function TETGAR\_C(Alm,Prp,Grs,Sps,SPS,marker,string)

% color plotting in TETGAR\_C is based on plot3c by Ulrich Theune; for testing whether a point plots in a convex hull see Inhull by John D'Errico

%calculation of coordinantes for the system Almandine-Pyrope-Grossular-Spessartine

x = (Alm/100)\*1+(Prp/100)\*2+(Grs/100)\*3+(Sps/100)\*2; % calculation of x- coordinates

y = (Alm/100)\*1+(Prp/100)\*2.7322+(Grs/100)\*1+(Sps/100)\*1.57735; % calculation of y-coordinates

z = (Alm/100)\*1+(Prp/100)\*1+(Grs/100)\*1+(Sps/100)\*2.633; % calculation of z-coordinates

data\_array=transpose([x;y;z]);

string='SPESSARTINE mol%'

subplot

x1=[3 2 1 2 3 2 2 1 3] ; %tetrahedron

y1=[1 2.732 1 1.577350 1 1.577350 2.732 1 1 ] ;

z1=[1 1 1 2.633 1 2.633 1 1 1 ];

x37=[3 2 1 3] %tetrahedron base

y37=[1 2.732 1 1]

z37=[1 1 1 1]

x2=[0.9] ; %annotation almandine

y2=[0.95];

z2=[1] ;

x3=[3.01]; %annotation grossular

y3=[0.95];

z3=[1];

x4=[2.03]; %annotation pyrope

y4=[2.86];

z4=[1.0];

x5=[2.03] ; %annotation spessartine

y5=[ 1.62];

z5=[2.72];

x6=[1.5 2.5 2 1.5 2 2.5 1.5 2 2.5 2.5 2 1.5 1.5 1.75 2.25 2 1.75 1.25 1.5 1.25 1.25 1.5 2.5 2.75 2.75 2.5 3 2.25 1.75 2 2.25 2.125 1.875 2 2.125 2.375 1.625 2 2.375 2.625 2.25 2.625 2.625 3 2.875 2.875 2.75 2.875 3 1 1.25 1.125 1.125 1.25 1.75 1.375 1.375 1.75 1 2 2 1.875 2.125 2 2 2.375 1.625 2 2.375];

y6=[ 1.866025 1.866025 1 1.866025 2.154675 1.28867 1.28867 2.154675 1.866025 1.28867 1 1.28867 1.866025 2.299 2.299 2.4433375 2.299 1.433 1 1.14433 1.433 1 1 1.14433 1.433 1 1 1.433 1.433 1.85621625 1.433 1.5051 1.5051 1.72168 1.5051 1.36083 1.36083 2.01035 1.36083 1.2165 1 1.649 1.2165 1 1.07216 1.2165 1 1.07216 1 1 1 1.07216 1.2165 1 1 1.2165 1.649 1 1 2.732 2.5876 2.5155 2.5155 2.5876 2.732 2.0825125 2.0825125 2.2997 2.0825125];

z6=[1 1 1 1 1.8165 1.8165 1.8165 1.8165 1 1.8165 1 1.8165 1 1 1 1.40825 1 1 1 1.40825 1 1 1 1.40825 1 1 1 2.22475 2.22475 2.22475 2.22475 2.42887 2.42887 2.42887 2.42887 2.020625 2.020625 2.020625 2.020625 1.61237 1 1 1.61237 1 1.20412 1 1 1.20412 1 1 1 1.20412 1 1 1 1.61237 1 1 1 1 1.20412 1 1 1.20412 1 1 1 1.61237 1 ];

x7=[1.37]; % annotation 50%

y7=[1.866025];

z7=[0.97];

x8=[2.55]; % annotation 50%

y8=[1.866025];

z8=[0.97];

x9=[2]; % annotation 50%

y9=[0.95];

z9=[0.97];

x10=[1.43]; % annotation 50%

y10=[1.28866];

z10=[1.8165];

x11=[2.525]; % annotation 50%

y11=[1.28866];

z11=[1.8165];

x12=[2]; % annotation 50%

y12=[2.17];

z12=[1.8165];

x13=[1.65]; % annotation 75%

y13=[1.433];

z13=[2.2275];

x14=[2.275]; % annotation 75%

y14=[1.433];

z14=[2.2275];

x15=[2]; % annotation 75%

y15=[1.88];

z15=[2.2275];

x16=[2]; % annotation 75%

y16=[2.46];

z16=[1.40825];

x17=[1.62]; % annotation 75%

y17=[2.31];

z17=[0.97];

x18=[2.30]; % annotation 75%

y18=[2.31];

z18=[0.97];

x19=[1.5];% annotation 75%

y19=[0.95];

z19=[0.97];

x20=[1.12]; % annotation 75%

y20=[1.44];

z20=[0.97];

x21=[1.165]; % annotation 75%

y21=[1.14433];

z21=[1.40825];

x22=[2.5]; % annotation 75%

y22=[0.95];

z22=[0.97];

x23=[2.77];% annotation 75%

y23=[1.14433];

z23=[1.40825];

x24=[2.80]; % annotation 75%

y24=[1.44];

z24=[0.97];

x25=[1.25]; % annotation 87.5%

y25=[0.95];

z25=[0.97];

x26=[1.75]; % annotation 62.5%

y26=[0.95];

z26=[0.97];

x27=[2.25] ; % annotation 62.5%

y27=[0.95];

z27=[0.97];

x28=[2.75]; % annotation 87.5%

y28=[0.95];

z28=[0.97];

x29=[1.01]; % annotation 87.5%

y29=[1.24];

z29=[0.97];

x30=[2.91] ; % annotation 87.5%

y30=[1.24];

z30=[0.97];

x31=[1.255] ; % annotation 62.5%

y31=[1.677];

z31=[0.97];

x32=[2.665]; % annotation 62.5%

y32=[1.677];

z32=[0.97];

x33=[1.50]; % annotation 62.5%

y33=[2.10];

z33=[0.97];

