**OxCal SQL code**

1. **General outlier model with SHCal13**

Curve("SHCal13","SHCal13.14c");

Outlier\_Model("General",T(5),U(0,2),"t");

Sequence("Wairajirca\_ceramic\_chronology")

{

Boundary("Start\_Wairajirca");

Phase("Wairajirca\_I")

{

R\_Date("17JCA-C69\_TKA-19530 ", 3472, 25)

{

Outlier(“General”,0.05);

};

Sum("Wairajirca\_I");

};

Boundary("End\_Wairajirca\_I");

Boundary("Start\_Wairajirca\_II");

Phase("Wairajirca\_II")

{

Sequence("E1N4\_Wairajirca\_II")

{

Boundary("Start\_E1N4\_Wairajirca\_II");

R\_Date("17JCA-C524\_TKA-19556", 3338, 21)

{

Outlier(“General”,0.05);

};

R\_Date("17JCA-C523\_TKA-19555", 3306, 21)

{

Outlier(“General”,0.05);

};

Boundary("End\_E1N4\_Wairajirca\_II");

};

Sequence("E1S2\_Wairajirca\_II")

{

Boundary("Start\_E1S2\_Wairajirca\_II");

R\_Date("17JCA-C59\_TKA-19527", 3275, 25)

{

Outlier(“General”,0.05);

};

R\_Date("17JCA-C58\_TKA-19526", 3256, 26)

{

Outlier(“General”,0.05);

};

Boundary("End\_E1S2\_Wairajirca\_II");

};

Sum("Wairajirca\_II");

Span("Wairajirca\_II");

};

Boundary("End\_Wairajirca\_II");

Boundary("Start\_Wairajirca\_III");

Phase("Wairajirca\_III")

{

Sequence("E1S3\_Wairajirca\_III")

{

Boundary("Start\_E1S3\_Wairajirca\_III");

R\_Date("17JCA-C545\_TKA-19582", 3216, 26)

{

Outlier(“General”,0.05);

};

Boundary("End\_E1S3\_Wairajirca\_III");

};

Sequence("E1N4\_Wairajirca\_III")

{

Boundary("Start\_E1N4\_Wairajirca\_III");

R\_Date("17JCA-C522\_TKA-19554", 3132, 22)

{

Outlier(“General”,0.05);

};

R\_Date("17JCA-C525\_TKA-19562", 3077, 24)

{

Outlier(“General”,0.05);

};

R\_Date("17JCA-C521\_TKA-19533", 3111, 24)

{

Outlier(“General”,0.05);

};

Boundary("End\_E1N4\_Wairajirca\_III");

};

Sum("Wairajirca\_III");

Span("Wairajirca\_III");

};

Boundary("End\_Wairajirca\_III");

Boundary("Start\_Wairajirca\_IV");

Phase("Wairajirca\_IV")

{

Sequence("E1S3\_Wairajirca\_IV")

{

Boundary("Start\_E1S3\_Wairajirca\_IV");

R\_Date("17JCA-C526\_TKA-19563", 3048, 24)

{

Outlier(“General”,0.05);

};

Boundary("End\_E1S3\_Wairajirca\_IV");

};

Sequence("E1N4\_Wairajirca\_IV")

{

Boundary("Start\_E1N4\_Wairajirca\_IV");

R\_Date("17JCA-C520\_TKA-19552", 3053, 20)

{

Outlier(“General”,0.05);

};

Boundary("End\_E1N4\_Wairajirca\_IV");

};

Sum("Wairajirca\_IV");

Span("Wairajirca\_IV");

};

Boundary("End\_Wairajirca\_IV");

Boundary("Start\_Wairajirca\_V");

Phase("Wairajirca\_V")

{

Sequence("E1S3\_Wairajirca\_V")

{

Boundary("Start\_E1S3\_Wairajirca\_V");

R\_Date("17JCA-C528\_TKA-19565", 2903, 24)

{

Outlier(“General”,0.05);

};

R\_Date("17JCA-C529\_TKA-19566", 2982, 24)

{

Outlier(“General”,0.05);

};

R\_Date("17JCA-C530\_TKA-19567", 2974, 24)

{

Outlier(“General”,0.05);

};

Boundary("End\_E1S3\_Wairajirca\_V");

};

Sequence("E1N4\_Wairajirca\_V")

{

Boundary("Start\_E1N4\_Wairajirca\_V");

R\_Date("17JCA-C519\_TKA-19551", 2987, 24)

{

Outlier(“General”,0.05);

};

R\_Date("17JCA-C518\_TKA-19550", 2955, 22)

{

Outlier(“General”,0.05);

};

R\_Date("17JCA-C517\_TKA-19549", 3019, 21)

{

Outlier(“General”,0.05);

};

Boundary("End\_E1N4\_Wairajirca\_V");

};

Sum("Wairajirca\_V");

Span("Wairajirca\_V");

