1. **AGE MODELING**

The supplementary *R* script is available as supplementary .txt file. The file documents calculations applied for age-depth modelling and data interpolation. Table S8 presents the input and Tables S9 and S10 the output for the model calculations.

**Supplementary Table 8.** Input data for age-depth modeling. Please note that the units of the mean age are given in cal BP for 14C data and in ka for luminescence dating and magnetic stratigraphy.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Depth(m)** | **Mean age(ka/cal BP)** | **Standard deviation (ka)** | **Thickness (m)** | **Calibration curves** | **Dating** **method** |
| 5.83 | 26.08 | 2.61 | 0.10 | normal | RPI |
| 6.17 | 27.63 | 2.76 | 0.10 | normal | RPI |
| 6.39 | 28.71 | 2.87 | 0.10 | normal | Mag. Susceptibility |
| 6.51 | 31.73 | 3.17 | 0.10 | normal | Mag. Susceptibility |
| 7.11 | 32.80 | 3.28 | 0.10 | normal | RPI |
| 7.39 | 35.76 | 3.58 | 0.10 | normal | Mag. Susceptibility |
| 7.61 | 35.88 | 3.59 | 0.10 | normal | RPI |
| 8.22 | 40.97 | 4.10 | 0.10 | normal | Mag. Susceptibility |
| 8.55 | 43.43 | 4.34 | 0.10 | normal | RPI |
| 8.67 | 43.63 | 4.36 | 0.10 | normal | Mag. Susceptibility |
| 9.36 | 47.75 | 4.78 | 0.10 | normal | RPI |
| 9.59 | 51.92 | 5.19 | 0.10 | normal | Mag. Susceptibility |
| 9.75 | 53.99 | 5.40 | 0.10 | normal | RPI |
| 8.23 | 40.06 | 3.31 | 0.10 | normal | Luminescence |
| 7.93 | 38.48 | 3.18 | 0.10 | normal | Luminescence |
| 7.47 | 38.32 | 3.37 | 0.10 | normal | Luminescence |
| 6.36 | 28.51 | 2.48 | 0.10 | normal | Luminescence |
| 5.60 | 28.25 | 2.46 | 0.10 | normal | Luminescence |
| 8.64 | 41.66 | 3.51 | 0.10 | normal | Luminescence |
| 1.90 | 5.41 | 0.05 | 0.10 | normal | 14C |
| 2.69 | 11.52 | 0.11 | 0.10 | normal | 14C |
| 3.35 | 17.93 | 0.18 | 0.10 | normal | 14C |
| 4.05 | 21.59 | 0.21 | 0.10 | normal | 14C |
| 4.77 | 24.51 | 0.30 | 0.10 | normal | 14C |
| 5.59 | 26.36 | 0.26 | 0.10 | normal | 14C |
| 5.94 | 27.50 | 0.27 | 0.10 | normal | 14C |
| 6.35 | 30.39 | 0.43 | 0.10 | normal | 14C |
| 8.08 | 39.85 | 0.14 | 0.10 | normal | Tephra |

