

Ground deformation detected by InSAR: Cases of mud volcanoes and around lakes located in Yamal Peninsula

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Mud volcano

- ✓ Extrusion of fluids and solid material originated from deeply buried sediments, such as saline waters, gases (mostly methane), mud and fragment of country rock.



mud volcano

<Size>

From centimeters to a few hundred in height and several kilometers long.

<formation>

There is various factors in each regions.

(example : fault, fold, accumulation gases)

<significance>

Resources, disaster

Method

SAR (Synthetic Aperture Radar)

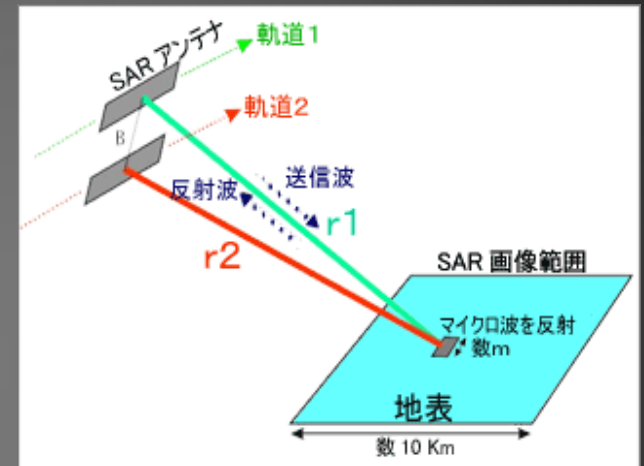
InSAR(Interferometric SAR)

ALOS/PALSAR

ALOS-2/PALSAR-2

Observation area

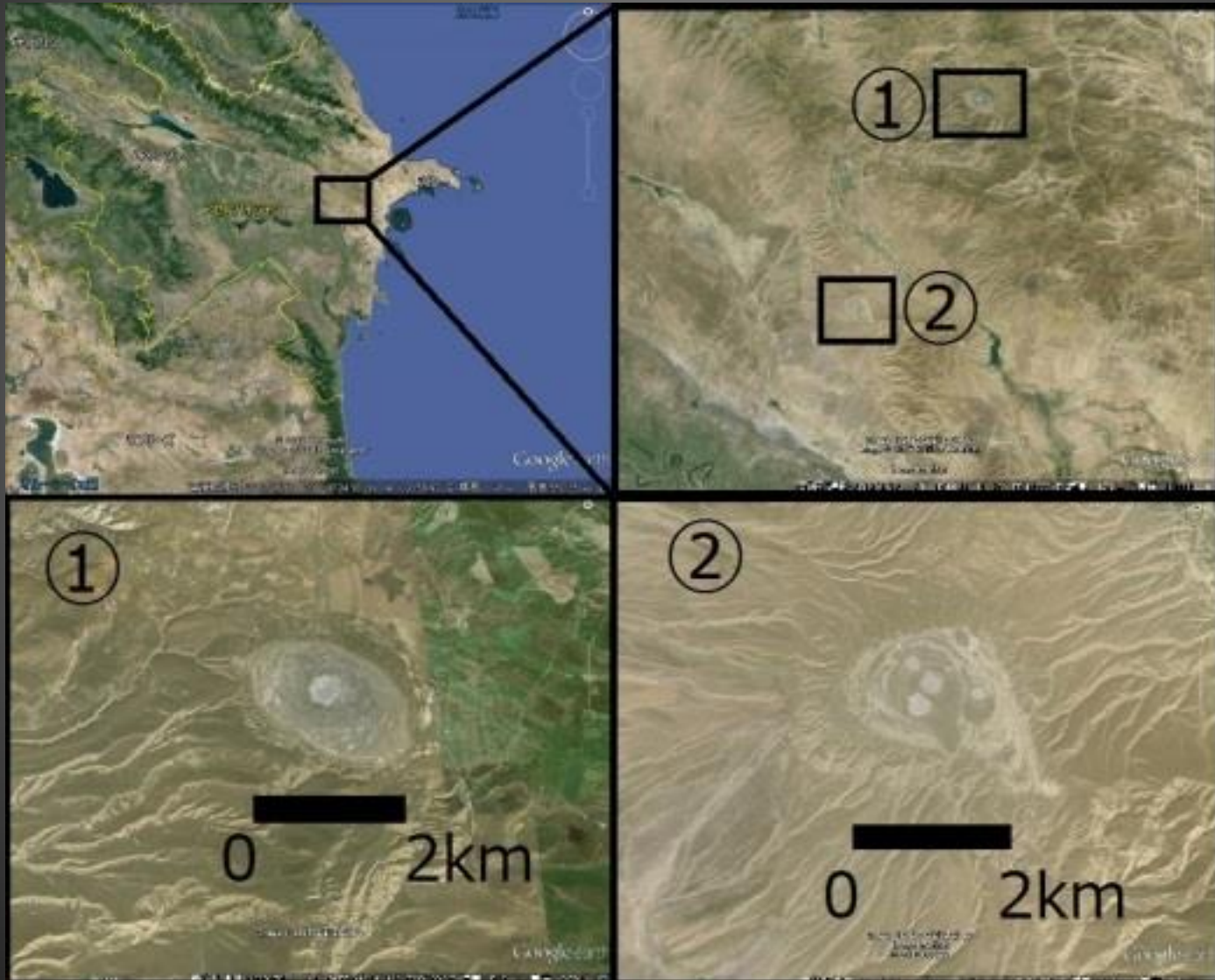
- Azerbaijan
- Sidoarjo, Jawa, Indonesia(LUSI)
- Nikappu Hokkaido



