BETA OPUS-Projects Webinar and Demo

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BETA OPUS-Projects gateway web page
https://beta.ngs.noaa.gov/OPUS-Projects/

This webinar is being recorded.
The link to that recording will be provided in a week or two.

This is an introduction to the new features in BETA OPUS-Projects (A.K.A. OP2IDB).

- 45 min introduction and background.

- 2 hr live demo:
    - Creating a project.
    - Processing two small projects.
        - I'll switch between these projects while processing to limit "dead air."

- Question and answer session.

Example 1 (GPS2912 : NC SC Boundary)

- Simulate starting from an existing project
    - Project ID: gps2912c.

    - Set project proposal tracking ID to 8364.

    - Upload description file.

    - Check CORS.

    - Process sessions.

    - Create adjustments.

    - Review and submit to IDB.

Example 2 (Hardin airport survey : FAA 00U)

● Simulate starting from a new project.

    ○ Project ID: faa00u_c.

    ○ Set project proposal tracking ID to 0000.

    ○ Datasheet coordinates and descriptions to n487, s487 and y538.

    ○ Check CORS.

    ○ Process sessions.

    ○ Create adjustments.

    ○ Review and submit to IDB.

Can't get enough?

- 11/8/2017 1-5 PM EDT
  https://attendee.gotowebinar.com/register/3757744100523741697

- The link is also given on the NGS training center's schedule of upcoming classes.
  https://www.ngs.noaa.gov/corbin/calendar.shtml

What does BETA version mean?

- *beta version. A pre-release of software that is given out to a large group of users to try under real conditions. Beta versions have gone through alpha testing inhouse and are generally fairly close in look, feel and function to the final product; however, design changes often occur as a result.*
PC Magazine Encyclopedia
(https://www.pcmag.com/encyclopedia/term/38567/beta-version)

What does BETA version mean for me?

- We're asking for your input. Try BETA OPUS-Projects.

  - If you have experience submitting GPS survey results for publication to the IDB, see if this seems easier.

  - If you don't have experience submitting, see if this makes you believe submission is easy enough that you ought to be.

- Please report any bugs.

- Suggestions are welcome.

- After six months, or so, and span without issue, we'll propose moving BETA OPUS-Projects to production OPUS-Projects.

Testing using existing projects.

- I apologize, but we cannot connect BETA OPUS-Projects to the production project directories for IT security reasons.

- If you have an existing project you'd like to work with in BETA OPUS-Projects, email me the project ID and I'll copy it to BETA.

- BETA OPUS is available. You can create new projects and upload data to them just as you would normally except that all online activities will be through the BETA web site.

OP2IDB sample projects for testing.

- If you'd prefer, I can create for you a copy of one of the 30 test projects the OP2IDB team used. Be aware that some of the projects have issues. The list is:

	Project	State	Locale	Start YEAR-DOY	End YEAR-DOY	Duration DAYS	Marks
1	FAA 00U	MT	Hardin	2012-333	2012-334	2	6
2	FAA 2G2	OH	Jefferson County	2012-069	2012-070	2	6
3	FAA AFM	AK	Ambler	2012-169	2012-170	2	3
4	FAA AUG	ME	Augusta	2012-231	2012-235	5	5
5	FAA BRD	MN	Brainerd Lakes	2013-051	2013-052	2	3
6	FAA COE	ID	Coeur d'Alene	2012-102	2012-103	2	6
7	GPS1404	DC	Washington	1999-229	1999-231	3	12
8	GPS2830	MT	NE Montana	2011-061	2011-199	139	13
9	GPS2859	KY	Carrollton	2011-178	2011-180	3	2
10	GPS2868	TX	Port Arthur	2010-265	2011-028	129	38

OP2IDB sample projects for testing. (cont)