**Supplementary Table 9.** Results from the modeling using the BChron code. Please note, the table extends over three pages.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Depth(m)** | **Mean age(ka)** | **Upper 1σ (ka)** | **Lower 1σ (ka)** | **1σ uncertainty (ka)** | **Upper 2σ (ka)** | **Lower 2σ (ka)** | **2σ uncertainty (ka)** |
| 1.90 | 5.40 | 5.23 | 5.54 | 0.15 | 5.06 | 5.67 | 0.31 |
| 1.98 | 6.13 | 5.81 | 6.83 | 0.51 | 5.50 | 7.53 | 1.01 |
| 2.06 | 6.71 | 6.19 | 7.56 | 0.69 | 5.67 | 8.41 | 1.37 |
| 2.14 | 7.32 | 6.63 | 8.21 | 0.79 | 5.95 | 9.11 | 1.58 |
| 2.22 | 7.90 | 7.15 | 8.85 | 0.85 | 6.39 | 9.81 | 1.71 |
| 2.30 | 8.46 | 7.59 | 9.39 | 0.90 | 6.71 | 10.33 | 1.81 |
| 2.38 | 9.04 | 8.13 | 9.85 | 0.86 | 7.22 | 10.67 | 1.73 |
| 2.45 | 9.67 | 8.75 | 10.34 | 0.79 | 7.84 | 11.02 | 1.59 |
| 2.53 | 10.29 | 9.43 | 10.79 | 0.68 | 8.57 | 11.30 | 1.36 |
| 2.61 | 10.84 | 10.18 | 11.15 | 0.49 | 9.52 | 11.46 | 0.97 |
| 2.69 | 11.56 | 11.44 | 11.92 | 0.24 | 11.32 | 12.28 | 0.48 |
| 2.77 | 12.40 | 12.02 | 13.26 | 0.62 | 11.64 | 14.11 | 1.24 |
| 2.85 | 13.08 | 12.49 | 14.05 | 0.78 | 11.89 | 15.02 | 1.57 |
| 2.93 | 13.84 | 13.05 | 14.85 | 0.90 | 12.26 | 15.87 | 1.80 |
| 3.01 | 14.58 | 13.70 | 15.58 | 0.94 | 12.81 | 16.57 | 1.88 |
| 3.09 | 15.29 | 14.32 | 16.16 | 0.92 | 13.34 | 17.02 | 1.84 |
| 3.17 | 16.06 | 15.09 | 16.76 | 0.83 | 14.12 | 17.45 | 1.67 |
| 3.25 | 16.74 | 15.88 | 17.25 | 0.69 | 15.01 | 17.77 | 1.38 |
| 3.33 | 17.56 | 16.96 | 17.81 | 0.42 | 16.35 | 18.05 | 0.85 |
| 3.41 | 18.27 | 18.02 | 18.72 | 0.35 | 17.76 | 19.16 | 0.70 |
| 3.48 | 18.66 | 18.30 | 19.25 | 0.47 | 17.94 | 19.84 | 0.95 |
| 3.56 | 19.05 | 18.60 | 19.65 | 0.52 | 18.15 | 20.24 | 1.04 |
| 3.64 | 19.45 | 18.92 | 20.06 | 0.57 | 18.38 | 20.67 | 1.15 |
| 3.72 | 19.82 | 19.25 | 20.38 | 0.56 | 18.68 | 20.94 | 1.13 |
| 3.80 | 20.23 | 19.64 | 20.72 | 0.54 | 19.05 | 21.22 | 1.09 |
| 3.88 | 20.64 | 20.07 | 21.04 | 0.48 | 19.50 | 21.43 | 0.97 |
| 3.96 | 21.04 | 20.54 | 21.33 | 0.40 | 20.04 | 21.63 | 0.79 |
| 4.04 | 21.44 | 21.13 | 21.67 | 0.27 | 20.82 | 21.90 | 0.54 |
| 4.12 | 21.88 | 21.64 | 22.24 | 0.30 | 21.39 | 22.61 | 0.61 |
| 4.20 | 22.17 | 21.86 | 22.62 | 0.38 | 21.56 | 23.08 | 0.76 |
| 4.28 | 22.46 | 22.07 | 22.90 | 0.41 | 21.69 | 23.34 | 0.83 |
| 4.36 | 22.77 | 22.33 | 23.24 | 0.46 | 21.89 | 23.71 | 0.91 |
