GMT examples:

Reproducing figures published by Grund & Ritter (2019)

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General information

If you make use of the content described in this manual please give reference to our paper in which slightly modified versions of the presented maps are included (Figures **3**, **DR10**, **DR12** and **DR13**) :

> **Grund, M. & Ritter, J. R. R. (2019)**, *Widespread seismic anisotropy in Earth's lowermost mantle beneath the Atlantic and Siberia*, Geology 47(2), p. 123-126, https://doi.org/10.1130/G45514.1.

1 Plotting the map

All content shown in the following is based on the bash-script `Scan_SKS_SKKS_figs.gmt` that can be downloaded together with all required files (data files, colormaps etc.) from https://github.com/michaelgrund/GMT-plotting.
The used *SKS-SKKS* data in the file `SKS_SKKS_GR2019.dat` represents a modified version of the content available from the Geology Data Repository (Grund & Ritter, 2019) via https://www.geosociety.org/datarepository/2019/.
Several files include further data extracted from results of other projects and studies. Depending on your use cases please acknowledge also the following publications:
• GyPSuM tomography model (files can be download from: https://ds.iris.edu/ds/products/emc-gypsum/ , last accessed: 21 May 2019):

> **Simmons, N. A., Forte, A. M., Boschi, L., & Grand, S. P. (2010)**, *GyPSuM: A joint tomographic model of mantle density and seismic wave speeds*, J. Geophys. Res., 115:B12310. https://doi.org/10.1029/2010JB007631.

• Vote map data (can be downloaded from: http://folk.uio.no/gracees/Shephard_SlabVoteMaps/1_MEAN/, last accessed: 21 May 2019):

Shepard, G. E., Matthews, K. J., Hosseini, K., & Domeier, M. (2017), *On the consistency of seismically imaged lower mantle slabs*, Sci. Rep., 7, 10976. https://doi.org/10.1038/s41598-017-11039-w.

• Cluster analysis data (can be downloaded from: https://www.geol.umd.edu/facilities/seismology/data/clustering-of-lower-mantle-structure-perm-anomaly/, last accessed: 21 May 2019):

Lekic, V., Cottaar, S., Dziewonski, A., & Romanowicz, B. (2012), *Cluster analysis of global lower mantle tomography: A new class of structure and implications for chemical heterogeneity*, Earth Planet. Sci. Lett., 357-358, 68–77. https://doi.org/10.1016/j.epsl.2012.09.014.

If GMT 5.2.1 (or higher, Wessel et al., 2013) is installed on your (Linux) system you can directly reproduce the whole content shown in this manual by running `Scan_SKS_SKKS_figs.gmt` via command line. In the following the individual steps to get the final figure are lined out.

1.1 Basic settings and data preparation

```
#!/bin/bash

gmtset  MAP_GRID_PEN_PRIMARY 0.3p,dimgrey \
        PS_MEDIA MGcust \
        PROJ_LENGTH_UNIT c \
        MAP_ANNOT_OBLIQUE 30 \
        MAP_ANNOT_OFFSET 5p \
        MAP_ANNOT_OFFSET_PRIMARY 5p \
        MAP_ANNOT_OFFSET_SECONDARY 5p \
        COLOR_MODEL rgb \
        FONT_ANNOT_PRIMARY 8p,Helvetica \
        FONT_LABEL 8 \
        MAP_FRAME_TYPE fancy \
        MAP_FRAME_WIDTH 2p \
        MAP_FRAME_PEN 1.1p,black \
        MAP_TICK_LENGTH_PRIMARY 0i

################################################################################################
# GMT (5.2.1) script to reproduce figures published in Grund and Ritter (2019)
################################################################################################

# 2019, Michael Grund (KIT Karlsruhe, Geophysical Institute)

# Required files to run this script are included in the download directory. MGcust
# is included as custom media format in file << gmt_custom_media.conf >>.

################################################################################################
# If you use the content of this script or the accompanying files please acknowledge GMT,
# our paper (Grund and Ritter, 2019, Geology) and my PhD thesis (DOI: 10.5445/IR/1000091425).
################################################################################################

#########################################################################################################
# initial map parameters
projJ="l40/60/16/80/1:48000000"
projR=-30/110/40/80
mapframes=SEwn
```

```
# define output name
ps=ScanArray_SKS_SKKS.ps

###############################################################################################
# prepare gridfiles and colormaps

#.....................................
# generate subset of GyPSuM model beneath Fennoscandia at 2700 km depth

# the subset GyPSuM_subset_Scand.txt was generated from the files
# Grid.GyPSuM.S.22.2650-2900km.txt and Grid.LatsLons.1deg which can
# be downloaded from:
#   https://ds.iris.edu/ds/products/emc-gypsum/

# GyPSuM model is available as 1x1 degree grid, here extend it to 1.5x1.5
xyz2grd GyPSuM_subset_Scand.txt -: -Ggrid_GyPSuM.grd -R$projR -I1.5/1.5

#.....................................
# generate grid for cluster analysis data of Lekic et al. (2012)

# file Lekic_Clustering_LM.txt can be downloaded from:
#   https://www.geol.umd.edu/facilities/seismology/data/
#   clustering-of-lower-mantle-structure-perm-anomaly/

# generate cluster data as 2x2 degree grid
xyz2grd Lekic_Clustering_LM.txt -GLekic_cluster.grd -R$projR -I2/2

#.....................................
# grid for vote map analysis data of Shephard et al. (2017)

# file max_extent_swave_0.5deg_2700_amean.grd can be downloaded from:
#   http://folk.uio.no/gracees/Shephard_SlabVoteMaps/1_MEAN/

# votemap data is 0.5x0.5 degree grid
gridSLAB=max_extent_swave_0.5deg_2700_amean.grd

###############################################################################################
```

