


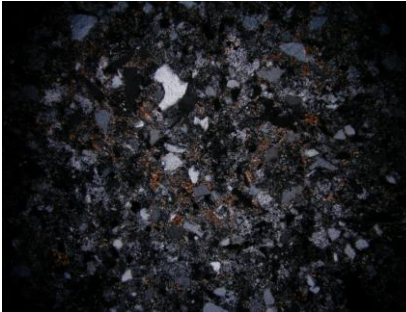

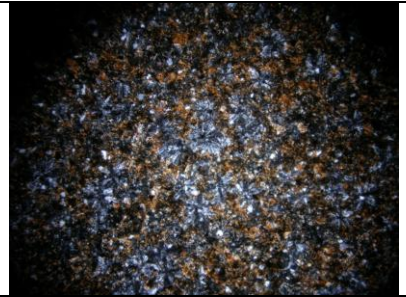

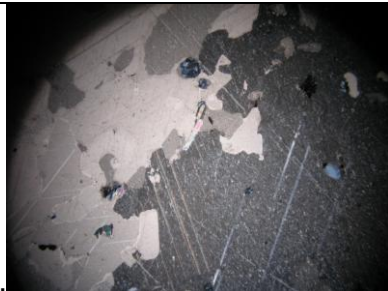
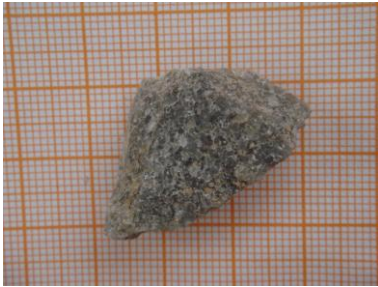
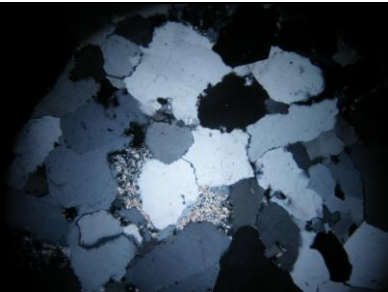



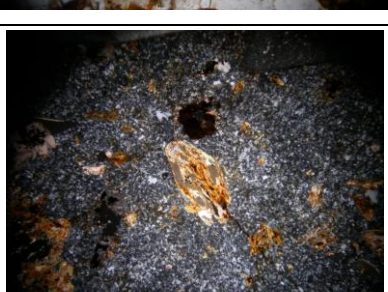

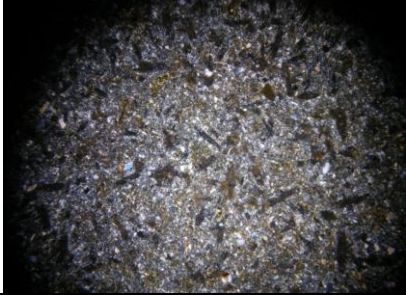



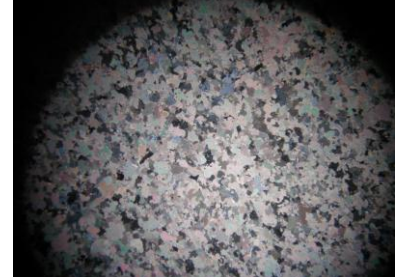


Appendix X The petrographic report on the lithic samples from Taosi and the Mount Dagudui quarry (carried out by Ms Ruli Dong from the Geology Science University of China)

| Lable | Unearthed feather | Raw material                       | appearance                                                                          | Under microscope (10X10 times)                                                        | Composition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------|-------------------|------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TS01  | TS2008PM04III②    | metamorphic coarse-grain sandstone |    |    | It consists of clastis and matrix. The clastis was composed of coarse-grain silt clastis and a few of fine-grain silt clastis. Quartz is the most common mineral.<br>Matrix has been altered totally and was made up of particle quartz and a few of sericite. Some iron particle and clastis distributed there.<br>Clastis: 55-50% (quartz)<br>Cement: 50-45% (1-2% iron)                                                                                                                                     |
| TS02  | TS2008PM04III②    | metamorphic fine-grain sandstone   |    |    | It consists of clastis and matrix. The clastis was composed of coarse-grain silt clastis and a few of fine-grain sand clastis. Quartz is the most common mineral, then feldspar and a few of heavy minerals—zircon and opaque minerals (ferruginous minerals). Single crystal quartz is the most common in the clastis. Feldspar surface was slightly kaolinitised or sericitised.<br>Quartz: 78-83%<br>Feldspar: 20-15%<br>Ferruginous minerals: 1-2%<br>Cement: 15% are recrystalized sericite and silicide. |
| TS03  | TS2008PM04III②    | andalusite hornfels                |  |  | Contact metamorphosed from sandy mudstone. Clay minerals were changed into Sericite and biotite in matrix and andalusite occurred.<br>Andalusite: $\pm 30\%$<br>Sericite and biotite: $< 59\%$<br>Silt clastis: $\leq 10\%$<br>Ferruginous minerals: $< 1\%$                                                                                                                                                                                                                                                   |