x34=[2.42] ; % annotation 62.5%

y34=[2.10];

z34=[0.97];

x35=[1.76] ; % annotation 87.5%

y35=[2.54];

z35=[0.97];

x36=[2.165]; % annotation 87.5%

y36=[2.54];

z36=[0.97];

x42=[1.51]; %annotation granites & pegmatites

y42=[1.40];

z42=[1.82];

x43=[1.91]; %annotation greenschists

y43=[1.32];

z43=[1.71];

x44=[1.39] ; %annotation metasedimentary amphibolites

y44=[1.06];

z44=[1.10];

x45=[1.63] ; %annotation metasedimentary & metaigneous blueschists

y45=[1.04];

z45=[1.10];

x46=[2.34] ; %annotation metasomatic rocks

y46=[1.07];

z46=[1.10];

x47=[1.64] ; %annotation metasedimentary granulites

y47=[1.88];

z47=[1.07];

x48=[1.61] ; %annotation metigneous granulites

y48=[1.47];

z48=[1.04];

x49=[1.65] ; %annotation metaigneous amphibolites

y49=[1.33];

z49=[1.07];

x50=[1.70] ; %annotation metasedimentary+metaigneous eclogites

y50=[1.65];

z50=[1.07];

x51=[1.78] ; %annotation ultramafic rocks

y51=[2.19];

z51=[1.04];

plot3(x1,y1,z1, 'k') %plot tetrahedron

hold on

grid

whitebg('white')

axis equal

 set(gcf, 'Color', [1,1,1])

hold on

% representative metasedimentary and metaigneous blueschist garnets (within the range of +/- SD of the mean)

bluex=[1.697; 1.715284715; 1.626252505; 1.698698699; 1.653923541; 1.652347652; 1.698396794; 1.692; 1.675702811; 1.609; 1.689; 1.605779154; 1.646292585; 1.636734694; 1.618618619; 1.59; 1.693239152; 1.623; 1.63; 1.603045685; 1.594; 1.624624625; 1.675; 1.728; 1.632; 1.598796389; 1.599; 1.629; 1.637637638; 1.765765766; 1.636; 1.664937759; 1.62; 1.634441088; 1.648; 1.641; 1.642; 1.622851365; 1.647; 1.677; 1.640280561; 1.655; 1.627; 1.667; 1.713; 1.693; 1.632820513; 1.716716717; 1.744723618; 1.66838843; 1.599; 1.557459677; 1.725430598; 1.712712713; 1.597; 1.692; 1.692; 1.718592965; 1.577435897; 1.675510204; 1.654; 1.57; 1.705; 1.651651652; 1.698698699; 1.532; 1.681; 1.69035533; 1.659; 1.787; 1.647590361; 1.74; 1.737; 1.72983871; 1.707];

bluey=[1.2072634; 1.200712388; 1.147516132; 1.141011812; 1.065053119; 1.150535664; 1.233134168; 1.1293256; 1.217372791; 1.222277; 1.166853; 1.21270743; 1.240079359; 1.210909388; 1.18724985; 1.1027723; 1.1893444; 1.176094; 1.167434; 1.222735025; 1.2113117; 1.176848549; 1.2407557; 1.2771277; 1.2240134; 1.219475827; 1.1899511; 1.1788271; 1.172071171; 1.231750851; 1.2805928; 1.274141909; 1.1743642; 1.070940785; 1.2667379; 1.2303659; 1.1662819; 1.231176845; 1.2326756; 1.1745196; 1.167193988; 1.2253253; 1.1699024; 1.1326441; 1.2938755; 1.2585046; 1.17631241; 1.171499499; 1.236170553; 1.216517045; 1.1098656; 1.133719355; 1.26951844; 1.250101301; 1.1742209; 1.1932751; 1.1932751; 1.238499598; 1.145531077; 1.246707449; 1.1543287; 1.2182606; 1.1472486; 1.161265866; 1.154909209; 1.1466731; 1.1911285; 1.167666802; 1.1118832; 1.2400512; 1.111910743; 1.1655796; 1.1668893; 1.118774597; 1.1842423];

bluez=[1.00326; 1.004885115; 1.0048998; 1.006526527; 1.006559356; 1.00977023; 1.011432866; 1.01304; 1.014728916; 1.0163; 1.0163; 1.025232198; 1.026132265; 1.026612245; 1.029369369; 1.03097; 1.031251261; 1.0326; 1.0326; 1.033096447; 1.03423; 1.034264264; 1.03423; 1.03423; 1.03586; 1.035967904; 1.03749; 1.03849; 1.038528529; 1.037527528; 1.03912; 1.041618257; 1.04238; 1.042678751; 1.04401; 1.04401; 1.04401; 1.044499494; 1.04564; 1.04464; 1.045731463; 1.04627; 1.05116; 1.05479; 1.05705; 1.06294; 1.064553846; 1.066266266; 1.067165829; 1.075774793; 1.07724; 1.079879032; 1.085238095; 1.092372372; 1.09391; 1.10369; 1.10369; 1.10320603; 1.108020513; 1.115785714; 1.11473; 1.12714; 1.12714; 1.127267267; 1.128898899; 1.13529; 1.13855; 1.155553299; 1.15748; 1.15748; 1.168564257; 1.17704; 1.17767; 1.216895161; 1.32437];

