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Linkage of the ArcHydro Data Model with SWAT

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Model Integration

- Sharing of information between models is necessary to capture the complexity of natural hydrologic processes.
- This sharing of information between models in a systematic fashion is called here *model integration*.

Model Integration





Connection on a two-model basis. Depends on the already connected models.

Model Integration





Connection on a *hub* basis. Independent of the already connected models

Arc Hydro

 Arc Hydro can be used as the hub for connecting hydrologic models.







What it is and what it is not ...

- Arc Hydro is a *geodatabase*, that is, a relational database that contains geographic information.
- Arc Hydro is a standard data model for spatial and temporal hydrologic data.
- A data model is a template for organizing data, so that it can be found and retrieved easily.



Entertainment center

ArcGIS-SWAT

- ArcGIS-SWAT is an ArcView 8.x preprocessor for the Soil Water Assessment Tool (SWAT) compatible with the Arc Hydro data model developed by Texas A&M University – Civil Engineering and Forest Sciences with support of the U.S. Army Corps of Engineers.
- Improvement with respect to AVSWAT developed by Di Luzio et al.



SWAT/GIS Interfaces

- Srinivasan and Arnold (1994): SWAT 1990 / GRASS C programming language.
- Bian et al. (1998): SWAT 1990 / ArcInfo Arc Macro Language (AML)
- **Di Luzio et al. (1998):** SWAT 1996 / ArcView Avenue programming language.
- Di Luzio et al. (2002): Improved 1998 interface and was incorporated in BASINS.
- Olivera et al. (2003): Improved 2002 interface for ArcView 8.x Visual Basic

What's new?

- Compatible with the latest ESRI GIS software package ArcView 8.x and programming standards.
- Uses a geodatabase data structure to store (and relate) spatial features, parameter tables and time series tables.
- Stores the location of the hydrologic response units (HRU).
- Includes a Monte Carlo parameter simulation utility.

ArcGIS-SWAT Toolbar



Watershed Delineator



Watershed Delineator



Watershed Delineator



Features Classes

Texas A&M University

ArcGIS SWAT Data Model (Dynamic Geodatabase)



Relationship Classes

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Watershed – Outlet: One-to-one relationship class.

Relationship Classes

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Reach – Outlet: One-to-one relationship class.

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Land use / land cover

 National Land Cove Dataset (NLCD)



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Soils and Land Use Data



Hydrologic Response Units



HRU are generated by intersecting watershed, soil and land-use polygons.

Hydrologic Response Units



HRU are generated by intersecting watershed, soil and land-use polygons.

Features Classes



Relationship Classes



HRU – Watershed: Many-to-one relationship class.

Weather



Weather



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Editing Static Geodatabase





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Monte Carlo Simulator

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Conclusions

- A new **SWAT** interface for **ArcView 8.x** has been developed.
- Development of an ArcView 8.x interface for SWAT requires to develop an *application-specific geodatabase* not to build *geometric networks* or create/edit *relationship classes*.
- The *hub* for data-sharing should be time series at points and not the entire spatial representation of the hydrologic features.
- XML applicability to read geodatabases and write XML files will be studied.