国土地理院HP 干渉SARのしくみ

<http://vldb.gsi.go.jp/sokuchi/sar/mechanism/mechanism03.html>

Azerbaijan



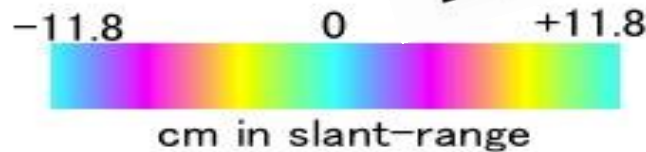
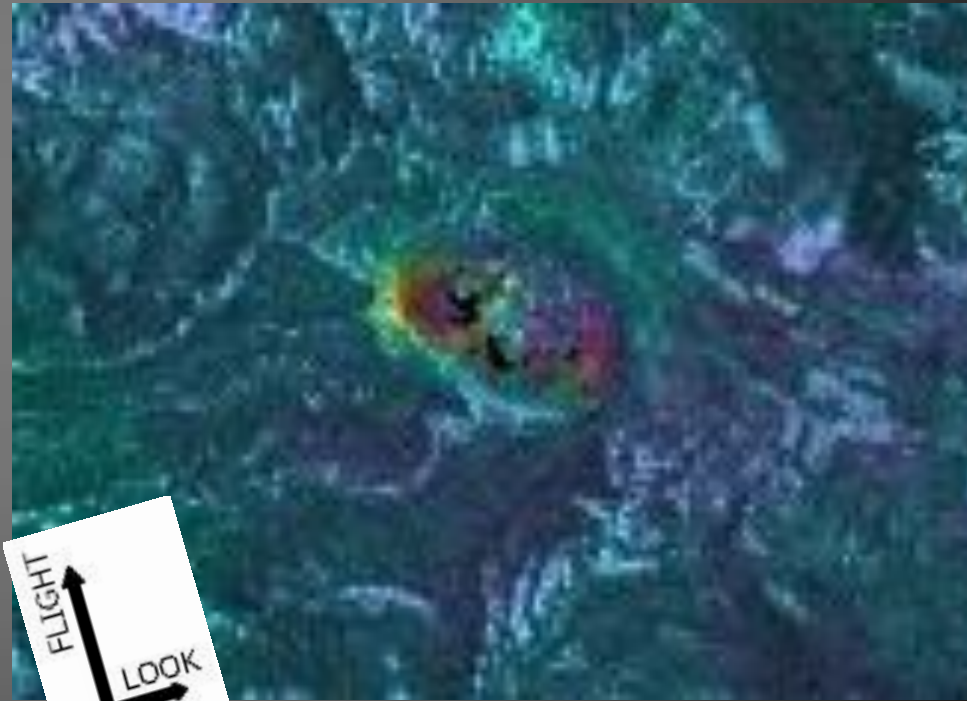
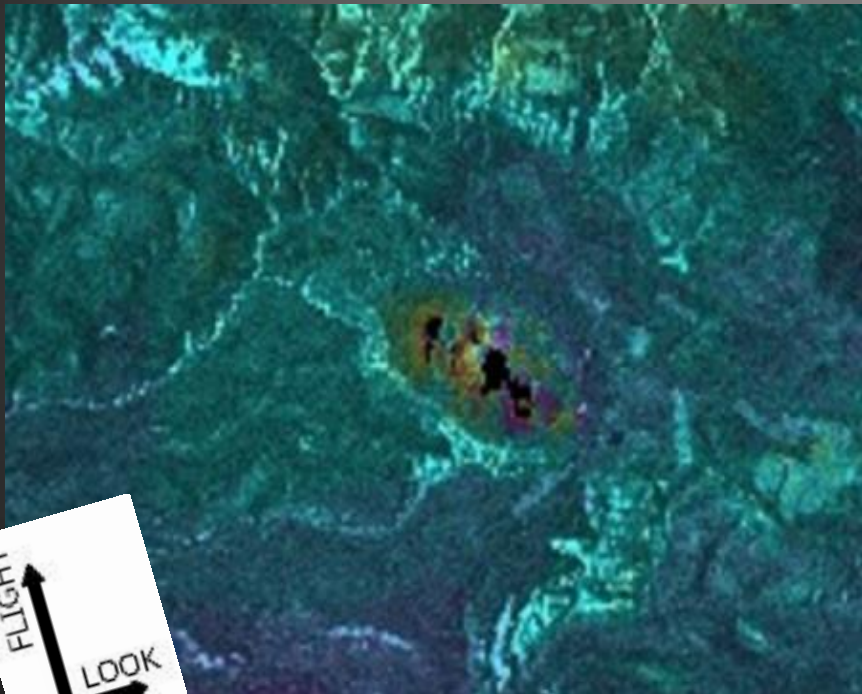
Azerbaijan