	Project	State	Locale	Start YEAR-DOY	End YEAR-DOY	Duration DAYS	Marks
11	GPS2870	MN	Solon Springs	2012-150	2012-198	49	23
12	GPS2876	FL	Punta Gorda	2012-073	2012-074	2	1
13	GPS2877	FL	Palm City	2012-046	2012-048	3	6
14	GPS2888	MI	thumb	2010-193	2010-235	43	40
15	GPS2898	VA	Sterling	2012-219	2012-228	10	25
16	GPS2900	IL	Quincy	2011-199	2011-257	59	37
17	GPS2912	NC	NC - SC Border	2013-014	2013-017	4	6
18	GPS2926	WA	Seattle	2011-069	2011-304	236	27
19	GPS2929	PA	Reading	2012-105	2013-078	340	20
20	GPS2933	HI	Kawaihae Harbor	2013-070	2013-071	2	2
21	GPS2939	HI	Kailua	2011-240	2011-243	4	5
22	GPS2965	MD	Baltimore	2013-231	2013-242	12	13
23	GPS2978	PA	Bloomsburg University	2013-184	2013-322	139	1
24	GPS2983	MN	Minneapolis	2013-343	2013-346	4	15
25	GPS2984	SC	NC - SC Border	2013-217	2013-269	53	25
26	GPS2991	FL	Titusville	2013-357	2013-357	1	4
27	GPS2995	LA	Baton Rouge	2012-086	2012-355	270	8
28	GPS2997	MN	Mankato	2013-233	2013-234	2	7
29	GPS3013	MI	Ferris State University	2014-015	2014-041	27	28
30	GPS3045	AS	American Samoa	2014-253	2014-255	3	7

The elephant in the room.

- bluebook   [bloo bo͝ok] noun
  The NGS Bluebook is a set of *strongly* structured data formats.
  While its origins go back to the late 1970s and early 1980s, it has
  been updated and adapted to changes in technology over the years.
  See also: Input Formats and Specifications of the National Geodetic
  Survey Data Base. https://www.ngs.noaa.gov/FGCS/BlueBook/

- bluebooking   [bloo bo͝okiNG] verb
  To format surveying results following the NGS Bluebook
  specifications for submission to the Integrated Database (IDB).

Bluebooking has been integral to NGS tasks.

- Pros
  - It has been the standard for submissions to the IDB for decades.
  - Many programs are tailored specifically to these formats.
  - Folks are used to it.
  - It has served its purposes <u>very</u> well.

- Cons
  - It uses 1960's technology.
  - Its detail and complexity are intimidating.
  - It is time intensive to create the files.
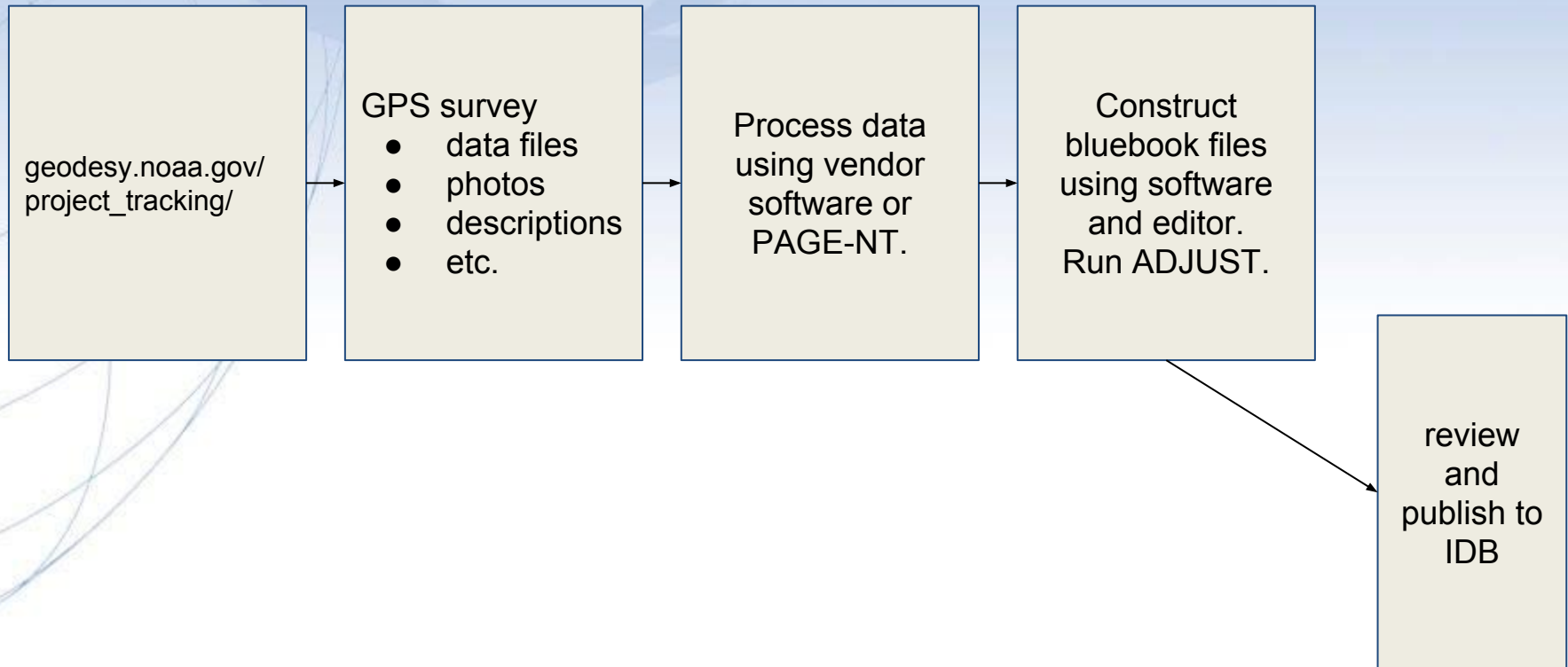 - It is difficult if not impossible to adapt for the future.