%representative metasedimentary and metaigneous eclogite garnets (within the range of +/- SD of the mean)

ecx=[1.842157842; 1.8; 1.765593561; 1.782217782; 1.751; 1.755; 1.948948949; 1.963; 1.96; 1.851851852; 1.79258517; 1.745235707; 1.771; 1.788; 1.805805806; 1.735; 1.793; 1.9168357; 1.725274725; 1.849150849; 1.85985986; 1.812625251; 1.841683367; 1.825; 1.824; 1.713; 1.824; 1.843; 1.695783133; 1.834; 1.854563691; 1.789795918; 1.774358974; 1.737874097; 1.728915663; 1.828396323; 1.787; 1.666666667; 1.749; 1.783; 1.783367556; 1.675];

ecy=[1.712295105; 1.5115188; 1.60347163; 1.396233966; 1.4243422; 1.4763022; 1.624146346; 1.6287182; 1.5842639; 1.728748649; 1.58717024; 1.62250341; 1.3423616; 1.4687976; 1.543817417; 1.6333376; 1.6471936; 1.566796755; 1.463715584; 1.479865135; 1.555376376; 1.594113226; 1.58196493; 1.3492907; 1.4099107; 1.4636027; 1.4999747; 1.5425427; 1.486332028; 1.5958124; 1.56212678; 1.568343265; 1.661854769; 1.417226419; 1.398805321; 1.473979673; 1.5120998; 1.378481263; 1.4589866; 1.4716883; 1.683441786; 1.602166];

ecz=[1.003256743; 1.00652; 1.006559356; 1.00977023; 1.00978; 1.00978; 1.00978979; 1.00978 ;1.01141; 1.011421421; 1.011432866; 1.011444333; 1.01304; 1.01304; 1.013053053; 1.01304; 1.01304; 1.013225152; 1.014655345; 1.016283716; 1.016316316; 1.016332665; 1.016332665; 1.01793; 1.01793; 1.01793; 1.01793; 1.01893; 1.018002008; 1.01956; 1.020621866; 1.020979592; 1.021087179; 1.019153767; 1.0212751; 1.022665986; 1.02282; 1.027650104; 1.02934; 1.03097; 1.031796715; 1.0326];

%representative pegmatite garnets (within the range of +/- SD of the mean)

pex=[1.449; 1.39217653; 1.384; 1.385614386; 1.412; 1.4; 1.557; 1.431343134; 1.574; 1.4418; 1.577; 1.592; 1.571; 1.478; 1.590590591; 1.602602603; 1.61; 1.611; 1.629; 1.5677; 1.616480163];

pey=[1.2616805; 1.233476128; 1.2264309; 1.227361139; 1.246065; 1.2472237; 1.4036902; 1.24720154; 1.3881044; 1.25486034; 1.3956145; 1.4008193; 1.391005; 1.2841987; 1.388509409; 1.379263564; 1.3765823; 1.3898639; 1.3898672; 1.32113342; 1.351424517];

pez=[1.66015; 1.492106319; 1.51671; 1.529220779; 1.5379; 1.55583; 1.59658; 1.604138414; 1.60636; 1.626246; 1.62755; 1.66667; 1.6683; 1.66993; 1.68039039; 1.683653654; 1.71557; 1.72861; 1.74328; 1.861618; 1.926927772];

%representative metasedimentary greenschist garnets (within the range of +/- SD of the mean)

grex=[1.580958096; 1.64; 1.768039672; 1.714585834; 1.77722063; 1.96039604; 1.7698; 1.7727; 1.85; 1.8288; 1.817; 1.8242; 1.81; 1.882414152];

grey=[1.123274637; 1.1385625; 1.126149939; 1.13336225; 1.142209972; 1.211503465; 1.240292245; 1.245546005; 1.2598065; 1.27181572; 1.2823235; 1.289482665; 1.3406345; 1.303994017];

grez=[1.161029903; 1.24495; 1.246743143; 1.258607343; 1.346085039; 1.501217822; 1.5988211; 1.6014339; 1.63687; 1.7041496; 1.73485; 1.7575487; 1.76751; 1.773168574];

%representative metaigneous granulite garnets (within the range of +/- SD of the mean)

metiggrax=[ 1.73026973; 1.609; 1.664994985; 1.751794872; 1.68; 1.636; 1.663663664; 1.692; 1.681; 1.705521472; 1.57957958; 1.709; 1.632632633; 1.695; 1.649350649; 1.677710843; 1.685055165; 1.633165829; 1.683; 1.65965966; 1.674; 1.633633634; 1.656312625; 1.665; 1.681318681; 1.669; 1.691];

metiggray=[1.419302198; 1.39547355; 1.469626429; 1.444694923; 1.5103629; 1.46417625; 1.527633233; 1.5219096; 1.51902295; 1.358915082; 1.369285586; 1.546735; 1.396447447; 1.51786835; 1.448716983; 1.539656325; 1.539115045; 1.471150804; 1.54442575; 1.420141892; 1.4306911; 1.474465566; 1.467999098; 1.48322845; 1.475247952; 1.4497432; 1.4774553];

metiggraz=[1.016313686; 1.021229; 1.021292879; 1.021773333; 1.022862; 1.024495; 1.026154154; 1.026128; 1.027761; 1.028385481; 1.029423423; 1.03266; 1.032692693; 1.034293; 1.03589011; 1.036070281; 1.036034102; 1.037747739; 1.040825; 1.040865866; 1.042458; 1.042500501; 1.042543086; 1.044091; 1.052203796; 1.052256; 1.062054];

%representative metaigneous amphibolite garnets (within the range of +/- SD of the mean)

metigamx=[1.726452906; 1.637396694; 1.57; 1.674; 1.677385892; 1.697; 1.685110664; 1.696696697; 1.663654618; 1.73; 1.686686687; 1.557575758; 1.548155738; 1.630390144; 1.630390144; 1.637014315; 1.591331269];

metigamy=[1.3314751; 1.314312862; 1.3821949; 1.38334965; 1.270101297; 1.2811617; 1.282858853; 1.257748849; 1.249830472; 1.2124592; 1.248502452; 1.202942323; 1.26441501; 1.244212012; 1.244212012; 1.255609969; 1.265133695];

metigamz=[1.014726453; 1.018556818; 1.022862; 1.031027; 1.032185685; 1.035926; 1.036142857; 1.042500501; 1.047547189; 1.052256; 1.060481481; 1.089072727; 1.105408811; 1.117361396; 1.117361396; 1.121890593; 1.123022704];