1.2 Plot basic content of gridfiles

```
##########
# Fig. 1 # plot basic content of gridfiles
##########

#.....................................
# GyPSuM tomography model

Yshift=4.5i

grdimage grid_GyPSuM.grd -R$projR -J$projJ -Ccmap_gypsum.cpt -E75 -P -K -Y$Yshift > $ps

# make colorbar
gmtset FONT_ANNOT_PRIMARY 8p,Helvetica
gmtset FONT_LABEL 8p
gmtset MAP_ANNOT_OFFSET 0.04i
gmtset MAP_TICK_LENGTH_PRIMARY 0.05i
gmtset MAP_LABEL_OFFSET 3.5p
gmtset MAP_ANNOT_OBLIQUE 1

psscale -Ccmap_gypsum.cpt -Dx-0.15i/0.15i+w1.3i/0.1i+h+e -B1 -B+l"dVs in %, 2700 km" \
   -O -K >> $ps

# set parameters back to defaults
gmtset FONT_ANNOT_PRIMARY 8p,Helvetica
gmtset FONT_LABEL 8
gmtset MAP_ANNOT_OFFSET 5p
```

```
gmtset MAP_TICK_LENGTH_PRIMARY 0p
gmtset MAP_LABEL_OFFSET 5.5p

#.....................................
# cluster analysis after Lekic

Xshift=7.5i

grdimage Lekic_cluster.grd -R$projR -J$projJ -Ccmap_cluster.cpt -X$Xshift -P -K -O >> $ps

psscale -Ccmap_cluster.cpt -Dx-0.15i/0.1i+w1.3i/0.1i+h -B+l"model agreement" -L0.07 \
   -O -K >> $ps

#.....................................
# vote maps after Shephard

Yshift2=4i

grdimage $gridSLAB -R$projR -J$projJ -Ccmap_votem.cpt -P -K -O -X-$Xshift -Y-$Yshift2 >> $ps

psscale -Ccmap_votem.cpt -Dx-0.15i/0.1i+w1.3i/0.1i+h -B+l"model agreement" -L0.07 -O -K >> $ps

#########################################################################################################
```

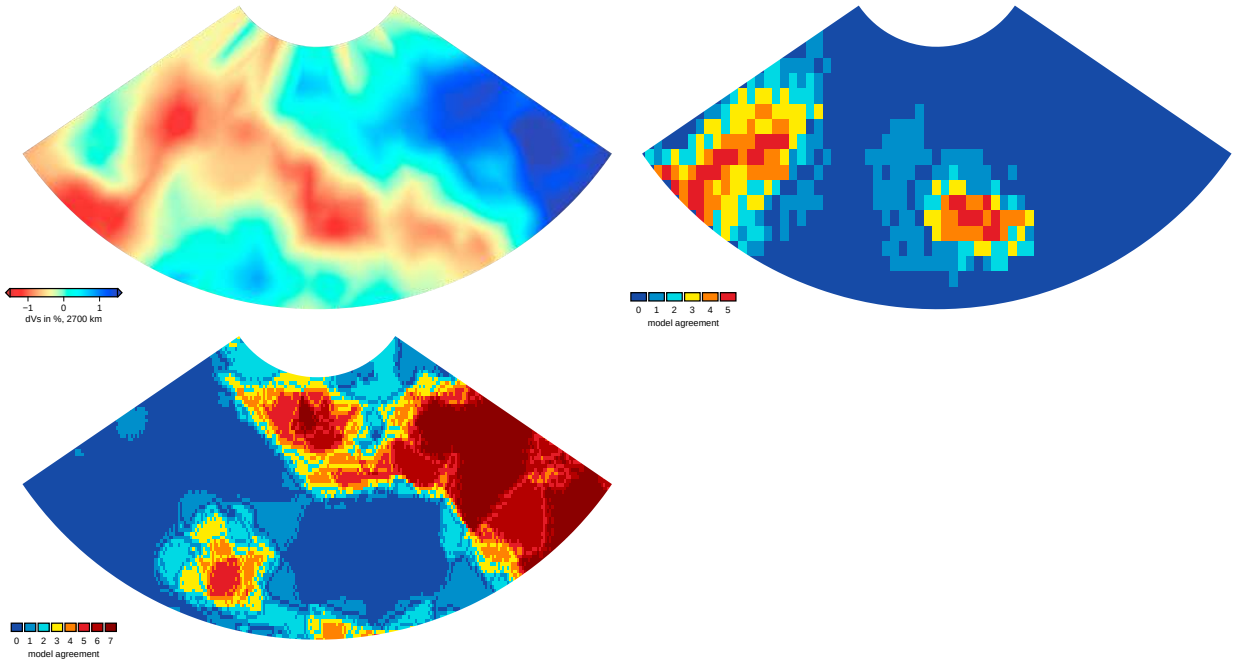

Figure 1: Plot basic content of gridfiles and add individual color bars. Upper left: GyPSuM tomography model (Simmons et al., 2010). Upper right: Cluster analysis at 2700 km depth (Lekic et al., 2012). Lower left: Vote map analyis at 2700 km depth (Shepard et al., 2017).

