Geodetic geekitude

About geodesy, software, geekitude, and Asperger

Martin Vermeer

February 18, 2021

What this story is about

- How it started. . . the flood of 1953
- Born Hardinxveld 1953. Primary school 1959-1965
- Looking up
- Gorinchem 1965-1970, high school
- Utrecht 1970-. . . , physics
- Intermezzo
- Delft 1975-1981, geodesy
- Helsinki 1979, traineeship FGI
- Helsinki 1981-2000, FGI. Ph. D 1985, Prof. 1992.
- Copenhagen 1988-1992, Nat. Survey & Cadastre
- Otaniemi 2000-, TKK/Aalto
- More software adventures

It is going to get personal.

How it started... the flood of 1953

I was born a few days earlier in *Hardinxveld* close to the right edge of the map, on the edge of the inundated area.

Hardinxveld 1953

People in Hardinxveld getting wet feet.
Hardinxveld, a small village in the Calvinist heartland, 10 000 inhabitants.
Primary school “Openbare lagere school IV” 1959-1965.

Gorinchem 1965-1970 (1)

Locations of Hardinxveld (red dot), Gorinchem, Utrecht and Delft (underlined).

Gorinchem 1965-1970 (2)

Gorinchem is an old fortress city, some 40 000 inhabitants. High school "Rijks HBS" 1965-1970. Good times. Colloquial Finnish: "Horkkis"

Astronomy and Space (1)

My father's book (today online in Project Gutenberg):

DE WONDERBOUW DER WERELD

DE GRONDSLAGEN VAN ONS STERREKUNDIG WERELDBEELD POPULAIR UITEENGEZET

DOOR

Dr A. PANNEKOEK

TWEEDE DRUK

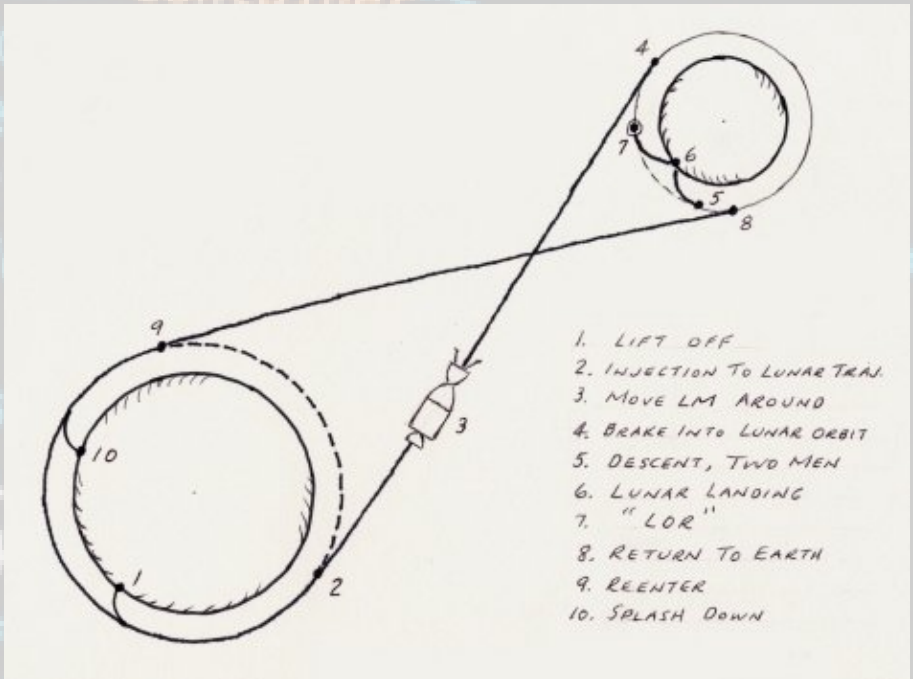
MET 5 PORTRETTEN, 138 FIGUREN EN STERREKAARTEN IN DEN TEKST, EN 2 UITSLAANDE KAARTEN VAN DEN DIERENRIEM.