};

Boundary("End\_Wairajirca");

};

1. **General outlier model with mixed atmospheric curve**

Curve ("IntCal13","IntCal13.14c");

Curve ("SHCal13","SHCal13.14c");

Mix\_Curve ("Mixed","IntCal13","SHCal13",U(0,100));

Outlier\_Model("General",T(5),U(0,2),"t");

Sequence("Wairajirca\_ceramic\_chronology")

{

Boundary("Start\_Wairajirca");

Phase("Wairajirca\_I")

{

R\_Date("17JCA-C69\_TKA-19530 ", 3472, 25)

{

Outlier(“General”,0.05);

};

Sum("Wairajirca\_I");

};

Boundary("End\_Wairajirca\_I");

Boundary("Start\_Wairajirca\_II");

Phase("Wairajirca\_II")

{

Sequence("E1N4\_Wairajirca\_II")

{

Boundary("Start\_E1N4\_Wairajirca\_II");

R\_Date("17JCA-C524\_TKA-19556", 3338, 21)

{

Outlier(“General”,0.05);

};

R\_Date("17JCA-C523\_TKA-19555", 3306, 21)

{

Outlier(“General”,0.05);

};

Boundary("End\_E1N4\_Wairajirca\_II");

};

Sequence("E1S2\_Wairajirca\_II")

{

Boundary("Start\_E1S2\_Wairajirca\_II");

R\_Date("17JCA-C59\_TKA-19527", 3275, 25)

{

Outlier(“General”,0.05);

};

R\_Date("17JCA-C58\_TKA-19526", 3256, 26)

{

Outlier(“General”,0.05);

};

Boundary("End\_E1S2\_Wairajirca\_II");

};

Sum("Wairajirca\_II");

};

Boundary("End\_Wairajirca\_II");

Boundary("Start\_Wairajirca\_III");

Phase("Wairajirca\_III")

{

Sequence("E1S3\_Wairajirca\_III")

{

Boundary("Start\_E1S3\_Wairajirca\_III");

R\_Date("17JCA-C545\_TKA-19582", 3216, 26)

{

Outlier(“General”,0.05);

};

Boundary("End\_E1S3\_Wairajirca\_III");

};

Sequence("E1N4\_Wairajirca\_III")

{

Boundary("Start\_E1N4\_Wairajirca\_III");

R\_Date("17JCA-C522\_TKA-19554", 3132, 22)

{

Outlier(“General”,0.05);

};

R\_Date("17JCA-C525\_TKA-19562", 3077, 24)

{

Outlier(“General”,0.05);

};

R\_Date("17JCA-C521\_TKA-19533", 3111, 24)

{

Outlier(“General”,0.05);

};

Boundary("End\_E1N4\_Wairajirca\_III");

};

Sum("Wairajirca\_III");

};

Boundary("End\_Wairajirca\_III");

Boundary("Start\_Wairajirca\_IV");

Phase("Wairajirca\_IV")

{

Sequence("E1S3\_Wairajirca\_IV")

{

Boundary("Start\_E1S3\_Wairajirca\_IV");

R\_Date("17JCA-C526\_TKA-19563", 3048, 24)

{

Outlier(“General”,0.05);

};

Boundary("End\_E1S3\_Wairajirca\_IV");

};

Sequence("E1N4\_Wairajirca\_IV")

{

Boundary("Start\_E1N4\_Wairajirca\_IV");

R\_Date("17JCA-C520\_TKA-19552", 3053, 20)

{

Outlier(“General”,0.05);

};

Boundary("End\_E1N4\_Wairajirca\_IV");

};

Sum("Wairajirca\_IV");

};

Boundary("End\_Wairajirca\_IV");

Boundary("Start\_Wairajirca\_V");

Phase("Wairajirca\_V")

{

Sequence("E1S3\_Wairajirca\_V")

{

Boundary("Start\_E1S3\_Wairajirca\_V");

R\_Date("17JCA-C528\_TKA-19565", 2903, 24)

{

Outlier(“General”,0.05);

};

R\_Date("17JCA-C529\_TKA-19566", 2982, 24)

{

Outlier(“General”,0.05);

};

R\_Date("17JCA-C530\_TKA-19567", 2974, 24)

{

Outlier(“General”,0.05);

};

Boundary("End\_E1S3\_Wairajirca\_V");

};

Sequence("E1N4\_Wairajirca\_V")

{

Boundary("Start\_E1N4\_Wairajirca\_V");

R\_Date("17JCA-C519\_TKA-19551", 2987, 24)

{

Outlier(“General”,0.05);

};

R\_Date("17JCA-C518\_TKA-19550", 2955, 22)

{

Outlier(“General”,0.05);

};

R\_Date("17JCA-C517\_TKA-19549", 3019, 21)

{

Outlier(“General”,0.05);

};

Boundary("End\_E1N4\_Wairajirca\_V");

};

