Topics

- HEC-HMS
  - Version 3.0
  - Concepts
  - Data Components
  - Simulation
  - Results
HEC-HMS Version 3.0

- **Initial Release**
  - New User Interface - JAVA
  - Snow Accumulation and Melt
  - Depth-Area Storm Event Analysis
  - Evapotranspiration

- **Under Development**
  - Interior Flooding Capabilities
  - Land Surface Wash-off
New User Interface - JAVA

- Finished Java Conversion
  - Converted Entire Existing Engine with Data Model and Simulation Components from C++, Galaxy to Java
  - Scraped Old Interface in Favor of New Design
    - Easy to Learn
    - More Flexible for Configuring Data and Viewing Results
    - Faster to Use Because it Anticipates User Needs
    - Similar in Layout to Other Engineering Software
- New Interface Design Complete
- Beta Testing in Progress
  - Approximately 60 testers
  - Several International
  - Testing Complete August 26th
HMS Provides

- Tool kit of options
  - Basin Parameters
  - Parameter estimation (optimization)
- Graphical user interface
  - Select-and-add icons
  - Graphical and tabular displays
- Multiple operating system support
  - Windows, UNIX
HMS Version 3.0

Watershed Explorer

Basin Map

Component Editor

Message Pane
Watershed Explorer

- List All Project Components
- Expand Multiple Components
- List All Elements
- Icon Shows Element Type
- Direct Access to Methods
- Selected Element Highlighted on Map
- Right Click Menu

HEC
Basin Map

- Georeferenced
- Shows all elements
- Make any Element Active
- Zoom In and Out
- Right Click Menu
- View Results
Component Editor

- Editors for all Elements
- Automatically Reflects Selected Element
Message Pane

- Instant Feedback
- Lists errors
- Tracks Current Execution

NOTE 10179: Opened basin model "Kahuku_Clarke" at time 06 May 2005, 19:41:36.
HEC-HMS Project

- Container for components
  - Basin model
  - Gage and paired data
  - Gridded data
  - Meteorologic model
  - Control specifications
- Analysis methods
  - Simulation
  - Parameter estimation (optimization)
  - Depth-Area
HEC-HMS Project Components
Basin Models
Basin Model Types

- Area Averaged
  - Parameters apply to entire subbasin
- Gridded (GeoHMS)
  - ModClark Transform
  - Gridded Precip
    - HRAP, SHG
  - Grid Cell File
Basin Model Elements

- **Subbasin** - *Watershed Catchments*
- **Reach** - *Rivers and Streams*
- **Reservoir** - *Dams and Lakes*
- **Junction** - *Confluence*
- **Diversion** - *Bifurcations and Withdrawals*
- **Source** - *Springs and other Model Sinks*
- **Sink** - *Outlets and Terminal Lakes*
Subbasin Element Loss Parameter

- Loss Methods
  - Initial and Constant
  - Deficit and Constant
  - Evapotranspiration
  - Green and Ampt
  - Gridded Deficit Constant
  - Gridded SCS Curve Number
  - Gridded SMA
  - SCS Curve Number
  - Soil Moisture Accounting
Subbasin Element

- Editor

**Name:** Bakanan Local

- Description: 
- Downstream: Bakanan Outlet
- Area (MIL): 0.581000
- Loss Method: Initial and Constant
- Transform Method: Snyder Unit Hydrograph
- Baseflow Method: Recession
Subbasin Element Transform Parameter

- Transform Methods
  - Clark UH
  - Kinematic wave
  - ModClark
  - Snyder UH
  - SCS UH
  - User-specified S-graph
  - User-specified UH
Subbasin Element Baseflow Parameter

- Baseflow Methods
  - Bounded Recession
  - Constant monthly
  - Linear reservoir
  - Recession
Reach Parameters

- Routing Methods
  - Kinematic Wave
  - Lag
  - Modified Puls
  - Muskingum
  - Muskingum-Cunge
  - Straddle-Stagger
Reservoir Parameters

- Reservoir Methods
  - Simplified Routing
    - Storage-Outlet
    - Elevation-Storage-Outlet
    - Elevation-Area-Outlet
  - Detailed Routing
    - Elevation-Storage
    - Elevation-Area
    - Outlet
    - Spillway
    - Overflow
    - Dam Failure
Additional Elements

- Junction
- Diversion
- Source
- Sink
Global Editors
Global Editors
Meteorological Models
Met Model Choices

- Precipitation
  - Frequency storm
  - Gridded precipitation
  - Inverse-distance gage weighting
  - Standard project storm
  - User hyetograph
  - User-specified gage weighting
**Met Model Editor**

- **Reflects Model Type**

### Meteorology Model

<table>
<thead>
<tr>
<th>Name: Freq1</th>
<th>Basin Model</th>
<th>Include Subbasins</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Basin 1</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Kahului</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Kahului_Carls</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Kahului_Rare</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Kukulu_1996</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Basin 2</td>
<td>No</td>
</tr>
</tbody>
</table>

