

OVERVIEW OF THE GLOBAL PALEOFLOOD DATABANK

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THE PALEOFLOOD DATABANK

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This Paleoflood Databank is a repository for paleoflood data that has been created for use by the paleoflood research community. It was compiled by researchers at The Arizona Laboratory for Paleohydrological Analysis (ALPHA) and The Laboratory of Tree-Ring Research, University of Arizona, under the direction of K.K Hirschboeck with funding from NOAA Office of Global Programs and the US Bureau of Reclamation.



Paleoflood data are entered by adding records in a BASIN-RIVER-SITE sequence:

[Add Records](#)

Data records are extracted via queries and reports:

[Query DATA](#)

[Report DATA](#)

[Query PALEOFLOOD](#)

[Report Paleofloods](#)

[Query flood 1983](#)

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[Exit Database](#)

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Overview of the Databank:

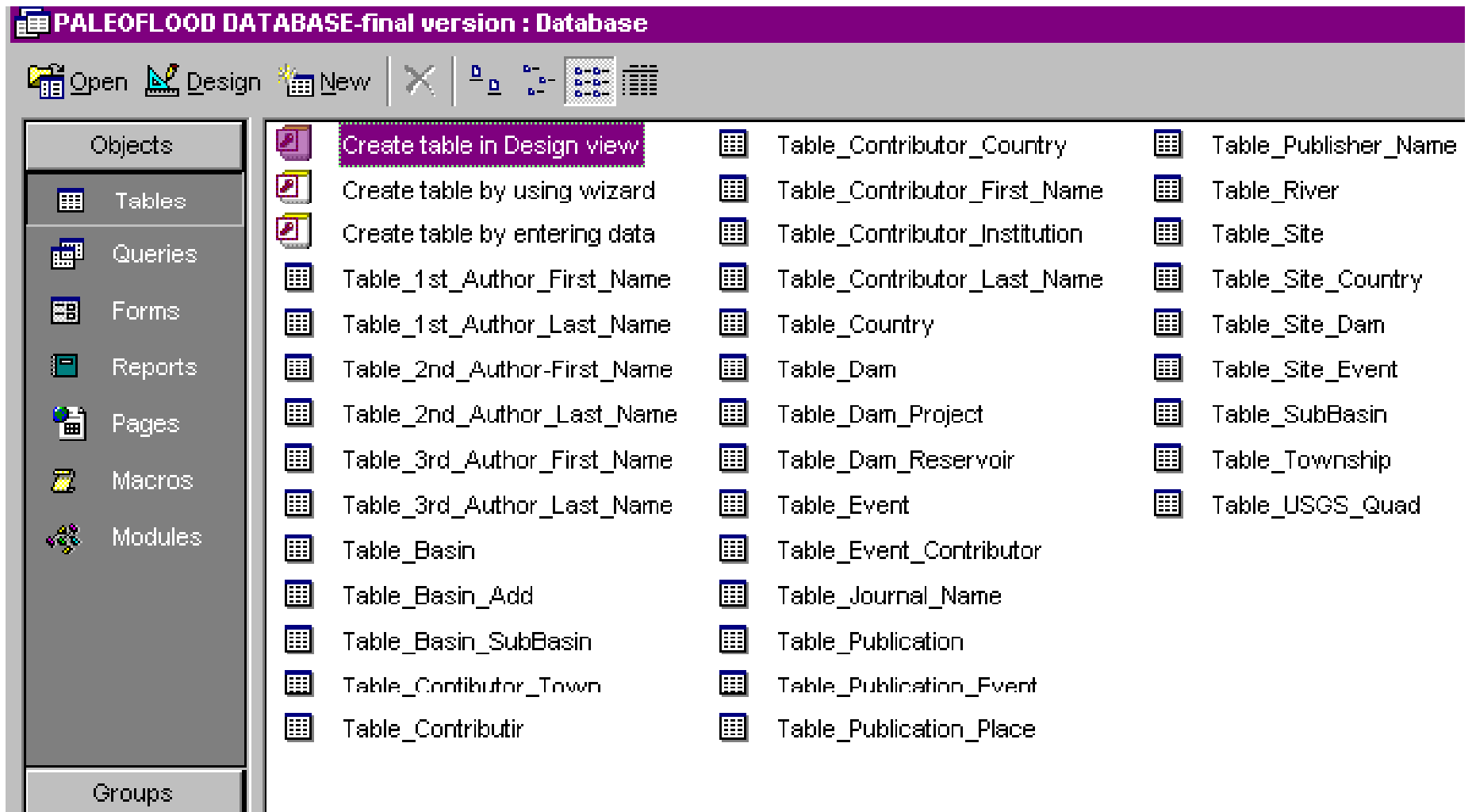
Microsoft Access

Organized around a series of data fields which describe:

- paleoflood site
- paleoflood “event data”
- methods and techniques
- source of information

HOW DATA ARE STORED IN THE DATABANK

Data fields are grouped into tables:



Tables contain:

(a) paleoflood event information:

technique

dating method

date

estimated discharge for event

(b) site information:

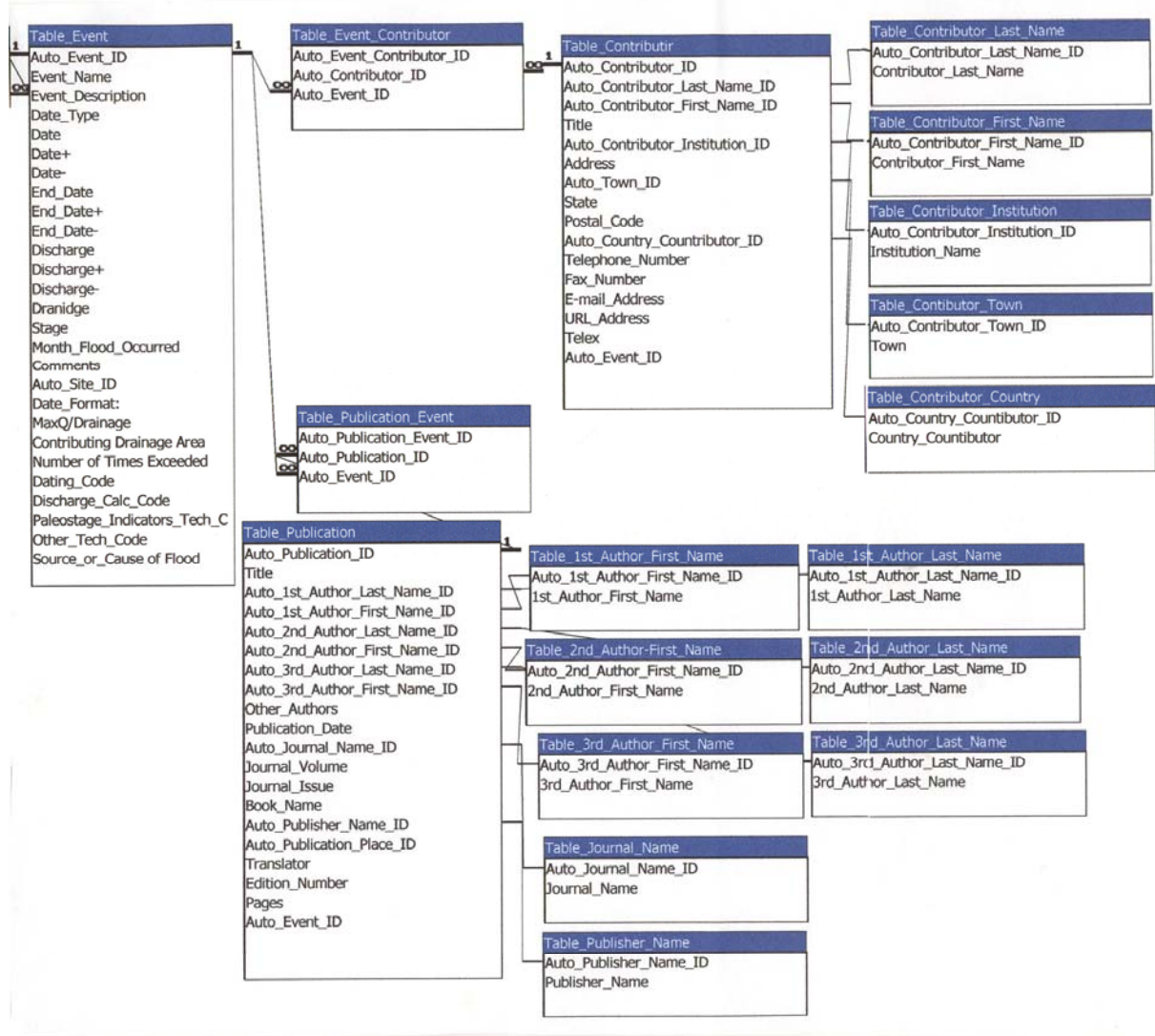
lat / lon, basin info, nearby gages, dams,

(c) contributor information

(d) publication (source) information

Tables are linked through critical data fields into a relational database

MS Access Relationship Diagram:



Complete Relationships Diagram for the Data Fields in the Paleoflood Databank, v. 3.1



***Databank's definition of
"paleoflood data" (PF) includes:***

- **PALEOFLOOD**

A past or ancient flood event which occurred prior to the time of human observation or direct measurement by modern hydrological procedures.

