Pre-GPS Data, and CMM Lessons Learned

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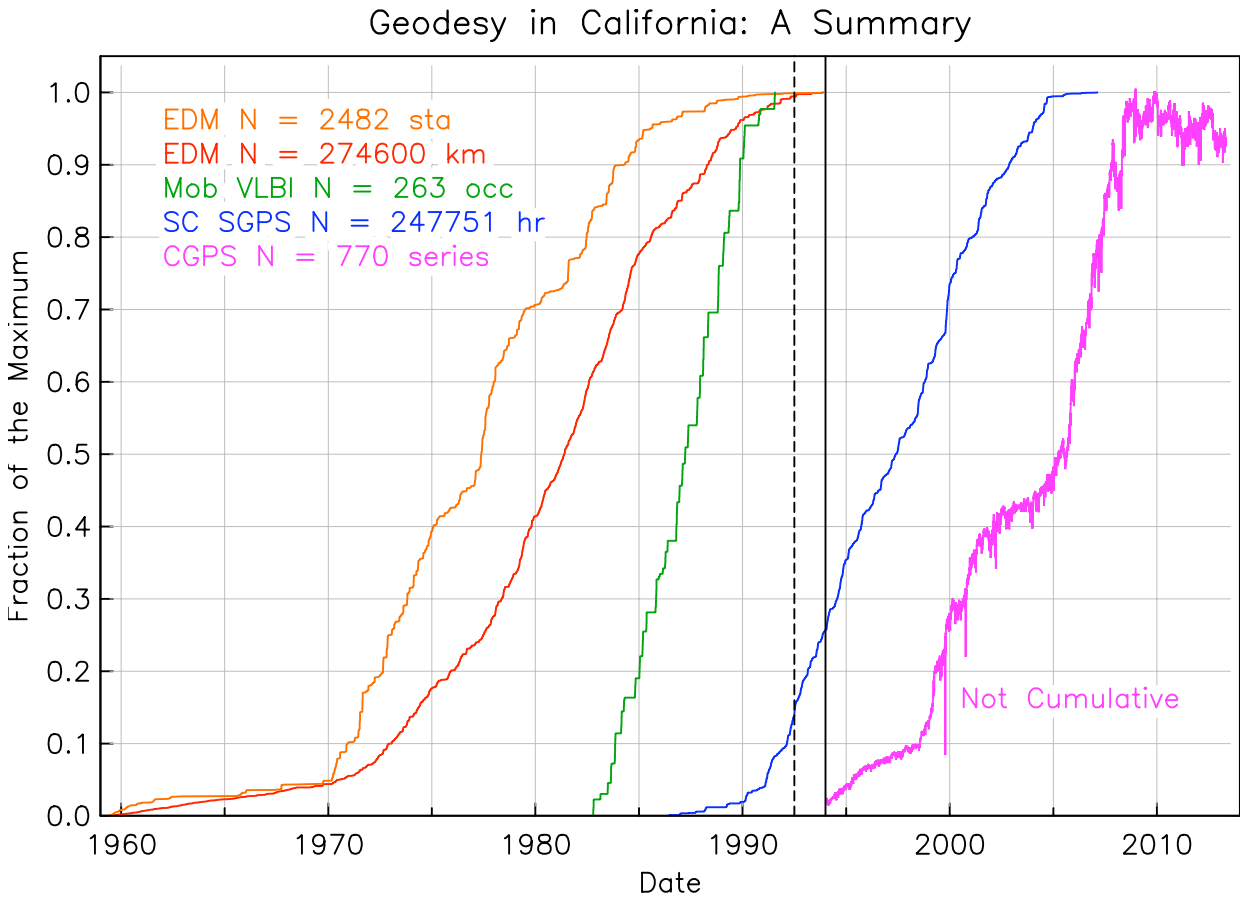
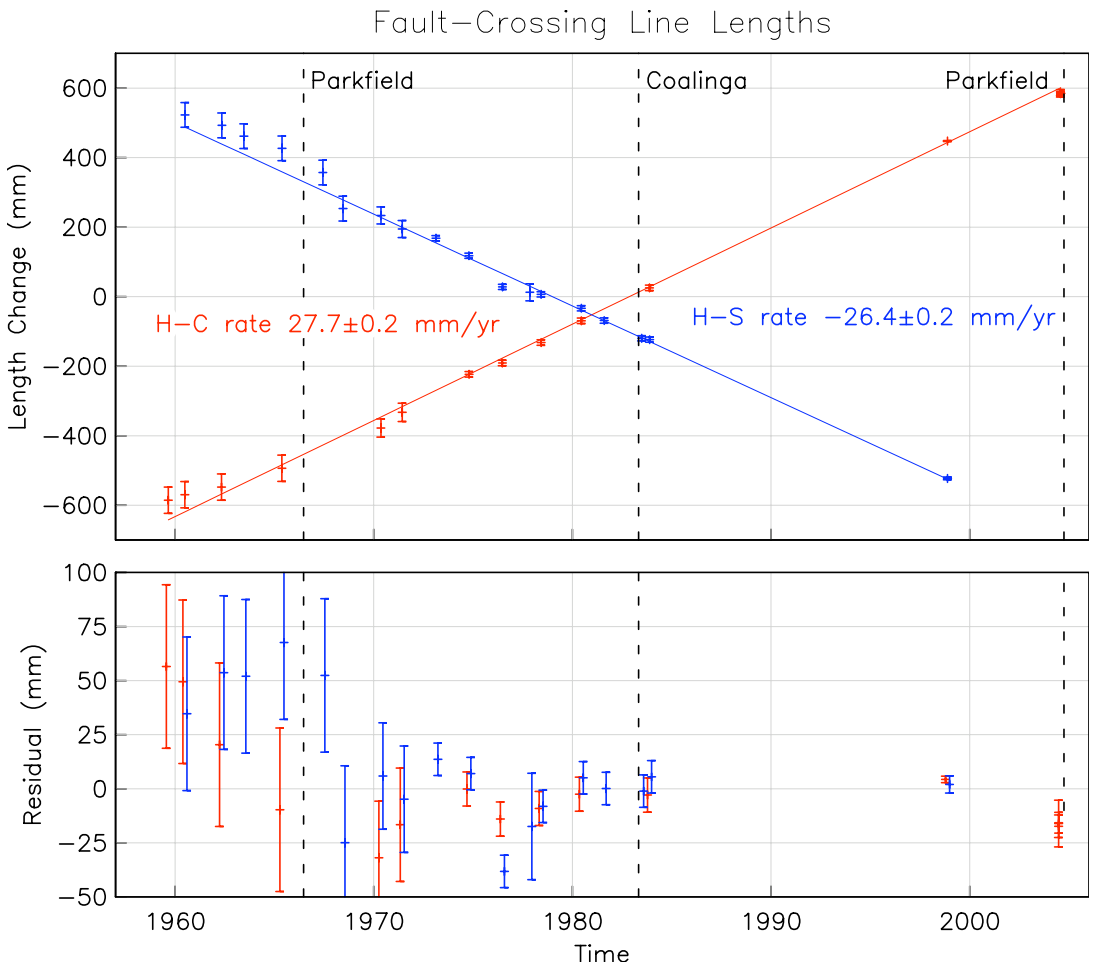

