**Table1 Magmatic and metamorphic age from bedrock in Lhasa, Nianchu and Pumchu River basin.**

Table 1-a, Age of the metamorphic rock from Nyainqentanglha Mountain in Lhasa River

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Catchment | Rock type | Mineral | Dating method | Age (Ma) | Referernce |
| Lhasa River | orthogneiss | Zircon | U-Pb | 58.5, 63.5 | (Hu et al., 2003) |
| Gneiss | Zircon | U-Pb | 13-28, 36-50 | (Xu et al., 1985) |
| Orthogneiss | Zircon | U-Pb | 59, 13,120 | (Kapp et al., 2005) |
| Granitic gneiss, ultramylonite, mylonite | Monazite | U-Pb | 8-22 |
| Amphibolite,schist | Zircon | U-Pb | 225-213 | (Dong et al., 2011) |
| Mafic and felsic granulite, | Zircon | U-Pb | 90， 30-65 | (Zhang et al., 2014) |

Table 1-b, age of the Himalaya leucogranite in Pumchu and Nianchu, modified from Guo and Wilson., 2012

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Catchment | Dome | Mineral | Dating method | Age (Ma) | Reference |
| Pumchu | Majia | Monazite | U–Pb | 9.8, 9.2, 9.5 | (Schärer et al., 1986, Liu et al., 1990) |
| Xenotime | U–Pb | 11.2 | (King et al. 2011) |
| Xenotime and Monazite | U–Pb | 8.8 |
| Zircon | U–Pb | 23.1 | (Lee et al. 2006) |
| Biotite | Ar–Ar | 8, 8.6, 8.8 | (Maluski et al. 1988, King et al. 2011) |
| Muscovite | Ar–Ar | 6.4 | (Maluski et al. 1988) |
| Monazite and zircon | U–Pb | 14.2-14.5 | ([Lee et al. 2006](#_ENREF_34)) |
| Muscovite | Ar-Ar | 13.48-12.84 |
| Lhagoi Kangri | Monazite and zircon | U–Pb | 15.1, 14.7 | ([Schärer et al. 1986](#_ENREF_48), Zhang et al., 2005) |
| Rongbuk | Monazite | U–Pb | 20.3, 22, 16.8, 16.4, 16.2 | (Harrison et al. 1995, Murphy and Harrison, 1999, Searle and Godin, 2003) |
| Monazite | U–Pb | 16.4, 15.6-15.4 | (Cottle et al. 2015) |
| Everest–Makalu | Monazite | U–Pb | 20.5, 21.3, 21.9, 24, 23 | (Murphy and Harrison 1999, Schärer et al., 1984, Searle and Godin, 2003) |
| Zircon | U–Pb | 23.8, 23.2 | (Streule et al. 2010) |
| Monazite and zircon | U–Pb | 14.3 | (Schärer et al., 1986) |
| Dinggye | Monazite | U–Pb | 15 | (Liu et al., 1990) |
| Monazite and zircon | U–Pb | 12–20 | (Leloup et al. 2010) |
| Muscovite | Ar-Ar | 13.8 |
| Nianchu  | WagyeLa | Monazite | U–Pb | 11.9 | (Wu et al. 1998) |
| Kangmar | Zircon | U–Pb | 478-461, 766-736, 1144-1117 | (Liu et al. 2004) |
| Zircon | U–Pb | 493 | (Xia et al. 2008) |

Table 1-c, age of the Himalaya metamorphic rock in Pumchu and Nianchu.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Catchment | Dome | Rock type | Mineral | Dating method | Age (Ma) | Referernce |
| Pumchu | Majia | Gneiss | Monazite | U–Pb | 29-20 | (Hacker et al. 2011) |
| Schist Orthogneiss | Muscovite | Ar-Ar | 12.85-17 | (Lee et al, 2006) |
| Everest–Makalu | Calc-silicate | Titanite | U-Pb | 13-20 | (Cottle et al. 2011) |
| Dinggye | Deformed leucogranite | Monazite and zircon | U–Pb | 12-20 | (Leloup et al., 2010) |
| Deformed leucogranite | Muscovite Biotite | Ar-Ar | 14.2 |
| Garnet–sillimanite micaschist | Biotite | Ar-Ar | 15.2 |
| Pelitic granulites | Monazite and zircon | U–Pb | 30-29, 21-19, 15 | (Wang et al. 2015) |
| Nianchu | Kangmar | Gneiss | Hornblende | K-Ar | 26 | (Zhang et al. 1986) |
| Muscovite Biotite | Ar-Ar | 13 | (Maluski et al., 1988) |
| Muscovite Biotite | K-Ar | 36-22 | (Zhou et al., 1981) |
| Muscovite Biotite | Ar-Ar | 21.7, 17.3 | (Maluski et al. 1988) |
| Orthogneiss and schist | Hornblende | Ar-Ar | 27.36-51.16 | (Lee et al. 2000) |
| Muscovite | Ar-Ar | 12.23-15.24 |
| Biotite | Ar-Ar | 10.94-16.28 |
| Feldspar | Ar-Ar | 11.5-10, 10-11 |
| Apatite | AFT | 4.1-7.9 |
| Pelite | Momazite | U-Pb | 16-20 | (Hacker et al., 2011) |
| Schist | Muscovite | Ar-Ar | 13.23 | (Wang et al. 2015) |
| Yadong | Granulites | Zircon | U-Pb | 17-28.5 | (Li et al., 2015) |
| Migmatites | Zircon | U-Pb | 20-30 | (Zhang et al. 2015) |

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