Eruption: 2005, 2006, 2007



20080702_20090820

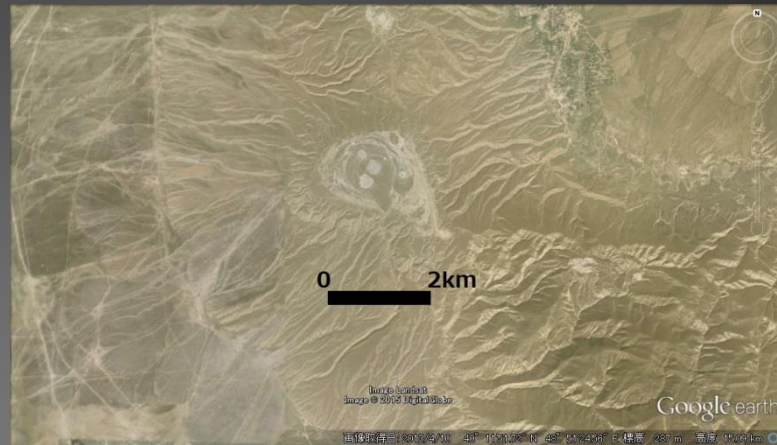
20140917_20150708



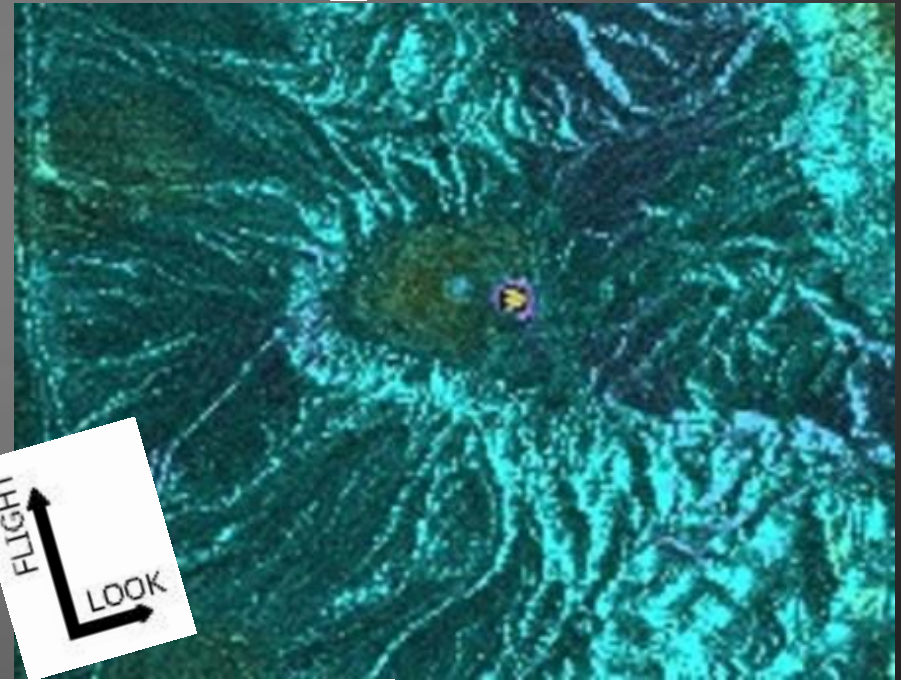
Azerbaijan

Eruption: 1982, 1986

20080702_20090820



20140917_20150708



Sidoarjo, Jawa, Indonesia

Eruption: 2006/5

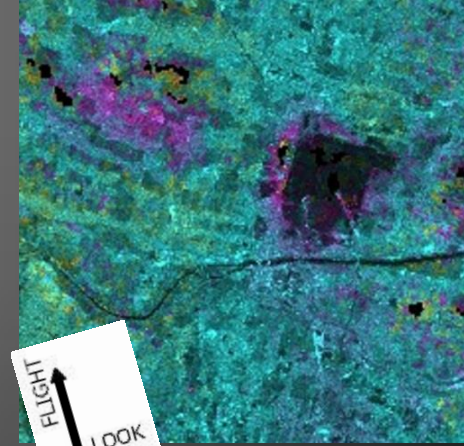
