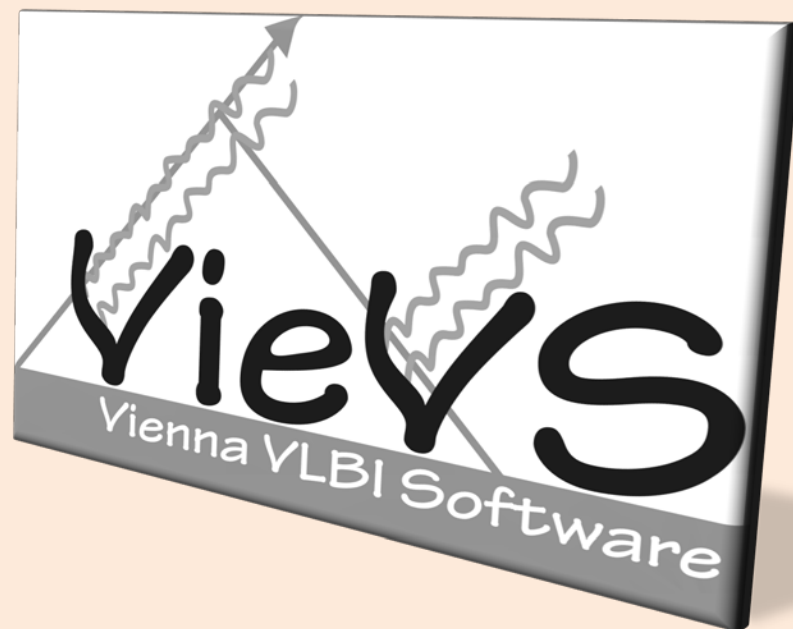


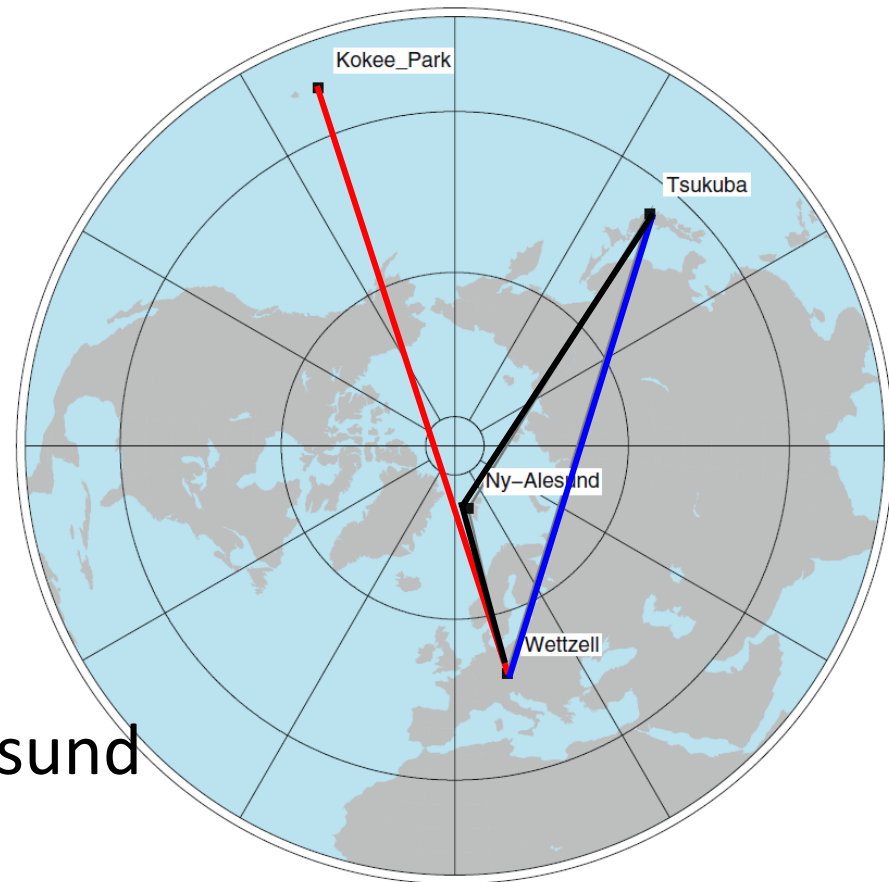
Processing Intensive Sessions with VieVS

