Programmes for access to TerraSAR-X, TanDEM-X and RapidEye data for science

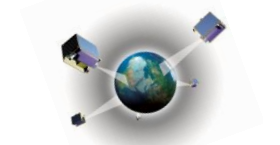Rossner, Godela (1); Bock, Michael (1); Danzeglocke, Jens (1); Roth, Achim (2); Hajnsek, Irena (3)

1: DLR Space Administration, Bonn, Germany; 2: DLR German Remote Sensing Data Center, Oberpfaffenhofen, Germany; 3: ETH Zurich / DLR Oberpfaffenhofen

Knowledge for Tomorrow

DLR

National EO Missions

TerraSAR-X		*Radar*
Launch: June 2007	**PPP**	
TanDEM-X		
Launch: June 2010		
Formation flight with TerraSAR-X	**PPP**	AIRBUS DEFENCE & SPACE

RapidEye		*Optic*
Launch: August 2008	**PPP**	PLANET LABS

EnMAP	
In Phase D	
Launch: end 2019	GFZ Helmholtz-Zentrum POTSDAM

MET*image*	
In Phase C/D	Bundesministerium für Verkehr und digitale Infrastruktur
Launch: 2021	EUMETSAT

MERLIN	
In Phase C/D	
Launch: End 2021	cnes CENTRE NATIONAL D'ÉTUDES SPATIALES

GRACE	*Gravity*
Since 2002	
GRACE-FO	NASA Bundesministerium für Bildung und Forschung GFZ Helmholtz-Zentrum POTSDAM
Launch 2018	

TerraSAR-X and TanDEM-X

- Launched in 2007 and in 2010
- Public Private Partnerships between DLR & Airbus DS / Infoterra GmbHs
- Scientific <u>and</u> commercial exploitation
- global DEM available free of charge for institutional users in >25 countries
- limited DEM data available free of charge for all scientific users
- global 90 m DEM will be available soon free of charge
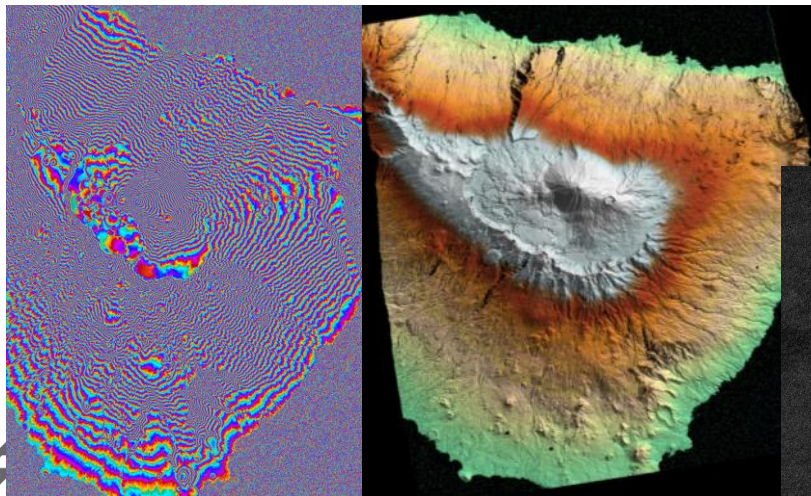
TerraSAR-X

Image Products

Mode	Res (Az.)	Swath
Wide ScanSAR	40m	200km
ScanSAR	16m	100km
Stripmap	3m	30km
Spotlight	1m	5x10km
Staring Spotlight	0,24	2,5x5km

Data access

Scientific data access

❑ The primary entry point is the TerraSAR-X Science Service System: http://sss.terrasar-x.dlr.de/
A research proposal is required.

❑ The AO for General Proposal Submission is permanent open. Marginal COFUR Costs for data handling are applicable.

❑ All science proposal submission details are included in http://sss.terrasar-x.dlr.de/pdfs/how_to_submit_a_tsx_proposal.pdf

❑ The AO for the utilization of the **TerraSAR-X archive** provides data older than 18 months **free of charge** on request.

❑ EOWEB® an EOWEB® Geoportal: http://eoweb.dlr.de//

Commercial data access

➢ Customer Service: http://www.intelligence-airbusds.com/terrasar-x/

➢ Direct Access Stations, Resellers and Regional offices

TanDEM-X

Bistatic Products *
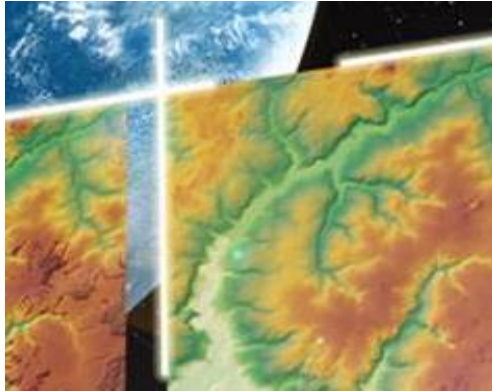
DLR Products	Res
Science CoSScs	12m
Science DEM (core)	12/30m
Global DEM (Release 2017)	90m