% representative metasedimentary granulite garnets (within the range of +/- SD of the mean)

sedgrax=[1.464; 1.552; 1.612676056; 1.578; 1.612; 1.516; 1.407407407; 1.353646354; 1.44044044; 1.624; 1.508682329; 1.524; 1.41; 1.42; 1.513; 1.54; 1.58041958; 1.477522478; 1.368686869; 1.545734841; 1.411; 1.539; 1.473473473; 1.565; 1.575; 1.454; 1.44; 1.451354062; 1.477948718; 1.441; 1.598; 1.463; 1.548; 1.496; 1.546; 1.422; 1.437; 1.571571572; 1.639558233; 1.581; 1.485; 1.495; 1.62; 1.431863727; 1.582164329; 1.357862903; 1.46; 1.554; 1.594; 1.444; 1.462; 1.609829488; 1.560247168; 1.503; 1.375375375; 1.47464503; 1.355; 1.389167503; 1.38804458; 1.394; 1.61; 1.46680286; 1.59; 1.495486459; 1.478439425; 1.445240532; 1.465163934; 1.401422764; 1.548; 1.47; 1.426; 1.482; 1.410876133; 1.396; 1.49389002; 1.407815631; 1.523906409];

sedgray=[1.7355227; 1.6904907; 1.875293159; 1.82905075; 1.88793875; 1.47918675; 1.639747848; 1.519081019; 1.523587688; 1.8140401; 1.732429111; 1.85791745; 1.64314945; 1.63622145; 1.79383345; 1.84059745; 1.862251199; 1.607901548; 1.588413586; 1.630735303; 1.6367988; 1.8515668; 1.665175976; 1.8099988; 1.8099988; 1.5969628; 1.5068988; 1.644660782; 1.607965949; 1.66262415; 1.87219615; 1.57948815; 1.68514015; 1.42607215; 1.8544535; 1.6292935; 1.6233655; 1.54497047; 1.672551707; 1.89933085; 1.62987085; 1.44627885; 1.63779885; 1.586010872; 1.842860571; 1.527438357; 1.6643562; 1.8071122; 1.8729282; 1.6062002; 1.6131282; 1.865865797; 1.475225747; 1.71069755; 1.541503053; 1.746395081; 1.4809189; 1.508424173; 1.422910081; 1.5149816; 1.8717736; 1.737305005; 1.90179495; 1.730787312; 1.622382238; 1.602152508; 1.593896516; 1.568532876; 1.8621137; 1.7116977; 1.5535084; 1.6031591; 1.576752367; 1.45220715; 1.528536813; 1.460633768; 1.511984232];

sedgraz=[1.003266; 1.003266; 1.006571429; 1.008165; 1.008165; 1.008165; 1.009807808; 1.009788212; 1.009807808; 1.009798; 1.010008172; 1.011431; 1.011431; 1.011431; 1.011431; 1.011431; 1.01141958; 1.01141958; 1.011546465; 1.011748201; 1.013064; 1.013064; 1.013077077; 1.013064; 1.013064; 1.013064; 1.013064; 1.012100301; 1.014424615; 1.015697; 1.015697; 1.015697; 1.015697; 1.014697; 1.01633; 1.01633; 1.01733; 1.016346346; 1.015391566; 1.018963; 1.017963; 1.017963; 1.018963; 1.017998998; 1.017998998; 1.017099798; 1.020596; 1.019596; 1.019596; 1.019596; 1.019596; 1.018651956; 1.01915139; 1.021229; 1.02125025; 1.022544625; 1.022862; 1.022930792; 1.024817629; 1.026128; 1.026128; 1.025667007; 1.027761; 1.027844534; 1.030178645; 1.033428864; 1.033463115; 1.03485061; 1.034926; 1.036926; 1.040192; 1.043458; 1.042757301; 1.046357; 1.048225051; 1.048086172; 1.050854527];

%representative metamafic garnets (within the range of +/- SD of the mean)

mafx=[1.929; 1.938; 2.032064128; 2.116116116; 1.9749499; 2.021042084; 2.021105528; 1.921588595; 1.90392562; 2.055323591; 2.024784483; 1.936063936; 1.921; 1.992992993; 1.862587763; 2.093467337; 1.93800813; 1.884928717; 1.920326864; 1.929519918; 1.92642487; 1.886694387; 1.901041667; 1.863541667; 1.905337362; 1.948640483; 1.936491935; 1.868287741; 1.870050761; 1.873096447; 1.925888325; 1.87398374; 1.87804878; 1.887983707; 1.915392457; 1.882772681; 1.886734694; 1.897854954; 1.949948927; 1.923391216; 1.918116684; 1.907786885; 1.939425051; 1.926879506; 1.890965732; 1.87987988; 1.887887888; 1.912912913; 1.926853707; 1.938816449; 1.952858576; 1.881526104; 2.008040201; 1.873239437; 1.868686869; 1.885858586; 1.916751269; 1.884028484; 1.929735234; 1.922528033; 1.856994819; 1.895119418; 1.858627859; 1.898216159; 1.836; 1.839; 1.903711133; 2.003024194; 1.878419453; 1.880658436; 1.877846791; 1.986528497; 1.834024896; 1.893193717; 1.816176471; 1.835835836; 1.895791583; 1.846693387; 1.80761523; 1.928427419; 1.952620968; 2.032454361; 1.913705584; 1.885683761; 1.889247312; 1.890928726; 1.77; 1.89; 1.833833834; 1.80980981; 1.85985986; 1.853413655; 1.947791165; 1.942190669; 1.899799599; 1.872361809; 1.891891892; 1.905905906; 1.875251509; 1.797174571; 1.957446809; 1.897795591; 1.827447023; 1.852941176];