Armin Hofmeister, Johannes Böhm

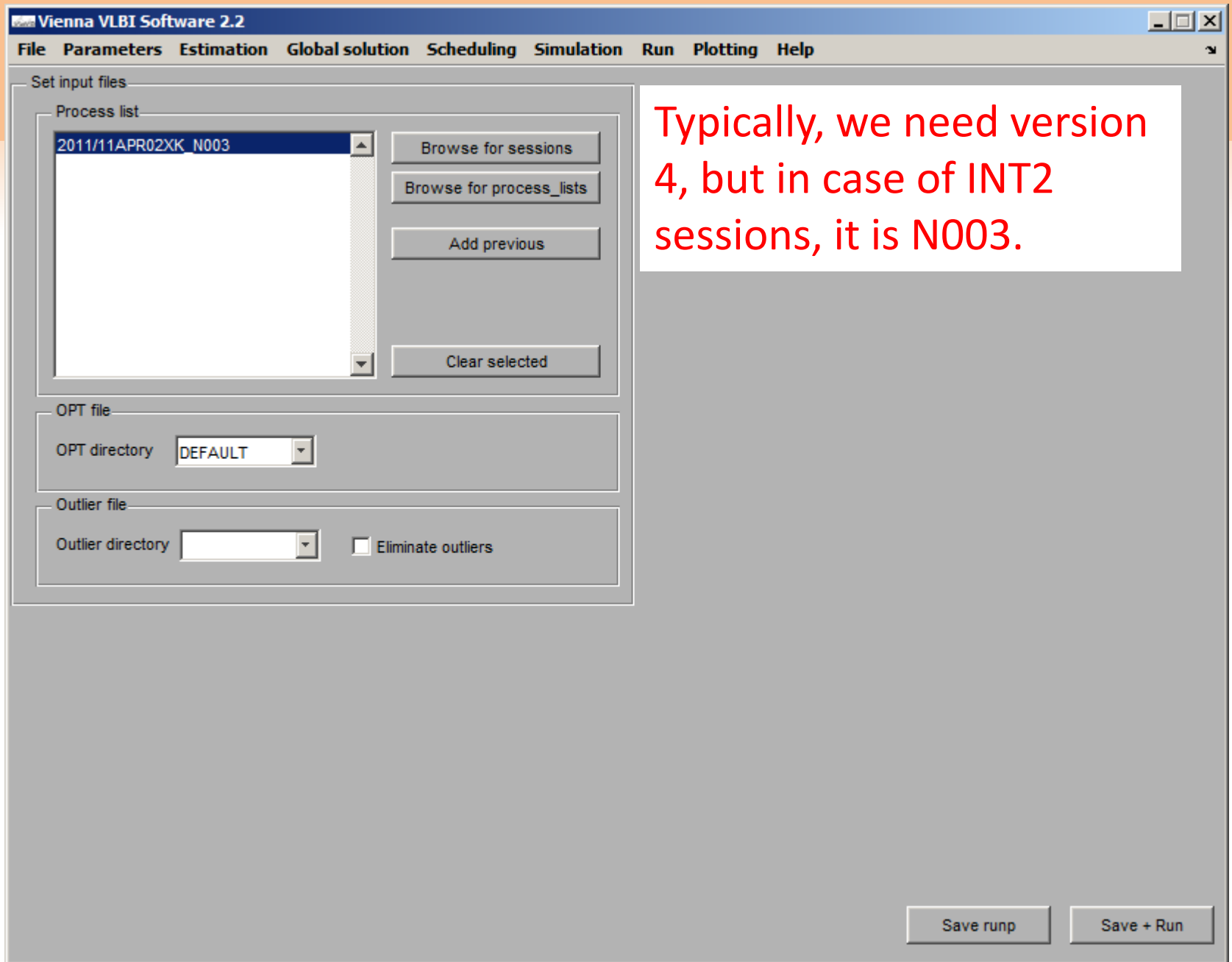


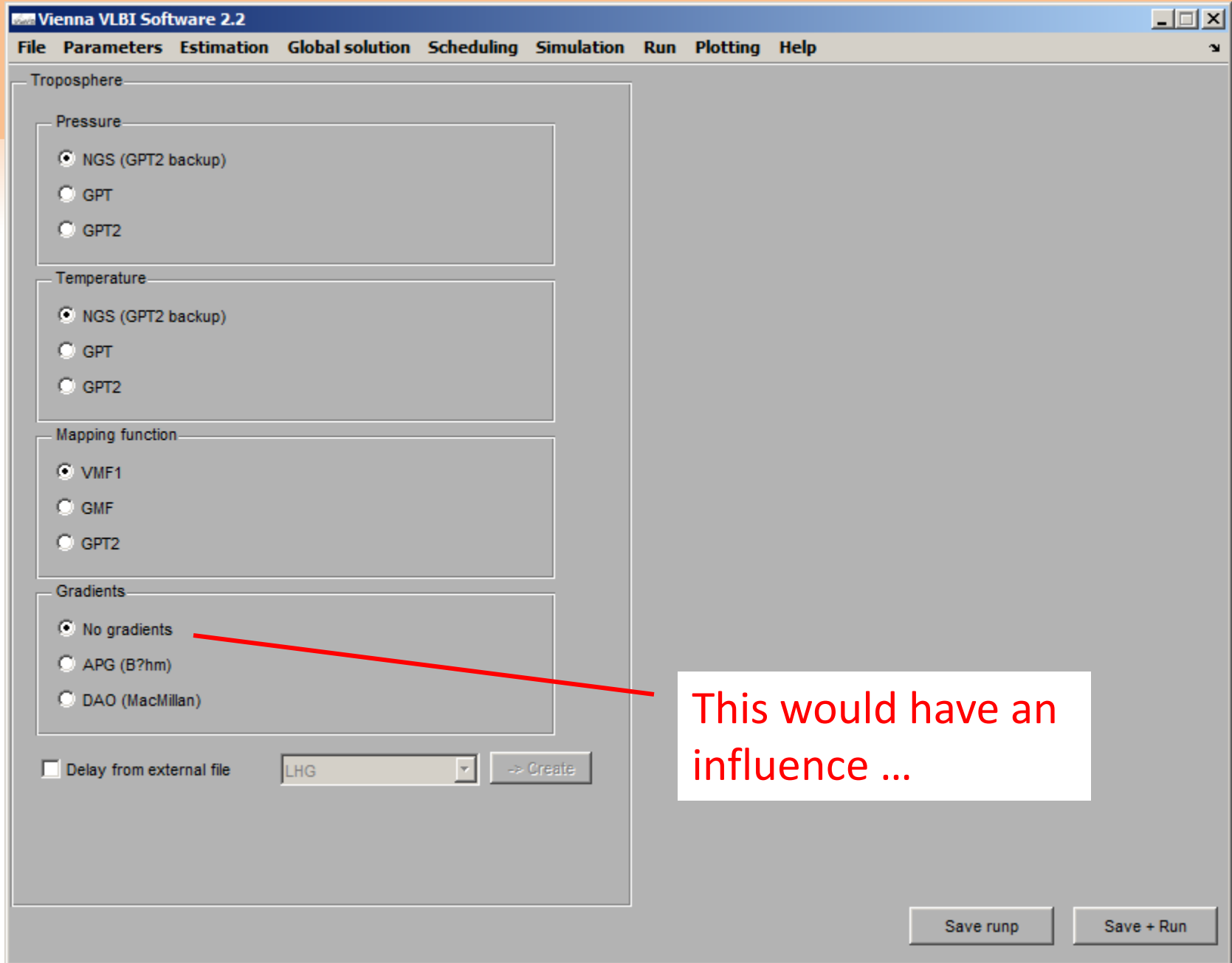
Introduction

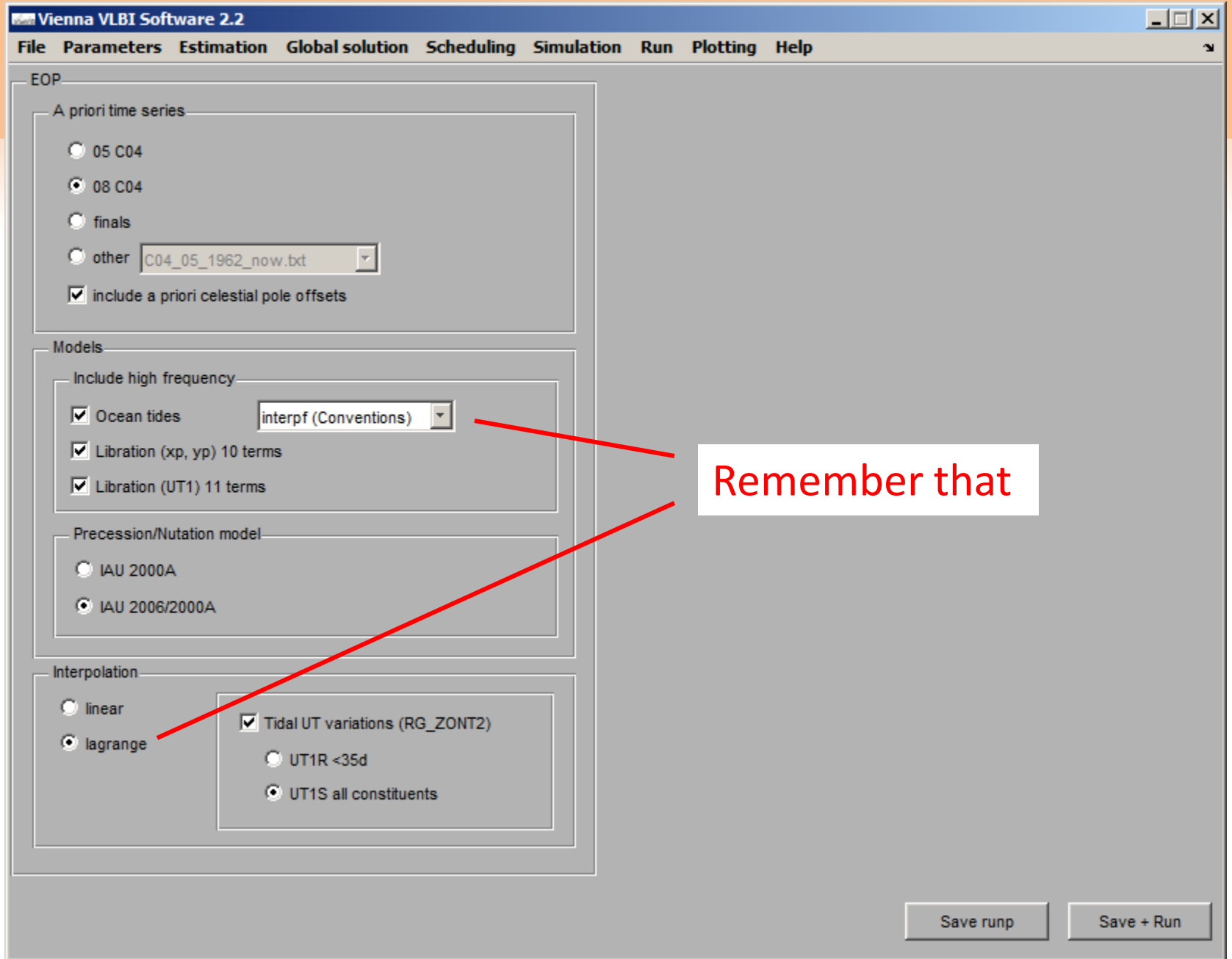
- **INT1** (2-3 days latency)
 - Kokee-Wetzzell
 - Mo-Fr 18:30
- **INT2** (e-transfer)
 - Tsukuba-Wetzzell
 - Sa-So 7:30
- **INT3** (e-transfer)
 - Tsukuba-Wetzzell-NyAlesund
 - Mo 7:00