- **HISTORICAL FLOOD**

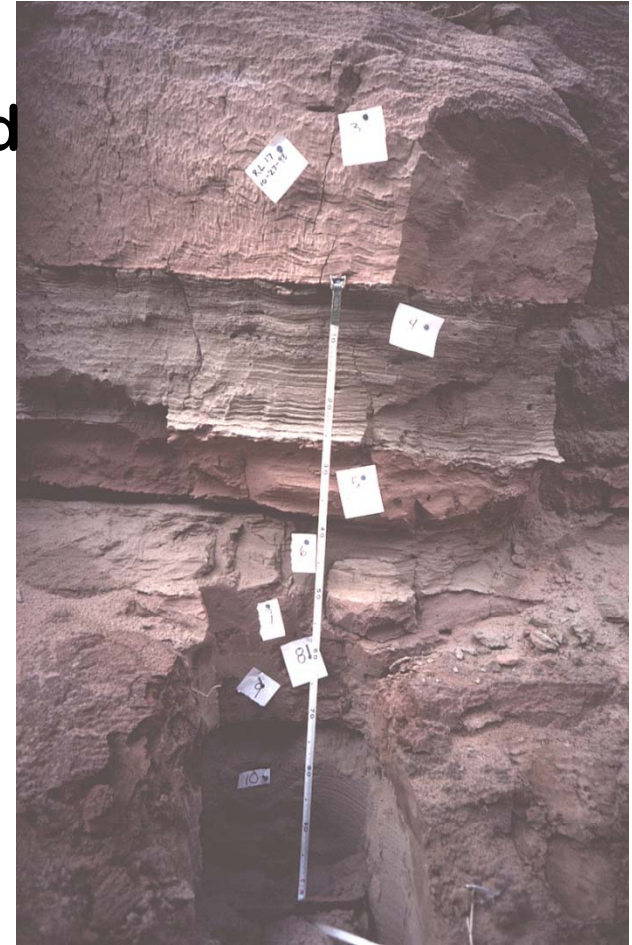
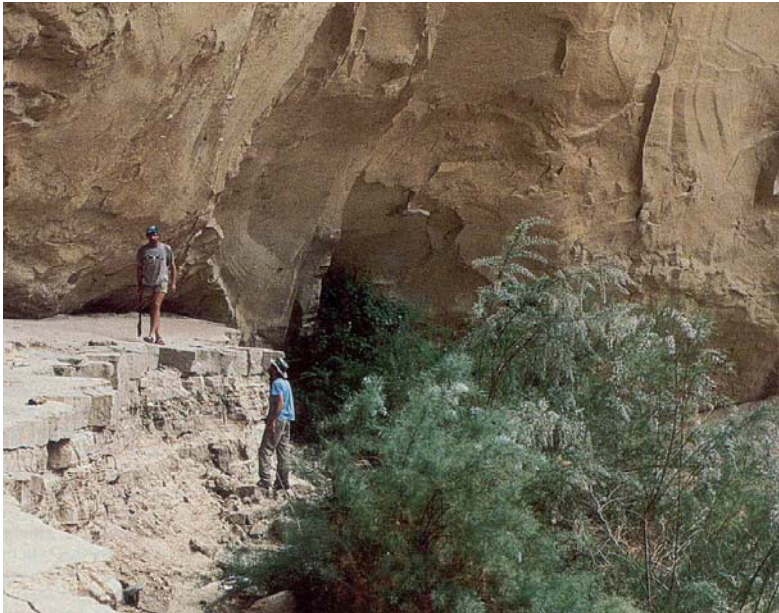
Flood events documented by human observation and recorded prior to the development of systematic streamflow measurements

- **EXTREME FLOODS IN UNGAGED WATERSHEDS**

For comparison & benchmarks:

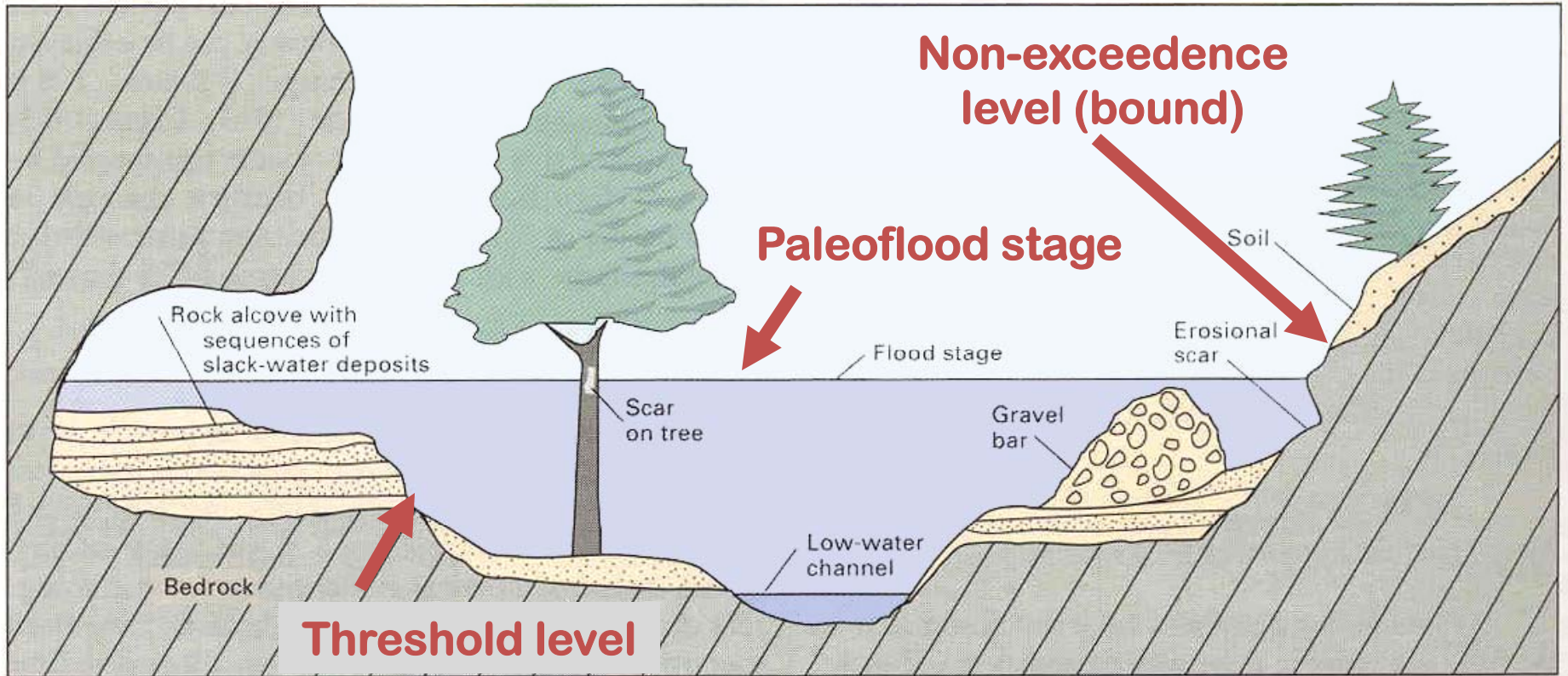
GAGED HYDROLOGICAL RECORDS *are also included*

