive_Facts>
6     <Space>Natural</Space>
7     <Subspace>Terrestrial</Subspace>
8     <Environment>Sub-Liquid</Environment>
9     <Medium>Sedimentary</Medium>
10  </Descriptive_Facts>
11  <Explanatory_Facts>
12    <Hydrodynamics>/Sample_01.hd</Hydrodynamics>
13    <Sediment_Transport>/Sample_01.sd
14  </Explanatory_Facts>
15 </Taxonomy>

```

Fig. 2: Explanatory example of BedformsML0

Results

“Taxonomy” is represented by “Descriptive Facts”, which contains the main information related to the taxonomy. “Explanatory Facts” fields list the files that contain the corresponding information. BedformsML0 in XML tree viewer shows that the declaration is intuitive and human-readable.

Conclusions

The taxonomy represents BF data through 3 levels: Level 1 describes the BFs genesis (genetic link of BF features), Level 2 describes BFs descriptive facts (data resulting from direct observations or operations from existing BF data), and Level 3 describes explanatory facts (observations that explain BF descriptive facts). Currently, most scientific databases use RDBMS (SQL). This study will be extended to define the most effective BF data warehouse architecture.