

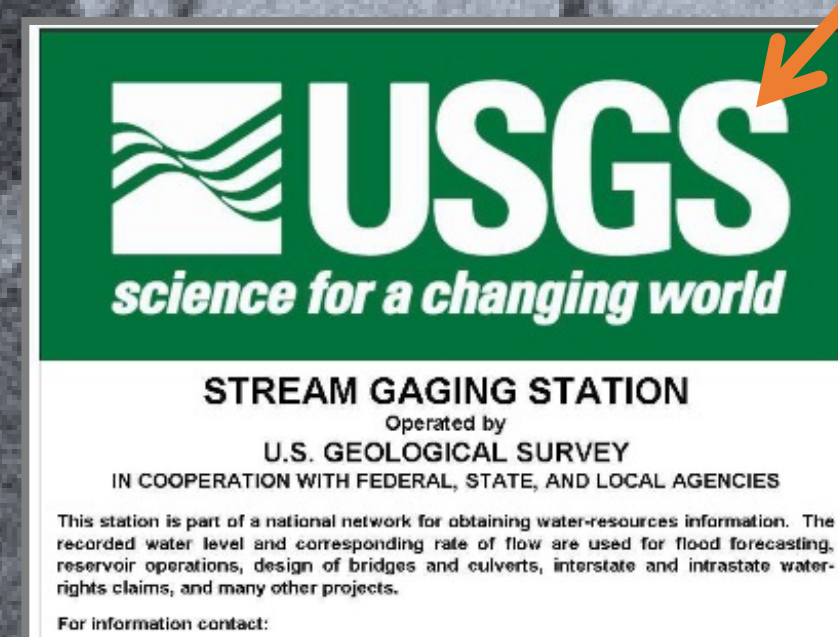
# Using survey-grade Global Navigation Satellite Systems (GNSS) for referencing recorded stage data to a consistent elevation datum across a fixed station monitoring network.

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## Abstract:

The USGS Estuarine Hydrodynamics Team is currently testing survey-grade Global Navigation Satellite Systems (GNSS) equipment for the purposes of referencing recorded stage data to a consistent elevation datum across a fixed station monitoring network. This equipment will allow us to relate water elevations measured at gaging stations to the North American Vertical Datum of 1988, the USGS-mandated reference datum. Providing all water-elevation data across the Delta (and throughout the larger national network) relative to a consistent vertical datum is a high priority for the USGS and our collaborators and cooperators. Moreover, the equipment will allow us to monitor any long-term elevation changes at our gages.

Over forty streamflow monitoring stations will be equipped with survey-grade GNSS receivers and antennae utilizing the Global Positioning System constellation and L1/L2 signals. Elevation data will be collected for twelve hours, once a week, every week. The data will be delivered wirelessly to an File Transfer Protocol server that will serve as a temporary repository before it is processed using the NGS (National Geodetic Survey) Online Position User Service for corrections (for example: ionospheric and tropospheric conditions, clock corrections, changes in satellite flight path, and datum application). The data will be returned from the NGS via email with a unique elevation (maximum uncertainty allowance of 0.16 foot) for each site that will be applied to the stage data.

