

Flow velocity measurement of Hubbard Glacier, Alaska, by L-band Synthetic Aperture Radar, ALOS/PALSAR

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Hubbard Glacier is the largest tidewater glacier in North America, whose length is about 120km from the flanks of Mt. Logan (5989m) in Yukon, Canada. It terminates in Disenchantment Bay and Russell Fiord in Alaska. The terminus has been previously observed due to its complicated and seasonal fluctuations (e.g., Ritchie et al., 2008). However, it remains unknown how the middle and upper parts will behave in terms of both their spatial and temporal characteristic. That is why we focus on the middle stream part and investigate the flow velocity.

We use ALOS/PALSAR data, which was launched by JAXA in 2006. SAR stands for Synthetic Aperture Radar, and it enables us to detect surface deformation with high spatial resolution regardless of sunlight and weather. In order to detect the glacier flow velocity, we performed pixel offset (feature tracking) technique applying to the SAR intensity images. Moreover, we estimate the 3-D flow field by using ASTER GDEM Ver.2. Because there are 14 SAR images around the Hubbard Glacier, we could derive the flow velocity maps at 7 epochs so that we could examine the spatial and temporal changes in the flow velocity field.

Two major findings at the time of this writing are as follows. First, the maximum velocity is about 1.3m/day. Secondly, the velocity in winter is 80% faster than that in summer. We have currently no idea how to explain the second observation result. But, if it is true, this result is consistent with the terminus changes (advance in winter and retreat in summer) in Ritchie et al (2008).

We are also going to show some results of other glaciers in Yukon.