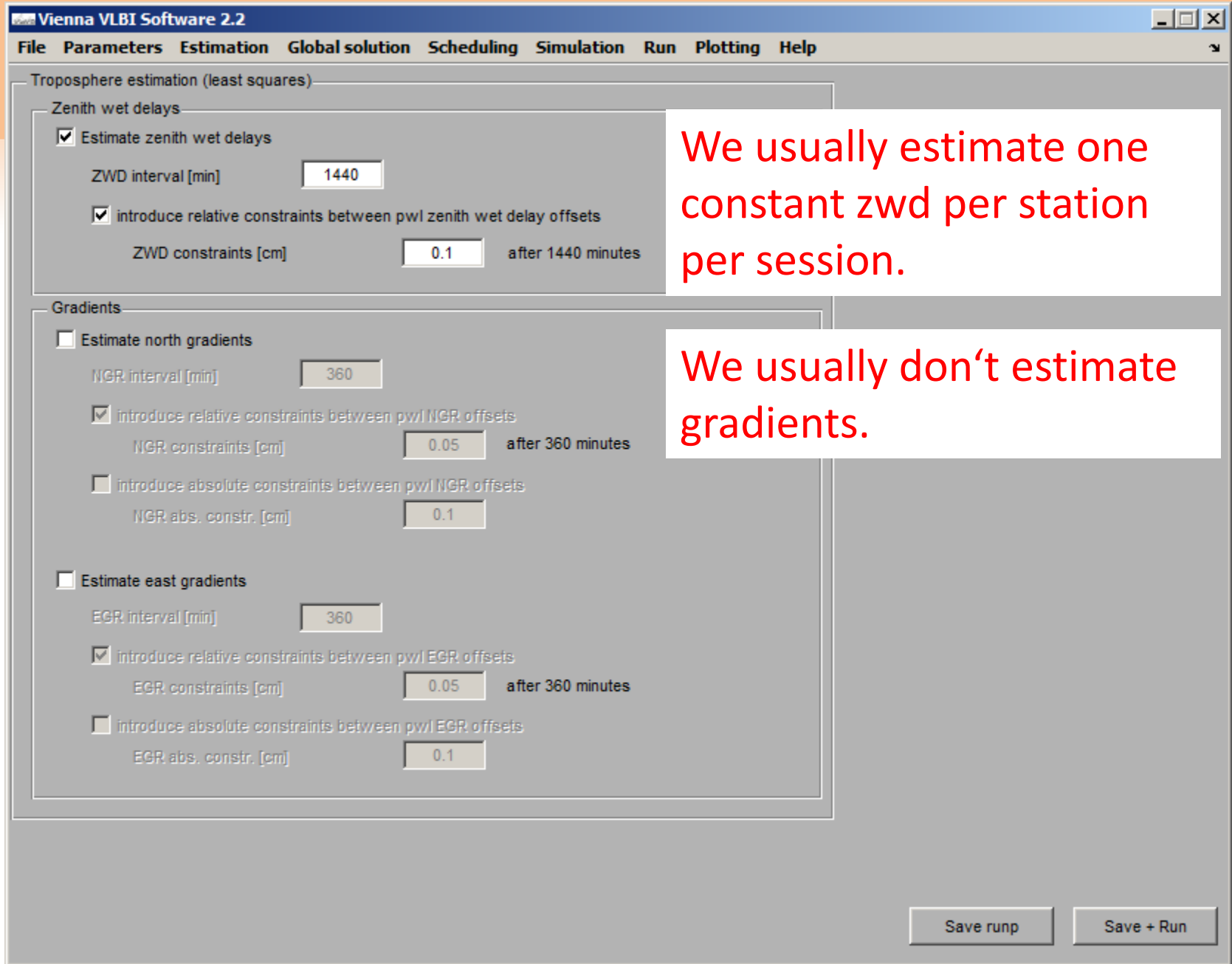


Luzum and Nothnagel (2010)