1.3 Plot country contours and map boundaries on top, add contours of large structures

```
##########
# Fig. 2 # plot country contours and map boundaries on top, add contours of large structures
##########

pscoast -J -R  -B15g0$mapframes -Wthinnest -Df -P -O -K -A10/0/1 -Y$Yshift2 >> $ps
pscoast -J -R  -B15g0$mapframes -Wthinner -Df -P -O -K -A10/0/1 -Wwhite -X$Xshift >> $ps
```

```
pscoast -J -R  -B15g0$mapframes -Wthinner -Df -P -O -K -A10/0/1 -Wwhite -X-$Xshift \
   -Y-$Yshift2 >> $ps
pscoast -J -R  -B15g0$mapframes -Wthinnest -Df -P -O -K -A10/0/1 -X$Xshift >> $ps

# plot contours of large structures with lines digitized with Didger(c)
gmtset PS_LINE_CAP round

col_clustfast=blue
col_clustslow=red
width_line=1.7p

awk '{if ($3 == "clusterLEKIC") print $1, $2 }' clusterLEKIC_contours.dat | psxy -J -R \
   -K -O -W$width_line,$col_clustslow,4_0_0_7:0 >> $ps
awk '{if ($3 == "Perm_cluster") print $1, $2 }' clusterLEKIC_contours.dat | psxy -J -R \
   -K -O -W$width_line,$col_clustslow,4_0_0_7:0 >> $ps

psxy clusterSHEP_contours.dat -J -R -K -O -W$width_line,$col_clustfast,4_0_0_7:0 >> $ps

# Iceland anomaly estimation from He et al. (2015)
psxy -J -R -SE- -K -O -Gred -Wred -t70 <<EOF>> $ps
-13 65 1450
EOF

psxy -J -R -SE- -K -O -Wred3 -Wthin  <<EOF>> $ps
-13 65 1450
EOF

# annotation Iceland anomaly
pstext -R -J -F+f8p,red -O -Gwhite@40 -N -K <<EOF >>$ps
-15.5 68.8 -dVs
EOF

#########################################################################################################
```

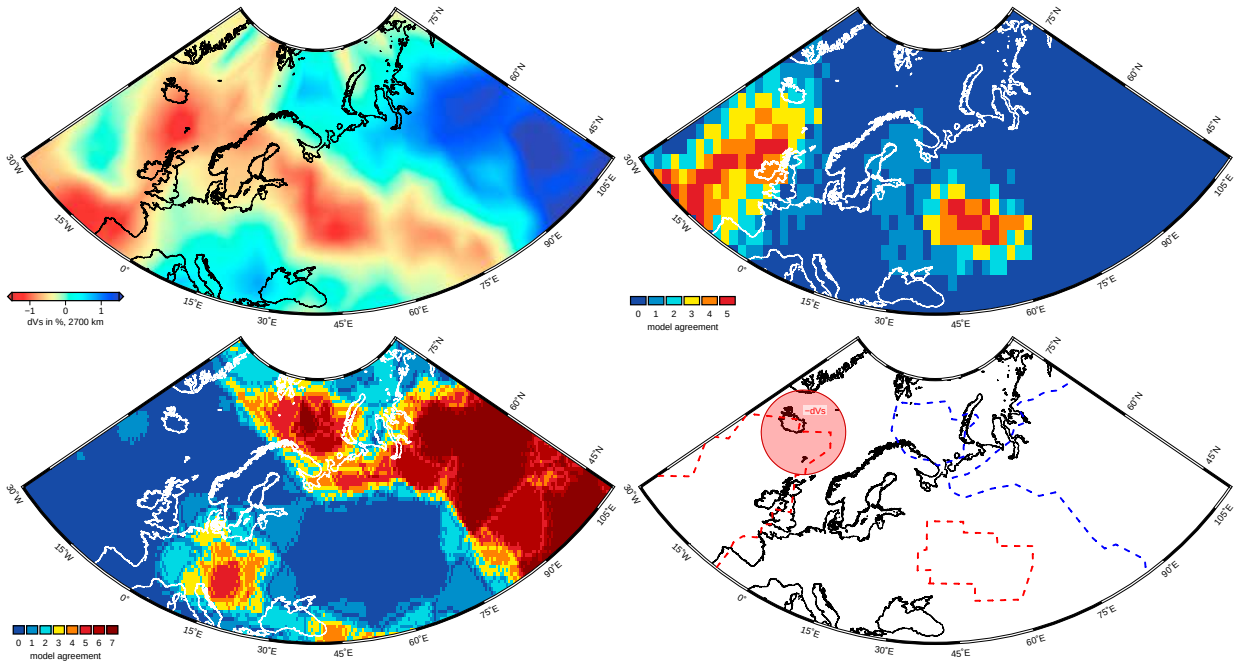

Figure 2: Plot country contours (black and white) and map boundaries on top. Add contours of large lowermost mantle structures (blue and red dashed lines) and Iceland Anomaly (large red circle) in lower right figure.

1.4 Plot connecting lines between *SKS/SKKS* pierce points

```
##########
# Fig. 3 # plot connecting lines between SKS/SKKS pierce points (available from
########## Geology website)

infile=SKS_SKKS_GR2019.dat
outfile=SKS_SKKS_pathconn.dat
outfile2=SKS_SKKS_pathconn_SI.dat

awk ' {print $1,$2} NR % 2 == 0 { print ">"; }' $infile > $outfile
# only extract discrepant ones for SI visulization
awk ' {if ($3 == "yes") print $1,$2} NR % 2 == 0 { print ">"; }' $infile > $outfile2

# plot connecting lines between SKS/SKKS pierce points
psxy $outfile -: -R -J -Wblack -O -K -W0.25p -X-$Xshift -Y$Yshift2 >> $ps
psxy $outfile -: -R -J -Wblack -O -K -W0.25p -X$Xshift >> $ps
psxy $outfile -: -R -J -Wblack -O -K -W0.25p -X-$Xshift -Y-$Yshift2 >> $ps
psxy $outfile2 -: -R -J -Wblack -O -K -W0.25p -X$Xshift >> $ps

#############################################################################################################
```

