

Estimation of glacier velocities at Pio XI in the Southern Patagonia Icefield detected by ALOS-2/PALSAR-2

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The Southern Patagonia Icefield(SPI) is the largest temperature ice mass in the southern hemisphere. Recently, it is reported that majority glaciers in the SPI had undergone significant retreat and thinning. On the contrary to this trend, only Pio XI glacier advanced in the SPI in the last century. Pio XI glacier, the largest glacier in the SPI, has two termini. The north tongue calves into the Greve lake, whereas south tongue into the Eyre Fjord. There are two interesting reports on the behaviours of Pio XI. One is about whether Pio XI is surge-type glacier, another is about switch the flow path of Pio XI.

In order to understand the dynamics of Pio XI glacier, this paper reports the temporal variations of flow velocities and terminus positions by using Advanced Land Observation Satellite-2/Phased Array-type L-band Synthetic Aperture Radar-2(ALOS-2/PALSAR-2)data acquired in 2015.

In 2015, Pio XI flows < 4m/d from February to June. However in the term from August to September, Pio XI revealed significant acceleration. In 2015, the primary flow of Pio XI is terminate into Greve lake from north tongue.

キーワード : 氷河、パタゴニア

Keywords: Glacier, Patagonia

Uncertainties in ice-sheet simulation due to a variation in the numerical schemes of the ice transport equations

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Generally the evolution of ice-sheet thickness in an ice-sheet model is formulated using the divergence term of horizontal ice flux and the mass balance terms at the upper and lower surfaces, derived from the continuity equation with the assumption of incompressible fluid (i.e., a non-linear transport equation). There are many variation of the formulation, which differs in numerical aspects such as stability, accuracy, numerical diffusivity, conservation, complexity, computational costs and so on.

Since ice-sheet thickness near grounding line is relatively steep, simulated evolution of thickness over this region is expected to be much influenced by numerical diffusion and/or oscillation caused by characteristics of numerical schemes to represent the transport equation. Often the evolution near the grounding line is a dominant aspect for large-scale ice-sheet evolution, the uncertainties due to the numerical characteristics should be evaluated.

In this study implementation of a variation of Constrained Interpolation Profile (CIP) in a numerical ice-sheet model ICIES is reported. Simulation under configuration of past ice-sheet model intercomparison experiments (e.g., EISMINT, ISMIP) is reported, comparing to those using typical schemes such as an upwind scheme and/or diffusion-type scheme.