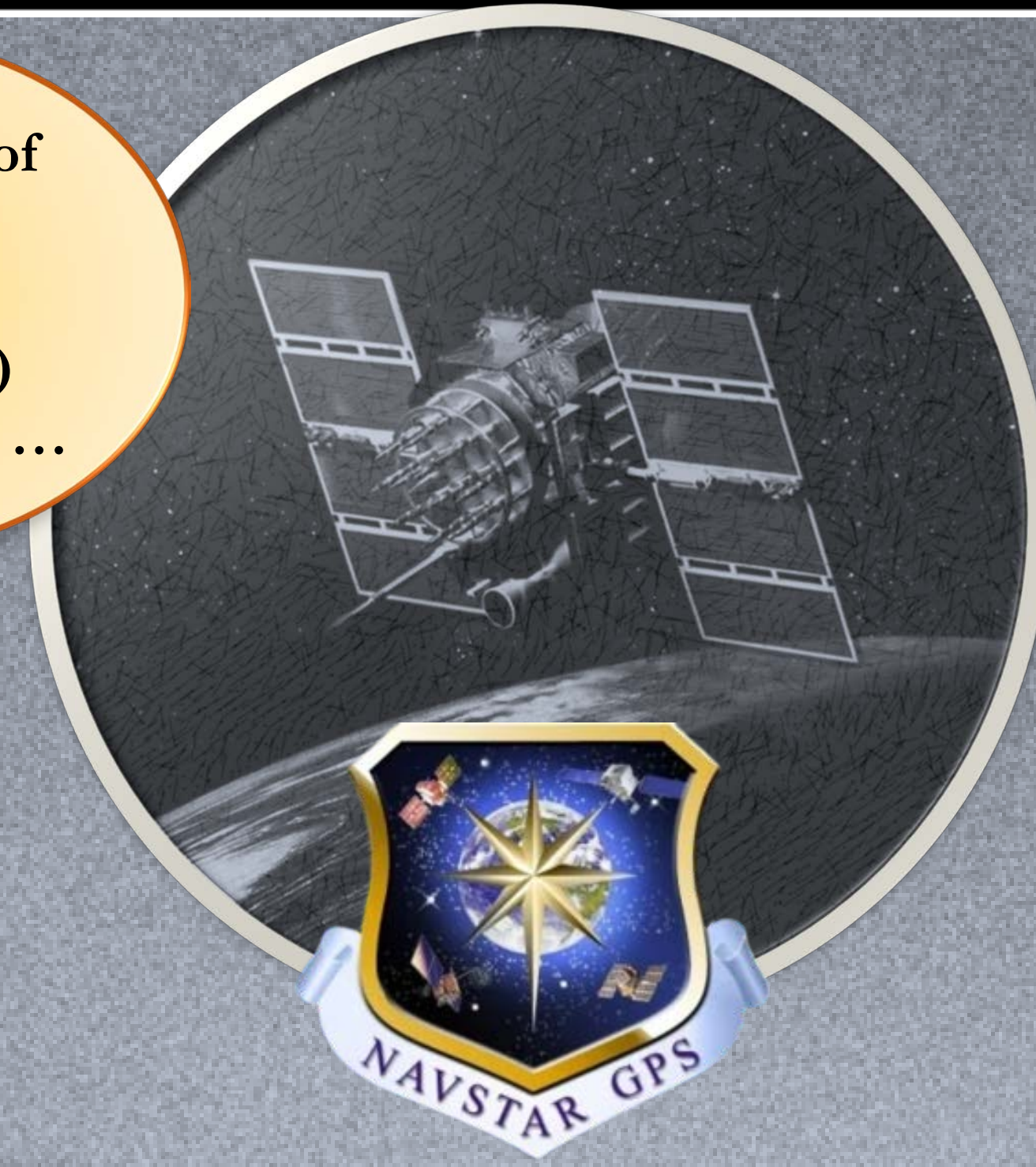


... and transported via its cellular data connection into a USGS FTP server folder ...

... are received at the GPS receiver (survey grade, capable of centimeter accuracy) mounted to USGS streamflow monitoring station.