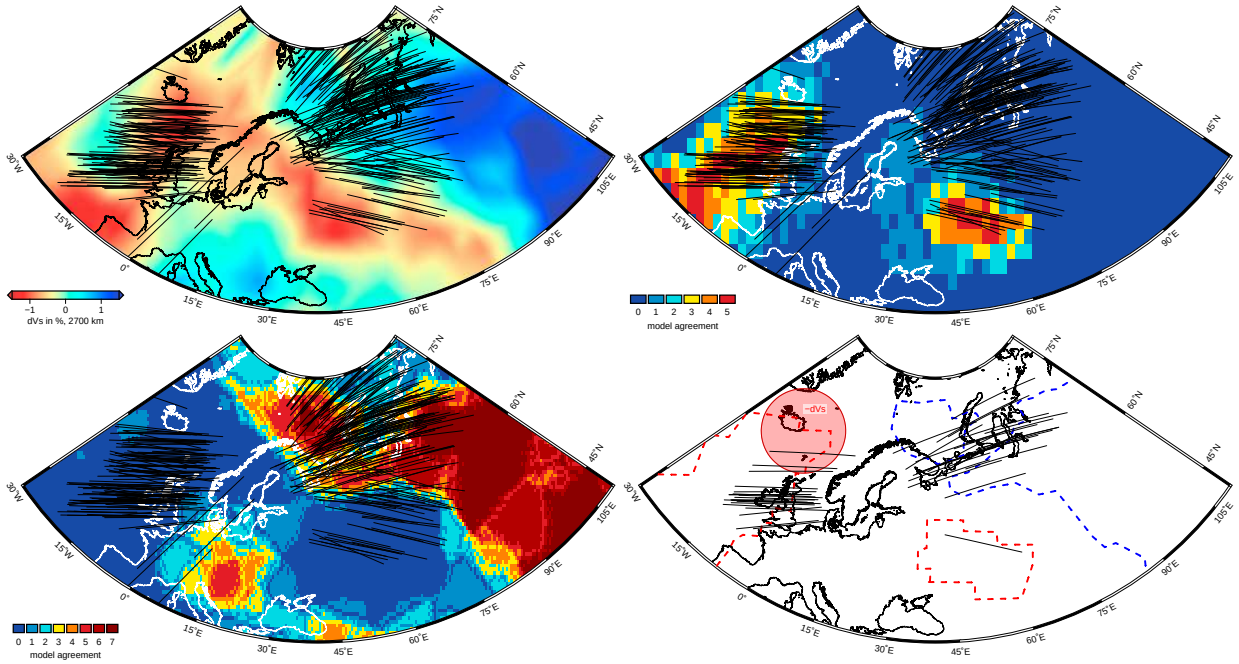

Figure 3: Plot connecting lines (thin black) between *SKS*/*SKKS* pierce points.

1.5 Plot pierce points of non-discrepant *SKS-SKKS* pairs at CMB depth

```
##########
# Fig. 4 # plot pierce points of non-discrepant SKS-SKKS pairs at CMB depth (available
########## from Geology website)

awk '{if ($3 == "no" ) print $0}' $infile |psxy -: -R -J -Sc0.10c -Gwhite -Wblack -K -O \
   -W0.6p -X-$Xshift -Y$Yshift2  >> $ps
awk '{if ($3 == "no" ) print $0}' $infile |psxy -: -R -J -Sc0.10c -Gwhite -Wblack -K -O \
   -W0.6p -X$Xshift >> $ps
awk '{if ($3 == "no" ) print $0}' $infile |psxy -: -R -J -Sc0.10c -Gwhite -Wblack -K -O \
```

```
    -W0.6p -X-$Xshift -Y-$Yshift2 >> $ps

##################################################################################################################
```

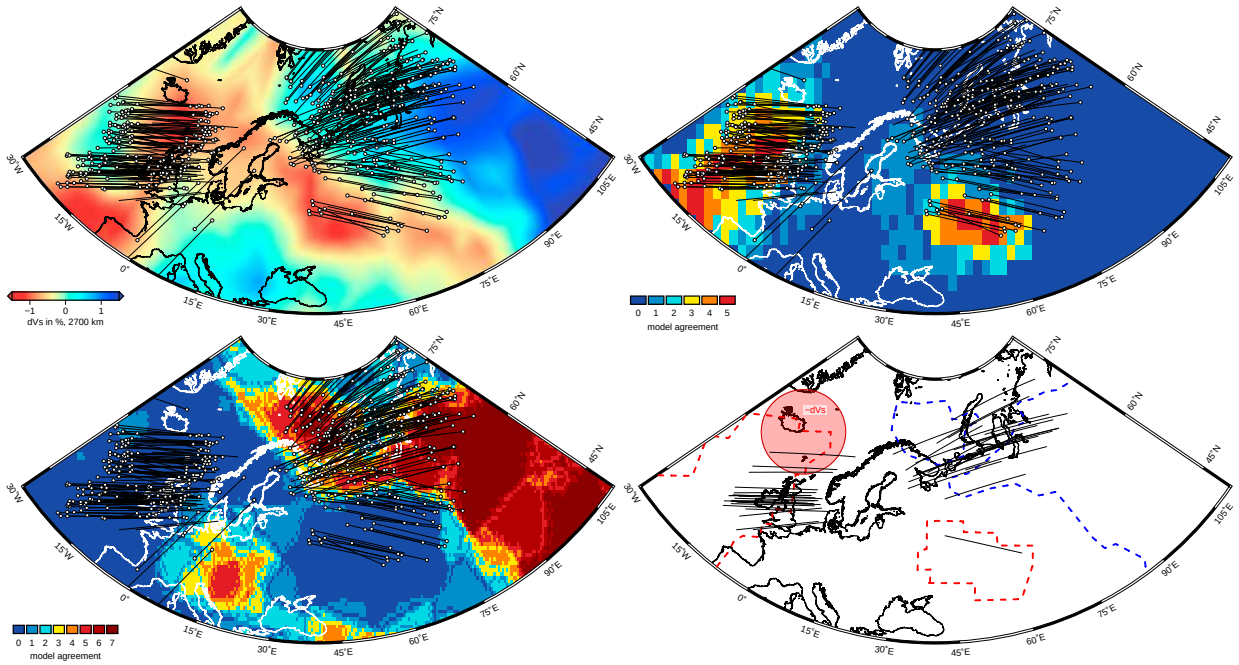

Figure 4: Plot pierce points (white circles) of non-discrepant *SKS-SKKS* pairs at CMB depth.