Unlike systematic gaged data, paleoflood information is collected and reported in different ways, leading to different “data types” . . .



- **Paleofloods (w/ stage +/- or discharge)**
- **Thresholds**
- **Non-exceedence bounds**

Paleoflood data types:



Diagrammatic section across a stream channel showing a flood stage and various features

(Source: Jarrett 1991, modified from Baker 1987)

Paleoflood = discrete flood / paleoflood stage or discharge estimate

Threshold = a stage or discharge level below which floods are not preserved; only floods which overtop the threshold level leave evidence; smaller events not preserved (over specific time interval)

Non-exceedence bound = a stage or discharge level which has either never been exceeded, or has not been exceeded during a specific time interval

A brief tour of the databank . . .

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Add Records

Data records are extracted via queries and reports:

Query DATA

Report DATA

Query PALEOFLOOD

Report Paleofloods

Query flood 1983

Report flood 1983

Exit Database

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THE PALEOFLOOD DATABANK



OVERVIEW OF DATA ENTRY PROCEDURE:

1. Enter or select the drainage basin and river where the paleflood site is located
2. Enter or select the site name, along with supplementary information
3. Enter each flood event, along with supplementary information
4. Enter or select publication and/or contributor information to record the source of the data

ADD RECORDS

BASIN - RIVER

SITE

EVENT

PUBLICATION

CONTRIBUTOR

RETURN TO MAIN
PAGE

Form_Basin_River : Form

BASIN - RIVER

Refresh



Close Form

DIRECTIONS:

Select a "Basin_Name" and "SubBasin_Name" from the drop-down list, then select the "River_Name" for the site.

If the basin, subbasin or river is not in the list, add the name by clicking on the ADD button.

Basin_Name

Lower Colorado Basin

Add

SubBasin_Name

Salt River Basin

Add

River_Name

Santa Rosa Wash

Silver Creek

Tonto Creek

Upper Gila-San Carlos Reservoir

Upper Gila-Mangos River

Upper Salt River

Upper San Pedro River

Upper Santa Cruz River

Add

Record: 14



1



SITE NAME

Refresh



Add Record



Save Record



Undo Record



Close Form

DIRECTIONS:

1. Select "Add Record" button. From "River_Name" drop-down list select river name on which the new site is located.
2. Type the new site name in "Site_Name" field.
3. Proceed to enter or select from drop-down lists (Boundary_Type, Continent, State, Latitude, Longitude) information in the other field. Channel slope has to be entered in decimal format: ".30".
4. After entering new "USGS_Quad_Name" and "Country Name" press "Refresh" button. Newly entered data will appear in drop_down lists and now should be selected.
5. Save record and return to previous page using "Close Form" button.
6. If data which have been entered are incorrect, select "Undo Record" button and start from step 1.

River_Name:

Lower Salt River

Site_Name:

Chinle Creek near Mexican Water

USGS_ID_Name:

9379200

Drainage_Area_mi2:

3660

Dranidge_Area_km2:

9480

Boundery_Type:

Channel_Slope:

0

SITE NAME:

1. for all PALEOFLOODS: PF- River Name@Site Name
2. for all hydrological gauge data use USGS site names

link to USGS >>>

<http://waterdata.usgs.gov/nwis/sw>

MAP LOCATION

Section:

19

Range:

41 N

Township:

25 E

1/4 Section:

0

USGS_Quad_Name:

0

Add

GEOGRAPHIC LOCATION

Continent:

North America

Country:

USA

State:

Arizona

County:

Apachy

Add

Latitude:

North

Latitude_dddmmss:

36:56:38

Longitude:

West

Longitude_dd:mm:ss:

109:42:36

Elevation:

0

Comment:

NONE

EVENT DESCRIPTION



Add Record

Save Record

Undo Record

Close Form

DIRECTIONS:

1. Select "Add Record" button. From "Site_Name" drop-down list select site name at which the new event happened.
2. Type the new event name in "Event_Name" field using the format of the given example below.
3. Select the SOURCE or CAUSE of the flood (if known), the TYPE OF DATA (gaged, dated paleoflood event, threshold, or non-exceedance bound) and enter the event's DATE.
4. Select from drop-down lists METHODS of DATING (Dating_Code, Discharge_Calc_Code, Paleostage_Indicators_Tech_Code, Other_Tech_Code) how the event was dated.
5. Enter the estimated DISCHARGE and STAGE information.
6. Save record and return to previous page using "Close Form" button.
7. If data which have been entered are incorrect, select "Undo Record" button and start from step 1.