| 4.44 | 23.05 | 22.56 | 23.50 | 0.47 | 22.08 | 23.94 | 0.93 |
| 4.52 | 23.35 | 22.89 | 23.78 | 0.44 | 22.43 | 24.20 | 0.89 |
| 4.59 | 23.63 | 23.20 | 24.02 | 0.41 | 22.78 | 24.41 | 0.81 |
| 4.67 | 23.93 | 23.52 | 24.27 | 0.37 | 23.10 | 24.60 | 0.75 |
| **Depth(m)** | **Mean age(ka)** | **Upper 1σ (ka)** | **Lower 1σ (ka)** | **1σ uncertainty (ka)** | **Upper 2σ (ka)** | **Lower 2σ (ka)** | **2σ uncertainty (ka)** |
| 4.75 | 24.27 | 23.95 | 24.54 | 0.30 | 23.63 | 24.81 | 0.59 |
| 4.83 | 24.59 | 24.29 | 24.89 | 0.30 | 23.98 | 25.19 | 0.61 |
| 4.91 | 24.77 | 24.46 | 25.08 | 0.31 | 24.15 | 25.39 | 0.62 |
| 4.99 | 24.95 | 24.63 | 25.26 | 0.32 | 24.30 | 25.58 | 0.64 |
| 5.07 | 25.12 | 24.79 | 25.45 | 0.33 | 24.45 | 25.79 | 0.67 |
| 5.15 | 25.28 | 24.94 | 25.62 | 0.34 | 24.61 | 25.96 | 0.67 |
| 5.23 | 25.44 | 25.08 | 25.75 | 0.33 | 24.73 | 26.06 | 0.67 |
| 5.31 | 25.62 | 25.26 | 25.91 | 0.33 | 24.90 | 26.21 | 0.66 |
| 5.39 | 25.77 | 25.43 | 26.06 | 0.31 | 25.09 | 26.35 | 0.63 |
| 5.47 | 25.94 | 25.63 | 26.21 | 0.29 | 25.32 | 26.48 | 0.58 |
| 5.55 | 26.13 | 25.84 | 26.38 | 0.27 | 25.54 | 26.63 | 0.54 |
| 5.62 | 26.73 | 26.45 | 26.99 | 0.27 | 26.17 | 27.25 | 0.54 |
| 5.70 | 26.90 | 26.61 | 27.16 | 0.27 | 26.32 | 27.42 | 0.55 |
| 5.78 | 27.07 | 26.78 | 27.33 | 0.27 | 26.49 | 27.58 | 0.54 |
| 5.86 | 27.37 | 27.08 | 27.61 | 0.27 | 26.80 | 27.86 | 0.53 |
| 5.94 | 27.70 | 27.43 | 27.94 | 0.25 | 27.15 | 28.17 | 0.51 |
| 6.02 | 28.14 | 27.78 | 28.58 | 0.40 | 27.42 | 29.02 | 0.80 |
| 6.10 | 28.49 | 28.05 | 28.99 | 0.47 | 27.61 | 29.49 | 0.94 |
| 6.18 | 29.09 | 28.55 | 29.58 | 0.52 | 28.00 | 30.06 | 1.03 |
| 6.26 | 29.55 | 29.02 | 29.97 | 0.48 | 28.48 | 30.40 | 0.96 |
| 6.34 | 29.98 | 29.55 | 30.36 | 0.40 | 29.13 | 30.73 | 0.80 |
| 6.42 | 31.19 | 30.73 | 31.77 | 0.52 | 30.28 | 32.34 | 1.03 |
| 6.50 | 31.67 | 31.13 | 32.30 | 0.59 | 30.58 | 32.93 | 1.18 |
| 6.58 | 32.18 | 31.56 | 32.88 | 0.66 | 30.94 | 33.58 | 1.32 |
| 6.65 | 32.47 | 31.82 | 33.23 | 0.71 | 31.16 | 33.99 | 1.42 |
| 6.73 | 32.78 | 32.08 | 33.58 | 0.75 | 31.39 | 34.38 | 1.50 |
| 6.81 | 33.10 | 32.33 | 33.92 | 0.79 | 31.57 | 34.73 | 1.58 |
| 6.89 | 33.40 | 32.64 | 34.19 | 0.78 | 31.87 | 34.98 | 1.55 |
| 6.97 | 33.64 | 32.86 | 34.50 | 0.82 | 32.09 | 35.36 | 1.63 |