1.6 Plot bars of the split phase of discrepant *SKS-SKKS* pairs

```
##########
# Fig. 5 # plot bars of the split phase of discrepant SKS-SKKS pairs (representing phi
########## relative to north and the delay time) and add bar legends

bar_ew=0.85p # bar edge width
bar_fcol=black # bar fill color
bar_ecol=white # bar edge color

#.....................................
# $6*500 scales the bar length based on the measured delay time
# 70 defines the thickness of the bar
awk '{if ($3 == "yes" && $4 == "SKS" && $5 != "NULL") print $1, $2, $5, $6*500 ,70}' $infile \
    | psxy -: -R -J -SJ -G$bar_fcol -W$bar_ew,$bar_ecol -K -O -Wthin -Y$Yshift2 >> $ps
awk '{if ($3 == "yes" && $4 == "SKS" && $5 != "NULL") print $1, $2, $5, $6*500 ,70}' $infile \
    | psxy -: -R -J -SJ -G$bar_fcol -W$bar_ew,$bar_ecol -K -O -Wthin >> $ps

# make legend for black bars
psxy -: -R -J -SJ -G$bar_fcol -W$bar_ew,$bar_ecol -K -N -O -Wthin <<EOF>> $ps
83 40 90 500 60
EOF

# 1 second annotation
pstext -: -R -J -F+f8p -O -N -K <<EOF >>$ps
84 40 1 s
EOF

#.....................................
awk '{if ($3 == "yes" && $4 == "SKS" && $5 != "NULL") print $1, $2, $5, $6*500 ,70}' $infile \
    | psxy -: -R -J -SJ -G$bar_fcol -W$bar_ew,$bar_ecol -K -O -Wthin -X$Xshift >> $ps
```

```
awk '{if ($3 == "yes" && $4 == "SKKS" && $5 != "NULL") print $1, $2, $5, $6*500 ,70}' $infile \
   | psxy -: -R -J -SJ -G$bar_fcol -W$bar_ew,$bar_ecol -K -O -Wthin >> $ps

psxy -: -R -J -SJ -G$bar_fcol -W$bar_ew,$bar_ecol -K -N -O -Wthin <<EOF>> $ps
83 40 90 500 60
EOF

pstext -: -R -J -F+f8p -O -N -K <<EOF >>$ps
84 40 1 s
EOF

#.....................................
awk '{if ($3 == "yes" && $4 == "SKS" && $5 != "NULL") print $1, $2, $5, $6*500 ,70}' $infile \
   | psxy -: -R -J -SJ -G$bar_fcol -W$bar_ew,$bar_ecol -K -O -Wthin -X-$Xshift \
   -Y-$Yshift2 >> $ps

awk '{if ($3 == "yes" && $4 == "SKKS" && $5 != "NULL") print $1, $2, $5, $6*500 ,70}' $infile \
   | psxy -: -R -J -SJ -G$bar_fcol -W$bar_ew,$bar_ecol -K -O -Wthin >> $ps

psxy -: -R -J -SJ -G$bar_fcol -W$bar_ew,$bar_ecol -K -N -O -Wthin <<EOF>> $ps
83 40 90 500 60
EOF

pstext -: -R -J -F+f8p -O -N -K <<EOF >>$ps
84 40 1 s
EOF

#.....................................
awk '{if ($3 == "yes" && $4 == "SKS" && $5 != "NULL") print $1, $2, $5, $6*500 ,70}' $infile \
   | psxy -: -R -J -SJ -G$bar_fcol -W$bar_ew,$bar_ecol -K -O -Wthin -X$Xshift >> $ps
awk '{if ($3 == "yes" && $4 == "SKKS" && $5 != "NULL") print $1, $2, $5, $6*500 ,70}' $infile \
   | psxy -: -R -J -SJ -G$bar_fcol -W$bar_ew,$bar_ecol -K -O -Wthin >> $ps

psxy -: -R -J -SJ -G$bar_fcol -W$bar_ew,$bar_ecol -K -N -O -Wthin <<EOF>> $ps
83 40 90 500 60
EOF

pstext -: -R -J -F+f8p -O -N -K <<EOF >>$ps
84 40 1 s
EOF

#############################################################################################################
```