DATED FLOOD/PALEOFLOOD EVENT

Site_Name:

Chinle Creek near Mexican Water

*EVENT NAME example:
River Name@Site Name: Flood Year*

Event_Name:

San Juan River_Cinle Creek_1964

Event_Description:

NONE

Flood_Source_or_Cause:

glacial break dam

Date_Format:

AD

Data_Type:

Data Type Explanation

<== CLICK HERE to see a figure that explains the various types of paleoflood data

Dating_Code:

Other_Tech_Code:

Comments:

DAM

Date of Event:

1964

Date "+":

0

Date "-":

0

Month_Flood Occurred:

August

Discharge [m3s]:

3280

Discharge "+":

0

Discharge "-":

0

Contributing Drainage Area

Stage [m]:

Discharge_Calc_Code:

Paleostage_Indicators_Tech_Code:

**THRESHOLD
or NON-EXCEEDANCE
EVENT**

Fields in "brown" should only be used when entering censored data describing thresholds on non-exceedance bound.

End_Date:

End_Date "-":

End_Date "+":

Number of Times Exceeded:

Site_Name: PF-Lower Salt River near Phoenix

*EVENT NAME example:
River Name@Site Name: Flood Year*

Event_Name:

Event_Description:

Flood_Source_or_Cause: rain and snow

Date_Format: AD

Data_Type: Paleoflood

Data Type Explanation [<== CLICK HERE to see a figure that explains the various types of paleoflood data](#)

Dating_Code: Historical Records

Other_Tech_Code: Newspaper Accounts

Comments:

DAM

- Radiocarbon Analysis**
- Discharge Gage Records
- Historical Records
- Precipitation Records
- Radiocarbon Analysis**
- Soil Carbonate Accumulation
- Soil Development
- Tephrochronology
- Other

**Method of
Dating the
Flood /
Paleoflood**

DATED FLOOD/PALEOFLOOD EVENT

Date of Event:

1964

Date "+":

0

Date "-":

0

Month_Flood
Occurred:

August

Discharge [m3s]:

3280

Discharge "+":

0

Discharge "-":

0

Contributing
Drainage Area

Stage [m]:

Discharge_Calc_Code:

Paleostage_Indicators_Tech_Code:

THRESHOLD or NON-EXCEEDANCE EVENT

*Fields in "brown" should only be used
when entering censored data describing
thresholds on non-exceedance bound.*

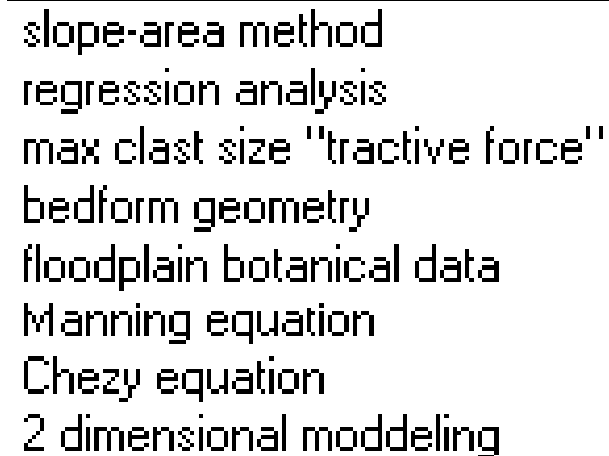
End_Date:

End_Date "-":

End_Date "+":

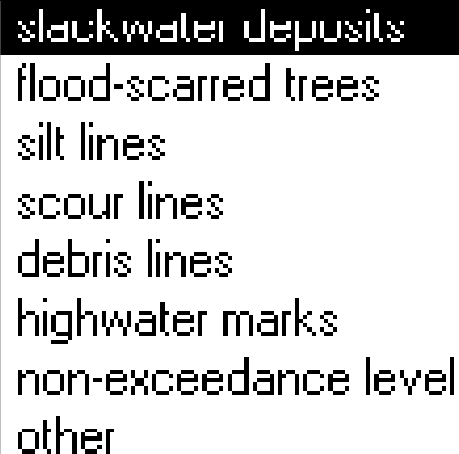
Number of
Times Exceeded:

Methods of discharge or stage calculation:



- slope-area method
- regression analysis
- max clast size "tractive force"
- bedform geometry
- floodplain botanical data
- Manning equation
- Chezy equation
- 2 dimensional modeling

Techniques used to indicate paleostage level:



- slackwater deposits
- flood-scarred trees
- silt lines
- scour lines
- debris lines
- highwater marks
- non-exceedance level
- other

PUBLICATIONS

Refresh



Add Record



Save Record



Undo Record



Close Form

Event_Name:

San Juan River_Cinle Creek_1964

DIRECTIONS: To link the publication to a flood event, select the event name in "Event_Name" line and fill in the publication information.