|      |                  |                      |                                                                                     |                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------|------------------|----------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TS04 | TS2008PM0<br>2H2 | marble               |    |    | Contact metamorphism from pure limestone (or dolomite). Granular metamorphic crystal was interlocking mosaic each other. A few of tremolite could be seen in the marble crystals                                                                                                                                                                                                                                     |
| TS05 | TS2008PM0<br>2③  | sandstone            |    |    | It was altered from coarse-medium grain sandstone. Particle crystallized quartz constitutes the rock and the grains interlocked each other. A few of particle conglomerate of quartz clastis distributed among the quartz. recrystallized sericite were among the particles.                                                                                                                                         |
| TS06 | TS2008PM0<br>1H1 | fine-grain sandstone |   |   | Clastis sizes are between 0.15-0.4mm. Fine-grain sand is the most common and then medium-grain. Quartz, feldspar and clastis are the most components.<br>Quartz: most are single-crystal and with cleavage.<br>Feldspar: most are plagioclase. 5—10%<br>Clastis: consists of flint, siltstone and siliceous clastis. 15—20%. 75% is quartz.<br>Cement: sericitised, partly dyed by oxidized iron into dark red. ±15% |
| TS07 | TS2008PM0<br>3③a | hornblende andesite  |  |  | Crystal: 40—45%. It consists of plagioclase, amphibole and biotite.<br>Matrix: 55—60%. Plagioclase distributed intricately in microcrystal. 2% quartz distributed in the matrix. Plagioclase laths (20—25%) distributed and slightly sericitised at the top.<br>Hornblende: 10—15%<br>Biotite: 5%<br>Accessory mineral: magnetite, <1%                                                                               |






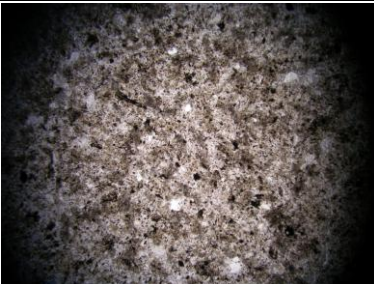


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|------|------------------|-------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TS08 | TS2008PM0<br>4③  | andalusite<br>hornfels  |   |   | <p>Contact metamorphosed from mudstone. In the matrix, there are andalusite, sericite, clay minerals and a few of opaque ferruginous minerals. Part of sericite has been crystallized into talc.</p> <p>Andalusite: <math>\pm 15\%</math><br/> Mica (+sericite): <math>\pm 10\%</math><br/> Aphanitic minerals: <math>\pm 75\%</math></p>                                                                                                                                                                                               |
| TS09 | TS2008PM0<br>2H2 | fine-grain<br>sandstone |   |   | <p>It consists of clastis and matrix. Coarse-grain silt is the most common component of the clastis, then fine-grain silt. The predominant minerals of the clastis are quartz and feldspar.</p> <p>Among the clastis,<br/> Quartz: 70—75%<br/> Feldspar : 20—15%<br/> Rock fragments : &lt;10%</p> <p>Zircon: minim<br/> matrix: calcite is the most common, then clay minerals. Calcite has been recrystallized and clay minerals have been sericitised.</p> <p>Calcite: <math>\pm 10\%</math><br/> Sericite: <math>\pm 5\%</math></p> |
| TS10 | TS2008PM0<br>2H2 | marble                  |  |  | <p>Calcite is the most common component. The matrix is interlocking mosaic calcite crystal texture.</p> <p>Plaster: 3—5%<br/> Calcite: 95—97%</p>                                                                                                                                                                                                                                                                                                                                                                                       |