Bluebooking is on the way out.

- Bluebooking is inseparably connected to the IDB.

- Both will be replaced in conjunction with the release of the new reference frame and geospatial database.

- But they won't disappear overnight.

  - They will exist until 2020.

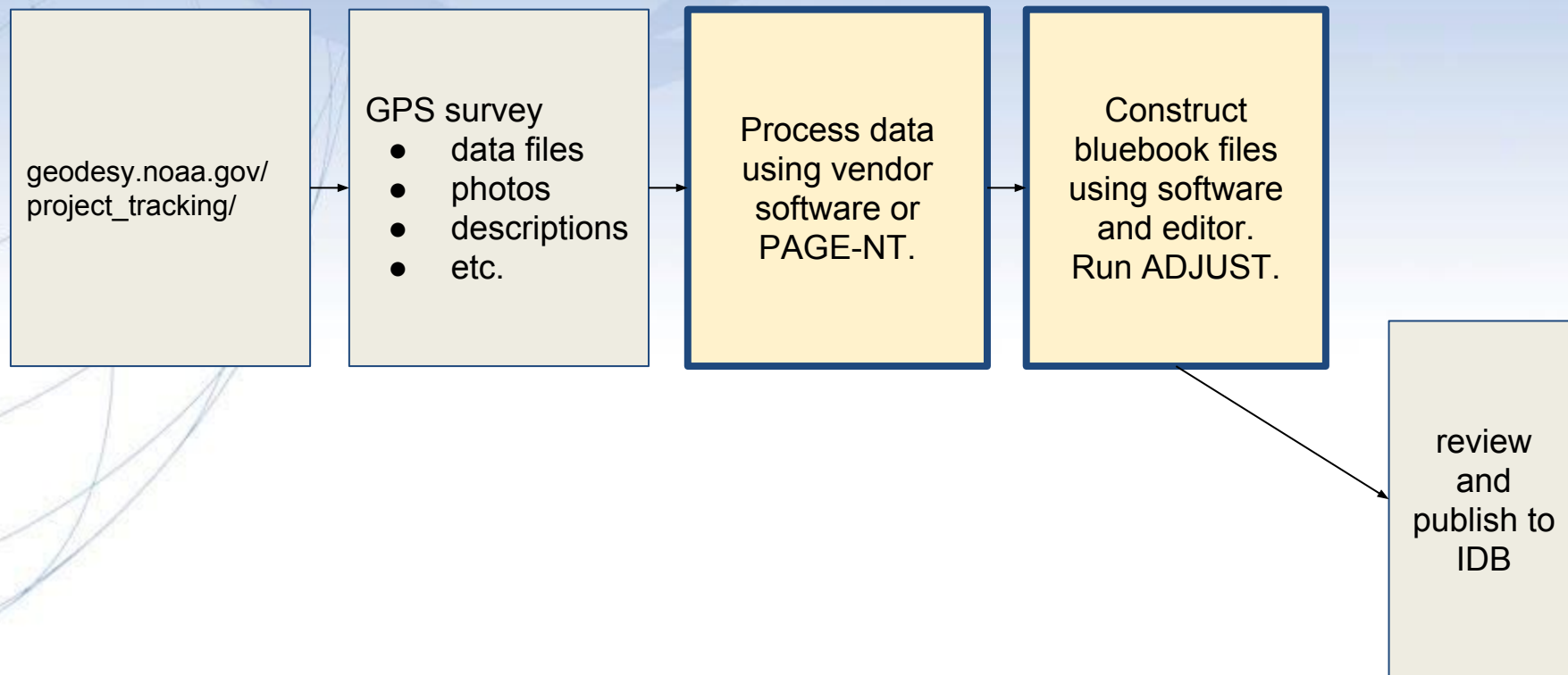 - And almost certainly after as deprecated products.