mafy=[2.2025854; 2.2181734; 1.94641022; 1.936794194; 2.142518437; 1.847488377; 1.95970794; 2.224628717; 2.270968388; 1.984118372; 2.015932543; 2.217533217; 2.17371875; 1.895762513; 2.161615597; 1.97943593; 2.196323933; 2.181122963; 2.230740296; 2.22543284; 2.257569689; 2.24168685; 2.291182031; 2.168498698; 2.104084693; 2.137224673; 2.136625101; 2.163440831; 2.151736142; 2.146461015; 2.220312792; 2.164483841; 2.158187093; 2.191547963; 2.250006218; 2.182915494; 2.210632755; 2.215407661; 2.278823391; 2.227791726; 2.221441249; 2.220168135; 2.26151961; 2.262879609; 2.258982451; 2.124037487; 2.13443989; 1.872646096; 2.152197846; 2.141193029; 1.832703561; 2.074250452; 2.132037638; 2.123727817; 2.128268131; 2.14825197; 2.12594665; 2.174048271; 2.260649134; 2.211752752; 2.17799943; 2.275008775; 2.230284252; 2.271749685; 2.0542108; 2.0462828; 1.906245537; 2.085410081; 2.203216616; 2.177237449; 2.19737764; 2.218083731; 2.176986307; 2.221770471; 2.116460924; 2.044708859; 2.200946042; 2.088140431; 2.016986122; 2.108689667; 2.136625151; 2.092600558; 2.178854975; 2.263059989; 2.268271129; 2.276699946; 1.9483735; 2.1142535; 2.068558058; 2.017278779; 1.822367868; 2.003957329; 2.010913153; 2.131831136; 1.914748347; 2.163950603; 2.073181381; 2.070446647; 2.04125171; 1.989215136; 1.847574671; 1.949881313; 1.893672603; 2.14939711];

mafz=[1.006532; 1.006532; 1.00654509; 1.006538539; 1.00654509; 1.00654509; 1.006564824; 1.006651731; 1.006747934; 1.006818372; 1.007038793; 1.008156843; 1.008165; 1.008173173; 1.008189569; 1.00820603; 1.008297764; 1.008314664; 1.008340143; 1.008340143; 1.00846114; 1.008487526; 1.008505208; 1.008505208; 1.009867069; 1.009867069; 1.009877016; 1.009927052; 1.009947208; 1.009947208; 1.009947208; 1.010973577; 1.009957317; 1.010995927; 1.009987768; 1.009987768; 1.009997959; 1.010008172; 1.007965271; 1.010008172; 1.010028659; 1.011063525; 1.009032854; 1.010090628; 1.010174455; 1.011442442; 1.011442442; 1.011442442; 1.012455912; 1.012468405; 1.011465396; 1.010472892; 1.011488442; 1.012506036; 1.012556566; 1.011546465; 1.011605076; 1.011628688; 1.0106222; 1.011652396; 1.011845596; 1.012908619; 1.011882536; 1.010945435; 1.013064; 1.012064; 1.01310331; 1.013169355; 1.013236069; 1.013440329; 1.015594203; 1.013537824; 1.012514523; 1.013679581; 1.013722689; 1.015712713; 1.014726453; 1.014726453; 1.014726453; 1.014815524; 1.014815524; 1.01490568; 1.013905584; 1.016770299; 1.015803226; 1.016951404; 1.00633; 1.01633; 1.016346346; 1.015345345; 1.016346346; 1.016395582; 1.016395582; 1.016561866; 1.016996994; 1.018053266; 1.019615616; 1.018614615; 1.020720322; 1.019773966; 1.019854103; 1.021271543; 1.021421796; 1.021530426];

%representative metasedimentary amphibolite garnets (within the range of +/- SD of the mean)

sedamx=[1.400599401; 1.378; 1.409; 1.319556452; 1.376; 1.42042042; 1.528; 1.393; 1.421; 1.513; 1.515; 1.46953047; 1.34; 1.436; 1.448; 1.398398398; 1.434565435; 1.365365365; 1.468468468; 1.34; 1.262677485; 1.54; 1.423423423; 1.339679359; 1.353367876; 1.431; 1.456; 1.449; 1.43; 1.272; 1.307; 1.399; 1.475; 1.466; 1.408; 1.454; 1.326; 1.358; 1.346; 1.447; 1.52; 1.502; 1.285; 1.352; 1.358739837; 1.290581162; 1.475475475; 1.485485485; 1.29; 1.384; 1.35959596; 1.355; 1.387; 1.36; 1.473; 1.459839357; 1.403; 1.371; 1.461; 1.275; 1.539; 1.45; 1.476; 1.314; 1.274390244; 1.282; 1.38; 1.432; 1.506024096; 1.281; 1.336; 1.380853278; 1.261; 1.314; 1.34; 1.333; 1.449; 1.341; 1.424; 1.466; 1.501; 1.385; 1.37; 1.462; 1.461923848; 1.38; 1.361; 1.334337349; 1.318; 1.329; 1.311043566; 1.355; 1.274; 1.381; 1.382382382; 1.357; 1.319; 1.497; 1.548; 1.368; 1.364; 1.564; 1.547; 1.623];

sedamy=[1.202441608; 1.2979041; 1.2407481; 1.356759526; 1.2193868; 1.07744024; 1.2609548; 1.33081215; 1.29732685; 1.3377402; 1.1853242; 1.137268282; 1.23901625; 1.13509625; 1.13509625; 1.34327953; 1.315486114; 1.192444745; 1.291267568; 1.35217365; 1.326140974; 1.23208835; 1.313806156; 1.317591533; 1.177687409; 1.2984817; 1.2697697; 1.3273484; 1.2182324; 1.31060575; 1.2411711; 1.3562151; 1.1795511; 1.2967498; 1.29559515; 1.16396315; 1.2320885; 1.2071085; 1.22516055; 1.32115255; 1.3494419; 1.13856065; 1.2518727; 1.3429367; 1.367874695; 1.321641333; 1.207470871; 1.203270671; 1.28751275; 1.31595675; 1.346400758; 1.2188101; 1.2264701; 1.16669545; 1.1922528; 1.20519759; 1.21534615; 1.33889555; 1.15876755; 1.2857809; 1.19456225; 1.2159236; 1.2401716; 1.33600895; 1.289411535; 1.2786983; 1.1027663; 1.137829; 1.18085241; 1.30887435; 1.21634635; 1.207103382; 1.2622651; 1.3471331; 1.2020678; 1.28000785; 1.31307055; 1.25533725; 1.29370925; 1.21130525; 1.1599226; 1.26268795; 1.12166395; 1.27943065; 1.176864379; 1.267884; 1.28000805; 1.235919729; 1.16742815; 1.26730695; 1.279016819; 1.288091; 1.2155017; 1.38235105; 1.383734785; 1.27958575; 1.23613115; 1.15068595; 1.14202595; 1.3156488 ;1.17089285; 1.1593462; 1.19614095; 1.2476783];