Geodesy in California: A Summary
EDM N = 2482 sta
EDM N = 274600 km
Mob VLBI N = 263 occ
SC SGPS N = 247751 hr
CGPS N = 770 series
Not Cumulative
Fraction of the Maximum
Date
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1960
1970
1980
1990
2000
2010


9350
NASA

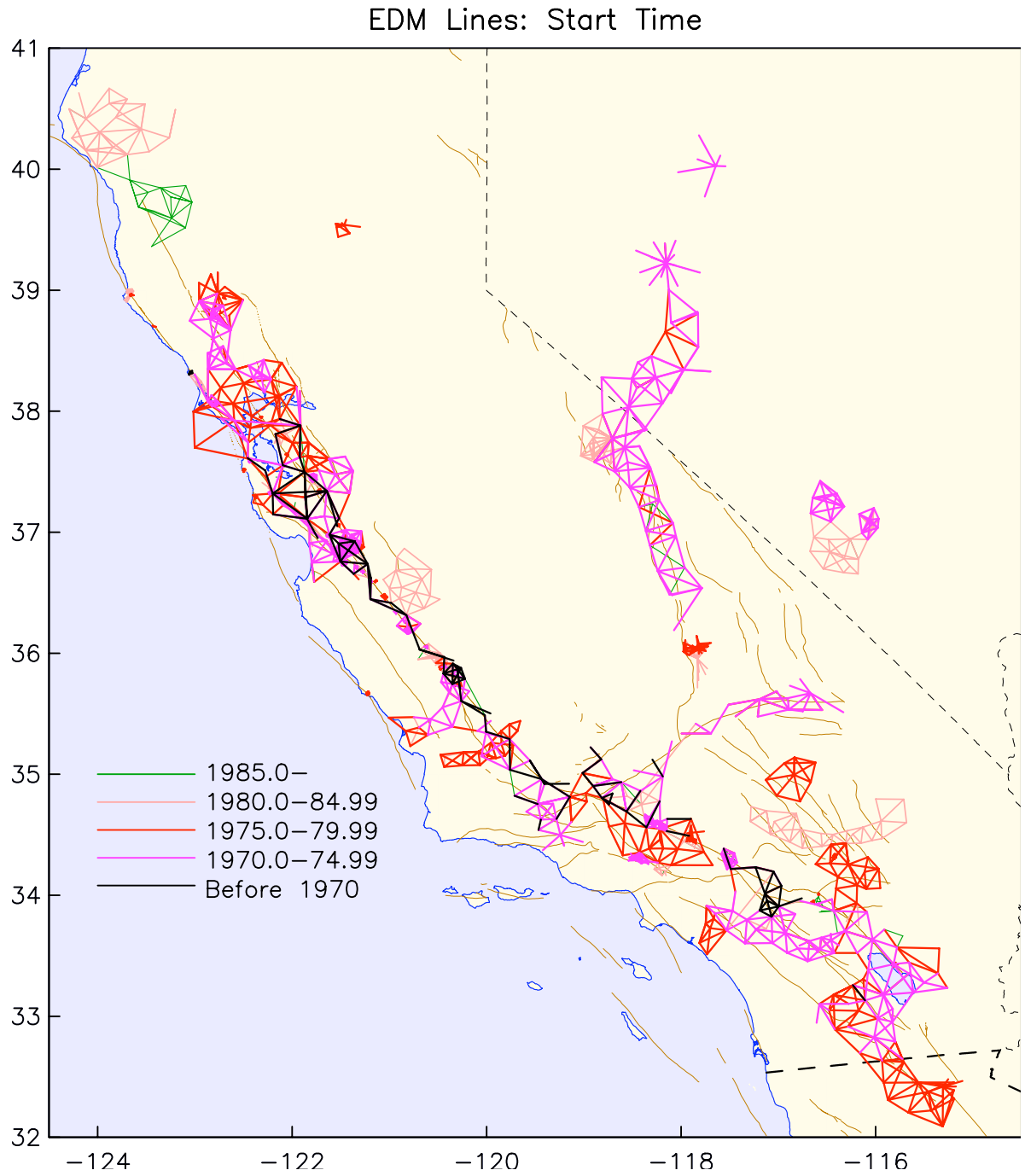
EDM Data

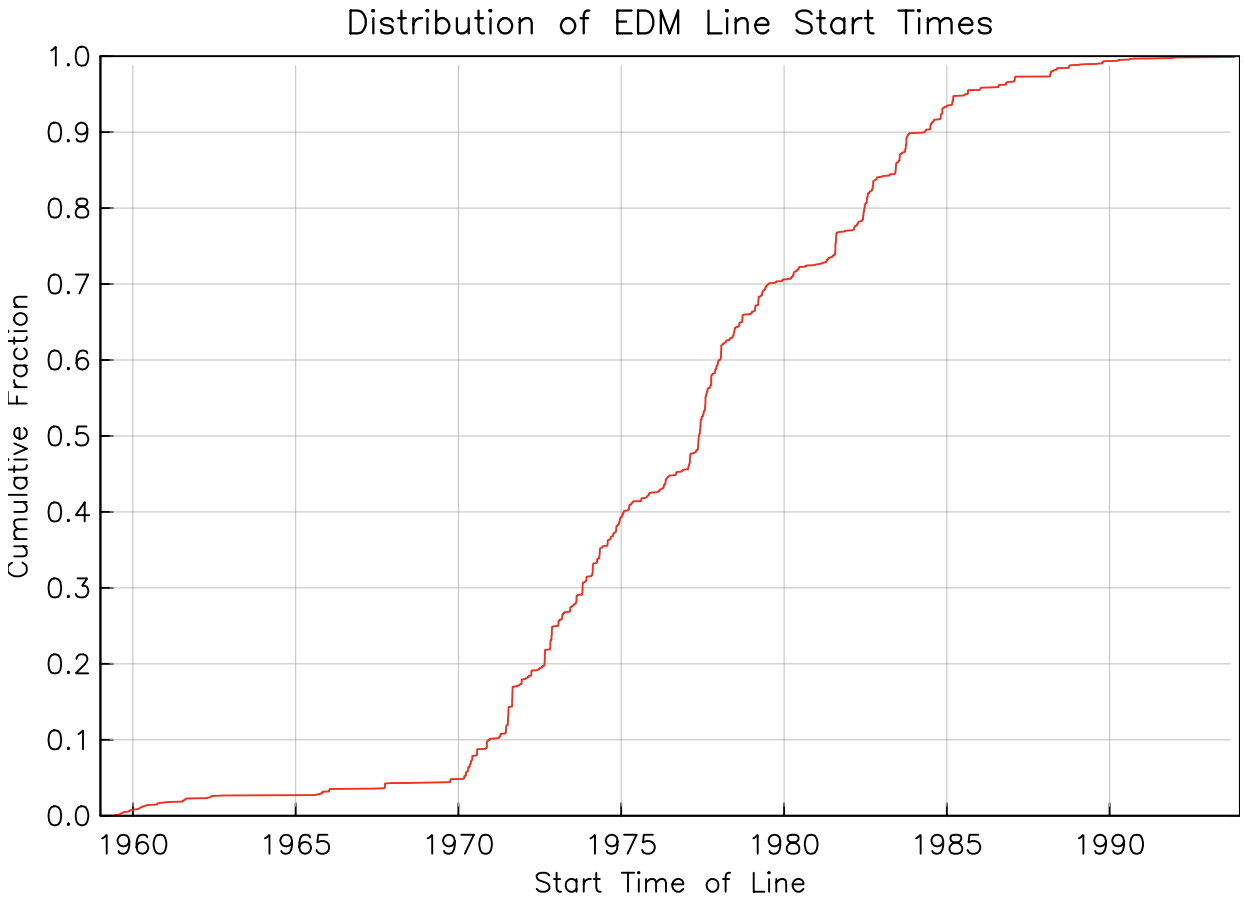
- 1959-70: Collected by DWR. Poor refraction correction.
- 1970-72: Collected by CDMG: better EDM
- 1972-1993: USGS Crustal Strain project, Geodolite, refraction measured by aircraft.