What is BETA OPUS-Projects?

- In 2015, NGS began a project called "Deriving a valid path for OPUS-Projects GPS projects to be loaded to the NGS IDB." That title is a mouthful, so I call it OP2IDB.

- Its project plan in two sentences:
  - Bluebooking is tedious and time-consuming.
  - Demonstrate that, with minimal changes to its web-based graphical user interface (GUI), OPUS-Projects can be extended to prepare in toto submissions to the IDB.

- BETA OPUS-Projects is the "last hurrah" of bluebooking as you know it *and* a transition to a new way of processing and publishing.

Submitting for publication. (now)

```
geodesy.noaa.gov/
project_tracking/
```
→
```
GPS survey
  ● data files
  ● photos
  ● descriptions
  ● etc.
```
→
```
Process data
using vendor
software or
PAGE-NT.
```
→
```
Construct
bluebook files
using software
and editor.
Run ADJUST.
```
→
```
review
and
publish to
IDB
```

Submitting for publication. (now)

geodesy.noaa.gov/ project_tracking/	GPS survey ● data files ● photos ● descriptions ● etc.	Process data using vendor software or PAGE-NT.	Construct bluebook files using software and editor. Run ADJUST.	review and publish to IDB

What is in that submission to the IDB? (1 of 5)

- Project Report
  - Include the following on the cover page:
    - Submitting organization name and 6 character id from Annex C of the Input Formats and Specifications of the National Geodetic Survey Data Base.
    - Contact name and email
    - Contracting organization name and 6 character id
    - Start and end dates of GNSS observations
    - Datum realization and epoch
    - Number of occupied stations
    - Number of CORS
    - Min/Max Lat/Long of project boundaries

What is in a submission to the IDB? (2 of 5)

- Approved NGS Survey Proposal tracking ID
- Project Instructions or Contract Specifications
- Pertinent Correspondence
- Project Sketch

into Project Report

- Station Photographs (digital)

- Observation (Field) Logs (scanned)

- Rubbings ☐

- Raw Data Files in both RINEX and proprietary receiver formats.

What is in a submission to the IDB? (3 of 5)

- Mark descriptions created using WinDesc:
  - Descriptions/Recoveries (.dsc file)
  - Neighbor Output (.nbr file)
  - Discrep Output (.dsc file)
  - WinDesc Check

What is in that submission to the IDB? (4 of 5)

- OPUS Output

- Vector Processing Program Output

- Adjustments (3 expected; all 4 is typical)
  - Final Free Adjustment
  - Final Constrained Horizontal Adjustment
  - Final Constrained Vertical Adjustment
  - Free Vertical Adjustment

using ADJUST

What is in a submission to the IDB? (5 of 5)

- Final Bfile
- Final Gfile
- Gfile transformed to NAD 83(??11) using HTDP
- Chkobs Output (checking program for the Bfile)
- Obschk Short Output (checking program for the B/Gfiles)
- Obschk Long Output (checking program for the B/Gfiles)
- HTDP Output
- Obsdes Output (validates descriptions with bfile and gfile)

Gfile : sometimes called the observation file.