### Precipitation

<table>
<thead>
<tr>
<th>Name: Freq1</th>
<th>Probability</th>
<th>Series Type</th>
<th>Intensity Duration</th>
<th>Storm Duration</th>
<th>Intensity Position</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.2 Percent</td>
<td>Annual Duration</td>
<td>5 Minutes</td>
<td>1 Hour</td>
<td>50 Percent</td>
</tr>
</tbody>
</table>

### Evapotranspiration

- None

### Snowmelt

- None

### Unit System

- U.S. Customary
Evapotranspiration
- Priestly-Taylor
  - Crop Coefficient
  - Solar Radiation
  - Temperature
- Gridded P-T
- Monthly Average
  - Pan Coeff.
  - Rate

Components | Compute | Results
---|---|---

**Meteorology Model**

<table>
<thead>
<tr>
<th>Name: Freq1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
</tr>
<tr>
<td>Precipitation: Frequency Storm</td>
</tr>
<tr>
<td>Evapotranspiration: Priestly-Taylor</td>
</tr>
<tr>
<td>Snowmelt: None</td>
</tr>
<tr>
<td>Unit System: Gridded Priestly-Taylor</td>
</tr>
</tbody>
</table>

**500-Year R-73**
- Frequency Storm
- Bakahan Local
- Priestly-Taylor
- High School Trib
- Hospital Ditch
- Kalaeokaahina Stream
- Keaaulu Gulch
- Kii Local A
- Kii Local B
- Kii Local C
- Kii Local D
- Ohia Gulch
- Nov 1996

**SPS**
Met Model Editor

- Snowmelt
- Temperature Index
- Gridded Temp Index
Control Specifications
Time Series Data

- Types
  - Precipitation
  - Discharge
  - Temperature
  - Solar radiation
  - Crop Coefficient
Paired Data

- Types
  - Storage-Outlet
  - Elevation Storage
  - Elevation-Area
  - Elevation-Discharge
  - Inflow-Diversion
  - Cross Sections
  - Unit Hydrograph
  - S-Graph
  - ATI Meltrate
  - ATI Coldrate
  - Groundmelt Patterns
  - Evaporation Patterns
  - Meltrate patterns
**Gridded Data**

- **Types**
  - Precipitation
  - Temperature
  - Solar radiation
  - Crop Coefficient
  - Storage Capacity
  - Percolation
  - Storage Coefficient
  - Moisture Deficit
  - Impervious Area
  - SCS Curve Number
  - Elevation
  - Cold Content
  - Cold Content ATI
  - Meltrate ATI
  - Liquid Water Content
  - Snow Water Equivalent

- **Data Source always DSS**
Model Computations

- Simulation
- Optimization
- Depth-Area Analysis
Simulation

Simulation Run
- Name: Hyp 50-Year
  - Description: Basin: Kahuku_Rare & Met: 50-Year & Control: Hyp Flood
  - Basin Model: Kahuku_Rare
  - Meteorologic Model: 50-Year
  - Control Specifications: Hyp Flood

Create Simulation Run
- Select Run
- Run Manager
- Create Optimization Trial
  - Select Trial
  - Trial Manager
- Create Analysis
  - Select Analysis
  - Analysis Manager
  - Compute Run [Hyp 50-Year]
Optimization

- Observed Data
- Existing Simulation
Depth-Area Analysis

- Based on Existing Simulation
- Frequency Storm Met Model
Depth-Area Analysis

- Frequency Storm Application Basis for Many Planning Studies
- Multiple Evaluation Locations Almost Always Necessary
- New Tool Provides Semi-Automated Analysis at Multiple Evaluation Locations
- Will Reduce Errors from Improperly Applied Storms
- Reduce Time to Evaluate Multiple Locations
Simulation Results – Basin Map

- Based on Last Compute
  - For Selected Element
    - Graph
    - Summary Table
    - Time Series table
  - Preset Graphs, Tables
    - Based on Element
Simulation Results – Results Tree

- Valid Results Enabled
- Compare Multiple Runs
- Plot in Preview Window
- Expand to Large Plot

![Diagram showing results tree with items such as Bakahan Local, Flow (CF/s), and various hypotetical events showing plots and summaries.](Image)
HEC-HMS Web Access

- Download HEC-HMS from HEC Website
- Beta Version HMS 3.0
  - Released and in test phase
- 2003 Statistics
  - 37,000 Downloads
  - 93 Countries
Contact Info

- Jeff Harris
- US Army Corps of Engineers
  Hydrologic Engineering Center
  609 2\textsuperscript{nd} Street
  Davis, CA 95616
  530-756-1104
  david.j.harris@usace.army.mil