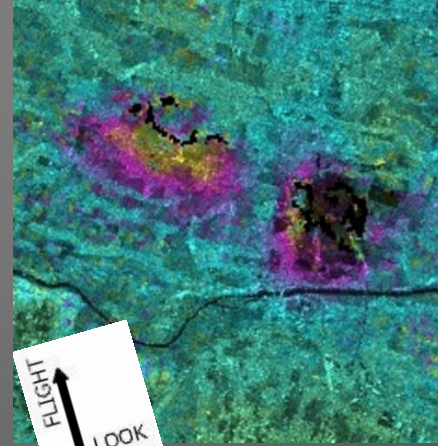
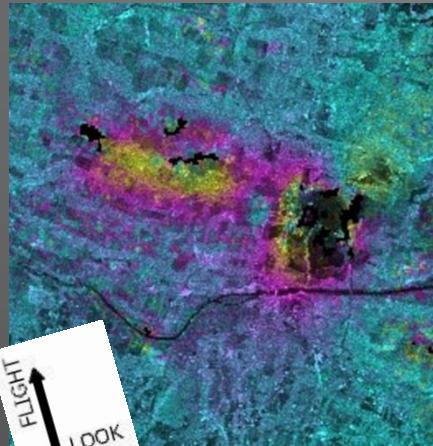
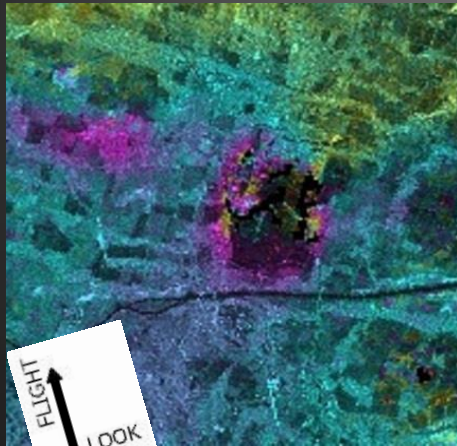


20070214_20070702

20070817_20080819

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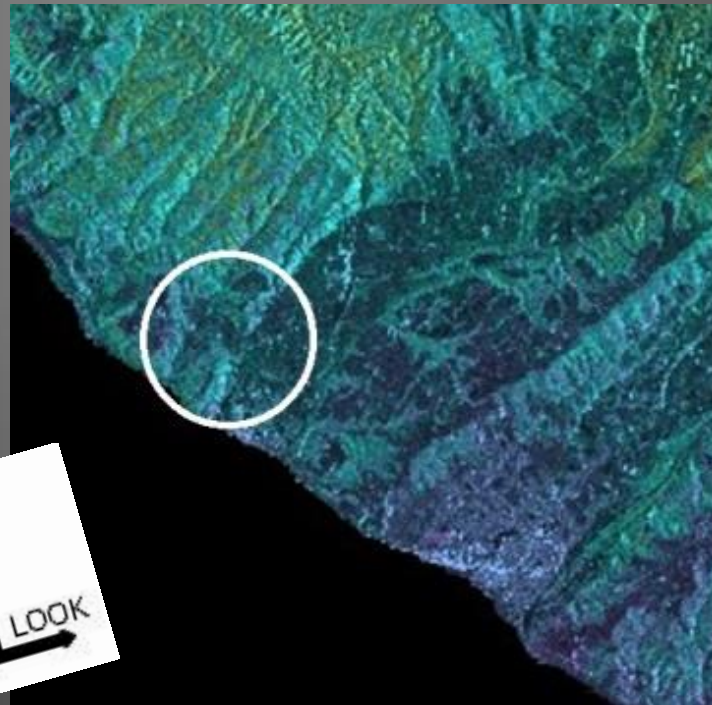
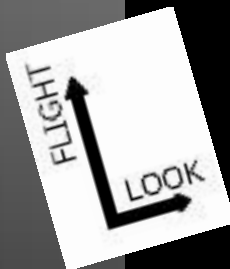
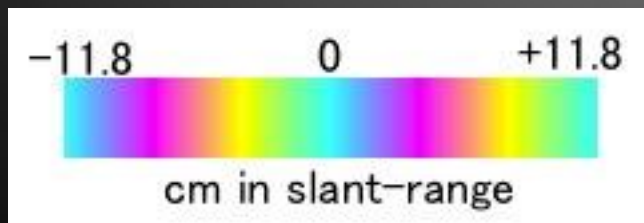