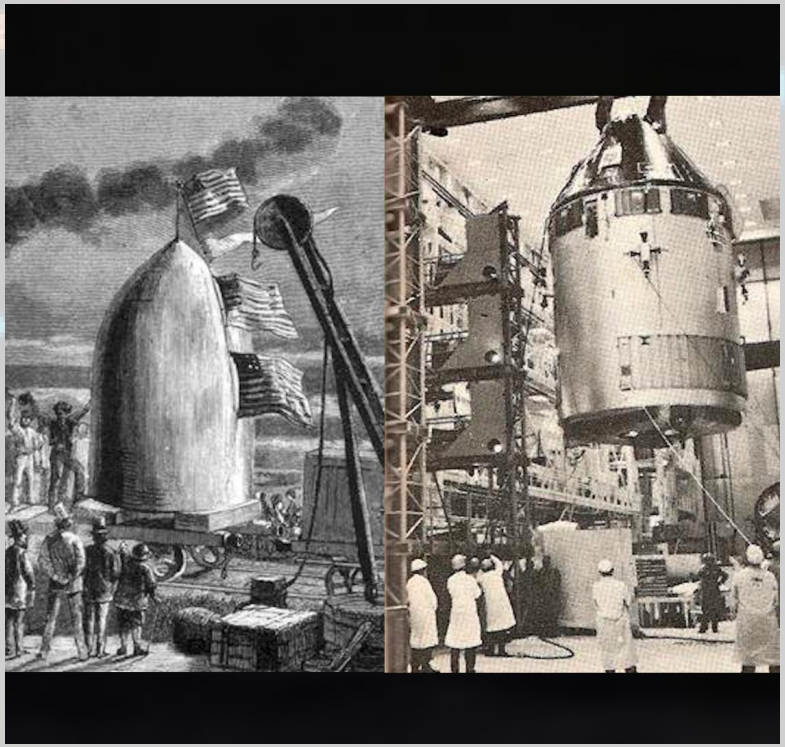
AMSTERDAM — S. L. VAN LOOY — 1920

Pannekoek was an internationally recognised astrophysicist as well as a dedicated Marxist. And a gifted science communicator!

Astronomy and Space (2)

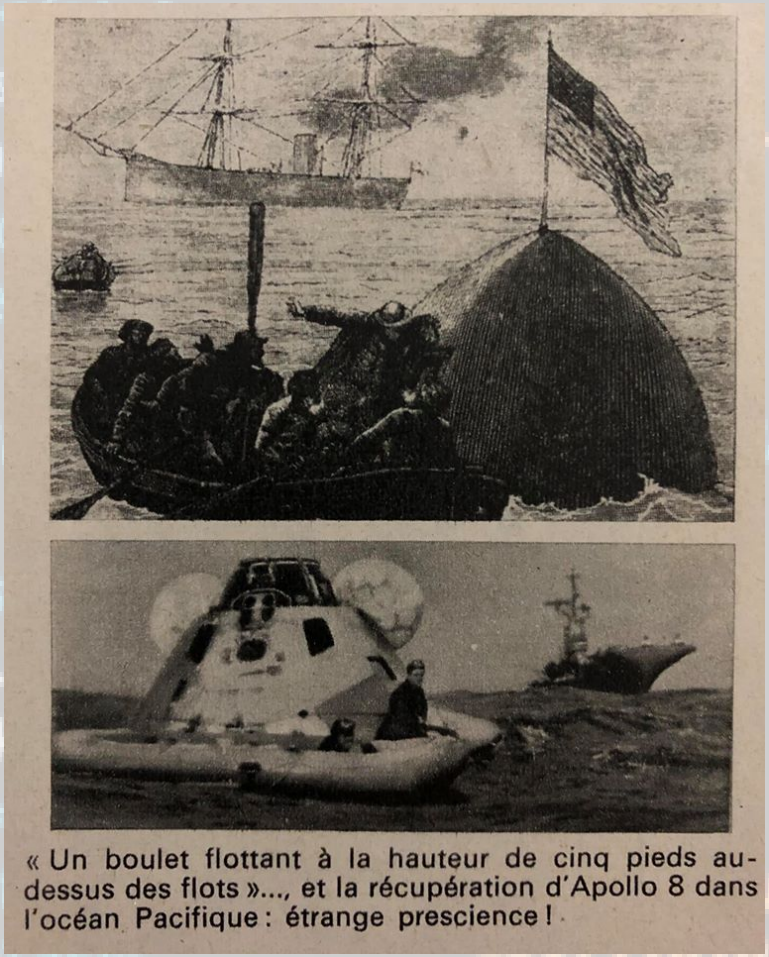
And Kennedy's plans, clearly based on Jules Verne – also on my father's bookshelf. I was well prepared!





Astronomy and Space (3)

. . . and how it ended.



