

Something is rotten in the state of geodesy

A play in four acts



Agency for Data Supply
and Infrastructure

Kristian Evers, NKG General Assembly 2022-09-06

The Problem

Plymouth

Geodesists are not software developers

- Yet we write a bunch of mission critical software ...
- ... often in isolation by ourselves or a in small teams ...
- ... without much concern for cyber security, ease of deployment and long-term maintainability
- ... or interoperability with other software package



In other words

Important geodetic software is often

- outdated or perhaps even abandoned by the original developer
- hard to use in a production setting due to insufficient security
- using old standards for data exchange or none at all



The Bad Examples

TEQC

- Great software but now discontinued
- Single developer who retired
- Closed source – no community development
- No proper replacement – many people still using RINEX2
- RINEX3 alternatives exists but are in no way equivalent

Software

• Help with Software

• Data Processing

• **TEQC**

- Overview
- Publications
- Current OS Support
- Executables
- FAQs
- Development & Release Log
- teqc Email Forum
- Documentation
- Tutorial [PDF]
- Original HTML Tutorial

Related Links

- [TEQC collaboration](#)

TEQC

Teqc software is end-of-life (EOL) following the 2019-02-25 final release. This final release will continue to be available from the UNAVCO website. For more information, see the white paper: [Geodetic Data Services Plan for GNSS Modernization: Data Formats and Preprocessing Tools](#).

UNAVCO will continue to host the teqc email forum, which will live on as a user to user forum. We will also work to ensure that the teqc mail list archives are searchable via the UNAVCO web site search/Google search. UNAVCO will also continue to host existing teqc documentation as well as the teqc “helpful tip of week” archives.

We would like to thank Dr. Lou Estey, the creator of teqc, for developing and supporting this software tool and its user community for the past 22 years and we wish him the best in his retirement.

Overview

Teqc (pronounced "tek") is a simple yet powerful and unified approach to solving many pre-processing problems with [GPS](#), [GLONASS](#), [Galileo](#), [SBAS](#), [Beidou](#), [QZSS](#), and [IRNSS](#) data, especially in [RINEX](#) or [BINEX](#) format:

- *translation*: binary data reading/translation of native binary formats (optional **RINEX** file creation for OBS, NAV, and/or MET files or optional creation of **BINEX**)
- *editing*: including time windowing; file splicing; SV or other filtering; metadata extraction, editing, and/or correction of **RINEX** header metadata or **BINEX** metadata records
- *quality check*: quality checking of GPS and/or GLONASS data (native binary, **BINEX**, or **RINEX** observation files; with or without ⁶ ephemerides)

Real-time GNSS streaming

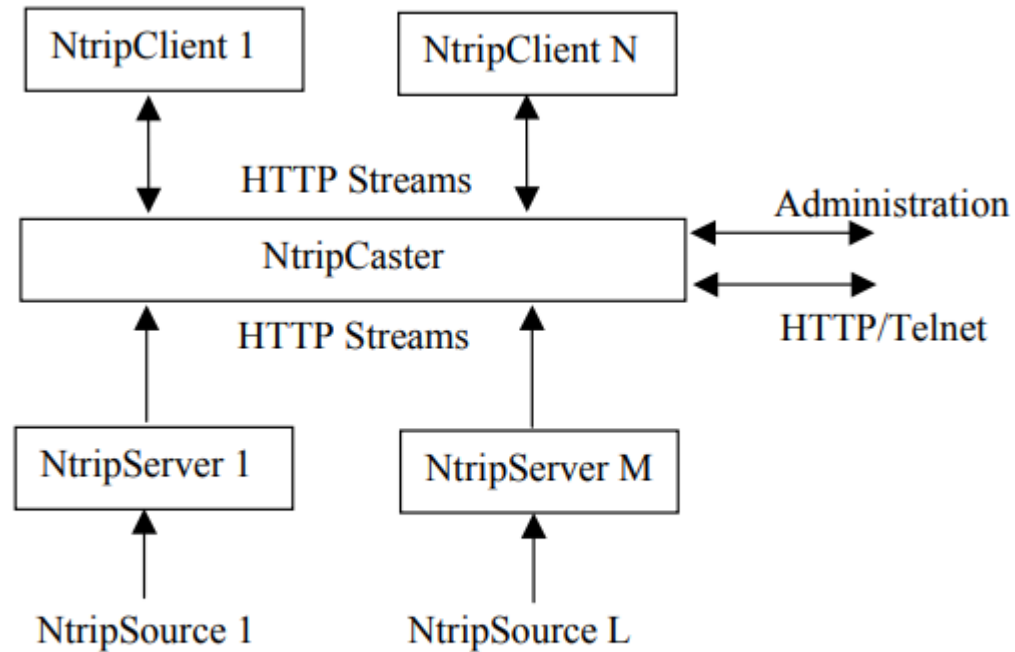


Figure 1. Ntrip Streaming System

- Version 1 of Ntrip protocol prevalent even though version 2 was released in 2011
- The root cause is seemingly that RTKLIB can't consume Ntrip2 streams ...
- ... which make software depending on RTKLIB Ntrip1 only
- RTKLIB is an abandoned one-man project



The Good Examples

Astronomers figured it out

- In 2011 the astronomy community decided to join forces and collaborate
- Eleven years later, Astropy is a big organization funded by the NumFocus initiative
- Has about 30 core packages and 50 affiliated packages that all mesh together
- ... and hundreds of contributors



As a community, ... we are clearly doing something wrong if people repeatedly implement the same basic functions rather than building on what's already there.

*What do we need to do differently?
How can we make it easier to use a shared repository and shared namespace for all this?*

P R Ø J



PROJ

- Probably the most complete software for geodetic transformations
- Contributors from many geodetic agencies ...
- ... including several NKG member states

- Organized in OSGeo ...
- ... securing a good integration in many commonly used GIS tools ...
- ... as well as the infrastructure required when maintaining a popular software package

The Fix



Community development

- As a community we can learn a lot from the likes of Astropy and OSGeo
- The key is collaboration – not isolated development
- Open source software is the first step
...
- ... the next step is organization





A Geodetic Software Consortium

- A supporting organization that brings geodetic developers and software packages together
- Software like
 - Bernese
 - RTKLIB
 - BKG NtripCaster
 - Gipsy
 - Gravsoft
 - Where
 - ...
- Perhaps based at the UN-GGRF Center of Excellence?

NKG Collaboration

- It works on a smaller scale too
- Plenty opportunities for collaboration within the NKG:
 - NKG Transformations
 - GNSS Analysis center
 - InSAR
 - Land uplift modelling
 - VLBI processing
 - ...



Thanks for listening