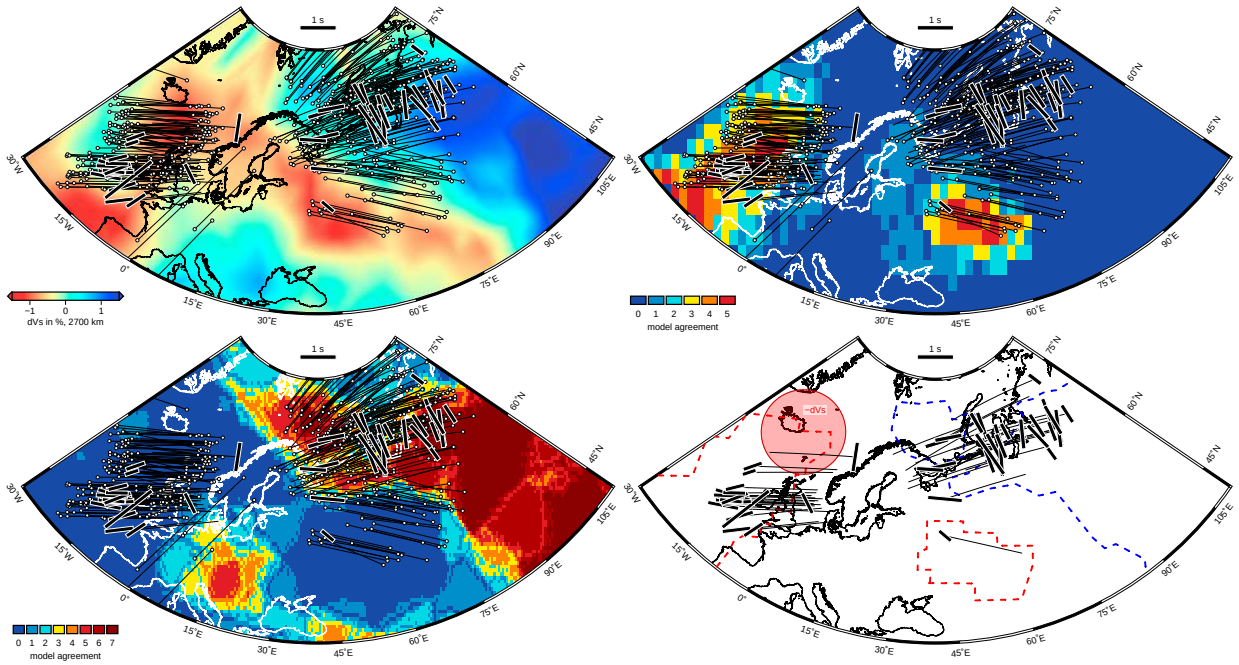

Figure 5: Plot bars (filled black with white edges) of the split phase of discrepant *SKS-SKKS* pairs (representing fast axis ϕ relative to north and the delay time δt) and add bar legends.

1.7 Plot circles red, orange and ΔSI-values (pierce points)

```
##########
# Fig. 6 # plot circles red, orange and SIdiff-values (pierce points) for discrepant
########## SKS-SKKS pairs and add legend

SKScol=red3
SKKScol=darkorange

awk '{if ($3 == "yes" && $4 == "SKS") print $0}' $infile |psxy -: -R -J -Sc0.19c -G$SKScol \
   -Wblack -K -O -W0.6p -X-$Xshift -Y$Yshift2 >> $ps
awk '{if ($3 == "yes" && $4 == "SKKS") print $0}' $infile |psxy -: -R -J -Sc0.19c -G$SKKScol \
   -Wblack -K -O -W0.6p >> $ps

### legend SKS-SKKS
pslegend -R -J -Dx0.45/0.95/1.55c/1.1c/BL -F+r2p+pblack+gwhite+p0.8p -O -K << EOF >> $ps
G 0.01i
N 1
S 0.15c c 0.19c $SKScol 0.6p 0.45c SKS
G 0.15c
S 0.15c c 0.19c $SKKScol 0.6p 0.45c SKKS
G 0.02i
EOF

#.....................................
awk '{if ($3 == "yes" && $4 == "SKS") print $0}' $infile |psxy -: -R -J -Sc0.19c -G$SKScol \
   -Wblack -K -O -W0.6p -X$Xshift >> $ps
awk '{if ($3 == "yes" && $4 == "SKKS") print $0}' $infile |psxy -: -R -J -Sc0.19c -G$SKKScol \
   -Wblack -K -O -W0.6p >> $ps

pslegend -R -J -Dx0.45/0.95/1.55c/1.1c/BL -F+r2p+pblack+gwhite+p0.8p -O -K << EOF >> $ps
G 0.01i
N 1
S 0.15c c 0.19c $SKScol 0.6p 0.45c SKS
G 0.15c
S 0.15c c 0.19c $SKKScol 0.6p 0.45c SKKS
```

```
G 0.02i
EOF

#.....................................
awk '{if ($3 == "yes" && $4 == "SKS") print $0}' $infile |psxy -: -R -J -Sc0.19c -G$SKScol \
   -Wblack -K -O -W0.6p -X-$Xshift -Y-$Yshift2 >> $ps
awk '{if ($3 == "yes" && $4 == "SKKS") print $0}' $infile |psxy -: -R -J -Sc0.19c -G$SKKScol \
   -Wblack -K -O -W0.6p >> $ps

pslegend -R -J -Dx0.45/0.95/1.55c/1.1c/BL -F+r2p+pblack+gwhite+p0.8p -O -K << EOF >> $ps
G 0.01i
N 1
S 0.15c c 0.19c $SKScol 0.6p 0.45c SKS
G 0.15c
S 0.15c c 0.19c $SKKScol 0.6p 0.45c SKKS
G 0.02i
EOF

#.....................................
# plot circles based on SI difference
awk '{if ($3 == "yes" ) print $1, $2, $7}' $infile |psxy -: -R -J -Sc0.19c -Ccmap_SIdiff.cpt \
   -Wblack -K -O -W0.6p -X$Xshift >> $ps
awk '{if ($3 == "yes" ) print $1, $2, $7}' $infile |psxy -: -R -J -Sc0.19c -Ccmap_SIdiff.cpt \
   -Wblack -K -O -W0.6p >> $ps

# S-ScS splitting from Wookey and Kendall (2008), two different reference frames are given in
# the paper, here we use the observation made at the station that is the same frame like our
# meausrements. Bar is plotted at the ~ bounce point position of ScS
colScS=127/255/0

#plot bar with 1.45 s length 1.45*500)
psxy -: -R -J -SJ -G$colScS -W$bar_ew,black -K -N -O -Wthin <<EOF>> $ps
72 85 -7 800 45
EOF

# plot circle at bounce point
psxy -: -R -J -Sc0.19c -G$colScS -Wblack -W0.6p -K -N -O -Wthin <<EOF>> $ps
72 85
EOF

# plot histogram with distribution of SI values
awk '{if ($3 == "yes") print $7}' $infile > SI_hist_temp.dat
# for each pair (SKS and SKKS) the SI diff values are included twice,
# remove doublets
sort SI_hist_temp.dat | uniq > SI_hist_uni_temp.dat

pshistogram SI_hist_uni_temp.dat -Jx3.2/0.08 -W0.2 -R0/1/0/20  -L1p -X-0.3i -BWSne \
   -Ccmap_SIdiff.cpt -By10+l"counts" -Bxa0.2+l"@~D@~SI" -O -K>> $ps

#############################################################################################
```