Nikappu, Hokkaido

Eruption: 2008/9



20080629_20090517



Yamal Peninsula

Location



Yamal-Nenets autonomous,
northwest Siberia, Russia

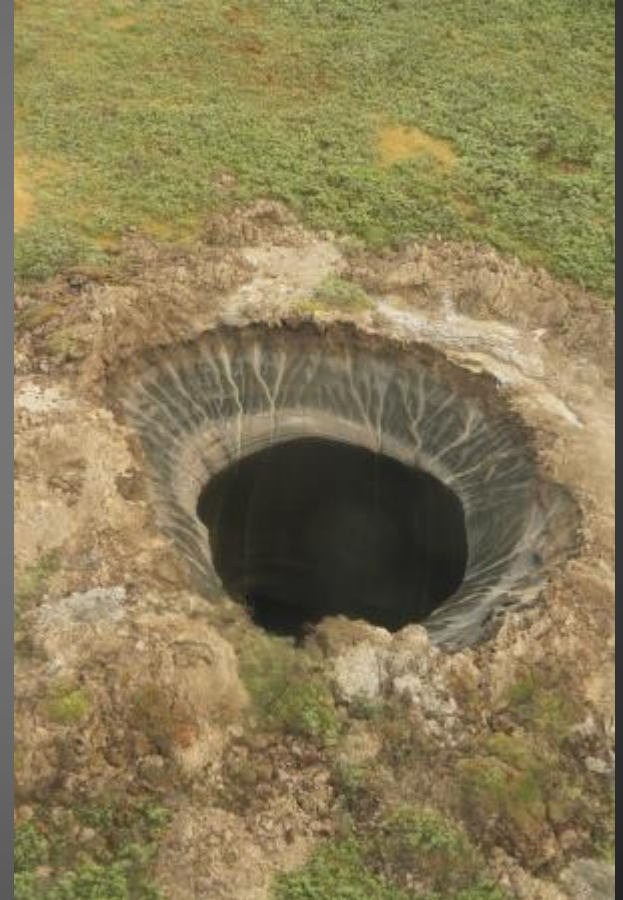
Information

- Winter : about 8 months
- Average temperatures
winter : -20 degrees
summer : 12 degrees
- annual rainfall
200-500mm
- The tundra area

Yamal Peninsula

A mystery crater spotted in the frozen Yamal peninsula in Siberia earlier this month was probably caused by methane released as permafrost thawed, researchers in Russia say.