« Un boulet flottant à la hauteur de cinq pieds au-dessus des flots »..., et la récupération d'Apollo 8 dans l'océan Pacifique : étrange prescience !

Utrecht 1970-

Studying physics in Utrecht, a large city of Roman origin with 250 000 inhabitants.

And then...

Things didn't work out so well.

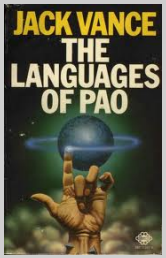
Dropped out. Only much later understood why.

But trying again...

Delft 1975-1981

Studying geodesy in Delft, a fortress city with 80 000 inhabitants. A smaller, closer knit community.

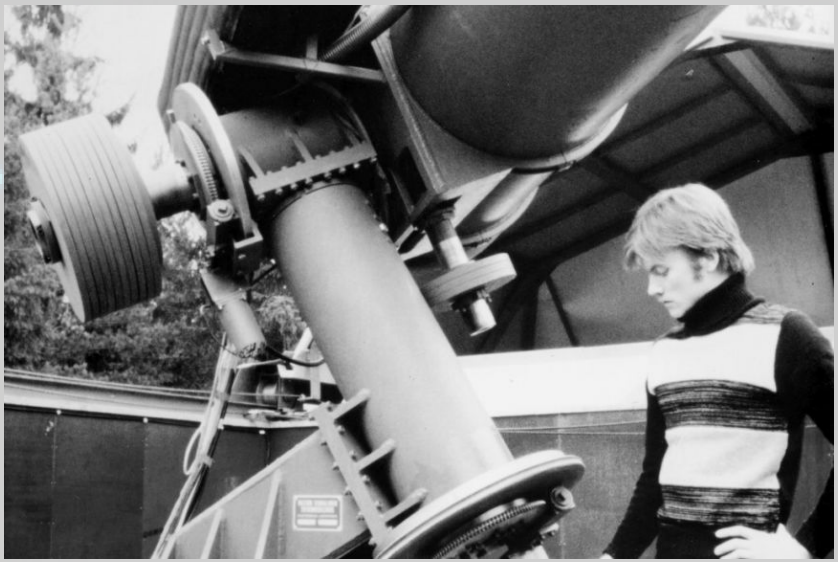
Helsinki 1979-1980



IEASTE exchange programme. Proposed by my Space Geodesy professor Aardoom. Planned for three months, extended to six.

Planet Suomi!

- Triangulation field work (Parm) in Kemijärvi-Salla-Sodankylä area
- Metsähovi laser software development on a PDP-11
- Article in a NL popular science magazine on Finnish geodesy
- Published: *QIKAIM, a fast semi-numerical algorithm for the generation of minute-of-arc accuracy satellite predictions.* Report 81:1, Finnish Geodetic Institute.



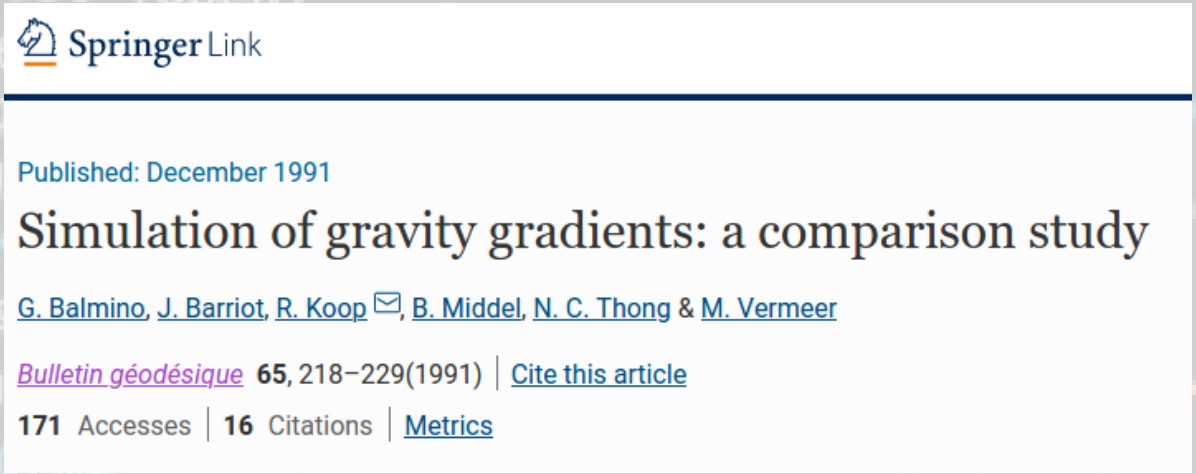
Helsinki 1981-2000

- Ph. D study on mass-point modelling of the geoid, 1985
- Building on work by Markku Heikkinen
- Done on PDP-11 in Fortran IV and assembly language
- Involved building scaled-integer multiply-add routines for lack of a floating-point coprocessor.