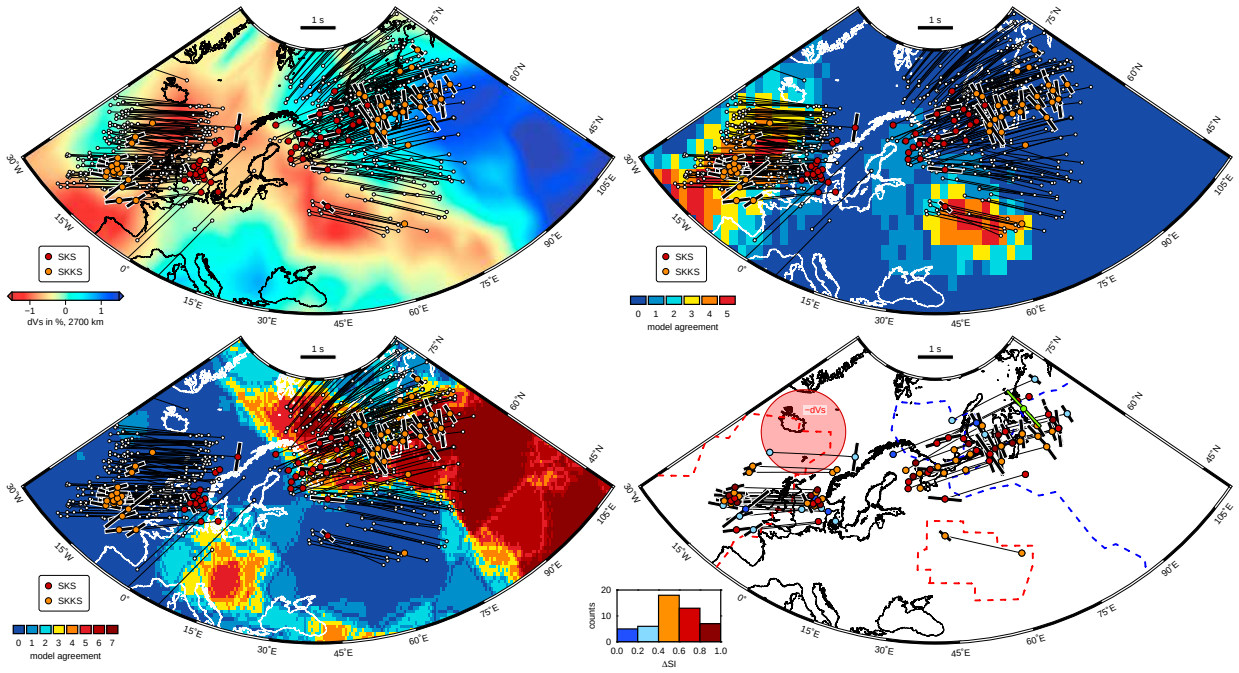

Figure 6: Plot circles red, orange and ΔSI-values (pierce points), add legends, a histogram for the ΔSI distribution and an *S-ScS* splitting measurement of Wookey & Kendall (2008) as green bar (lower right figure).