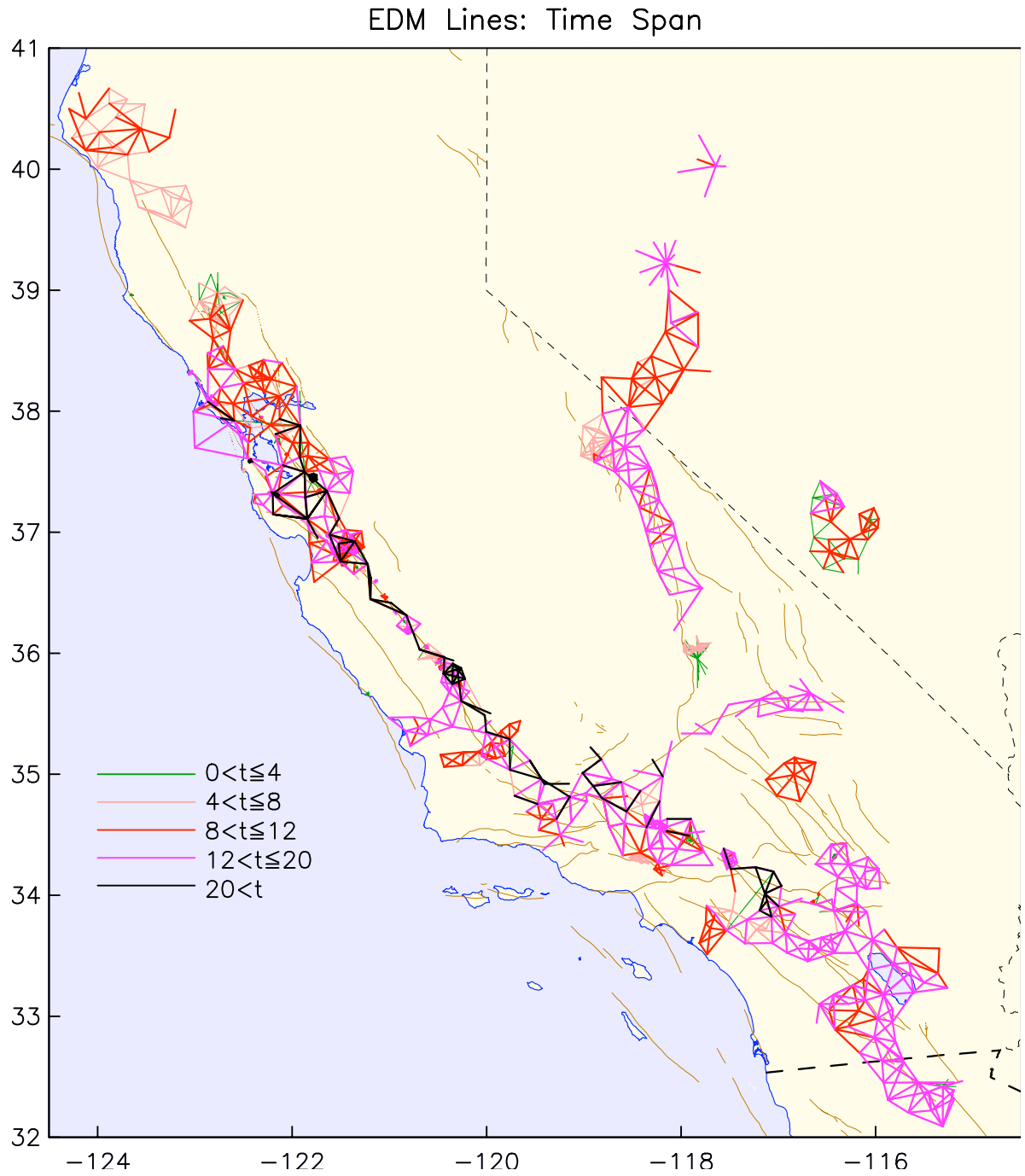
- All data available in 2 text files

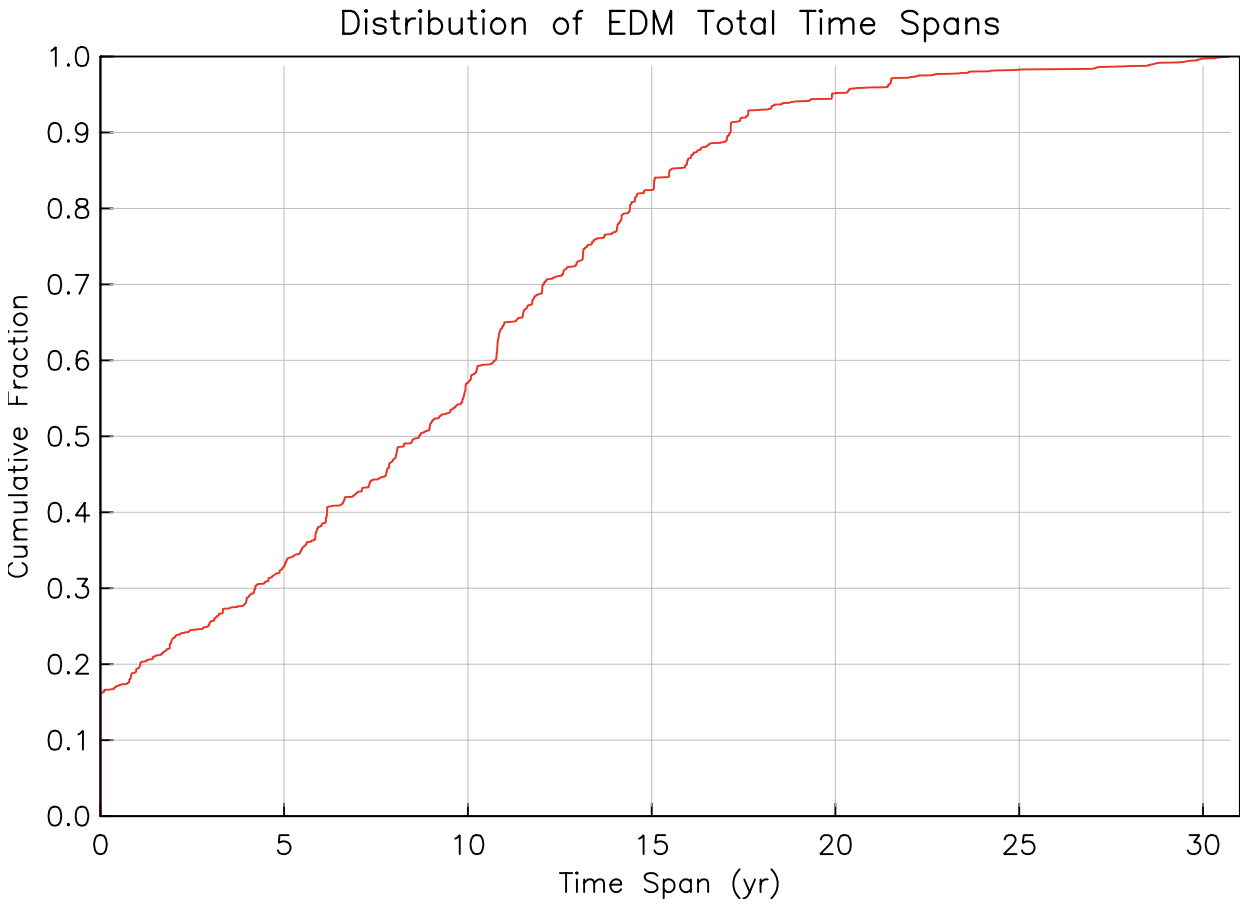


