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Towards a generic lithological taxonomy for the International Hydrogeological Map of Europe (IHME 1500 1 : 1 500 000)

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The IHME 1500

- harmonised trans-boundary representation for entire Europe and areas adjacent to the East
- long-term scientific cooperation of experts (> 320) from the European Geological Surveys
- renders complex information on lithology, aquifer characteristics, surface catchments and groundwater divides, springs, special features etc.
- hydrogeological regions and water quality (explanatory notes)
- Consists of 25 individual map sheets 1 : 1 500 000
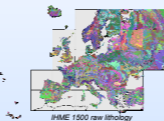
IHME 1500 general content and systematics

- **Aquifer information**
  - Blue: intergranular aquifers
  - Green: fissured and karst aquifers
  - Brown: non-aquifers or only of local potential
  - Lithological rock type various types in grey
- **Special features**
  - full blue for surface water, springs and karst
  - violet for groundwater features, e.g. groundwater contours
  - orange for chemical and thermal features
  - red for man-made changes of the natural GW regime
  - black for geological features, e.g. lithological boundaries, faults

IHME 1500 V2

Data situation IHME 1500 lithology

- 25 Sheets with specific lithological taxonomy
- Digital geometric dataset +/-harmonized
- Semantic dataset: 1296 lithology classes
- Geometric dataset: 1287 lithology classes
- 1244 geometric classes can be related to 1057 semantic classes with English lithological descriptions as of 12/11

Task: Aggregation of spatially and semantically related classes as a basis for the development of a generic lithological taxonomy

IHME 1500 raw lithology

Constraints for aggregation of sheet classes

- Aggregation of classes is conducted solely on geometrical class properties (e.g., spatial relationships and sizes of sheet-specific classes)
- Geometrical data structure is maintained (e.g., sheet-specific polygon classes are not levered)
- Existing taxonomy is maintained (e.g., no new class descriptions are introduced)
- Polygons lacking lithological descriptions are not classified as of 12/11
- Aggregation workflow allows for incorporation of additional classes and tracking of aggregation levels without loose of information

Class aggregation: Level I

Generation of intersection-free classes

- Aggregation of sheet classes with high taxonomic similarity only separated by map borders
- Class descriptions assigned from largest class while avoiding local/stratigraphic/genetic descriptions if possible
- Results in 751 classes at Level I

Original

Level I

Class aggregation: Level II

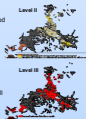Elimination of island classes and very small classes

- Sheet classes consisting of only one polygon (island classes) are merged with larger regional classes of similar taxonomy
- Sheet classes < 100 km² are merged with larger regional classes of similar taxonomy
- All treated classes are local varieties of regional lithologies without any exception
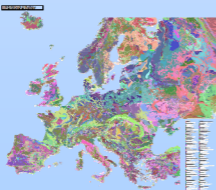- Results in 685 classes at Level II

Level I

Level II

Class aggregation: Level III

Aggregation for major types (not finished by 12/11)

- IHME 1.5M displays six major aquifer-types, geometrically based on the litho-polygons
- Level II classes with similar taxonomy belonging to same aquifer types were merged
- Generic classes (i.e., "Sandstones") were not further merged at this stage
- Results in 282 classes at Level III

Level II

Level III

Status of the work (12/11)

Aggregated IHME 1500 lithology (282 classes)

Work in progress and outlook

- The proposed aggregation of sheet-specific lithological classes into 282 generic classes provides a basis for the development of a general lithologic taxonomy for the IHME 1.5 M
- When geometric dataset is complete, missing classes will be introduced into the proposed aggregation scheme
- Even though a higher level aggregation seems feasible, this would presumably result in significant reduction of original information
- Based on the Level III aggregation (282 classes), a suitable lithological taxonomy will be developed allowing for best transportation of the semantic information, also considering auxiliary datasets (IGME 5M, OneGeology)
- For a generalizing taxonomy, ~100 lithological classes are envisaged at the lowest aggregation level
- IHME 1500 lithology can serve as important background data for the delineation of groundwater bodies throughout Europe
- IHME 1500 lithology will provide important harmonized information on first-order structural and textural properties of geologic materials throughout Europe and can contribute to many global and European initiatives requiring lithological information