Title:

Statistical Summaries of Arizona Sream Flow data

1st_Author_Last_Name:

Anderson

Add

2nd_Author_Last_Name:

White

Add

1st_Author-First_Name:

T

Add

2nd_Author_First_Name:

Natalie

Add

3rd_Author_Last_Name:

NONE

Add

3rd_Author_First_Name:

NONE

Add

Other_Authors:

NONE

Publication_Date:

1979

Book_Name:

NONE

Journal_Name:

NONE

Add

Publisher_Name:

U.S. Geological Survey

Add

Journal_Volume:

0

Publication_Place:

Tucson

Add

Journal_Issue:

0

Translator:

None

Edition_Number:

1

Pages:

1-416

CONTRIBUTOR

Refresh



Add Record



Save Record



Undo Record



Close Form

Event_Name:

Agua Fria River near Mayer, 1983 AD

DIRECTIONS: To link a contributor to a flood event, select the event name in "Event_Name" line and fill in the contributor's information.

Last_Name:

Hirschboeck

Add

First_Name:

Katie

Add

Title:

Dr.

Institution_Name:

University of Arizona; LTRR

Add

Address:

Town:

Tucson

Add

State:

AZ

Postal_Code:

Country:

USA

Add

Telephone_Number:

Fax_Number:

E-mail_Address:

katie@ltrr.arizona.edu

URL_Address:

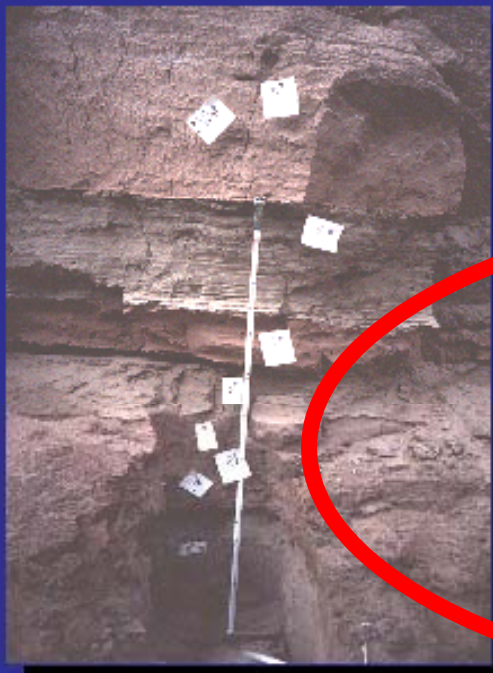
Telex:

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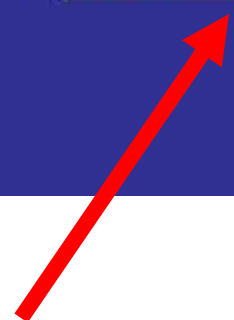
Query PALEOFLOOD

Report Paleofloods

Query flood 1983

Report flood 1983

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QUERIES & REPORTS

Example of a QUERY: for a given date, e.g. 1983:

Event_Name	Event_Description	Date_Type	Date	Date+	
Santa Maria River near Bagdad_1983 AD	flood 09/24/1983	Hydrological gauge data	1983	0	0
Agua Fria River near Mayer_1983 AD	flood 09/23/1983	Hydrological gauge data	1983		
Agua Fria River near Mayer_1983 AD	flood 09/23/1983	Hydrological gauge data	1983		
Black River below Pumping Plant, Nr Point of Pines_1983 a	flood 04/01/1983	Hydrological gauge data	1983	0	0
Black River below Pumping Plant, Nr Point of Pines_1983 a	flood 04/01/1983	Hydrological gauge data	1983	0	0
Black River below Pumping Plant, Nr Point of Pines_1983 b	flood 10/02/1983	Hydrological gauge data	1983	0	0
Black River below Pumping Plant, Nr Point of Pines_1983 b	flood 10/02/1983	Hydrological gauge data	1983	0	0
Black River near Fort Apache_1983 A AD	flood 01/30/1983	Hydrological gauge data	1983	0	0
Black River near Fort Apache_1983 A AD	flood 01/30/1983	Hydrological gauge data	1983	0	0
Black River near Fort Apache_1983 B AD	flood 10/02/1983	Hydrological gauge data	1983	0	0
Black River near Fort Apache_1983 B AD	flood 10/02/1983	Hydrological gauge data	1983	0	0
Black River near Maverick_1983 AD	flood 10/02/1983	Hydrological gauge data	1983	0	0
Black River near Maverick_1983 AD	flood 10/02/1983	Hydrological gauge data	1983	0	0
Brawley Wash near Three Points_1983 AD	flood 10/01/1983	Hydrological gauge data	1983		
Brawley Wash near Three Points_1983 AD	flood 10/01/1983	Hydrological gauge data	1983		
Los Robles Wash near Marana_1983 AD	flood 10/02/1983	Hydrological gauge data	1983		
Los Robles Wash near Marana_1983 AD	flood 10/02/1983	Hydrological gauge data	1983		
Hassayampa River near Arlington_1983 AD	flood 09/30/1983	Hydrological gauge data	1983	0	0
Hassayampa River near Arlington_1983 AD	flood 09/30/1983	Hydrological gauge data	1983	0	0
Gila River below Gillespie Dam_1983 AD	flood 10/05/1983	Hydrological gauge data	1983	0	0
Gila River below Gillespie Dam_1983 AD	flood 10/05/1983	Hydrological gauge data	1983	0	0
Aravaipa Creek near Mammoth_1983 AD	flood 10/01/1983	Hydrological gauge data	1983		
Aravaipa Creek near Mammoth_1983 AD	flood 10/01/1983	Hydrological gauge data	1983		
PF-Lower San Pedro River_Buehman Canyon_1983 AD	flood 1983 AD	Paleoflood	1983	0	0
PF-Lower San Pedro River_Buehman Canyon_1983 AD	flood 1983 AD	Paleoflood	1983	0	0
PF-Lower San Pedro River_Edgar Canyon_1983 AD	flood 1983 AD	Paleoflood	1983	0	0
PF-Lower San Pedro River_Edgar Canyon_1983 AD	flood 1983	Paleoflood	1983	0	0
PF-Lower San Pedro River_Edgar Canyon_1983 AD	flood 1983	Paleoflood	1983	0	0
PF-Lower San Pedro River_Edgar Canyon_1983 AD	flood 1983 AD	Paleoflood	1983	0	0
PF-Lower San Perdo River_Aravaipa Creek/Canyon_1983 AD	flood 1983 AD	Paleoflood	1983	0	0
PF-Lower San Perdo River_Aravaipa Creek/Canyon_1983 AD	flood 1983 AD	Paleoflood	1983	0	0
San Pedro River below Araviapa Creek near Mammoth_1983	flood 10/01/1983	Hydrological gauge data	1983		

Record: 1 of 224

Example of a DATA REPORT

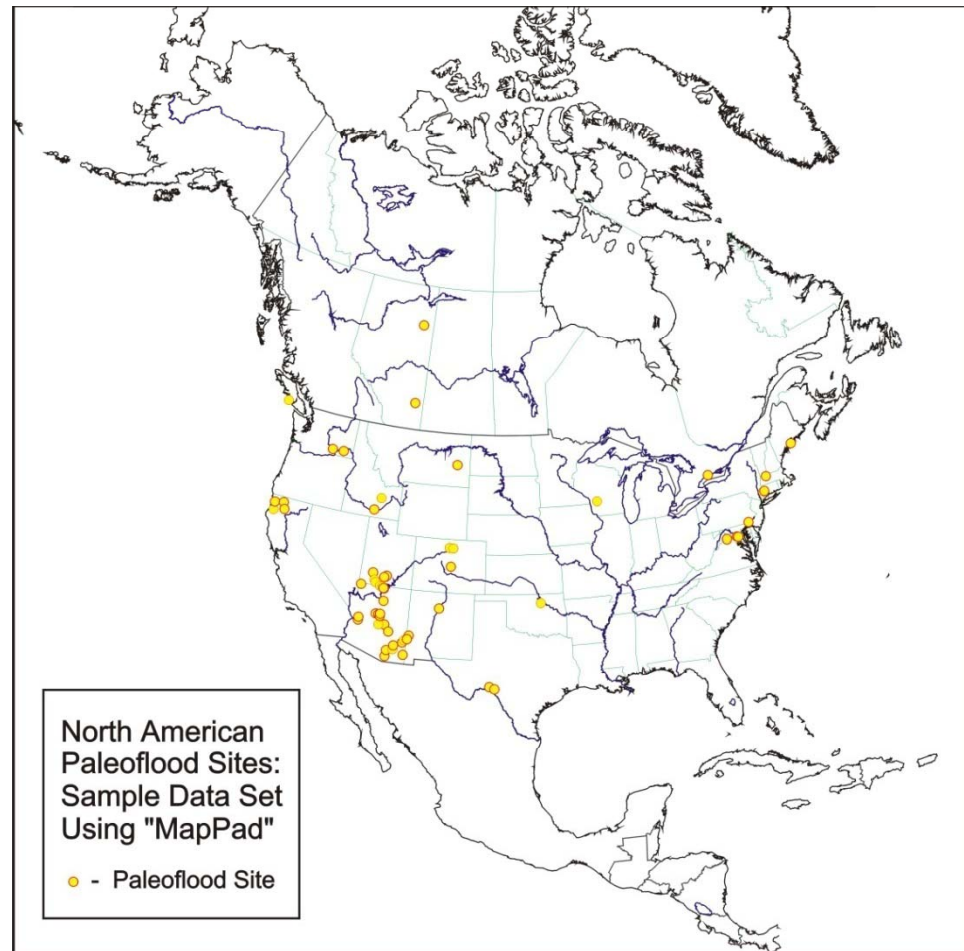
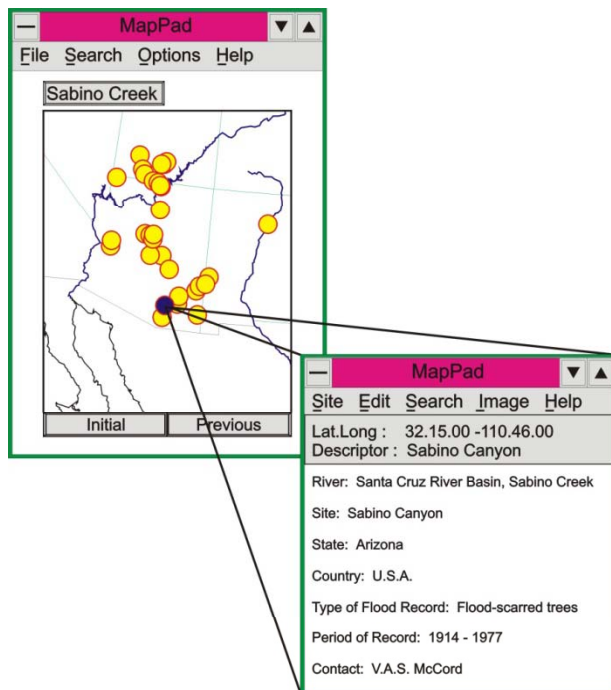
Event_Name		<i>PF-Upper Salt River 10 km Upstream of Roosevelt Lake_600 BP</i>		
Continent	<i>North America</i>			
Country	<i>USA</i>			
State	<i>Arizona</i>			
County				
		Site Characteristics		
		Latitude_ddmmss	<i>33:37:10</i>	<i>North</i>
		Longitude_ddmmss	<i>110:55:15</i>	<i>West</i>
		Elevation		
Range		Boundary_Type_Code	<i>Fixed boundary</i>	
Section		Channel_Slope		
Township		Drainage_Area_mi2		
1/4 Section		Drainage_Area_km2	<i>11153</i>	
USGS_Quad_ID	<i>0</i>			