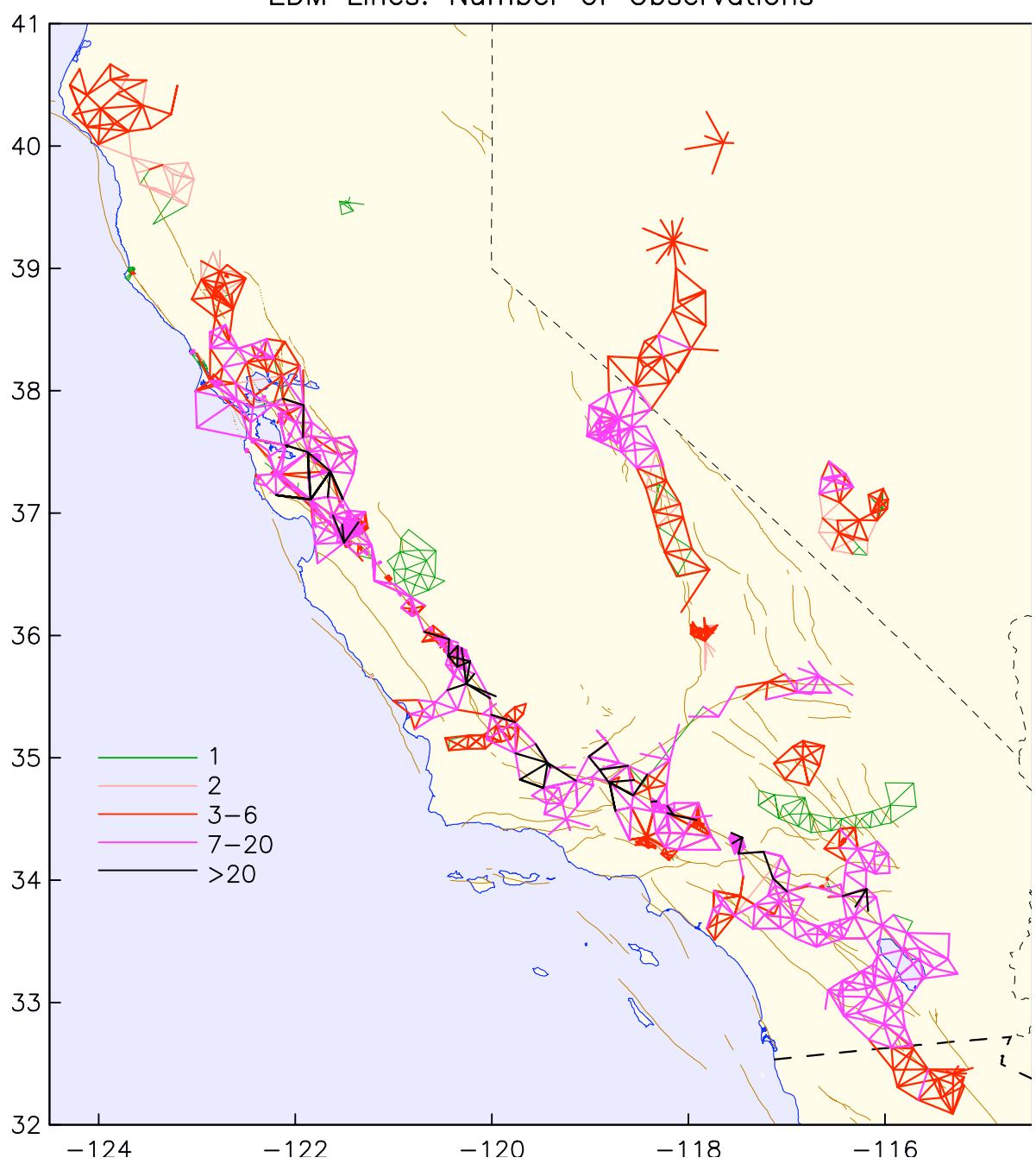
Data on the creeping section: EDM and later GPS

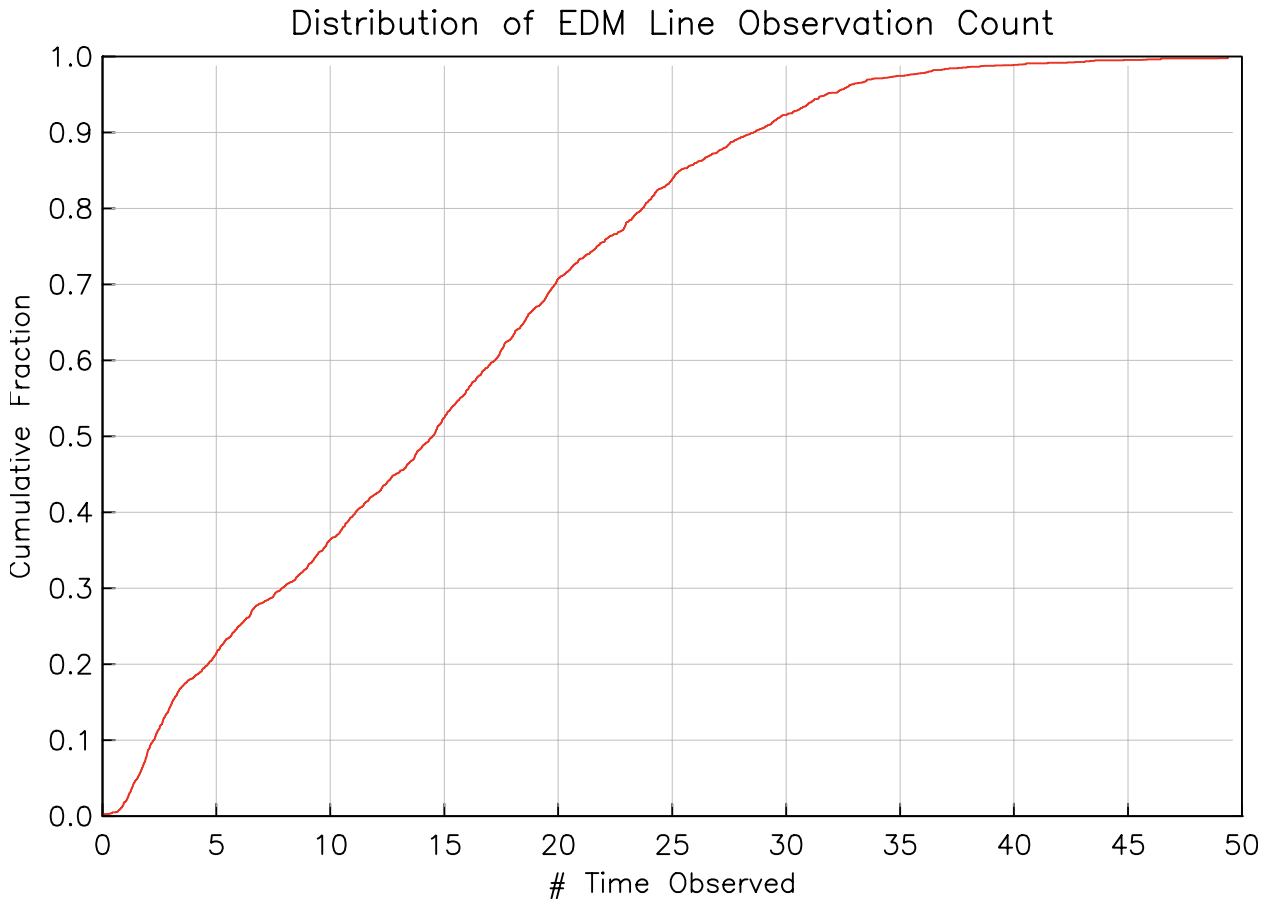

EDM Lines: Start Time
41
40
39
38
37
36
35
34
33
32
−124
−122
−120
−118
−116
1985.0−
1980.0−84.99
1975.0−79.99
1970.0−74.99
Before 1970