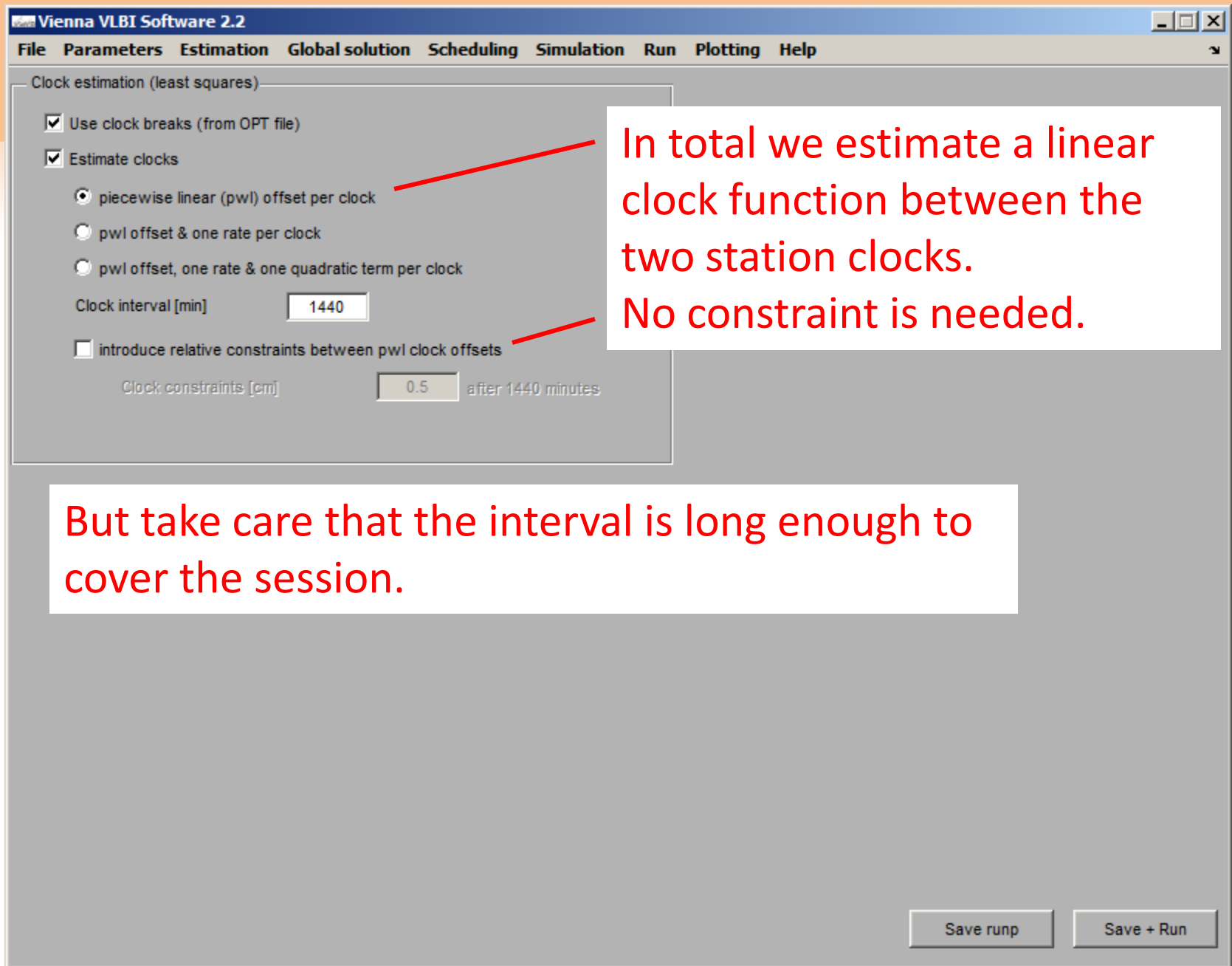






We usually estimate one constant zwd per station per session.

We usually don't estimate gradients.



In total we estimate a linear clock function between the two station clocks.
No constraint is needed.

But take care that the interval is long enough to cover the session.

Vienna VLBI Software 2.2

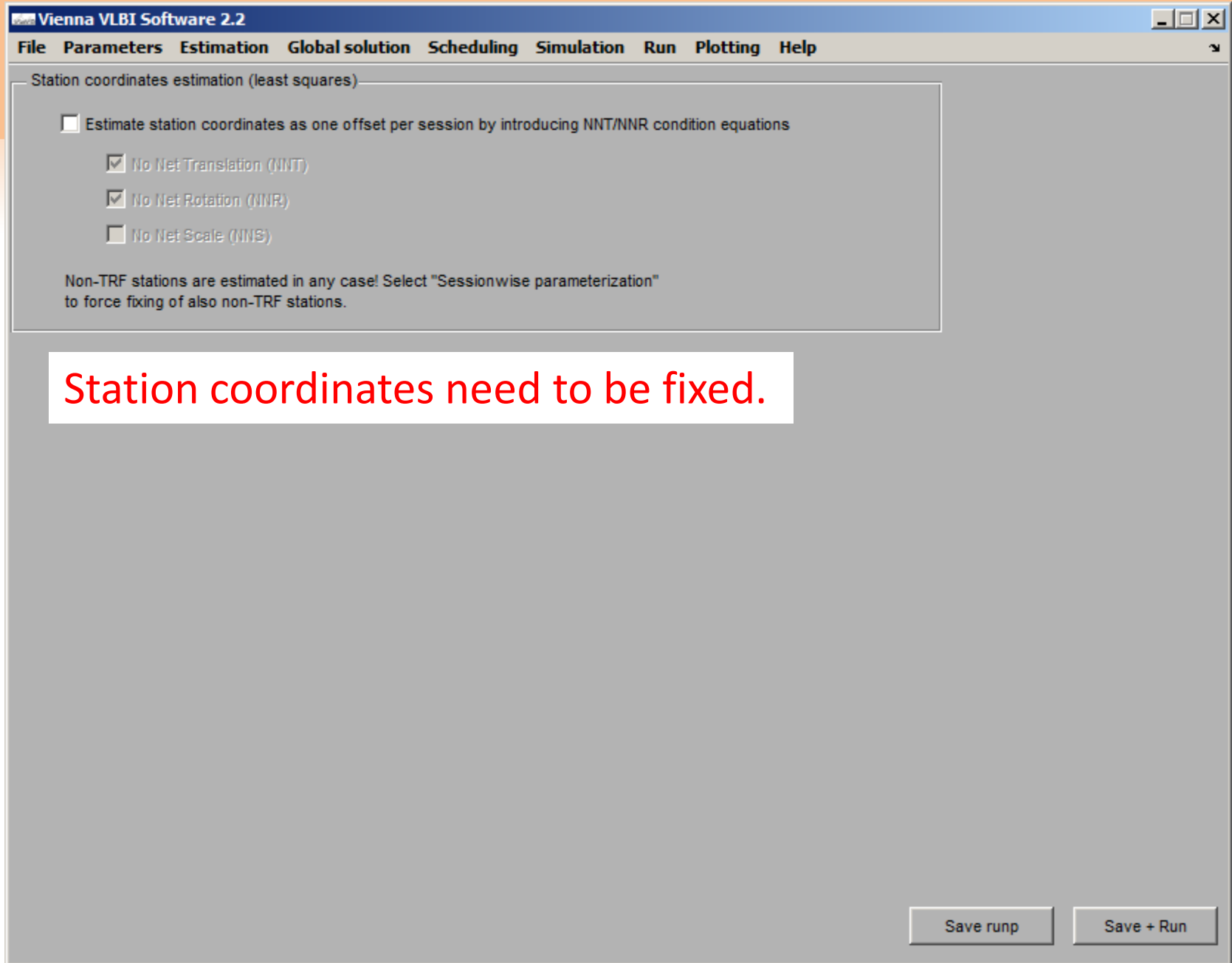
File Parameters Estimation Global solution Scheduling Simulation Run Plotting Help

EOP estimation (least squares)