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| TS11 | TS2008PM0<br>4③ | mudstone                                      |   |   | It mainly consists of clay minerals.<br>Clay minerals: most are aphanitic, just <10% fibriform sericite.<br><1% quartz fine-grain silt (<0.05mm).<br>ferruginous minerals are distributed evenly at the top of clay, $\pm 1\%$ .                                                                                                                                                                                                                             |
| TS12 | TS2008PM0<br>4③ | andalusite hornfels                           |   |   | Metamorphism from mudstone with silt. The clay minerals partly were metamorphosed into sericite and a few of talc and andalusite formed.<br>Andalusite: laths crystal, unevenly distributed among the aphanitic clay minerals. Micro-granular ferruginous minerals have been oxidized and colorized the clay minerals into light brown.<br>Andalusite: 20%<br>Sericite+talc: <10%<br>Aphanitic clay minerals: >59%<br>Ferruginous minerals: <1%<br>Silt: 10% |
| TS13 | TS2008PM0<br>4③ | carbonaceous metamorphic fine-grain sandstone |  |  | Contact metamorphism from carbonaceous silt mudstone. The mud in the original rock was silicified into micro-granular and aphanitic quartz and constitutes the matrix. The carbon in the original rock was distributed in the shaped of laths. Coarse-grain silt (most are quartz) was distributed evenly among matrix.<br>Silt quartz: 10%<br>Carbon: 15%<br>Matrix: 75%                                                                                    |



|      |                                    |                                  |                                                                                    |                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------|------------------------------------|----------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SN01 | collection                         | Andalusite hornfels              |   |   | <p>It consists of quartz, sericite, biotite and ferruginous minerals.</p> <p>Quartz: 90%, fine-granular and micro-granular metamorphic crystal. The micro-granular metamorphic crystals are interlocking mosaic each other.</p> <p>Sericite: 3—2%, unevenly distributed.</p> <p>Ferruginous minerals: 2—3%, distributed in micro-granular, calstic and laths.</p> <p>Biotite: 5%</p>                                                     |
| SN02 | collection                         | Metamorphic fine-grain sandstone |   |   | <p>It consists of clastis and matrix. Coarse-grain silt is the most common in clastis. The components are mostly quartz, feldspar and a few of mica and opaque minerals etc.</p> <p>Quartz: singe crystal, 73—78%.</p> <p>Feldspar: 10—15%, slightly sericitized.</p> <p>Clastis: &lt;10%</p> <p>Biotite, heavy minerals, zircon and opaque minerals: <math>\pm 2\%</math></p> <p>Cement: totally sericitized. <math>\pm 10\%</math></p> |
| SN03 | The profile of the previous square | andalusite hornfels              |  |  | <p>Metamorphosed from sandstone. Fine-grain sand is the most common. The particle sizes are between 0.1-0.24mm. The components of the clastis are quartz, feldspar and rock fragments. Mud in the original rock has been re-crystallized into sericite and new altered minerals: andalusite.</p> <p>Andalusite: 20—25%</p>                                                                                                               |

|      |                |                          |                                                                                    |                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------|----------------|--------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SN04 | collection     | andalusite<br>hornfels   |   |   | <p>Contact metamorphosed from mudstone. Andalusite was formed because of the high temperature. Part of the mud minerals have been re-crystallized into fibriform sericite. The other part was distributed aphanitically.</p> <p>The ferruginous minerals in the original rock have been oxidized.</p> <p>Andalusite: <math>\pm 15\%</math></p>                                                                                          |
| SN05 | DG88T0949<br>③ | Metamorphic<br>sandstone |   |   | <p>Metamorphosed from silt mudstone. Andalusite and sericite were formed because of the metamorphism.</p> <p>Andalusite: 15—20%, distributed in laths.</p> <p>Sericite: micro-fibriform, re-crystallized from clay minerals, distributed unevenly.</p> <p>Silt clastis: 10—15%, quartz is most in common.</p> <p>Ferruginous minerals: 1—2%</p>                                                                                         |
| SN08 | DG89T114<br>9③ | Andalusite<br>hornfels   |  |  | <p>Metamorphosed from mudstone. Clay minerals have been re-crystallized into sericite and a few of andalusite was formed.</p> <p>Andalusite: <math>&lt; 15\%</math>, radially distributed among the clay minerals.</p> <p>Sericite: distributed in the matrix.</p> <p>Silt clastis: <math>&lt; 10\%</math> in the original rock, distributed evenly in the matrix.</p> <p>Ferruginous minerals: <math>\pm 1\%</math> in the matrix.</p> |

(The samples titled with TS are from Taosi and those with SN from the Mount Dagudui quarry.)