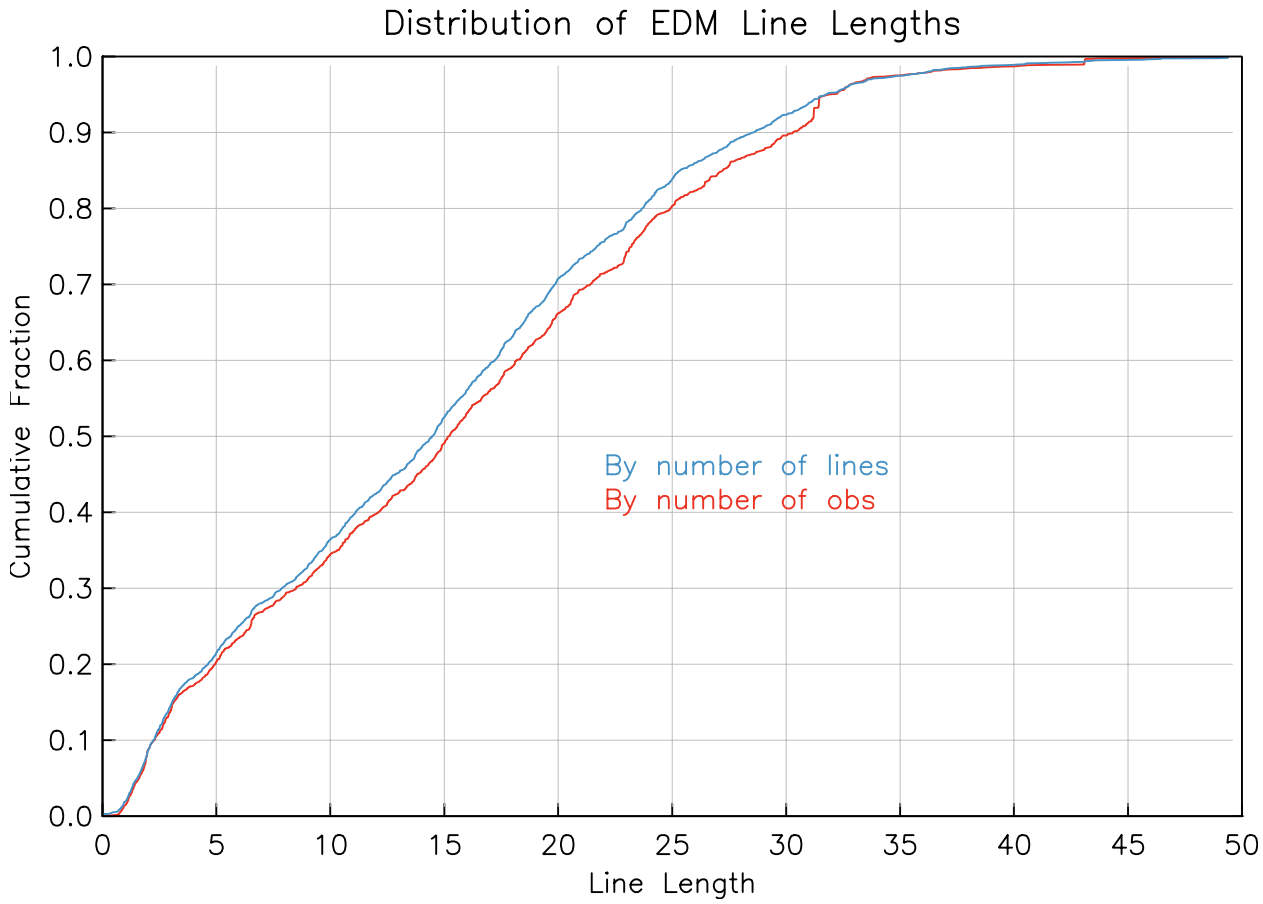

Distribution of EDM Line Start Times
Cumulative Fraction
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1960
1965
1970
1975
1980
1985
1990
Start Time of Line


EDM Lines: Time Span
41
40
39
38
37
36
35
34
33
32
−124
−122
−120
−118
−116
0<t≦4
4<t≦8
8<t≦12
12<t≦20
20<t


Distribution of EDM Total Time Spans
Cumulative Fraction
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
5
10
15
20
25
30
Time Span (yr)