| 7.05 | 33.96 | 33.08 | 34.82 | 0.87 | 32.20 | 35.67 | 1.74 |
| 7.13 | 34.51 | 33.56 | 35.38 | 0.91 | 32.61 | 36.24 | 1.82 |
| 7.21 | 34.90 | 33.96 | 35.73 | 0.89 | 33.02 | 36.57 | 1.77 |
| 7.29 | 35.25 | 34.30 | 36.04 | 0.87 | 33.35 | 36.84 | 1.75 |
| 7.37 | 35.61 | 34.63 | 36.35 | 0.86 | 33.64 | 37.10 | 1.73 |
| 7.45 | 36.32 | 35.36 | 37.01 | 0.83 | 34.40 | 37.70 | 1.65 |
| 7.53 | 36.91 | 35.94 | 37.57 | 0.81 | 34.98 | 38.22 | 1.62 |
| 7.61 | 37.32 | 36.47 | 37.96 | 0.75 | 35.61 | 38.60 | 1.49 |
| 7.69 | 37.84 | 37.02 | 38.41 | 0.69 | 36.21 | 38.98 | 1.39 |
| 7.76 | 38.15 | 37.36 | 38.68 | 0.66 | 36.58 | 39.22 | 1.32 |
| 7.84 | 38.49 | 37.73 | 38.93 | 0.60 | 36.98 | 39.38 | 1.20 |
| **Depth(m)** | **Mean age(ka)** | **Upper 1σ (ka)** | **Lower 1σ (ka)** | **1σ uncertainty (ka)** | **Upper 2σ (ka)** | **Lower 2σ (ka)** | **2σ uncertainty (ka)** |
| 7.92 | 38.87 | 38.17 | 39.27 | 0.55 | 37.47 | 39.66 | 1.10 |
| 8.00 | 39.43 | 38.94 | 39.65 | 0.36 | 38.44 | 39.88 | 0.72 |
| 8.08 | 39.88 | 39.71 | 40.04 | 0.17 | 39.55 | 40.21 | 0.33 |
| 8.16 | 40.38 | 40.10 | 40.91 | 0.40 | 39.82 | 41.44 | 0.81 |
| 8.24 | 41.49 | 40.98 | 42.20 | 0.61 | 40.47 | 42.92 | 1.23 |
| 8.32 | 42.05 | 41.44 | 42.98 | 0.77 | 40.84 | 43.91 | 1.54 |
| 8.40 | 42.53 | 41.78 | 43.53 | 0.88 | 41.04 | 44.54 | 1.75 |
| 8.48 | 43.00 | 42.15 | 44.07 | 0.96 | 41.30 | 45.13 | 1.92 |
| 8.56 | 43.73 | 42.75 | 44.77 | 1.01 | 41.76 | 45.80 | 2.02 |
| 8.64 | 44.45 | 43.40 | 45.60 | 1.10 | 42.35 | 46.76 | 2.20 |
| 8.72 | 45.72 | 44.53 | 46.96 | 1.22 | 43.33 | 48.21 | 2.44 |
| 8.79 | 46.27 | 44.97 | 47.78 | 1.41 | 43.67 | 49.29 | 2.81 |
| 8.87 | 46.84 | 45.45 | 48.41 | 1.48 | 44.06 | 49.99 | 2.96 |
| 8.95 | 47.31 | 45.91 | 48.96 | 1.52 | 44.51 | 50.60 | 3.04 |
| 9.03 | 47.83 | 46.35 | 49.48 | 1.56 | 44.87 | 51.13 | 3.13 |
| 9.11 | 48.37 | 46.83 | 50.11 | 1.64 | 45.30 | 51.84 | 3.27 |
| 9.19 | 48.87 | 47.30 | 50.63 | 1.66 | 45.73 | 52.39 | 3.33 |
| 9.27 | 49.46 | 47.87 | 51.29 | 1.71 | 46.27 | 53.12 | 3.42 |
| 9.35 | 50.14 | 48.42 | 52.00 | 1.79 | 46.71 | 53.85 | 3.57 |
| 9.43 | 51.13 | 49.30 | 53.02 | 1.86 | 47.46 | 54.92 | 3.73 |
| 9.51 | 51.74 | 49.84 | 53.70 | 1.93 | 47.94 | 55.66 | 3.86 |