Sum("Wairajirca\_V");

};

Boundary("End\_Wairajirca");

};

1. **Charcoal model with SHCal13**

Curve("SHCal13","SHCal13.14c");

Outlier\_Model("Charcoal",Exp(1,-10,0),U(0,2),"t");

Sequence("Wairajirca\_ceramic\_chronology ")

{

Boundary("Start\_Wairajirca");

Phase("Wairajirca\_I")

{

R\_Date("17JCA-C69\_TKA-19530 ", 3472, 25)

{

Outlier("Charcoal",1);

};

Sum("Wairajirca\_I");

};

Boundary("End\_Wairajirca\_I");

Boundary("Start\_Wairajirca\_II");

Phase("Wairajirca\_II")

{

Sequence("E1N4\_Wairajirca\_II")

{

Boundary("Start\_E1N4\_Wairajirca\_II");

R\_Date("17JCA-C524\_TKA-19556", 3338, 21)

{

Outlier("Charcoal",1);

};

R\_Date("17JCA-C523\_TKA-19555", 3306, 21)

{

Outlier("Charcoal",1);

};

Boundary("End\_E1N4\_Wairajirca\_II");

};

Sequence("E1S2\_Wairajirca\_II")

{

Boundary("Start\_E1S2\_Wairajirca\_II");

R\_Date("17JCA-C59\_TKA-19527", 3275, 25)

{

Outlier("Charcoal",1);

};

R\_Date("17JCA-C58\_TKA-19526", 3256, 26)

{

Outlier("Charcoal",1);

};

Boundary("End\_E1S2\_Wairajirca\_II");

};

Sum("Wairajirca\_II");

};

Boundary("End\_Wairajirca\_II");

Boundary("Start\_Wairajirca\_III");

Phase("Wairajirca\_III")

{

Sequence("E1S3\_Wairajirca\_III")

{

Boundary("Start\_E1S3\_Wairajirca\_III");

R\_Date("17JCA-C545\_TKA-19582", 3216, 26)

{

Outlier("Charcoal",1);

};

Boundary("End\_E1S3\_Wairajirca\_III");

};

Sequence("E1N4\_Wairajirca\_III")

{

Boundary("Start\_E1N4\_Wairajirca\_III");

R\_Date("17JCA-C522\_TKA-19554", 3132, 22)

{

Outlier("Charcoal",1);

};

R\_Date("17JCA-C525\_TKA-19562", 3077, 24)

{

Outlier("Charcoal",1);

};

R\_Date("17JCA-C521\_TKA-19533", 3111, 24)

{

Outlier("Charcoal",1);

};

Boundary("End\_E1N4\_Wairajirca\_III");

};

Sum("Wairajirca\_III");

};

Boundary("End\_Wairajirca\_III");

Boundary("Start\_Wairajirca\_IV");

Phase("Wairajirca\_IV")

{

Sequence("E1S3\_Wairajirca\_IV")

{

Boundary("Start\_E1S3\_Wairajirca\_IV");

R\_Date("17JCA-C526\_TKA-19563", 3048, 24)

{

Outlier("Charcoal",1);

};

Boundary("End\_E1S3\_Wairajirca\_IV");

};

Sequence("E1N4\_Wairajirca\_IV")

{

Boundary("Start\_E1N4\_Wairajirca\_IV");

R\_Date("17JCA-C520\_TKA-19552", 3053, 20)

{

Outlier("Charcoal",1);

};

Boundary("End\_E1N4\_Wairajirca\_IV");

};

Sum("Wairajirca\_IV");

};

Boundary("End\_Wairajirca\_IV");

Boundary("Start\_Wairajirca\_V");

Phase("Wairajirca\_V")

{

Sequence("E1S3\_Wairajirca\_V")

{

Boundary("Start\_E1S3\_Wairajirca\_V");

R\_Date("17JCA-C528\_TKA-19565", 2903, 24)

{

Outlier("Charcoal",1);

};

R\_Date("17JCA-C529\_TKA-19566", 2982, 24)

{

Outlier("Charcoal",1);

};

R\_Date("17JCA-C530\_TKA-19567", 2974, 24)

{

Outlier("Charcoal",1);

};

Boundary("End\_E1S3\_Wairajirca\_V");

};

Sequence("E1N4\_Wairajirca\_V")

{

Boundary("Start\_E1N4\_Wairajirca\_V");

R\_Date("17JCA-C519\_TKA-19551", 2987, 24)

{

Outlier("Charcoal",1);

};

R\_Date("17JCA-C518\_TKA-19550", 2955, 22)

{

Outlier("Charcoal",1);

};

R\_Date("17JCA-C517\_TKA-19549", 3019, 21)

{

Outlier("Charcoal",1);

};

Boundary("End\_E1N4\_Wairajirca\_V");

};

Sum("Wairajirca\_V");

};

Boundary("End\_Wairajirca");

};