

Glacier surface velocity measurement of Pobeda - Khan Tengry massif, Tien Shan, by ALOS/PALSAR

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Pobeda (Chinese Tuomuer) - Khan Tengry massif is the largest glacial area in Tien Shan, located at the northern periphery of central Asia. Sporadically, research activities have been carried out since 1903 (Glazirin, 2010). The glaciers are the major source of principal rivers in arid region. Many glaciers have been retreating since Little Ice Age, especially since 1970's (Liu & Han, 1992; Holch & Marchenko, 2009). Also, GLOF (Glacier Lake Outburst Flood) occur regularly in summer at Lake Merzbacher, the proglacial lake of Inylchek glacier (Glazirin 2010). For these reasons, the glacier dynamics in this region gathered researcher's attention. Many researches based on field and remote sensing technique have been carried out (Aizen et al., 1997; Mayer et al., 2008; Wang et al., 2011; Han et al., 2010; Li et al., 2013)

Li et al. (2013) detected 2-D velocity map of glaciers based on SAR technique using ALOS/PALSAR archive data (Path 514, Row 830, 8 scenes). They discussed spatio-temporal velocity changes, such as seasonal and annual velocity changes. However, some glaciers were not covered and they did not use all archive data.

We used three path and all PALSAR archive data (Path 513-515, Row 830, total 46 scenes) to cover major glaciers in the massif. Usually, SRTM4 Digital Elevation model (DEM) and ASTER GDEM are applied for co-registration of two SAR image. There are discontinuities on the glacier surface in SRTM4 DEM. We used ASTER GDEM for co-registration. We used offset tracking (feature tracking) method and detected surface velocity field, assumed that glaciers flow parallel to surface topography.

First of all, we paid attention to Inylchek glacier. Inylchek glacier is the largest valley glacier in the massif, covers from 2900 to 7450m a.s.l and has two major branches (Southern and Northern Inylchek glacier). The area of the glacier is 794 km² and there are two proglacial lakes between South and North branch. The lower lake is dammed by Southern Inylchek and regularly releases lake water in summer (Glazirin 2010). Also, Northern Inylchek glacier caused glacier surge in 1997 (Mavlyudov, 1999). We will discuss the interaction of glacier velocity change with the drainage of the lake water and glacier surge.

Keywords: SAR, Mountain glacier, Tien Shan, Surface velocity, PALSAR, Offset tracking