31 July 2014
(nature.com)



Yamal Peninsula

Observation area



ALOS/PALSAR

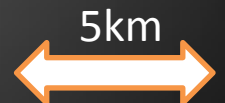
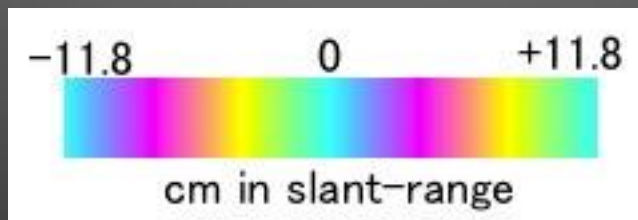
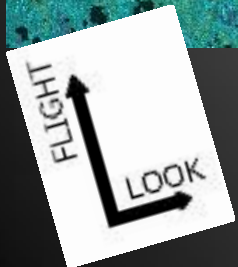
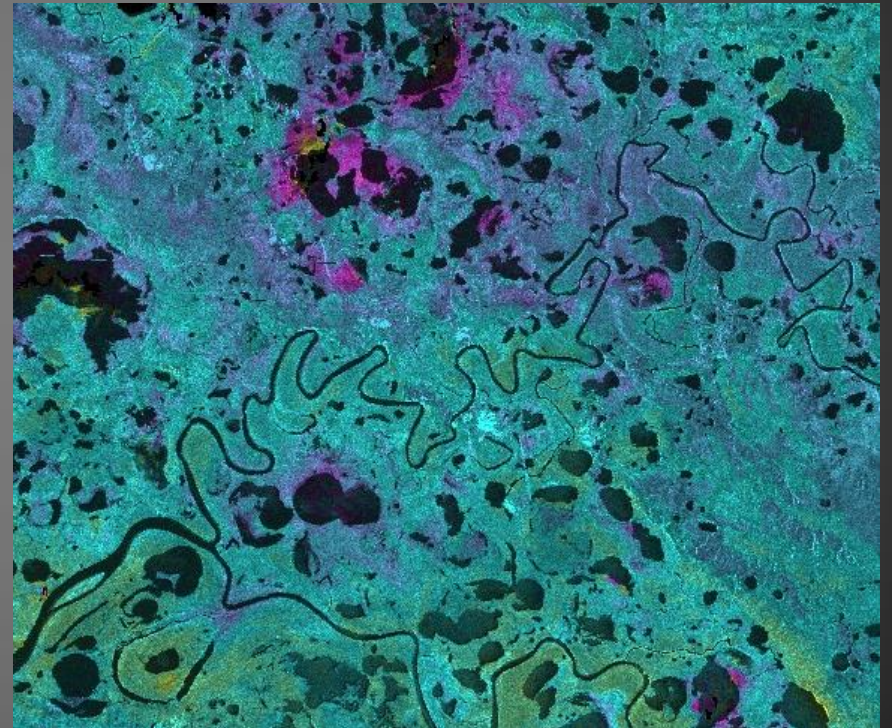
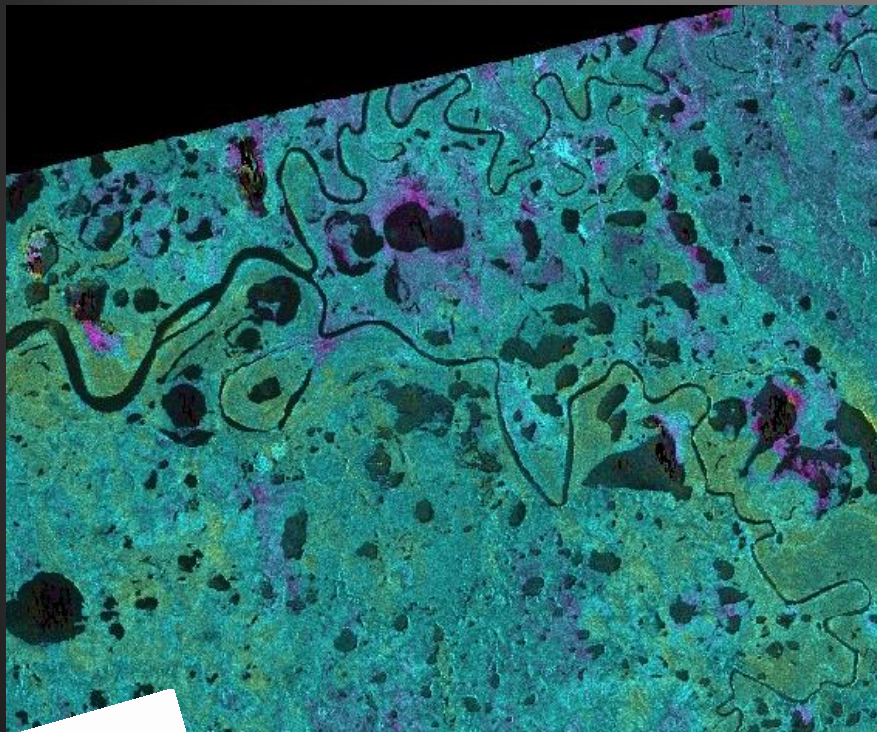
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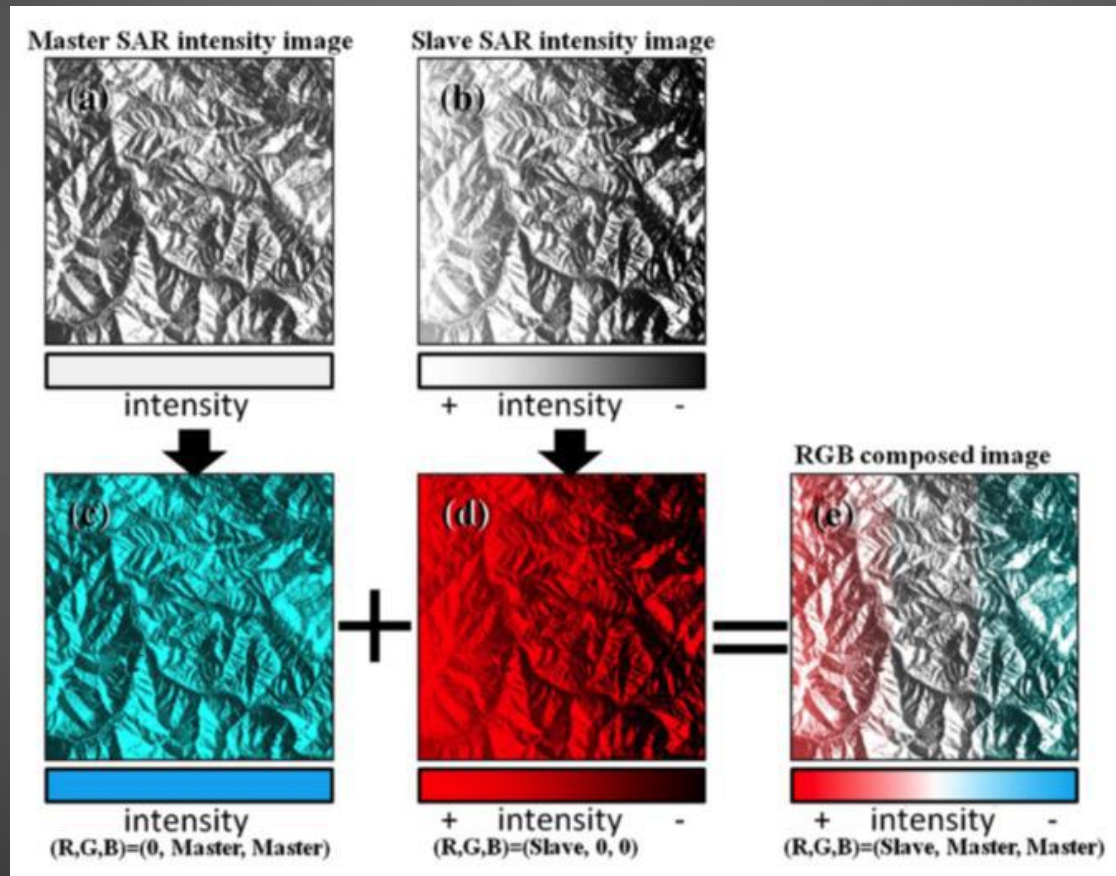
Yamal Peninsula