1.8 Add text and arrows for major structures, roseplots and legend

```
##########
# Fig. 7 # add text and arrows for major structures, roseplots and legend
##########

Xshifttemp=7.2i

# -C sets distance between text and edge of textbox, -TO generates round corners
pstext -R$projR -J$projJ -F+f8p -O -K -Gwhite@30 -TO -C0.025i/0.025i  -X-$Xshifttemp \
   -Y$Yshift2 << EOF >> $ps
50 45 Perm Anomaly
-10 71.5 Iceland Anomaly
5 43.5 African LLSVP
100 55 fast anomaly
EOF

# arrows from textboxes to area of interest
psxy -R -J -Gblack -Wblack -SV0.15c+e+n0.03c+a40 -W0.8 -K -O << EOF >> $ps
50 46 -20 1
-8 70.3 -170 0.9
-1.5 41.5 -80 0.7
EOF

#.....................................
pstext -R -J -F+f8p -O -K -Gwhite@30  -TO -C0.025i/0.025i  -X$Xshift  << EOF >> $ps
50 45 Perm Anomaly
-10 71.5 Iceland Anomaly
5 43.5 African LLSVP
EOF

psxy -R -J -Gblack -Wblack -SV0.15c+e+n0.03c+a40 -W0.8 -K -O << EOF >> $ps
50 46 -20 1
-8 70.3 -170 0.9
-1.5 41.5 -80 0.7
```

```
EOF

#.....................................
pstext -R -J -F+f8p -O -K -Gwhite@30  -TO -C0.025i/0.025i  -X-$Xshift \
   -Y-$Yshift2  << EOF >> $ps
100 55 fast anomaly
EOF

#########################################################
# generate roseplots

MAX_radial=1    # plot radius within roseplot
radi_rose=1.1c  # radius roseplot on map

# sort in east and west cluster
awk '{if ($3 == "yes" && $2 > 15 && $5 != "NULL") print $5}' $infile > ROSE_EAST_temp.dat
awk '{if ($3 == "yes" && $2 < 15 && $5 != "NULL") print $5}' $infile > ROSE_WEST_temp.dat

scale_down=0.125 # scale length down to fit frame of roseplot
awk '{print 1.2, $1}' ROSE_EAST_temp.dat | psrose -F -L -R0/$MAX_radial/0/360 -S$radi_rose \
   -Z$scale_down -A15 -X12.5i -Y0.75i -Bx25 -By90g90 -B+gwhite -T -Gdarkgray -W0.75p,black \
   -O -K >> $ps
awk '{print 1.2, $1}' ROSE_EAST_temp.dat | psrose -F -L -R0/$MAX_radial/0/360 -S$radi_rose \
   -Z$scale_down -A15 -T -Gdarkgray -W0.75p,black -O -K >> $ps

scale_down=0.16 # scale length down to fit frame of roseplot
awk '{print 1.2, $1}' ROSE_WEST_temp.dat | psrose -F -L -R0/$MAX_radial/0/360 -S$radi_rose \
   -Z$scale_down -A15 -X-3.3i -Y-0.35i -Bx25 -By90g90 -B+gwhite -T -Gdarkgray -W0.75p,black \
   -O -K >> $ps
awk '{print 1.2, $1}' ROSE_WEST_temp.dat | psrose -F -L -R0/$MAX_radial/0/360 -S$radi_rose \
   -Z$scale_down -A15 -T -Gdarkgray -W0.75p,black -O -K >> $ps

# annotation WEST and EAST roseplot
pstext -R$projR -J$projJ -F+f8p -O -N -K -X-1.5i << EOF >> $ps
7.4 42.2 West
68.8 48.3 East
EOF

# add legend for slow and fast cluster contour
pslegend -R -J -Dx15/-1/2.55c/1.125c/BL -F+r2p+pblack+gwhite+p0.8p -t0 -O -K << EOF >> $ps
G 0.01i
N 1
S 0.1i - 0.08i - $width_line,$col_clustslow 0.3i slow cluster
G 0.05i
S 0.1i - 0.08i - $width_line,$col_clustfast 0.3i fast cluster
G 0.02i
EOF

########################
#gv $ps &
rm *_temp.dat
ps2pdf $ps $ps.pdf
pdfcrop $ps.pdf $ps.pdf

########################
```

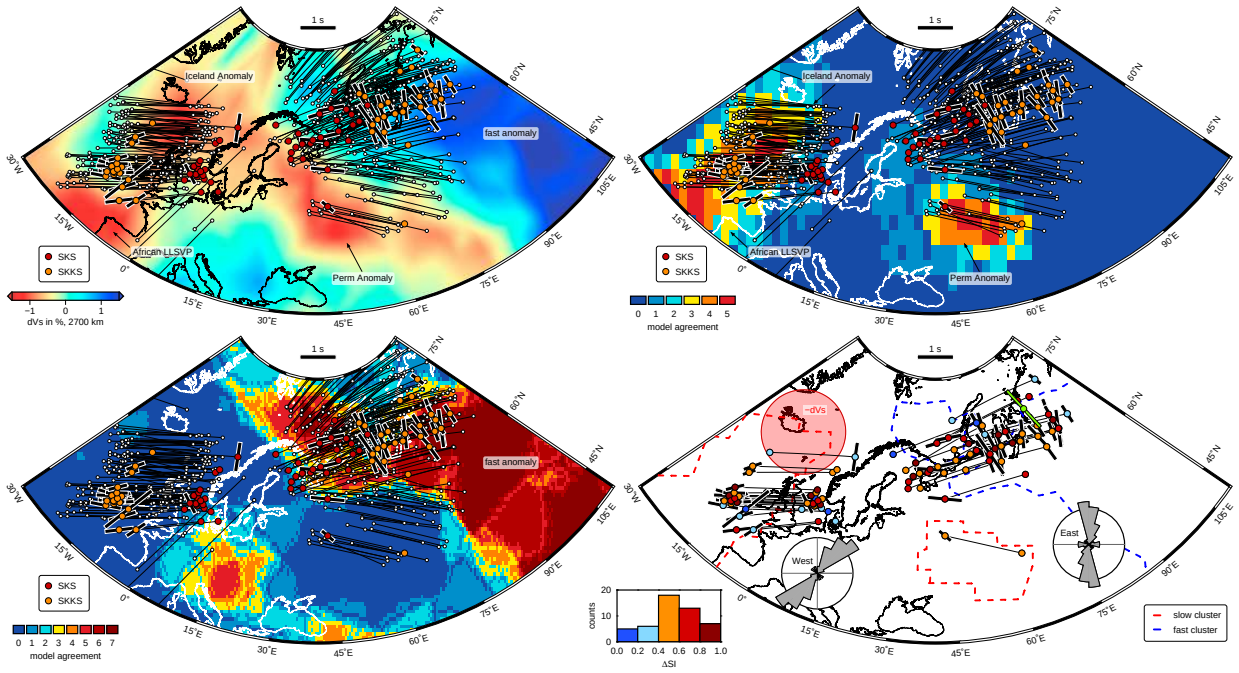

Figure 7: Add text and arrows for major structures (African LLSVP, Iceland Anomaly, Perm Anomaly, fast anomaly), roseplots and legend (lower right figure).

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