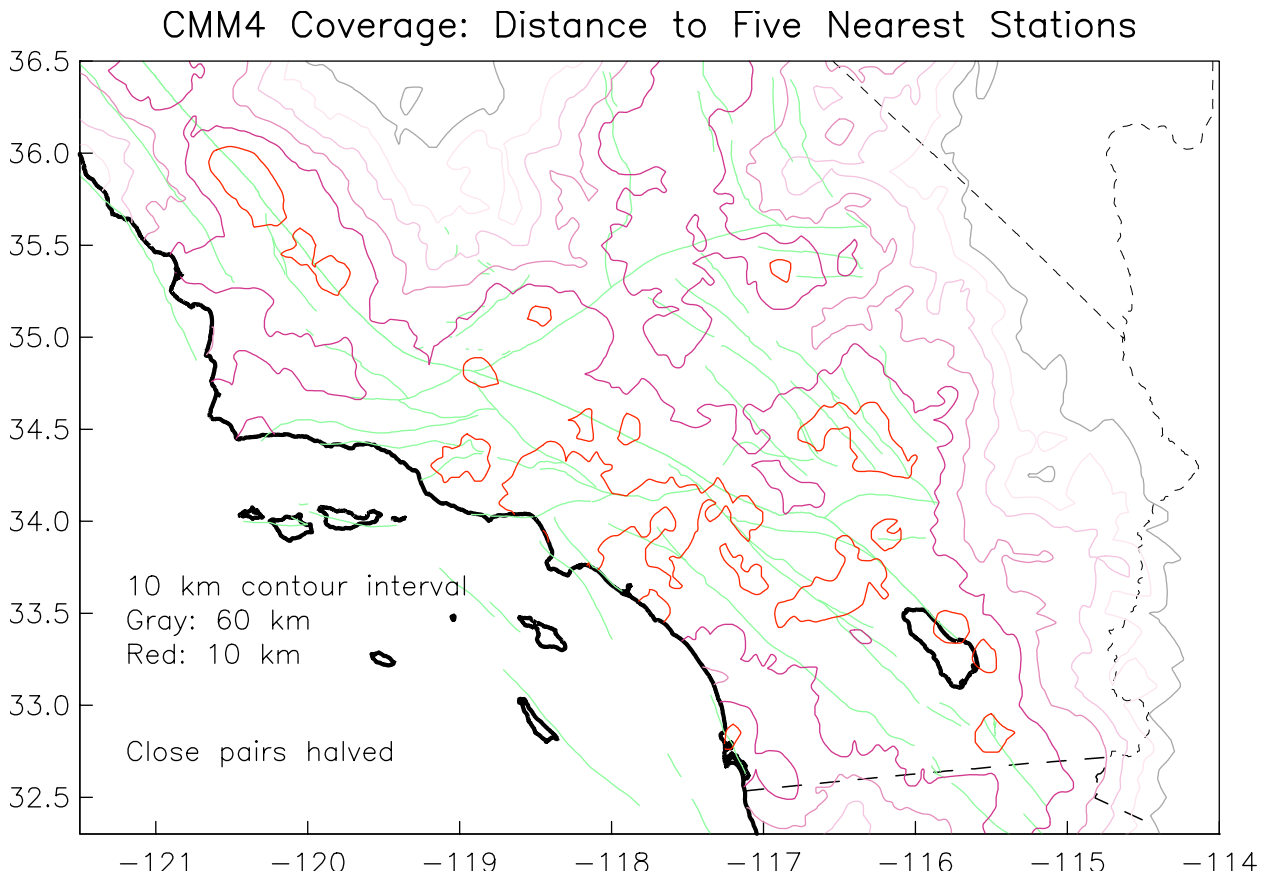

EDM Lines: Number of Observations
41
40
39
38
37
36
35
34
33
32
−124
−122
−120
−118
−116
1
2
3−6
7−20
>20

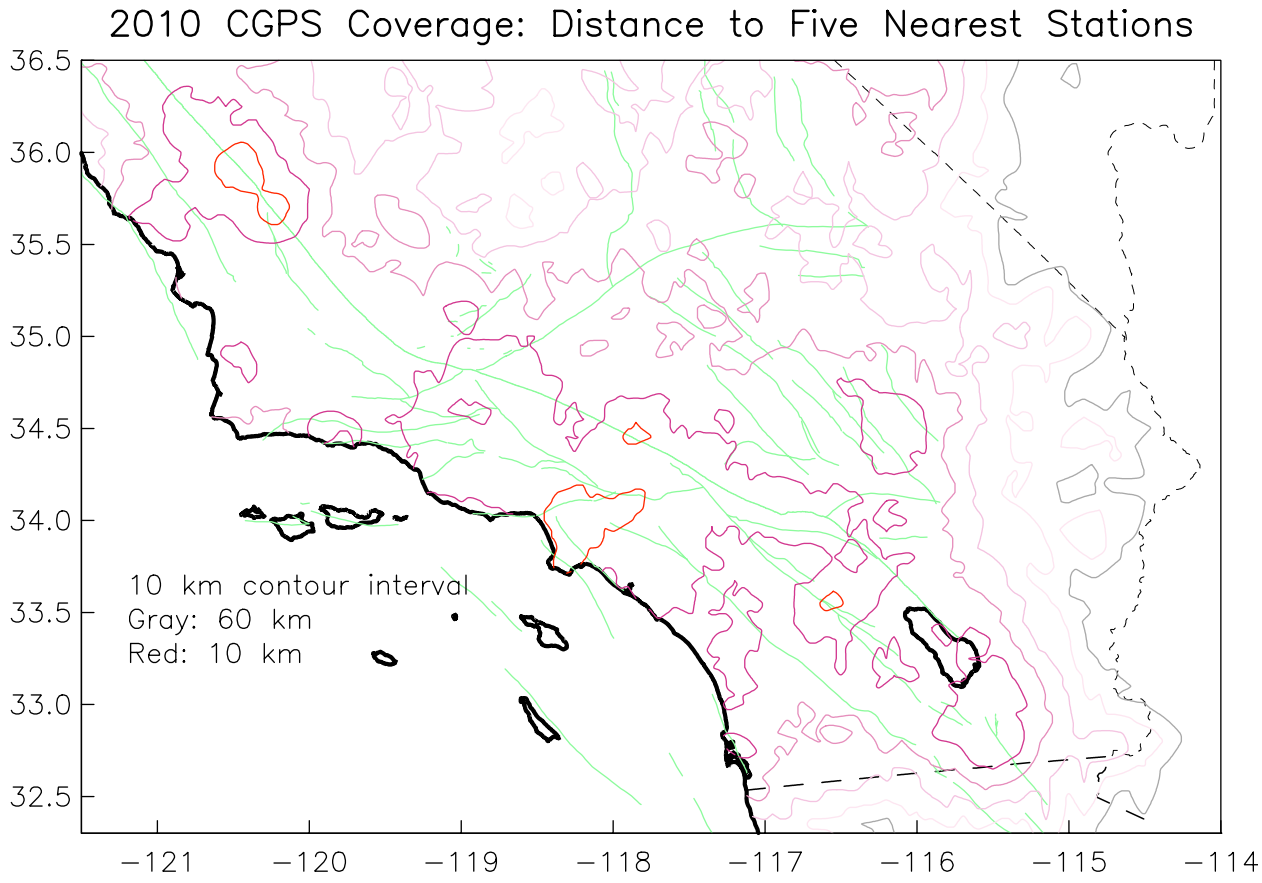

Distribution of EDM Line Observation Count
Cumulative Fraction
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
5
10
15
20
25
30
35
40
45
50
Time Observed