- Annex N : Global Positioning System Data Transfer Format
  https://www.ngs.noaa.gov/FGCS/BlueBook/pdf/Annex_N.pdf

```
 ***CAUTION: All sigmas were scaled by a factor of 10.0 ***
AAA2013011420130117
B201301140000201301142004100P dev1.0        IGS      227 1 2 27SCGS   20170601IFDDPF
IIGS08_1918           IGS     20161009
F00010007       314031388   52       53603277  204      -11420428   151 R0143AR0143A
F00020007       314484558   80       54041832  328      -10914570   233 R0143AR0143A
F00040007       254899125   52       50477410  204         510250   147 R0143AR0143A
F00060007       265624081   62       25061981  231      -39010228   169 R0143AR0143A
F00080007       316945439   51       55978782  199       -8797162   142 R0143AR0143A
F00120007     22808796035   33    -3543922963   82    -4043138265    61 A0143AR0143A
F00090007      -130768974   21     -265464189   75     -341401010    53 R0143AR0143A
F00050007       367531202   21     -149207084   75     -316885778    53 R0143AR0143A
F00100007      -331865897   22      121900902   77      273555713    54 R0143AR0143A
F00110007       -24409931   21      211002193   72      312808271    51 R0143AR0143A
D   1   2 -8025288   1   3  7834948   1   4  1324829   1   5  -928217   1   6    927140
D   1   7  1978921   1   8 -1436025   1   9  1401284   1  10  1731739   1  11 -1347714
D   1  12  1308968   1  13  1999777   1  14 -1456869   1  15  1429162   1  16  1426367
D   1  17 -1146388   1  18   989722   1  19  1994678   1  20 -1338555   1  21  1253006
```

Bfile : sometimes called the positions file.

- Chapter 4 : Horizontal Control Data
  https://www.ngs.noaa.gov/FGCS/BlueBook/pdf/Annex_N.pdf

```
000010*AA*HZTLOBS SCGS  SOUTH CAROLINA GEODETIC SURVEY                    20130114
000020*10*BOUNDARY MON STRICKLAND NC SC HEIGHT MODERNIZATION 2013 (OP: gps2912f)
000030*12*201301201301MS MARK SCHENEWERK                                     4NCAA
000040*13*NAD 83(2011)          GRS 80          63781370002982572221
000050*25*0001R0143ABLUFMS 004  003
000060*26*BB 0143A -> OP 2013-014-A
000070*27*00011301141641                              2000
000080*27*00011301142001                              2000
                                     ⋮
001900*70*007055      Trimble NavigationDUAL CARRIER PHASE PPSNETR5   4742K10896
001910*70*008055      Trimble NavigationDUAL CARRIER PHASE PPSNETR5   4744K11096
001920*70*009055      Trimble NavigationDUAL CARRIER PHASE PPSNETR5   4829K57356
001930*72*001   AOAD/M_T       NONE      KW5-0201
001940*72*010   TRM57971.00    NONE      30973141
001950*72*011   TRM57971.00    NONE      30976660
                                     ⋮
002040*80*0001BLUFF                           34173468578N079034455052W      NC
002050*86*0001    20756G  N88      -338086   -13052A  ANAD_83(2011)
```

Dfile : sometimes called the description file.