| 9.59 | 52.67 | 50.58 | 54.78 | 2.10 | 48.48 | 56.88 | 4.20 |
| 9.67 | 53.51 | 51.33 | 55.64 | 2.15 | 49.15 | 57.77 | 4.31 |
| 9.75 | 54.30 | 52.02 | 56.62 | 2.30 | 49.75 | 58.93 | 4.59 |

**Supplementary Table 10.** Results from the modeling using the ADMin code.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Depth(m)** | **Mean age(ka)** | **Upper 1σ (ka)** | **Lower 1σ (ka)** | **1σ uncertainty (ka)** | **Upper 2σ (ka)** | **Lower 2σ (ka)** | **2σ uncertainty (ka)** |
| 1.90 | 5.41 | 5.35 | 5.47 | 0.06 | 5.29 | 5.53 | 0.12 |
| 2.69 | 11.52 | 11.39 | 11.65 | 0.13 | 11.25 | 11.79 | 0.27 |
| 3.35 | 17.93 | 17.73 | 18.15 | 0.21 | 17.53 | 18.36 | 0.42 |
| 4.05 | 21.59 | 21.36 | 21.82 | 0.23 | 21.12 | 22.05 | 0.46 |
| 4.77 | 24.51 | 24.16 | 24.85 | 0.35 | 23.81 | 25.20 | 0.69 |
| 5.59 | 26.33 | 26.01 | 26.58 | 0.29 | 25.68 | 26.84 | 0.58 |
| 5.60 | 26.71 | 25.22 | 28.30 | 1.54 | 23.72 | 29.89 | 3.09 |
| 5.83 | 27.10 | 25.43 | 28.69 | 1.63 | 23.76 | 30.27 | 3.26 |
| 5.94 | 27.50 | 27.23 | 27.80 | 0.29 | 26.95 | 28.10 | 0.57 |
| 6.17 | 28.53 | 26.48 | 30.74 | 2.13 | 24.43 | 32.95 | 4.26 |
| 6.35 | 30.22 | 29.75 | 30.63 | 0.44 | 29.27 | 31.04 | 0.88 |
| 6.36 | 30.42 | 28.98 | 32.08 | 1.55 | 27.54 | 33.73 | 3.10 |
| 6.39 | 30.95 | 29.23 | 33.01 | 1.89 | 27.51 | 35.07 | 3.78 |
| 6.51 | 31.70 | 29.70 | 34.02 | 2.16 | 27.70 | 36.34 | 4.32 |
| 7.11 | 32.77 | 30.78 | 35.40 | 2.31 | 28.80 | 38.04 | 4.62 |
| 7.39 | 34.06 | 31.77 | 37.02 | 2.63 | 29.47 | 39.97 | 5.25 |
| 7.47 | 35.03 | 32.42 | 38.32 | 2.95 | 29.81 | 41.60 | 5.90 |
| 7.61 | 35.72 | 33.28 | 39.21 | 2.97 | 30.84 | 42.71 | 5.94 |
| 7.93 | 39.00 | 36.84 | 40.76 | 1.96 | 34.67 | 42.52 | 3.93 |
| 8.08 | 39.75 | 39.68 | 39.90 | 0.11 | 39.61 | 40.05 | 0.22 |
| 8.22 | 40.54 | 38.25 | 42.96 | 2.35 | 35.97 | 45.39 | 4.71 |
| 8.23 | 40.79 | 38.95 | 43.25 | 2.15 | 37.11 | 45.71 | 4.30 |
| 8.55 | 40.89 | 38.77 | 44.29 | 2.76 | 36.64 | 47.70 | 5.53 |
| 8.64 | 41.62 | 39.90 | 44.70 | 2.40 | 38.19 | 47.79 | 4.80 |
| 8.67 | 41.68 | 39.55 | 46.11 | 3.28 | 37.41 | 50.54 | 6.56 |
| 9.36 | 43.16 | 40.83 | 48.78 | 3.97 | 38.49 | 54.39 | 7.95 |
| 9.59 | 45.18 | 42.64 | 51.42 | 4.39 | 40.10 | 57.65 | 8.77 |
| 9.75 | 45.88 | 43.24 | 52.92 | 4.84 | 40.60 | 59.95 | 9.67 |