キーワード：氷床、数値スキーム

Keywords: ice-sheet, numerical schemes

Lansat 8 による赤雪分布の再評価

Revaluation with Landsat 8 of red snow mapping in ice field

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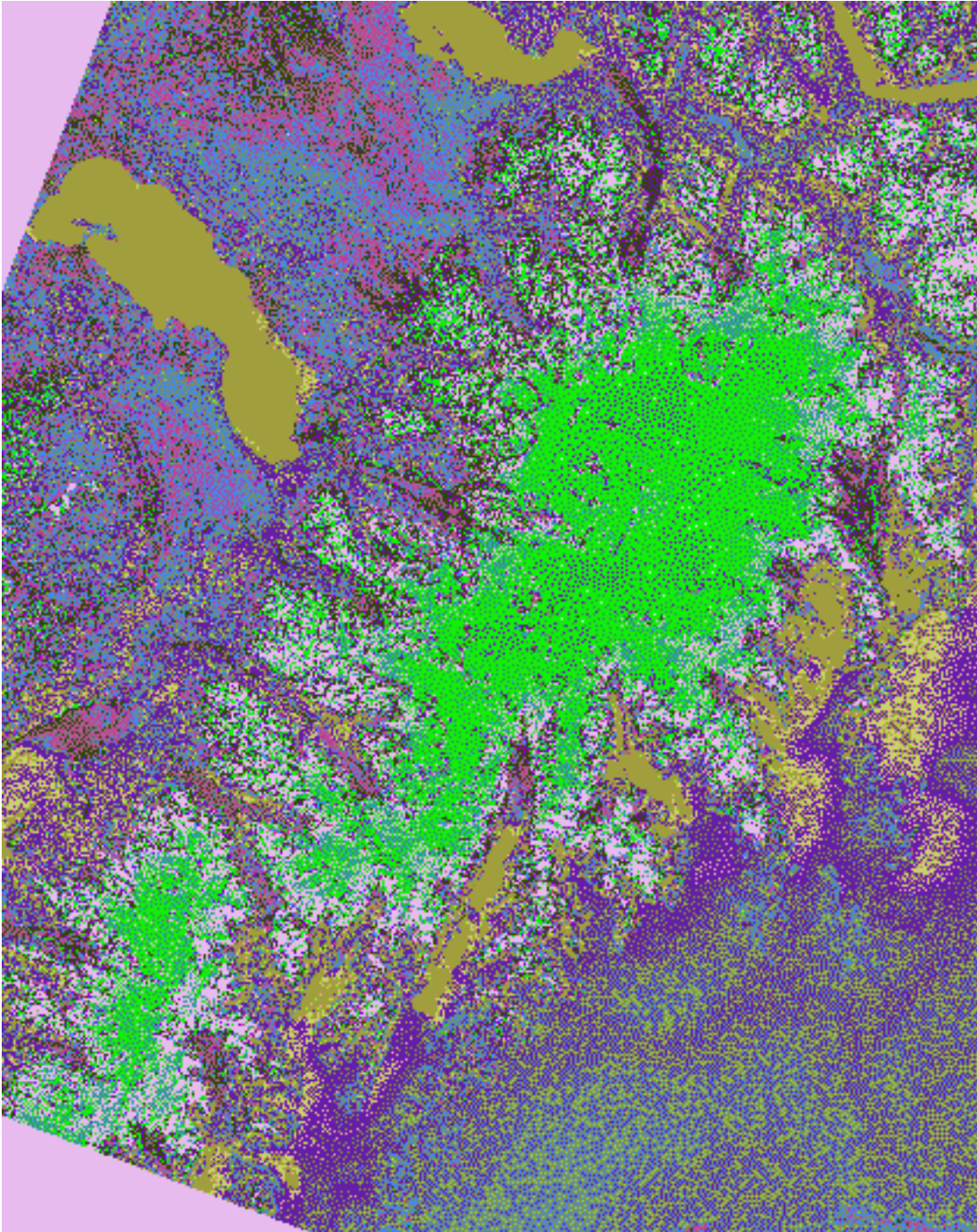
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The melting of glaciers has various effects on the environment such as sea level rise and glacial lake collapse. The global warming is commonly believed to cause the melting, while some scientists insist that the breeding of snow creatures on the glacier contributes mainly. The colorful phenomenon such as red snow, where microorganisms breed on the surface of the glaciers, makes the absorption of heat from sunlight increase, resulting in the faster melting rate of the glacier than usual. However, the actual amount of melting in the glacier is unknown. In order to elucidate it, the distribution of the coloring phenomenon on the glacier should be investigated. Therefore, we aimed at observing glaciers using remote sensing which can observe coloring phenomenon extensively and easily. Using remote sensing the red snow has been observed twice (2006, 2015). However, around 19 percent area in the ice field was not observed due to the saturation of the conventional 8-bit image sensor of the satellite. In this study Landsat 8 with the saturation-free 16-bit image sensors (band 2 and 4) is adopted and Harding ice field in June- August 2015 was selected for our observation with the information from previous studies. As shown in figure, we achieve to observe the whole area without the sensor saturating and the red snow appears in the larger area than before. The detail evaluation will be shown in the presentation.

キーワード：ランドサット、赤雪、氷原、リモートセンシング

Keywords: Landsat, Red snow, Ice field, Remote sensing



ALOS1/2を用いたInSAR解析による永久凍土地帯の地盤変動検出：Herschel島（カナダ）とBatagaika crater（シベリア）の事例

GROUND DEFORMATION MAPPING BY ALOS1/2 INSAR: CASE STUDIES AT HERSCHEL ISLAND, CANADA, AND BATAGAIKA CRATER, SIBERIA

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永久凍土は北半球において四分の一の面積を占め、その融解や凍結により地盤の沈下や隆起が生じる。これらの地盤変動は人口建築物の損壊や変形をもたらすものとして、ロシアなどの北極海沿岸地域において古くから地域に密着した問題として研究されてきた。しかし、定量的な観測データは皆無であり、またその時空間分布などは殆ど調査されていない。一方、近年地球温暖化問題が提起され、温室効果ガスの推移について多くの研究がされている中で、広大な凍土に貯蔵されている有機炭素の重要性が指摘されている。北半球のうち永久凍土地帯が占める面積は広大であり、実際に凍土の融解により形成されるサーモカルスト湖ではメタンガスの放出が確認されている。永久凍土の融解は地球環境を考える上で無視できない変動であり、高緯度地域に限られた問題ではない。一方で永久凍土そのものの観測を広域で行うことは非常に難しい。その代わりに、永久凍土地帯の地盤の沈下や隆起の広域モニターは技術的には可能であり、それができれば凍土の融解過程の監視に重要な貢献ができる可能性がある。

本研究では合成開口レーダーを用いたリモートセンシングによる永久凍土地帯の地盤変動観測、特に融解による地盤沈下の検出を試みた。JAXAによって打ち上げられた2つのSAR衛星ALOSとALOS2のデータを用いて、2007年から2016年の最近の地盤変動を観測した。観測対象としては変動速度が比較的速いスランプ地形に着目し、カナダのハーシェル島とロシアのバタガイカクレーターにおいて地盤沈下を検出した。ハーシェル島では海岸部の沈降と後退を先行研究では調べられていないALOS2による近年の変動を観測した。一方永久凍土起源のクレーターとして知られるバタガイカクレーターでは、内陸部にできたメガスランプで変動のシグナルを検出したが、解析に用いたDEMによる影響が結果に生じている。

キーワード：ALOS、InSAR、永久凍土、サーモカルスト、リモートセンシング

Keywords: ALOS, InSAR, permafrost, thermokarst, remote sensing