- Annex P : Geodetic Control Descriptive Data (Dfile)
  https://www.ngs.noaa.gov/web/tools/updates/windesc5/dformat.documentation.htm

```
DN02.01.02WINDESC 04.17.1620130226GPS                    SCCSCGS   SOUTH CAROLINA GEODETIC
SURVEY                                                   N341924        N341537
W0790358      W0785955        ABOUNDARY MON STRICKLAND NC SC, GPS HEIGHT
MODERNIZATION 2013
B
@0001AB6819GBLUFF
GPS BLUFF 1989                                   FAIR BLUFF
YUSNC047COLUMBUS                    DDD07                              BMF
CSCGS   SOUTH CAROLINA GEODETIC SURVEY
CSCGS   SOUTH CAROLINA GEODETIC SURVEY
  DDW20121211      NIN0001LN341734.68   W0790344.55   O83              4X^@M20.760
    A88             12N^@TRECOVERED AS DESCRIBED, WITNESS POST WAS FOUND CUT OFF
 AND HAD BEEN REMOVED.^@^@
@0002        SBOUNDARY MON STRICKLAND NC SC

  FAIR BLUFF                              YUSNC047COLUMBUS                OV 00
                            BN                       C
                                              CSCGS   SOUTH CAROLIN
A GEODETIC SURVEY                                     20120111
```
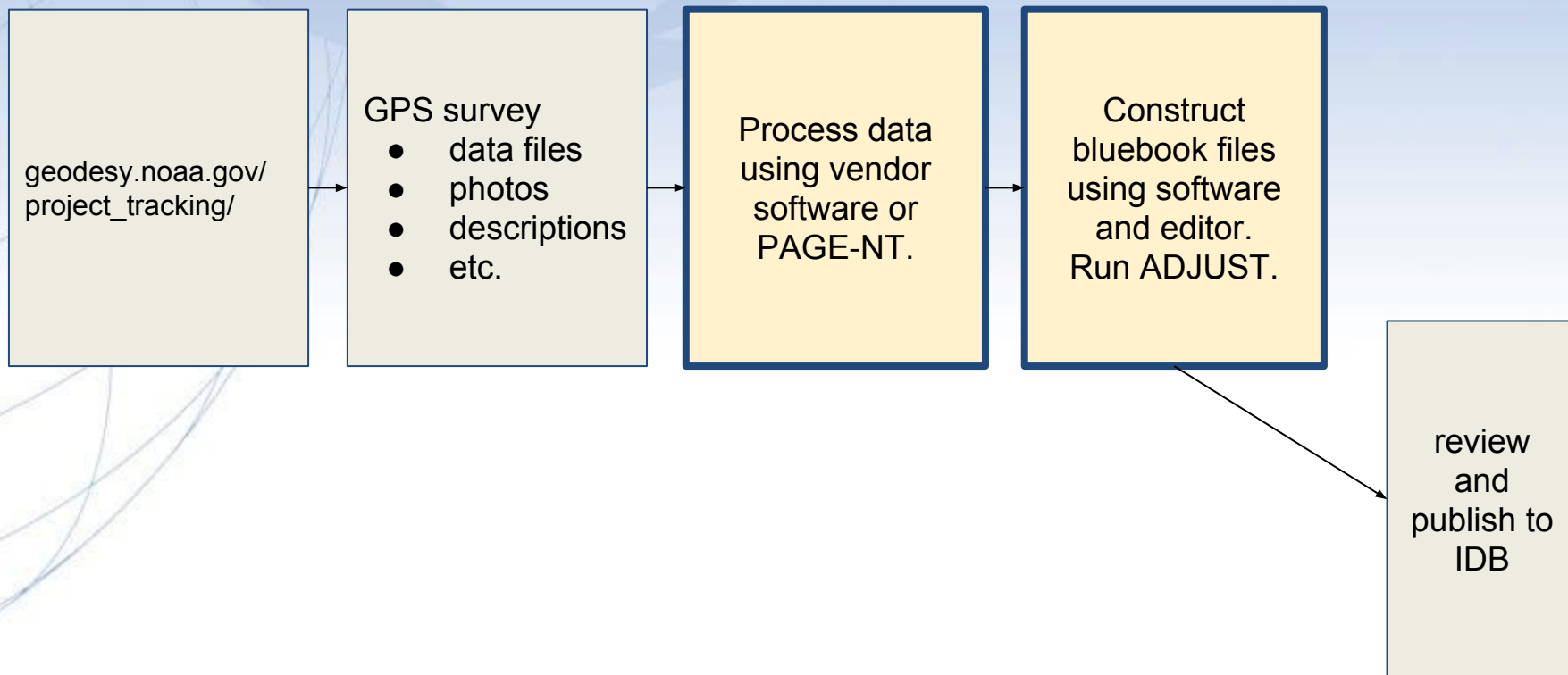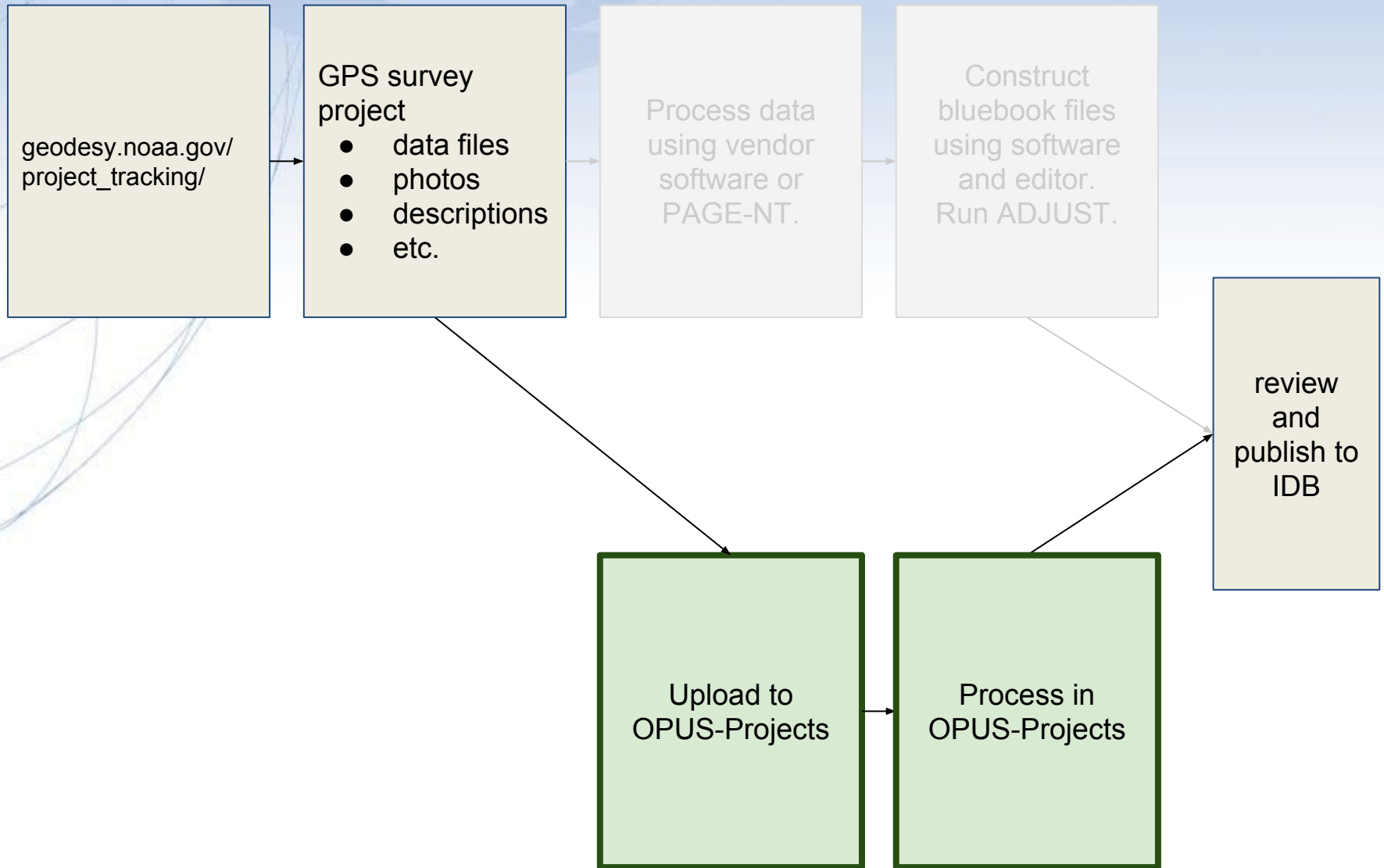
Datasheets.