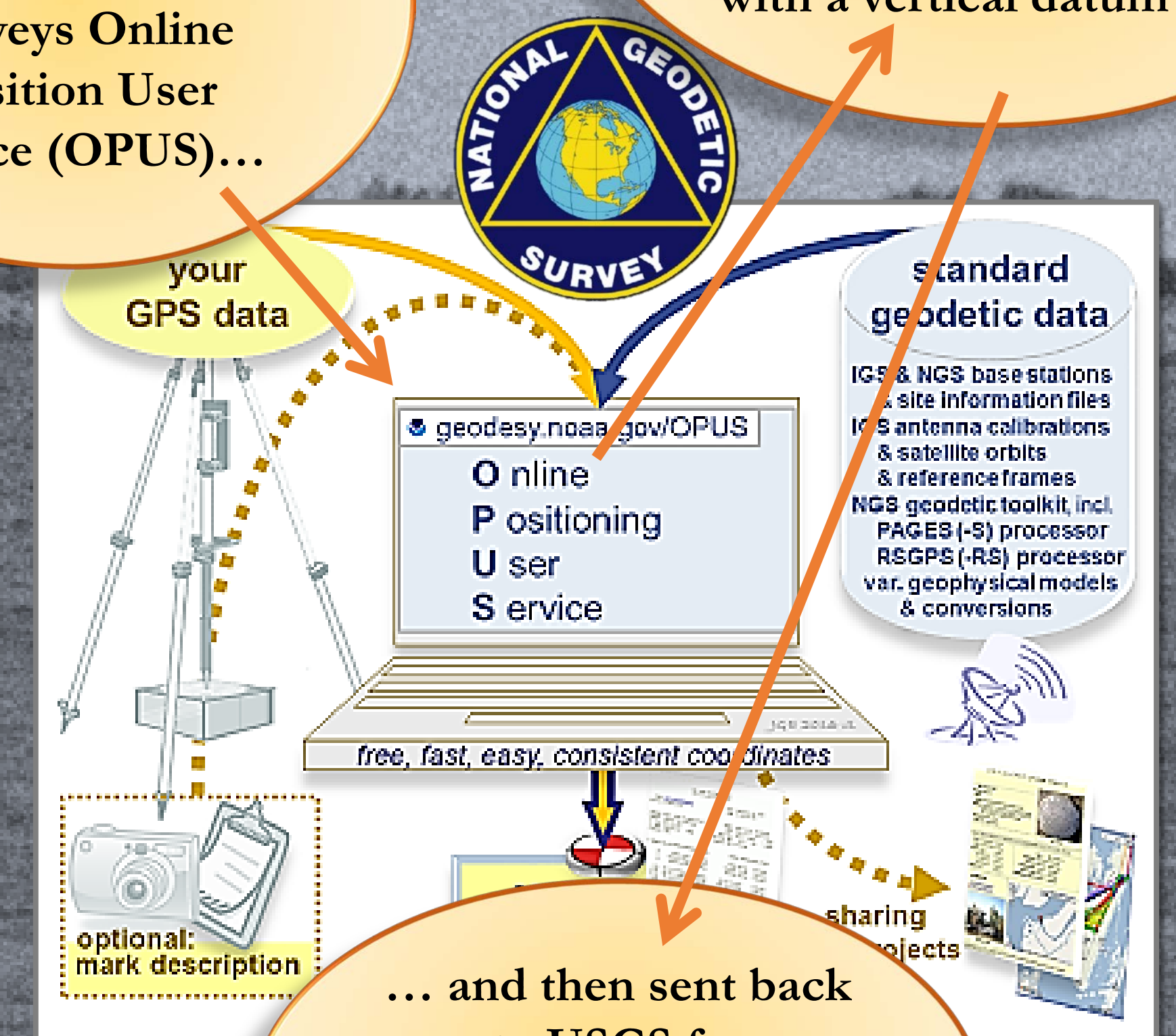
Approximately twelve hours of continuous position data is collected by the GPS receiver and combined into a single file which is pushed via WiFi to the monitoring stations cellular data connection...

Transmission of Global Positioning System (GPS) satellite signals ...