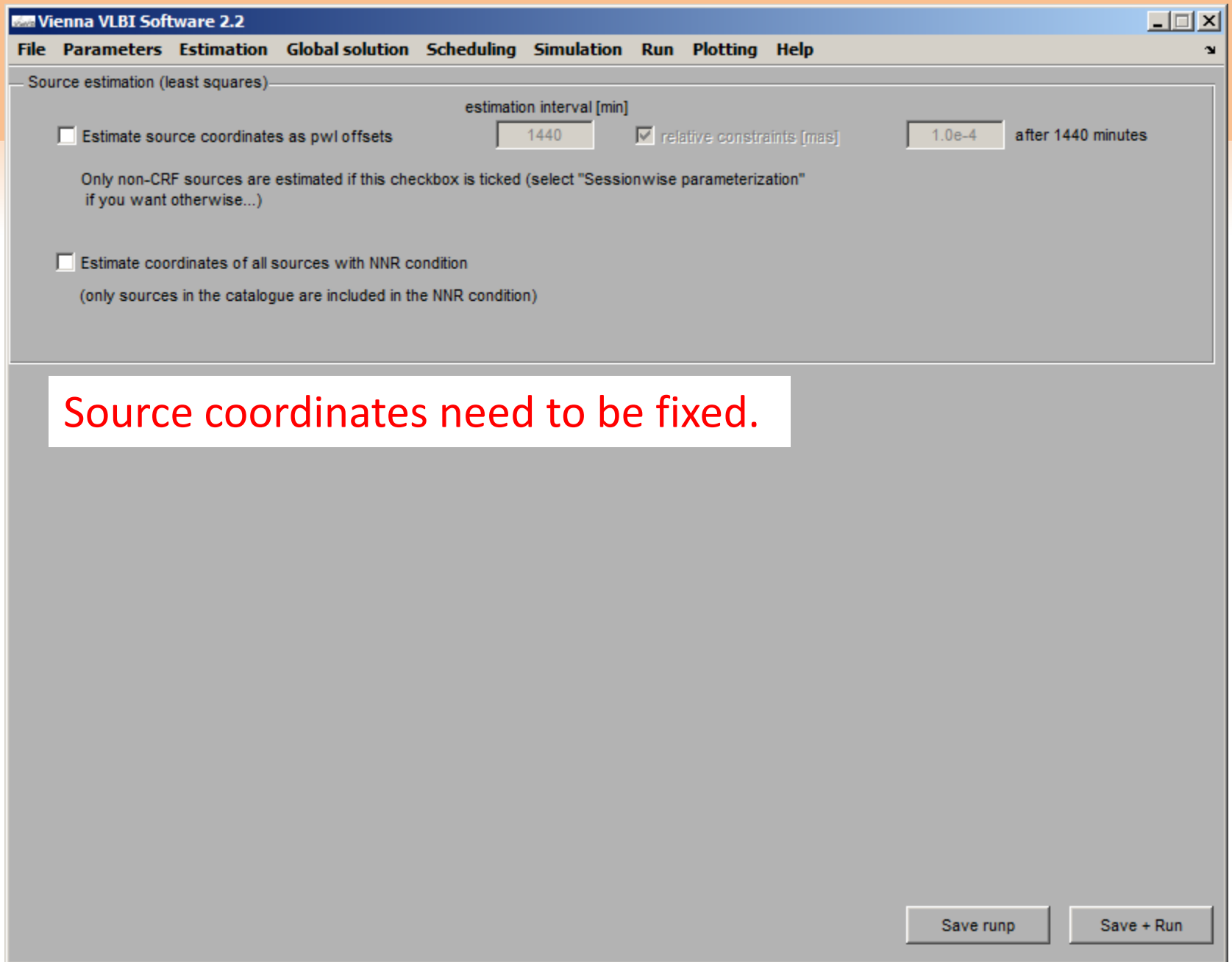
	estimation interval [min]	relative	
<input type="checkbox"/> Estimate Xpol (inter. pole coor. in TRF)	1440	<input checked="" type="checkbox"/> constraints [mas]	1.0e-4 after 1440 minutes
<input type="checkbox"/> Estimate Ypol (inter. pole coor. in TRF)	1440	<input checked="" type="checkbox"/> constraints [mas]	1.0e-4 after 1440 minutes
<input checked="" type="checkbox"/> Estimate dUT1 (rotation angle)	1440	<input checked="" type="checkbox"/> constraints [mas]	1.0e-4 after 1440 minutes
<input type="checkbox"/> Estimate nutdx (CIP coor. in celes. long.)	1440	<input checked="" type="checkbox"/> constraints [mas]	1.0e-4 after 1440 minutes
<input type="checkbox"/> Estimate nutdy (CIP coor. in obliquity)	1440	<input checked="" type="checkbox"/> constraints [mas]	1.0e-4 after 1440 minutes

Save runp Save + Run

We estimate one constant dut1 value per session.



Station coordinates need to be fixed.



Source coordinates need to be fixed.

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File Parameters Estimation Global solution Scheduling Simulation Run Plotting Help

VieVS estimation settings

First solution

- Run first solution (only following clock function)
 - one offset per clock
 - one offset & one rate per clock
 - one offset, one rate & one quadratic term per clock
 - Manually find clock breaks