- ## Survey Marks and Datasheets
  https://www.ngs.noaa.gov/DATASHEET/dsdata.pdf

```
DATABASE = ngsdev.NGSIDB, PROGRAM = datasheet95, VERSION = 8.12.1
1        National Geodetic Survey,   Retrieval Date = MAY 19, 2017
 TJ0232 ***********************************************************************
 TJ0232  HT_MOD       -  This is a Height Modernization Survey Station.
 TJ0232  DESIGNATION -  E 91
 TJ0232  PID          -  TJ0232
 TJ0232  STATE/COUNTY-  MT/VALLEY
 TJ0232  COUNTRY      -  US
 TJ0232  USGS QUAD   -  DRY FORK CREEK (1984)
 TJ0232
 TJ0232                        *CURRENT SURVEY CONTROL
 TJ0232  _____
 TJ0232* NAD 83(2011) POSITION- 48 31 20.48872(N) 106 33 45.74979(W)   ADJUSTED
 TJ0232* NAD 83(2011) ELLIP HT-   812.860 (meters)       (06/27/12)   ADJUSTED
 TJ0232* NAD 83(2011) EPOCH   -  2010.00
 TJ0232* NAVD 88 ORTHO HEIGHT -   829.82  (meters)     2722.5   (feet) GPS OBS
 TJ0232  _____
 TJ0232  NAVD 88 orthometric height was determined with geoid model   GEOID09
 TJ0232  GEOID HEIGHT    -        -16.942 (meters)                     GEOID09
```

Submitting for publication. (now)

geodesy.noaa.gov/ project_tracking/

GPS survey
- data files
- photos
- descriptions
- etc.