sedamz=[1.004894106; 1.009798; 1.009798; 1.011523185; 1.013064; 1.013077077; 1.013064; 1.014697; 1.017963; 1.019596; 1.019596; 1.021207792; 1.024495; 1.024495; 1.024495; 1.02451952; 1.026101898; 1.029423423; 1.029423423; 1.031027; 1.033123732; 1.034293; 1.034327327; 1.034361723; 1.035536788; 1.035926; 1.034926; 1.039192; 1.039192; 1.040825; 1.043458; 1.042458; 1.042458; 1.045724; 1.047357; 1.047357; 1.04899; 1.04999; 1.053889; 1.052889; 1.054522; 1.063687; 1.067586; 1.068586; 1.06970122; 1.070359719; 1.071923924; 1.072924925; 1.073485; 1.072485; 1.074227273; 1.075118; 1.074118; 1.077751; 1.078384; 1.078698795; 1.080017; 1.086549; 1.086549; 1.088182; 1.089815; 1.091448; 1.091448; 1.093081; 1.093578252; 1.095714; 1.094714; 1.09898; 1.098373494; 1.099613; 1.100613; 1.10469615; 1.106778; 1.106778; 1.111044; 1.115943; 1.118209; 1.121475; 1.123475; 1.122475; 1.124108; 1.125741; 1.126741; 1.129007; 1.130267535; 1.13064; 1.135539; 1.136083333; 1.145337; 1.158401; 1.158832827; 1.1633; 1.165566; 1.167199; 1.168367367; 1.170465; 1.177997; 1.191061; 1.191061; 1.210024; 1.213923; 1.215556; 1.224721; 1.225354];

%representative calc-silicate rocks (within the range of +/- SD of the mean)

calx= [2.948421053; 2.91391129; 2.781059063; 2.475748194; 2.132725431; 2.119119119; 2.136831276; 2.11663286; 2.046487603; 2.134556575; 2.119096509];

caly= [1.088119316; 1.027935534; 1.026456415; 1.076263364; 1.197712513; 1.209207558; 1.217988632; 1.218406744; 1.210539773; 1.207749847; 1.218134138];

calz= [1.001718947; 1.004938508; 1.019955193; 1.053927761; 1.355719352; 1.361254254; 1.36456893; 1.369329615; 1.388006198; 1.392852192; 1.400705339];

hold on

if mod(length(x)+length(y)+length(z)+length(SPS),4)

 disp('All vectors must be of same length')

 return

end

delete(gca)

if nargin <5

 marker='.';

end

if nargin < 6

 string='SPESSARTINE %'

end

% Define the data range

miv=min(0.1);

mav=max(100);

% Get the current colormap

map= jet;

hold off

grid on

axis equal

% Re-format the colorbar

h=colorbar;

set(h,'ylim',[1 length(map)]);

yal=linspace(1,length(map),10);

set(h,'ytick',yal);

% Create the yticklabels

ytl=linspace(miv,mav,10);

s=char(10,4);

for i=1:10

 if abs(min(log10(abs(ytl)))) <= 3

 B=sprintf('%-4.3f',ytl(i));

 else

 B=sprintf('%-4.2E',ytl(i));

 end

 s(i,1:length(B))=B;

end

set(h,'yticklabel',s,'fontsize',9);

grid

set(get(h,'title'),'string',string,'fontweight','bold')

view(3)

hold on

interiorPoints= [bluex,bluey,bluez];

DT = DelaunayTri(interiorPoints); %# create the tetrahedral mesh

hullFacets = convexHull(DT); %# find the facets of the convex hull

check\_blue=inhull(data\_array, interiorPoints) %# heck if points are subfield

center\_blue=mean(interiorPoints,1); %# mean of subfield

trisurf(hullFacets,DT.X(:,1),DT.X(:,2),DT.X(:,3),'FaceColor','b','EdgeAlpha',.5,'LineStyle',':')

axis equal;

hold on

interiorPoints= [pex,pey,pez];

DT = DelaunayTri(interiorPoints); %# create the tetrahedral mesh

hullFacets = convexHull(DT); %# find the facets of the convex hull

check\_pe=inhull(data\_array, interiorPoints) %# check if points are subfield

center\_pe=mean(interiorPoints,1); %# mean of subfield

trisurf(hullFacets,DT.X(:,1),DT.X(:,2),DT.X(:,3),'FaceColor','y','EdgeAlpha',.5,'LineStyle',':')

hold on

interiorPoints= [ecx,ecy,ecz];

DT = DelaunayTri(interiorPoints); %# create the tetrahedral mesh

hullFacets = convexHull(DT); %# find the facets of the convex hull

check\_ec=inhull(data\_array, interiorPoints) %# check if points are subfield

center\_ec=mean(interiorPoints,1); %# mean of subfield

trisurf(hullFacets,DT.X(:,1),DT.X(:,2),DT.X(:,3), 'FaceColor',[0.2 0.8 0.6],'EdgeAlpha',.5,'LineStyle',':')

axis equal;

interiorPoints= [grex,grey,grez];

DT = DelaunayTri(interiorPoints); %# create the tetrahedral mesh

hullFacets = convexHull(DT); %# find the facets of the convex hull

check\_gre=inhull(data\_array, interiorPoints) %# check if points are subfield

center\_gre=mean(interiorPoints,1); %# mean of subfield

trisurf(hullFacets,DT.X(:,1),DT.X(:,2),DT.X(:,3),'FaceColor','g','EdgeAlpha',.5,'LineStyle',':')

axis equal;

hold on

interiorPoints= [metiggrax,metiggray,metiggraz];