PDP-11 computer

- Digital Equipment Corp minicomputer, 64 kB of magnetic-core memory
- IBM punched-cards input, line printer output
- RT11 operating system, no multitasking
- Later upgraded to multi-user environment with user changeable discs

Other software studies



Springer Link

Published: December 1991

Simulation of gravity gradients: a comparison study

G. Balmino, J. Barriot, R. Koop, B. Middel, N. C. Thong & M. Vermeer

Bulletin géodésique **65**, 218–229(1991) | Cite this article

171 Accesses | **16** Citations | Metrics

A generalized Strang van Hees approach to fast geopotential inversion.

Show affiliations

Vermeer, M.; Forsberg, R.

In a paper published in manuscripta geodaetica in 1990, G. Strang van Hees described how the Stokes integral may be evaluated using FFT techniques on a φ, λ grid instead of the customary x, y grid. He showed that errors made using this approximation can be kept small provided a global reference model (spherical harmonic expansion) is removed/restored. The authors extend this by showing how Stokes and similar integrals may be Taylor expanded in latitude, yielding a series of convolution integrals in φ, λ suitable for FFT evaluation.

Publication: Manuscr. Geod., Vol. 17, No. 5, p. 302 - 314

Pub Date: 1992

Bibcode: 1992MGeo...17..302V

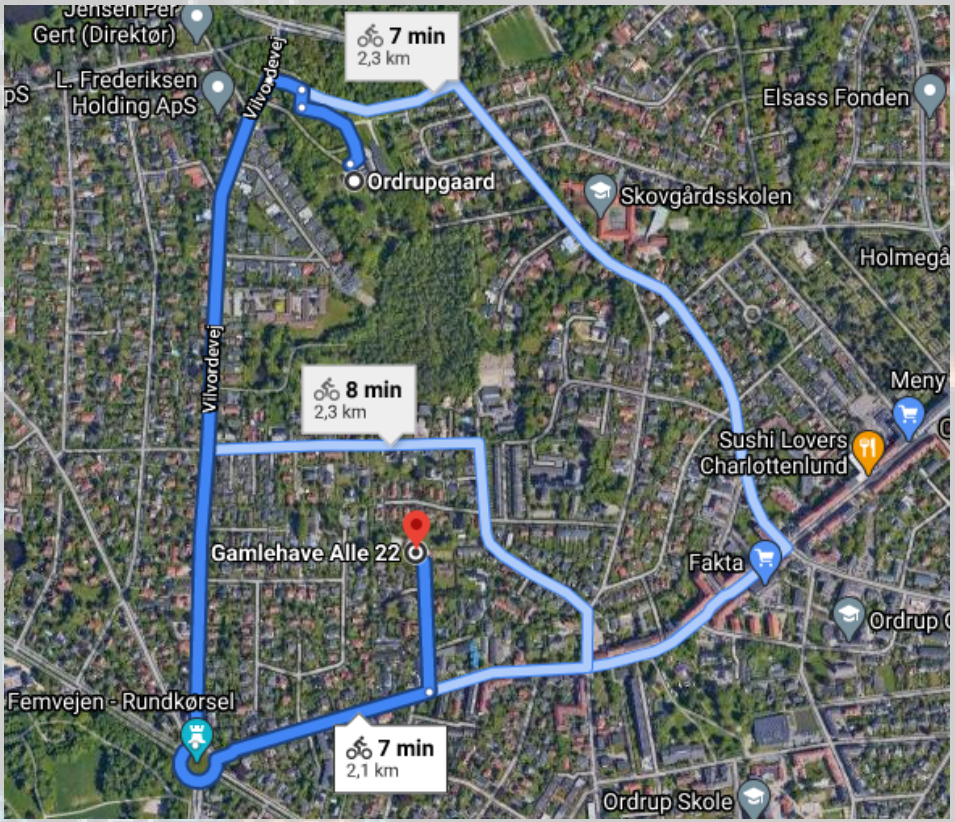
Dragon home micro

- First personally owned computer (PDP-11 was often personally run by me after office hours)
- Cassette tape mass storage, 32 kB memory, later 64 kB
- Microsoft Extended Color Basic, Motorola 6809 assembly
- Wrote word-processor software, terminal emulator; club activity
- Added disc drive and Microware OS-9 software (UNIX like).