Process data using vendor software or PAGE-NT.

Construct bluebook files using software and editor. Run ADJUST.

review and publish to IDB

Submitting for publication. (looking forward)

geodesy.noaa.gov/
project_tracking/

GPS survey project
- data files
- photos
- descriptions
- etc.

Process data using vendor software or PAGE-NT.

Construct bluebook files using software and editor. Run ADJUST.

review and publish to IDB

Upload to OPUS-Projects

Process in OPUS-Projects

Differences to OPUS-Projects. (in general)

- Backward compatible to, but not quite identical to OPUS-Projects.
  - Online help.
  - Fewer email messages.
  - All marks have velocities.
  - Add/Del CORS.
  - More site information available when adding CORS.
  - Better integer fixing - particularly between CORS.
  - Enhanced automated baseline selection within a session.
  - "Smart" windowing of data files to match sessions.

Differences to OPUS-Projects. (bluebooking)

- Does not run or interface to WinDesc.

- More information and files are required.

- Orchestrates and performs adjustments using ADJUST.

- For CORS without measured coordinate uncertainties, uncertainties are computed from the CORS short-term time series.

- Scales and transforms observation files (gfiles).

- Position files (bfiles) are complete and correct.

- Automatically performs basic, required quality control.

- One-click review and one-click submission.

OPUS-Projects can't spin straw into gold.

- OPUS-Projects <u>does not </u>make a project plan obsolete.

- OPUS-Projects <u>does not</u> make field logs obsolete.

- OPUS-Projects <u>does not</u> make mark descriptions obsolete.

- OPUS-Projects <u>does not</u> make mark photos obsolete.

- OPUS-Projects <u>does not</u> make non-GNSSable marks GNSSable.

- OPUS-Projects <u>does not</u> make bad data good.

- OPUS-Projects <u>does not</u> make processing decisions as well as you.

- OPUS-Projects <u>does not</u> quality control processing results as well as you.

Final notes: (1 / 2)

- Remember that this webinar is being recorded.

- The demo is informal. Questions and comments are welcome.

- Be patient. The BETA server is perky, but not as "potent" as the three production OPUS/OPUS-Projects servers.

- With only one BETA server, there may be short outages.

- I am not a bluebooking expert. I can answer BETA OPUS-Projects questions, and I will try to answer bluebooking questions, but folks in this community and the NGS regional geodetic advisors have much greater experience than I do.

Final notes: (2 / 2)

- Remember that nothing is set in concrete at this point (although the concrete is poured and setting), so don't hesitate to make comments. This is an NGS tool. We're here to serve you, so we'll try to make BETA OPUS-Projects what you need it to be.

  - Does BETA OPUS-Projects work for you?

  - Does BETA OPUS-Projects make bluebooking easy?

  - Does BETA OPUS-Projects hide bluebooking?

References:

- Constrained Adjustment Guidelines
  https://geodesy.noaa.gov/PC_PROD/ADJUST/adjustment_guidelines.pdf

- NGS Survey Marks and Datasheets
  https://geodesy.noaa.gov/datasheets/index.shtml
  https://geodesy.noaa.gov/DATASHEET/dsdata.pdf

- OPUS-Projects training and reference documents.
  ftp://geodesy.noaa.gov/pub/opus-projects/

References: ("deprecated")

- Input Formats and Specifications of the National Geodetic Survey Data Base (Note Chapter 4 and Annex N).
https://www.ngs.noaa.gov/FGCS/BlueBook/

- PC Software Download - ADJUST AND UTILITIES
https://geodesy.noaa.gov/PC_PROD/ADJUST/

Useful URLs:

- BETA OPUS upload web page:
  https://beta.ngs.noaa.gov/OPUS/

- BETA OPUS-Projects gateway web page:
  https://beta.ngs.noaa.gov/OPUS-Projects/

Demo