20080716_20090719



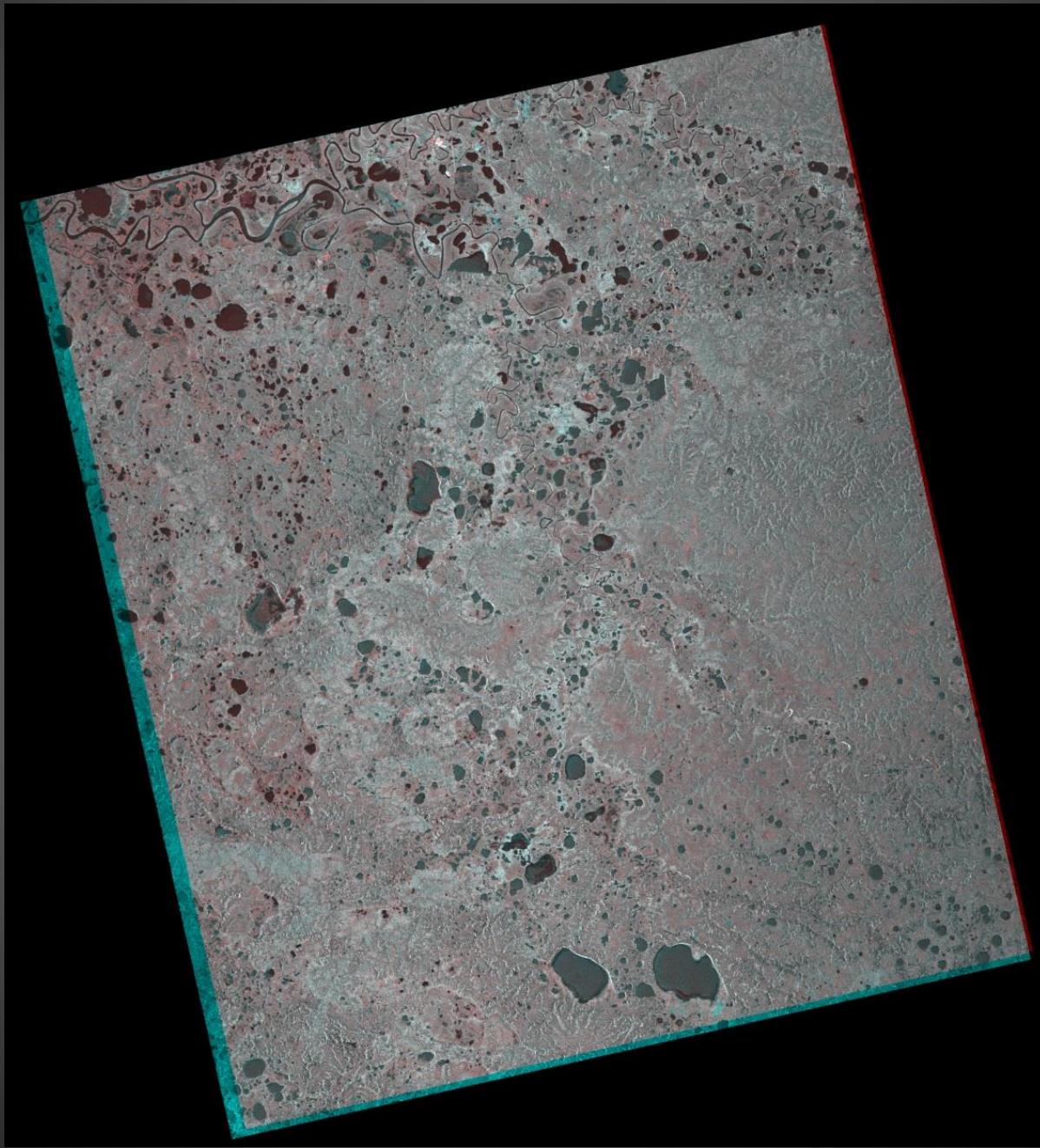
Yamal Peninsula

- RGB composed image

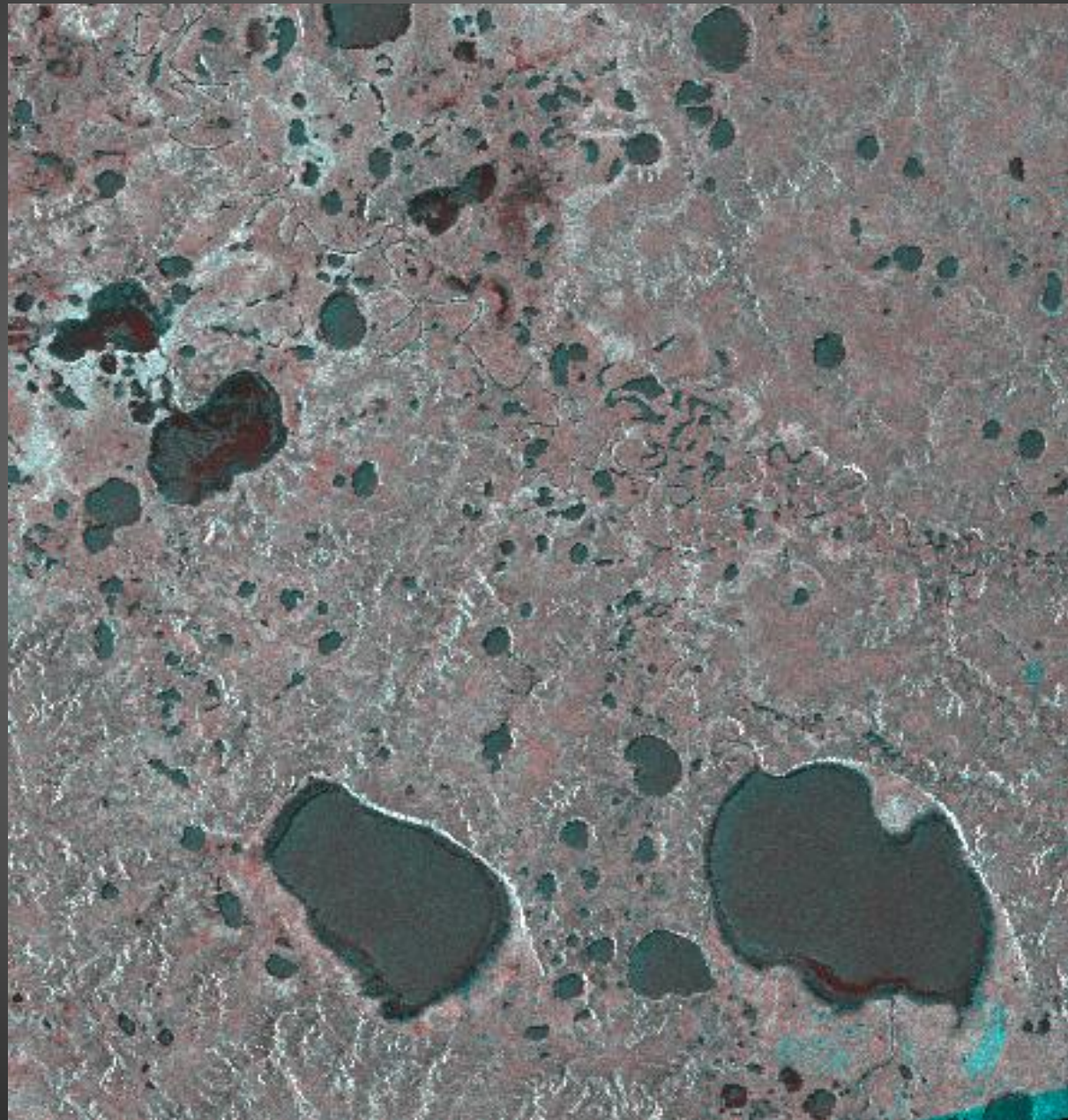


(Yasuda and Furuya, 2013)

20071014_2010906
RGB



20071014_2010906
RGB



5km

Summary

Detection of deformation by InSAR and RGB composed image

- subsidence is observed in summit of mud volcanoes continued to erupt
- Summit of mud volcanoes is low coherence due to mud and the size.
- Many small lakes are located along a river
- Subsidence is observed around lakes because of methane release from permafrost