DT = DelaunayTri(interiorPoints); %# create the tetrahedral mesh

hullFacets = convexHull(DT); %# find the facets of the convex hull

check\_metiggra=inhull(data\_array, interiorPoints) %# check if points are subfield

center\_metiggra=mean(interiorPoints,1); %# mean of subfield

trisurf(hullFacets,DT.X(:,1),DT.X(:,2),DT.X(:,3),'FaceColor',[0 0.5 1],'EdgeAlpha',.5,'LineStyle',':')

axis equal;

hold on

interiorPoints= [metigamx,metigamy,metigamz];

DT = DelaunayTri(interiorPoints); %# create the tetrahedral mesh

hullFacets = convexHull(DT); %# find the facets of the convex hull

check\_metigam=inhull(data\_array, interiorPoints) %# create the tetrahedral mesh

center\_metigam=mean(interiorPoints,1); %# mean of subfield

trisurf(hullFacets,DT.X(:,1),DT.X(:,2),DT.X(:,3),'FaceColor','m','EdgeAlpha',.5,'LineStyle',':')

axis equal;

hold on

interiorPoints= [mafx,mafy,mafz];

DT = DelaunayTri(interiorPoints); %# create the tetrahedral mesh

hullFacets = convexHull(DT); %# find the facets of the convex hull

check\_maf=inhull(data\_array, interiorPoints) %# check if points are subfield

center\_maf=mean(interiorPoints,1); %# mean of subfield

trisurf(hullFacets,DT.X(:,1),DT.X(:,2),DT.X(:,3),'FaceColor','r','EdgeAlpha',.5,'LineStyle',':')

axis equal;

hold on

interiorPoints= [sedamx,sedamy,sedamz];

DT = DelaunayTri(interiorPoints); %# create the tetrahedral mesh

hullFacets = convexHull(DT); %# find the facets of the convex hull

check\_sedam=inhull(data\_array, interiorPoints) %# check if points are subfield

center\_sedam=mean(interiorPoints,1);%# mean of subfield

trisurf(hullFacets,DT.X(:,1),DT.X(:,2),DT.X(:,3),'FaceColor','k','EdgeAlpha',.5,'LineStyle',':')

axis equal;

hold on

interiorPoints= [calx,caly,calz];

DT = DelaunayTri(interiorPoints); %# create the tetrahedral mesh

hullFacets = convexHull(DT); %# find the facets of the convex hullmean of subfield

check\_cal=inhull(data\_array, interiorPoints) %# Check if points are subfield

center\_cal=mean(interiorPoints,1); %# mean of subfield

trisurf(hullFacets,DT.X(:,1),DT.X(:,2),DT.X(:,3),'FaceColor','c','EdgeAlpha',.5,'LineStyle',':')

axis equal;

hold on

interiorPoints= [sedgrax,sedgray,sedgraz];

DT = DelaunayTri(interiorPoints); %# Create the tetrahedral mesh

hullFacets = convexHull(DT); %# Find the facets of the convex hull

check\_sedgra=inhull(data\_array, interiorPoints) %# Check if points are subfield

center\_sedgra=mean(interiorPoints,1); %# mean of subfield

trisurf(hullFacets,DT.X(:,1),DT.X(:,2),DT.X(:,3),'FaceColor','w','EdgeAlpha',.5,'LineStyle',':')

alpha(0.12)

grid

axis off

annotation('textbox', [.68 .50 .16 .40 ], 'String','(1)\*granites & pegmatites (2)\*greenschist-facies metasedimentary rocks (3)\*amphibolite-facies metasedimentary rocks (4)\*amphibolite-facies metaigneous rocks (5)\*blueschist-facies metaigneous & metasedimentary rocks (6)\*calc-silicate rocks (7)\*granulite-facies metasedimentary rocks (8)\*granulite-facies metaigneous rocks (9)\*eclogite-facies metaigneous & metasedimentary rocks (10)\*ultramafic rocks', 'FontSize', 16,'BackgroundColor',[1 1 1],'EdgeColor','none','LineStyle',':','FontWeight','bold');

%annotation('textbox', [.68 .50 .19 .40 ], 'String', '(1) Granites & pegmatites (2) Greenschist-facies metasedimentary rocks (3) Amphibolite-facies metasedimentary rocks (4) Amphibolite-facies metaigneous rocks (5) Blueschist-facies metaigneous & metasedimentary rocks (6) Calc-silicate rocks (7)Granulite-facies metasedimentary rocks (8) Granulite-facies metaigneous rocks (9) Eclogite-facies metaigneous & metasedimentary rocks (10) Ultramafic rocks', 'FontSize', 17,'BackgroundColor',[1 1 1],'EdgeColor','none','LineStyle',':','FontWeight','bold');

%annotation('textbox', [.65 .55 .18 .35 ], 'String', '(1) Granites & pegmatites (2) Metasedimentary greenschists (3) Metasedimentary amphibolites (4) Metaigneous amphibolites (5) Metaigneous & metasedimentary blueschists (6) Calc-silicate rocks (7) Metasedimentary granulites (8) Metaigneous granulites (9) Metaigneous & metasedimentary eclogites (10) Ultramafic rocks', 'FontSize', 17,'BackgroundColor',[1 1 1],'EdgeColor','none','LineStyle',':','FontWeight','bold');

hold on

centers=[center\_blue;center\_pe;center\_ec;center\_gre;center\_metiggra;center\_metigam;center\_maf;center\_sedam;center\_cal;center\_sedgra]

subfield\_names=[{'blue'};{'pe'};{'ec'};{'gre'};{'metiggra'};{'metigam'};{'maf'};{'sedam'};{'cal'};{'sedgra'}]

dist\_to\_centers=zeros(length(x),length(centers));

dist\_mins=cell(length(x),2);

marker='o';