Main solution

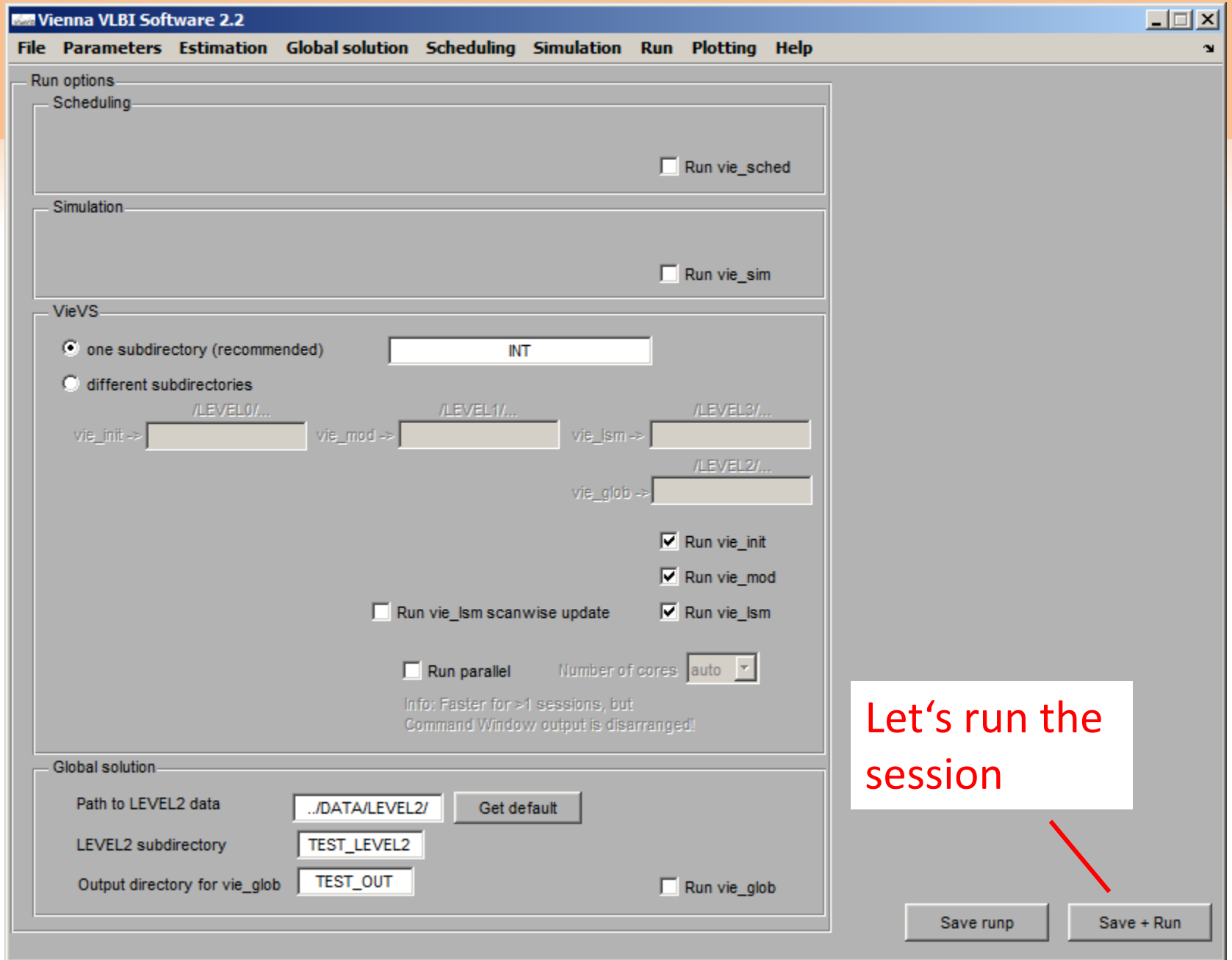
- Run main solution (parameter estimation)
 - Simple outlier test ($c * m0$)
 - Normal outlier test ($c * m0 * \text{sqrt}(qv\text{v})$)
 - Apply baseline dependent weights (only `vie_lsm`)

Estimate parameters (otherwise: only N matrix created)