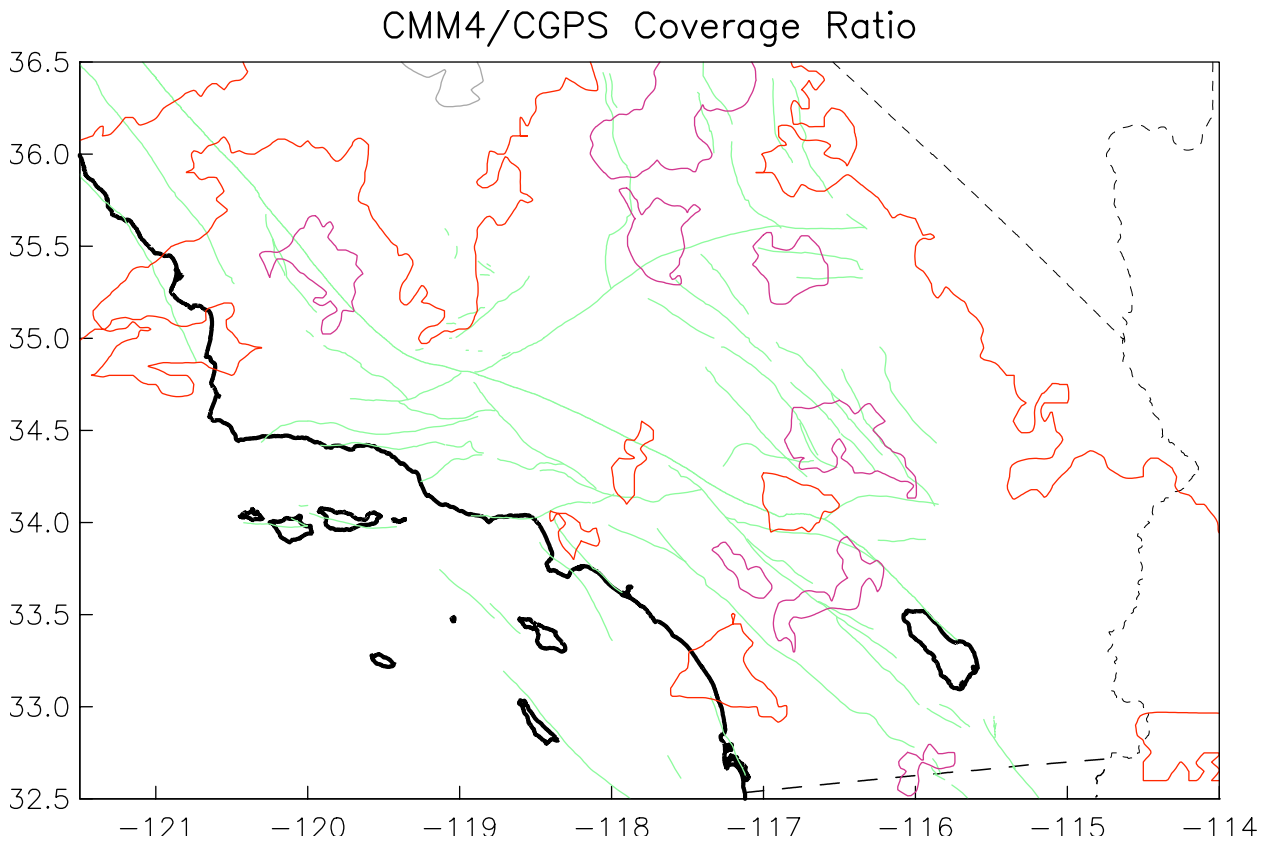

Distribution of EDM Line Lengths
Cumulative Fraction
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
5
10
15
20
25
30
35
40
45
50
Line Length
By number of lines
By number of obs

Crustal Motion Map

- Phase 1: collect dual-frequency long-span survey-mode GPS data from 1985-2004 (floppy disks!)
- Phase 2: enter/correct the metadata, eg antenna heights, monument codes (logsheets!)
- Phase 3: GAMIT/GLOBK/QOCA processing—including orbit determination pre-IGS
- Phase 4: cross-check the results, fix remaining issues, develop error models
- Phase 5: write the paper


CMM4 Coverage: Distance to Five Nearest Stations
36.5
36.0
35.5
35.0
34.5
34.0
33.5
33.0
32.5
−121
−120
−119
−118
−117
−116
−115
−114
10 km contour interval
Gray: 60 km
Red: 10 km
Close pairs halved


2010 CGPS Coverage: Distance to Five Nearest Stations
36.5
36.0
35.5
35.0
34.5
34.0
33.5
33.0
32.5
−121
−120
−119
−118
−117
−116
−115
−114
10 km contour interval
Gray: 60 km
Red: 10 km


CMM4/CGPS Coverage Ratio
36.5
36.0
35.5
35.0
34.5
34.0
33.5
33.0
32.5
−121
−120
−119
−118
−117
−116
−115
−114

Data Collection and Checking

- Tedious, and essential.
- Software to minimize effort of data entry
- Needs supervision to check for errors and resolve issues.

- S Calif pre-2004 done. N Calif pre-2004 mostly done; post-2004 needs to be done.

Data Processing

- EDM data needs to be put into SINEX to be useful (with a pancake covariance)

- Pre-1994 GPS is much more difficult to work with. The CMM processing is available (MIT SINEX files).

- We can continue to include VLBI, similarly.

Data Interpretation

- Need to be careful in order to produce reliable error bars on velocities.

- We now have a lot of postseismic data, and should see how best to apply it to older results.