Copenhagen 1988-1992

The old Geodetic Institute building, with the Regnecentralen BOSS computer

Copenhagen 1988-1992 (2)



Ordrupgaard, probably the best impressionist collection in Northern Europe. . .

- And Kystvejen, with Rungstedlund (Karen Blixen's home), the Louisiana Museum of Modern Art, and Elsinore, Hamlet's castle
- . . . and Hven, Tycho Brahe's observatory island in the Sound
- . . . and five royal palaces on Sjælland alone. . .

Otaniemi 2000-

Aalto-yliopisto

Teknillinen korkeakoulu

And then. . .

STEVE SILBERMAN SCIENCE 12.01.2001 12:00 PM

The Geek Syndrome

Autism—and its milder cousin Asperger's syndrome—is surging among the children of Silicon Valley. Are math-and-tech genes to blame?

Though no one has tried to convince the Valley's best and brightest to sign up for batteries of tests, the culture of the area has subtly evolved to meet the social needs of adults in high-functioning regions of the spectrum. In the geek warrens of engineering and R&D, social graces are beside the point. You can be as off-the-wall as you want to be, but if your code is bulletproof, no one's going to point out that you've been wearing the same shirt for two weeks. Autistic people have a hard time multitasking—particularly when one of the channels is face-to-face communication. Replacing the hubbub of the traditional office with a screen and an email address inserts a controllable interface between a programmer and the chaos of everyday life. Flattened workplace hierarchies are more comfortable for those who find it hard to read social cues. A WYSIWYG world, where respect and rewards are based strictly on merit, is an Asperger's dream.

Obviously, this kind of accommodation is not unique to the Valley. The halls of academe have long been a forgiving environment for absentminded professors. Temple Grandin—the inspiring and accomplished autistic woman profiled in Oliver Sacks' *An Anthropologist on Mars*—calls NASA the largest sheltered workshop in the world.

geek out

— ***phrasal verb*** with geek ***verb***

UK /gi:k/ US /gi:k/

mainly US informal

to behave in a very enthusiastic way about something that you are interested in and know a lot about but that other people might find boring:

- *Dougie and I were geeking out over recording software.*

So many things snapping into place. . .

(Aus der Wiener Universitäts-Kinderklinik [Vorstand: Prof. Franz Hamburger].)

Die „Autistischen Psychopathen“ im Kindesalter*

Von

Doz. Dr. Hans Asperger,

Leiter der Heilpädagogischen Abteilung der Klinik.

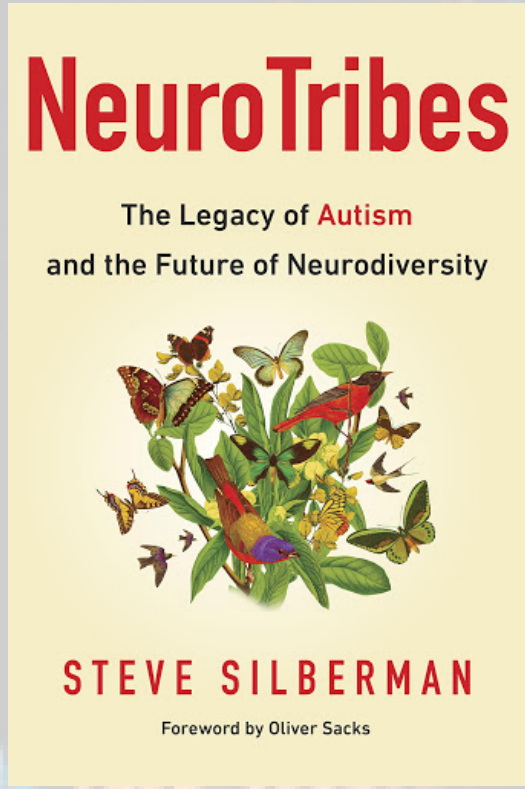
(Eingegangen am 8. Oktober 1943.)