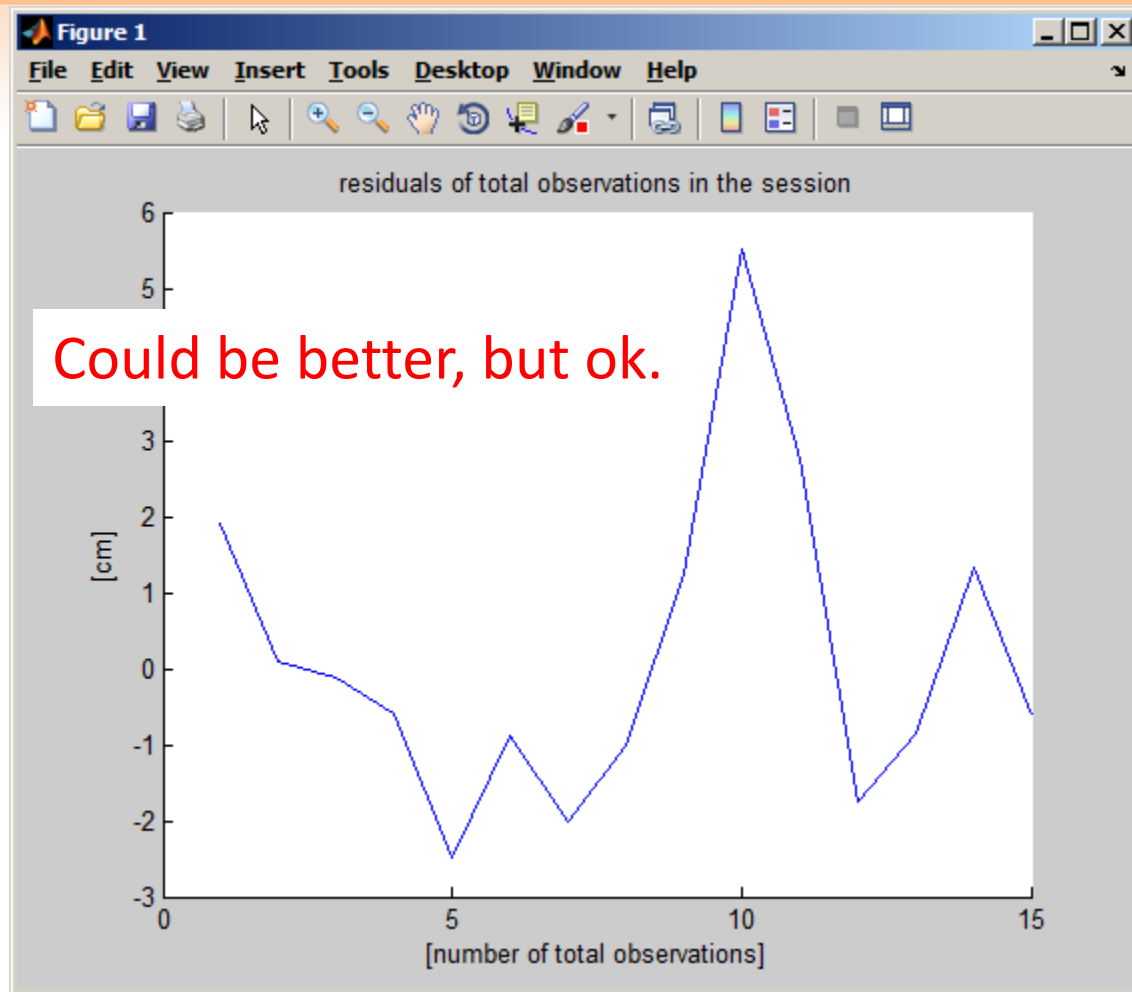
Write all parameters to ASCII file

Allow for stationwise and sourcewise parameterization for each session

You could skip the first solution, but if you apply it, don't estimate more parameters than a linear clock function between the stations.



Let's run the session



```
session 1 of 1
Current file: ../DATA/LEVEL0/INT/11APR02XK_N003
```

```
-----
|           Welcome to VIE_INIT!!!!         |
-----
```

```
No OPT file was found
Stations to be excluded: 0
Stations to be down-weighted: 0
Sources to be excluded: 0
Baselines to be excluded: 0
```

```
Start reading 2011/11APR02XK_N003
[antenna,sources,scan]=read_ngs(ngsfile,trffile,crffile,ini_opt,pt, tp, trf, crf)
Done reading the file!
```

```
A total of 2 stations, 14 sources and 15 scans were found
The following stations were found:
```

```
KOKEE
WETTZELL
VIE_INIT finished!!! You can now continue with VIE_MOD
```

```
-----
|           Welcome to VIE_MOD             |
-----
```

```
C04_08
remove tidal UT
UT1S
Lagrange interpolation of EOP
re-add tidal UT
UT1S
interpf (Conventions)
load existing ephemerides ...
IAU_2006A
station corrections
Cubic model after 2010.0 is not available, a linear model for extrapolation is used. (IERS Conv. 2010)
```

```
vie_mod successfully finished!
```

15 scans are not so many ...

Welcome to VIE_LSM!!!!

number of scans : 15
number of antennas : 2
number of sources : 14
number of obs. : 15

2. CREATING DEFAULT OPTIONS

3. FORMING THE WEIGHT MATRIX OF THE OBSERVATIONS "Pobserv"

apriori std. dev. of unit weight. : 1.4741

obs. of the antenna KOKEE : 15

obs. of the antenna WETZELL : 15

4. FORMING THE REDUCED OBSERVATION VECTOR "oc_observ"

clock KOKEE is selected as the ref. clock for the first solution

chi-squared of first solution: 5.4959

5. FORMING THE DESIGN MATRICES "A(i).sm" ...

6. FORMING THE CONSTRAIN MATRIX and WEIGHT MATRIX OF CONSTRAINTS

7. ESTIMATING THE PARAMETERS WITH LEAST SQUARES

clock KOKEE is selected as the ref. clock for the main solution

chi-squared of main solution $vTPv/degOfFreedom$: 2.6821

WRMS of post-fit residuals $\sqrt{v_realTPv_real/sumOfWeights}$: 1.7768cm(59.2688ps)

outlier detection test was not applied!

total number of estimated parameters: 8
total clock offsets: 2
total rate and quad. terms of clock funct.: 0
total zenith wet delay offsets: 4
total tropo. north gradients: 0
total tropo. east gradients: 0
total pole coor. (x-pol) offsets: 0
total pole coor. (y-pol) offsets: 0
total dUT1 offsets: 2
total celestial pole (nutation dx) offsets: 0
total celestial pole (nutation dy) offsets: 0
total right ascension offsets of sources : 0
total declination offsets of sources : 0
antenna coor. dx offsets: 0
antenna coor. dy offsets: 0
antenna coor. dz offsets: 0

estimated parameters are saved as ../VieVS/DATA/LEVEL3/INT/x_11APR02XK_N003.mat
estimation options are saved as ../VieVS/DATA/LEVEL3/INT/opt_11APR02XK_N003.mat
normal equation matrix is saved as ../VieVS/DATA/LEVEL3/INT/atpa_11APR02XK_N003.mat
right hand side vector is saved as ../VieVS/DATA/LEVEL3/INT/atpl_11APR02XK_N003.mat
residuals are saved as ../VieVS/DATA/LEVEL3/INT/res_11APR02XK_N003.mat
8. vie_ism IS COMPLETED!
Elapsed time is 0.110194 seconds.

Actually, we only have 5 parameters
(one linear clock, two zwd offsets, one
dut1 offset).


```
>> load('..\DATA\LEVEL3\INT\x_11APR02XK_N003.mat')
>> x_.dut1
ans =
    col: [7 8]
    mjd: [55653 55654]
    val: [-0.0094 -0.0094]
    mx: [0.0155 0.0155]
```

The result is $-9.4 \mu\text{s}$, which is reasonable.
Also the formal error is ok.

Thanks!