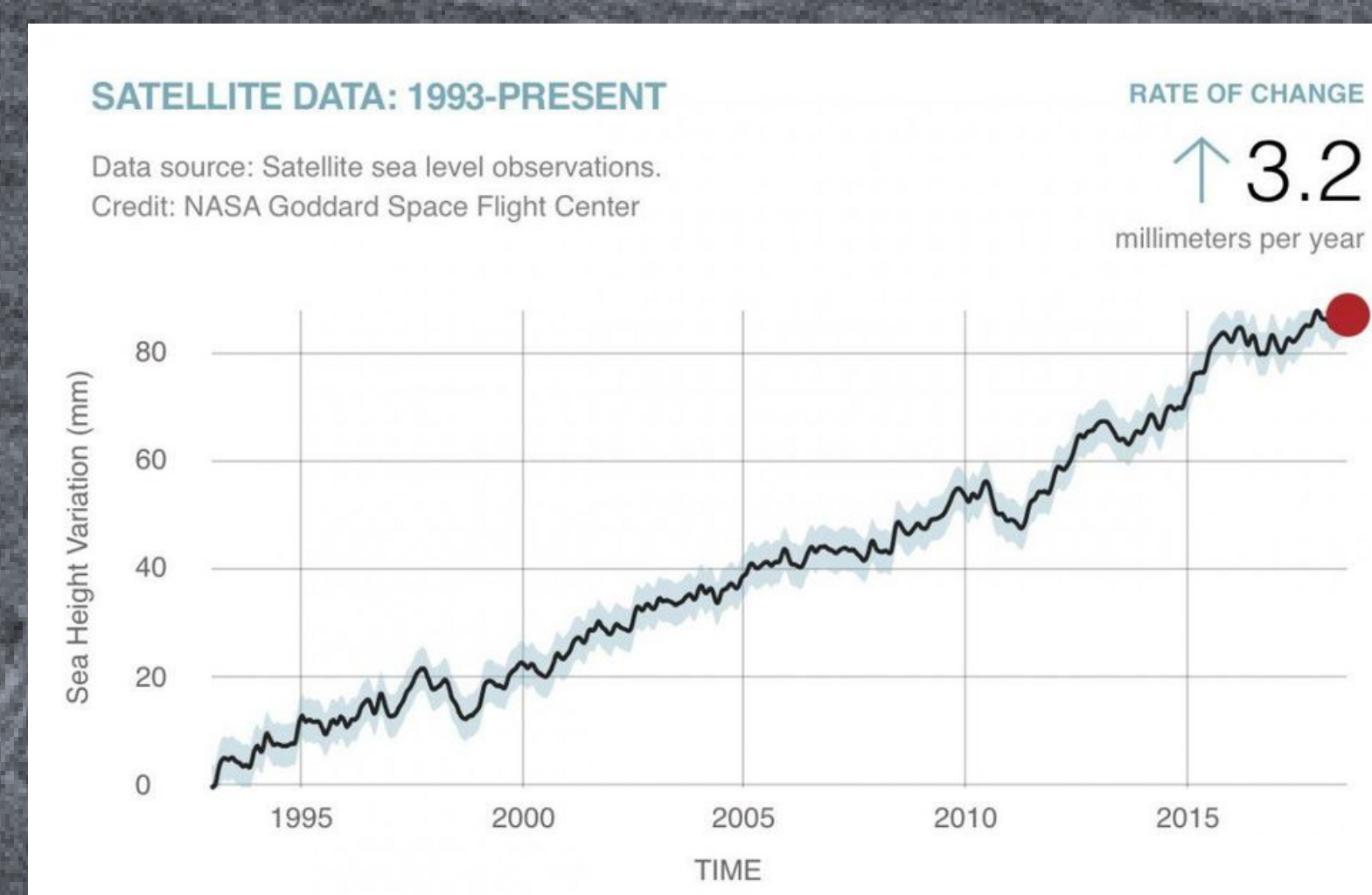
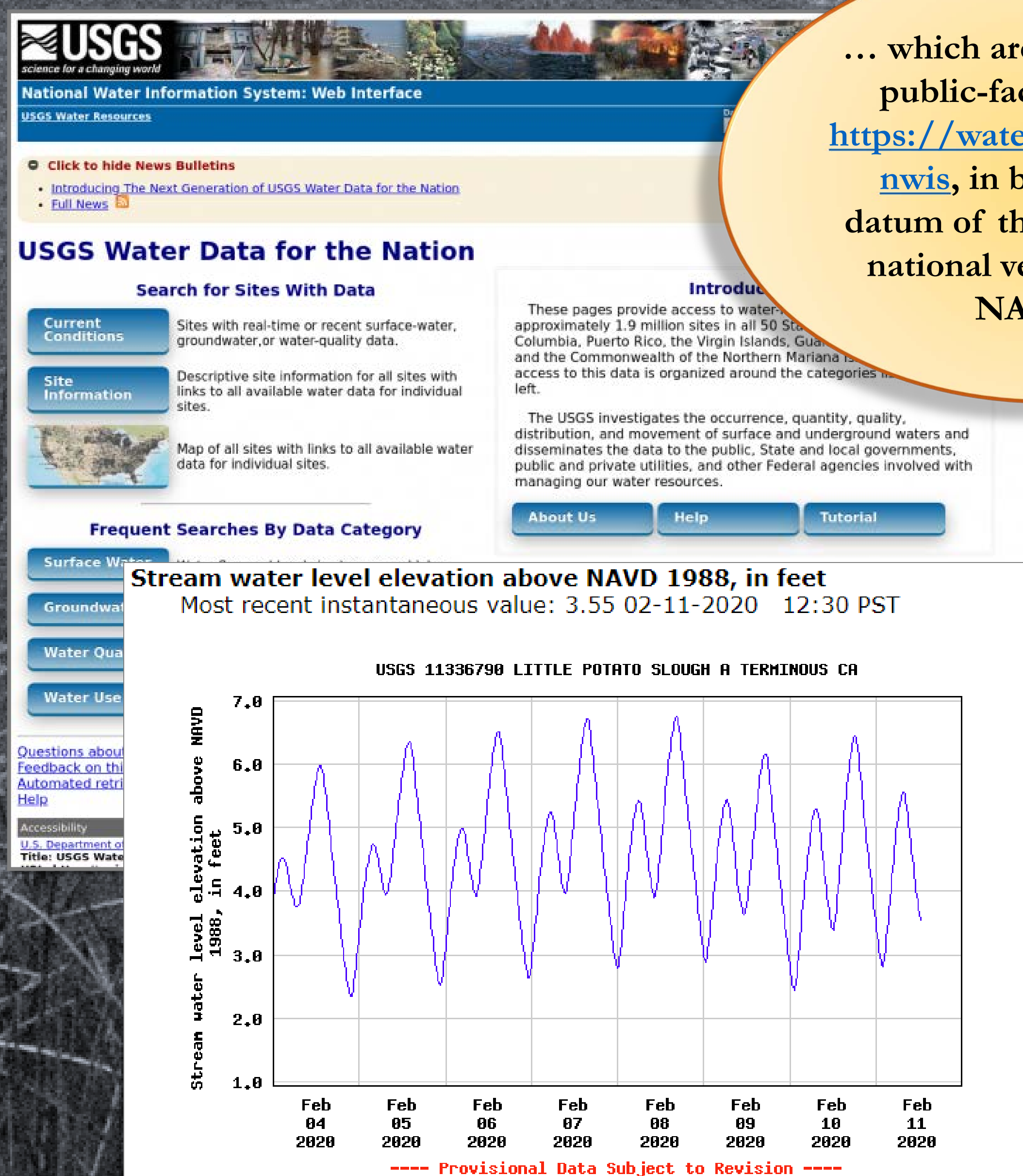
... which is then uploaded to the National Geodetic Surveys Online Position User Service (OPUS)...

... where the data is refined – NGS corrects satellite clock offsets, position, ionospheric and tropospheric conditions, and associates position with a vertical datum – ...



... and then sent back to USGS for incorporation into water elevation datasets ...

... which are pushed to the public-facing website, <https://waterdata.usgs.gov/nwis>, in both the local datum of the gage and the national vertical datum, NAVD88.



Sep 18, 2019  
1981-2010 Avg Min

As the natural world changes around us accounting for these changes quickly and accurately is important for managing water resources, responding to natural disasters, and shaping policy. Aligning our data to a nationally recognized datum checked in near real-time intervals, made widely available and simple to integrate, improves and enhances the ability to respond to our changing world.