Heb ik autisme, asperger of PDD-

Een heleboel kenmerken en symptomen kunnen wijzen op een autisme spectrum stoornis. De verschillende vormen van autisme variëren ook qua kenmerken. Grofweg zijn er drie clusters van symptomen die bij iedere vorm van autisme een rol spelen en in verschillende mate voorkomen. Daardoor zie je bij mensen met autisme verschillend gedrag. Kenmerken van autisme zijn:

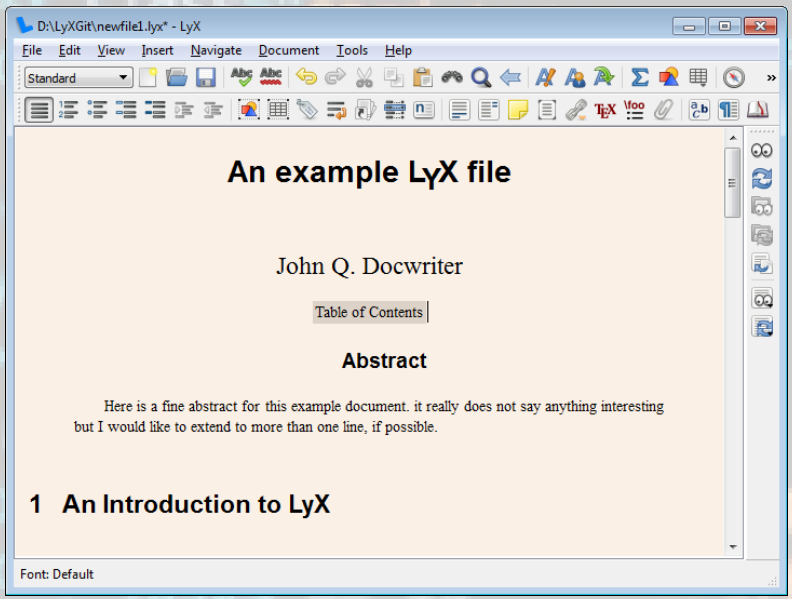
1. Problemen bij de sociale interactie (contactstoornis)

- Je hebt moeite met persoonlijk of sociaal contact zoals vriendschappen sluiten en onderhouden. Je maakt op een opvallend andere manier contact dan mensen zonder autisme dat doen.
- moeite om te begrijpen wat een ander van u verwacht
- het niet goed kunnen aanvoelen van andere mensen



LyX meeting, Bromarv 2007

- LyX is a word processor like GUI for LaTeX.
- At the meeting, we worked mainly on flex insets.



10 Bromarv, Suomi, 2007

In Bromarv, Finland. See LyX meeting 2007.

Deltagere/Osallistujat:

- Martin Vermeer
- Liisa Vermeer
- Christian Ridderström
- Lars Gullik Bjønnes
- José Abílio Oliveira Matos
- Jean-Marc Lasgouttes
- André Pönitz
- Susana "with the short name" Barbosa

Roligd/Pitaä Hauskaa:

- Take a swim in the Baltic sea

Arbete/Työ:

- Nothing yet
- More stuff

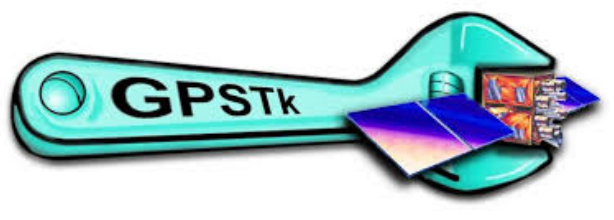
News report from the middle of the meeting: LyXDevelThread:91652.

LyX

Own contributions:

- LyX branches: e.g., multiple alternative languages within the same source document
- Part of flex insets, i.e., highly configurable insets
- Part of change tracking (there was incomplete change tracking already)
- Several document layouts for journals.

VecSol



- VecSol is part of the GPStk package, an open source package for GNSS processing.
- I wrote it in order to become familiar with the technicalities of GNSS processing.
- Loaded it into the Nokia N800 Linux tablet.
- Presented at an ION meeting in Ft Worth TX.
- Some people found it useful...