Event Characteristics			
Date_Format:	<i>BP</i>	Data_Type	<i>Paleoflood</i>
Date	<i>600</i>	Source_or_Cause_of_Flood	<i>unknown</i>
Date+	<i>0</i>	Month_Flood_Occurred	
Date-	<i>0</i>	Contributing_Drainage_Area	
End_Date	<i>0</i>	Stage	
End_Date+	<i>0</i>	Number_of_Times_Exceeded	<i>none</i>
End_Date-	<i>0</i>		
Discharge	<i>3200</i>	Dating_Code	<i>Radiocarbon Analysis</i>
Discharge+	<i>600</i>	Paleostage_Indicators_Tech_Code	<i>Slackwater Deposits</i>
Discharge-	<i>200</i>	Discharge_Calc_Code	<i>Step_Backwater</i>
		Other_Tech_Code	<i>NONE</i>

Future Plans:

Geo-referencing

Web-based user interface



To be housed at:
**National Geophysical
Data Center NGDC**

Possible “universal” data entry form: (could be a web-based form)

Global Paleoflood Databank Contribution Form

This first page contains the most vital information. * Indicates required fields.
PLEASE REPORT RESULTS IN SI UNITS

*Name: (Last)		* (First)		* (Middle)	
*Title:		*Institution			
*Address:					
Phone number:		Fax number:			
*E-mail address:		Telex:			
URL Address:					

⊕ Site/Basin Information

*Name of River where the flood occurred:		Basin name:			
*Name of Study Site:		*State/Country of study site:			
*Latitude of study site: (ddm mss)		*Longitude of study site: (dddm mss)		Basin relief:	
Nearest gage name or number:		Hydrologic Unit Code:		Max recorded discharge at gage:	
				m ³ /s	PMF estimate for basin:
					m ³ /s
*Contributing drainage area:		km ²	Total basin area:		km ²
				Channel slope:	
*Does the study reach of the river have a: <input type="checkbox"/> deformable boundary or <input type="checkbox"/> fixed boundary?					

POTENTIAL USES OF DATABANK:

- **Seasonal / long-term / extreme event perspective**
- **Site-specific and regional synthesis of extremes**
- **Regional linkages / differences identified**
- **Entire flood history context → benchmarks of extreme events**
- **Archive /reference database for near-real time assessment of developing events**

LESSONS LEARNED:

- Multiple sources of data → an extremely complex database
- Understand all linkages & attributes of data
- Involve a database expert from the start , ideally someone familiar with the nature of the data
(false start with first database structure, e.g. linked, but not relational; additional modifications needed based on nature of data)
- Think broadly re: all potential uses of data
(even “negative” information, e.g., non-exceedance)
- Discipline-wide standardization in reporting of data ideal (but not always practical)

CURRENT STATUS

- **Additional beta-testing needed**
- **Central repository issue**
- **Standardization of PF data-reporting format**
- **Quality control issue**
- **When issues are resolved, goal is for databank to be available publicly (featuring Arizona data) in late 2009**