% Plot the points

hold on

for i=1:length(x)

 in=round((SPS(i)-miv)\*(length(map)-1)/(mav-miv));

 %--- Catch the out-of-range numbers

 if in==0;in=1;end

 if in > length(map);in=length(map);end

 %plot3(x(i),y(i),z(i),marker,'color',map(in,:),'markerfacecolor', map(in,:),'MarkerSize',10)

 if check\_blue(i)==1 || check\_pe(i)==1 || check\_ec(i)==1 || check\_gre(i)==1 || check\_metiggra(i)==1 || check\_metigam(i)==1 || check\_maf(i)==1 || check\_sedam(i)==1 || check\_cal(i)==1 || check\_sedgra(i)==1

 plot3(x(i),y(i),z(i),marker,'color',map(in,:),'markerfacecolor', map(in,:),'MarkerSize',7)

 else plot3(x(i),y(i),z(i),marker,'color',map(in,:),'MarkerSize',7,'LineWidth',3)

 colormap jet

 end

 %calculate the distance to the centers of all subfields and determine

 %the closest for each data point

 for c=1:length(centers)

 dist=data\_array(i,:)-centers(c,:);

 dist\_to\_centers(i,c)=sqrt(sum(dist.^2,2));

 end

 [dist\_min, dist\_min\_idx]=min(dist\_to\_centers(i,:));

 dist\_mins(i,1)=subfield\_names(dist\_min\_idx);

 dist\_mins(i,2)={dist\_min};

 %plot a red line between each data point and the closest subfield

 %center

 plot3([x(i),centers(dist\_min\_idx,1)],[y(i),centers(dist\_min\_idx,2)],[z(i),centers(dist\_min\_idx,3)],':r','LineWidth',1.9)

 end

plot3(x1,y1,z1,'k')

%plot the centers of the subfields as red points

for i=1:length(centers(:,1))

 plot3(centers(i,1),centers(i,2),centers(i,3),'.r','MarkerSize',14)

plot3 (x37,y37,z37, 'k', 'linewidth',1.5)

text(x2,y2,z2,'Alm','FontWeight','bold','FontSize',14)

text(x3,y3,z3,'Grs','FontWeight','bold','FontSize',14)

text(x4,y4,z4, 'Prp ','FontWeight','bold','FontSize',14)

text(x5,y5,z5, 'Sps','FontWeight','bold','FontSize',14)

plot3(x6,y6,z6, '--k', 'linewidth',0.2)

text(x7,y7,z7, '50%','Color','k', 'FontSize',11)

text(x8,y8,z8, '50%','Color','k', 'FontSize',11)

text(x9,y9,z9, '50%','Color','k', 'FontSize',11)

text(x10,y10,z10, '50%','Color','k', 'FontSize',11)

text(x11,y11,z11, '50%','Color','k', 'FontSize',11)

text(x12,y12,z12, '50%','Color','k', 'FontSize',11)

text(x13,y13,z13, '75%','Color','k', 'FontSize',11)

text(x14,y14,z14, '75%','Color','k', 'FontSize',11)

text(x15,y15,z15, '75%','Color','k', 'FontSize',11)

text(x16,y16,z16, '75%','Color','k', 'FontSize',11)

text(x17,y17,z17, '75%','Color','k', 'FontSize',11)

text(x18,y18,z18, '75%','Color','k', 'FontSize',11)

text(x19,y19,z19, '75%','Color','k', 'FontSize',11)

text(x20,y20,z20, '75%','Color','k', 'FontSize',11)

text(x21,y21,z21, '75%','Color','k', 'FontSize',11)

text(x22,y22,z22, '75%','Color','k', 'FontSize',11)

text(x23,y23,z23, '75%','Color','k', 'FontSize',11)

text(x24,y24,z24, '75%','Color','k', 'FontSize',11)

text(x25,y25,z25, '87.5%','Color','k', 'FontSize',8)

text(x26,y26,z26,'62.5%','Color','k', 'FontSize',8)

text(x27,y27,z27,'62.5%','Color','k', 'FontSize',8)

text(x28,y28,z28,'87.5%','Color','k', 'FontSize',8)

text(x29,y29,z29,'87.5%','Color','k', 'FontSize',8)

text(x30,y30,z30,'87.5%','Color','k', 'FontSize',8)

text(x31,y31,z31,'62.5%','Color','k', 'FontSize',8)

text(x32,y32,z32,'62.5%','Color','k', 'FontSize',8)

text(x33,y33,z33,'62.5%','Color','k', 'FontSize',8)

text(x34,y34,z34,'62.5%','Color','k', 'FontSize',8)

text(x35,y35,z35,'87.5%','Color','k', 'FontSize',8)

text(x36,y36,z36,'87.5%','Color','k', 'FontSize',8)

text(x42,y42,z42, '1','Color','k','FontSize',14,'FontWeight','bold')

text(x43,y43,z43, '2','Color','k','FontSize', 14,'FontWeight','bold' )

text(x44,y44,z44,'3','Color','k','FontSize', 14,'FontWeight','bold')

text(x45,y45,z45,'5','Color','k','FontSize', 14,'FontWeight','bold')

text(x46,y46,z46,'6','Color','k','FontSize', 14,'FontWeight','bold')

text(x47,y47,z47,'7','Color','k','FontSize', 14,'FontWeight','bold')

text(x48,y48,z48,'8','Color','k','FontSize', 14,'FontWeight','bold')

text(x49,y49,z49,'4','Color','k','FontSize', 14,'FontWeight','bold')

text(x50,y50,z50,'9','Color','k','FontSize', 14,'FontWeight','bold')

text(x51,y51,z51,'10','Color','k','FontSize', 14,'FontWeight','bold')

grid

caxis([1, 100])

colorbar

h = colorbar;

ylabel(h, '');

title(h,'Spessartine mol. %','FontSize', 11,'FontWeight','bold')

end