Scientific Research Publishing

Open Journal of Earthquake Research, 2017, 6, 1-34
http://www.scirp.org/journal/ojer
ISSN Online: 2169-9631
ISSN Print: 2169-9623

Late Stage Interseismic Strain Interval, Cascadia Subduction Zone Margin, USA and Canada

Kenneth M. Cruikshank, Curt D. Peterson

Department of Geology, Portland State University, Portland, OR, USA
Email: CruikshankK@pdx.edu, PetersonC@pdx.edu

The data used in this article were collected from several sources: Daily RINEX files were obtained from the Pacific Northwest Geodetic Array [3], NOAA Continually Operating Reference stations [30] and the Plate Boundary Observation Stations [4], along with the precise ephemeris files from the International GPS Service (IGS) [31]. These data are processed using *vecsol*, [32], which is part of the GPSTK toolkit [33]. *Vecsol* solves for the baseline vector between two stations. During processing, one station is designated as the start of the vector, and the other at the end. The baselines are processed twice, using each end as the starting point of the vector and the other station is at the end-point, and the two baselines are compared for consistency. Typically, solutions are calculated for several years to look for the long-term trends in changes in the baseline. At least two years of data are needed to ensure the trend is not influenced by annual variations in baseline lengths [28]. The baseline vectors are stored in a database and analyzed using R [34].

[32] Vermeer, M. and Väisänen, M. (2006) Geodetic Baseline GPS Processing by a Simple Sequential Technique. *ION GNSS* 19th *International Technical Meeting of the Satellite Division*. Fort Worth, 2977-2882.
http://www.gpstk.org/pub/Documentation/GPSTkPublications/vermeer-baseline-processing-ion-gnss-2006.pdf

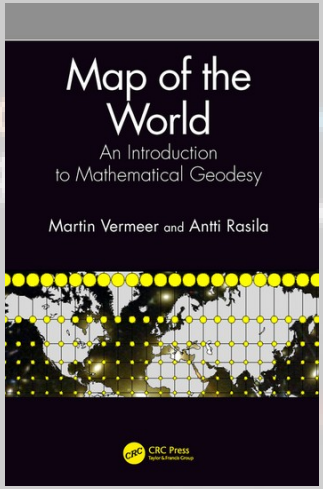
e-foto

- Made (mostly) in Brazil.
- Can do interior and exterior orientation, aerotriangulation, DTM construction and orthorectification.
- Accepts aircraft location, attitude measurements by GNSS + IMU.
- Runs on Windows and Linux machines.
- Used in a digital photogrammetry course in Bahir Dar and Addis Ababa, Ethiopia, using inexpensive anaglyph glasses.
- Lecture notes written by me for the Ethiopian course are also used for teaching at the U. of Pretoria, South Africa.
- My own software contribution to e-foto is automatic flight azimuth determination.

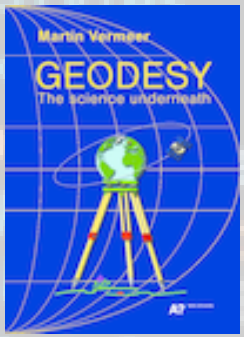
Finally: Aalto LaTeX guru

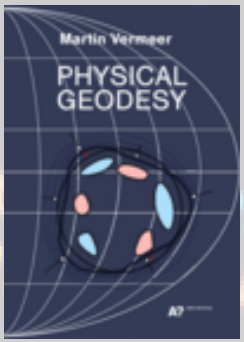
- LyX helps to understand and get used to LaTeX.
- Developed the aaltotextbook class file for my own use.
- Noticed that I had answers to all questions posted to Aalto LaTeX wiki, usually by doctoral candidates wanting their dissertation to look good.
  - Decided to make it official.
- Published three bilingual e-books on the aaltodoc platform:
  - Geodesy / Geodesia
  - Physical geodesy / Fysikaalinen geodesia
  - Methods of navigation / Navigoinnin menetelmät.

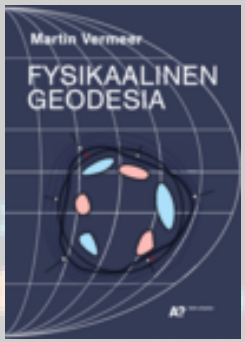
Books!

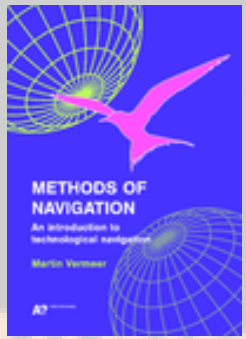


- Published three bilingual e-books on the aaltodoc platform under a Creative Commons license:
  - Geodesy / Geodesia
  - Physical geodesy / Fysikaalinen geodesia
  - Methods of navigation / Navigoinnin menetelmät.









Thank you!

Thank you for listening!