



Cosmogenic exposure dating the Pre-Columbian archaeological structures at Tiwanaku, Bolivia

David Fink¹, Vladimir Levchenko¹, and Toshiyuki Fujioka²

¹ANSTO, Sydney, 2234, Australia (fink@ansto.gov.au)

²CENIEH, Burgos 09002, Spain

We use in-situ cosmogenic ^{10}Be in an attempt to date the construction of the Kalasasaya Platform temple at the UNESCO Heritage archaeological site at the ancient city of Tiwanaku, Bolivia. The unique site is located within the altiplano valley of Tiwanaku at 3870 masl near the southern shores of Lake Titicaca. The monuments at Tiwanaku were constructed as ceremonial and civic buildings of exceptional precision and quality by an Andean civilization, who were precursors of the Inca Empire. The date of construction of Tiwanaku is unknown. Earliest settlement is believed to be at least ~3,000 years ago and archeological evidence supports a drought-based empire collapse in the first half of the 12th century. Radiocarbon dating of construction material and other debris range from 300 to 950 AD (ie 1700 to 1050 years ago). At its apogee Tiwanaku is estimated to have extended over an area of as much as 6km² and to have housed between 70,000 and 125,000 inhabitants. We gained permission to sample the very tops of 3 of the Kalasasaya pillars, and multi-meter sized excavated sandstone blocks and adjacent unmodified bedrock outcrop at a known quarry site which was used for sourcing material for Tiwanaku construction. The pillars, ~5 meters tall and of square meter section, frame the outer perimeter wall of the 120m square Kalasasaya Platform and are made of andesite and sandstone. Samples at the quarry site, about 15 km distant and at 4300 masl, were taken from surfaces of the cavity from where blocks originated, select faces from the extracted blocks and unmodified bedrock outcrop. We were able to re-orient extracted blocks back into their original excavated cavity and thus determine pre-excavated buried and post-excavated exposed faces which allowed us to measure how long ago the block was carved out of bedrock and rotated in the process. Our results show that the cosmogenic signal in platform pillar tops is dominated by inheritance but that blocks had been quarried as recently as 1500-3000 years ago, the age range depending on choice of attenuation length and estimating shielding. Details of sampling, site descriptions and ^{10}Be -age calculations will be presented.