AIRBUS products	Res
WorldDEM™ core	12m
WorldDEM™ edited	12m
WorldDEM™ DTM	12m

Data access

Scientific data access:

❑ The primary entry point is the TanDEM-X Science Service System: https://tandemx-science.dlr.de/ **A research proposal is required**

❑ The AO for General Proposal Submission is permanent open. Marginal COFUR Costs for data handling are applicable. AOs for specific products are released frequently

❑ All science proposal submission details are included in https://tandemx-science.dlr.de/pdfs/TD-GS-UM-0115-TanDEM-X-Science-Service-System-Manual_V1.0.pdf.

❑ EOWEB® and EOWEB® Geoportal: http://eoweb.dlr.de//

Commercial data access

Contact Customer Service for available products and demo data

http://www.intelligence-airbusds.com/en/5689-worlddem-data-request-form

☞ WorldDEM™ DTM Now Available
☞ WorldDEM™ Availability
☞ WorldDEM™ Pricelist

⬇ Sample Data

⬇ Order WorldDEM™ Now

Global DEM – TanDEM-X WorldDEM™

DEM AO 2016 : 757 scientific proposals submitted to DLR to access free data

-TanDEM-X DEM (Kamtschatka)

< 2 m	: 56.77%
< 5 m	: 22.31%
< 8 m	: 11.1%
<= 10 m	: 1.4%
> 10 m	: 1.68%
Not App.	: 6.74%

Absolute Height Error per DEM Tile.
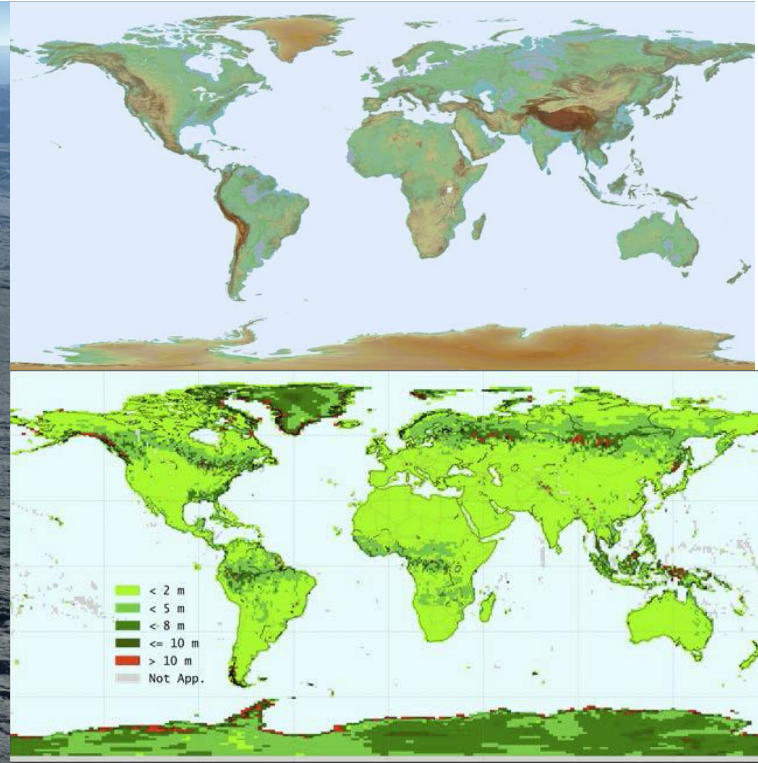
❑ **First consistent Global DEM in 12m resolution**

❑ **Based on two global coverages 2010-2014**

❑ **470.000 RAWDEMs to produce 20.000 final DEM-Tiles**

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TerraSAR-X & TanDEM-X

catalog - order –browse – download service

https://geoservice.dlr.de/egp

Data access for science for TerraSAR-X and TanDEM-X

- Registration

- **Proposal submission (!)**
    - Team composition, innovation and contribution to mission objectives.
    - Detailed description of the project
    - Data requirements
    - Co-Investigators

- Evaluation process:
    - scientific benefit, contribution to the mission objectives and feasibility

- Data costs
    - Data costs are COFUR; special conditions for dedicated calls and scientific programs under GEO/CEOS as well as archive data

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Open Calls TerraSAR-X & TanDEM-X

Name of the Call	Description	Due Date
Special TerraSAR-X products	TerraSAR-X like processed products from TanDEM-X pursuit monostatic phase and experimental TerraSAR-X products	unlimited
TerraSAR-X Archive	Archived data older than 18 months	unlimited
GENERAL Proposal Submission	TerraSAR-X data products according to the COFUR price list	unlimited
GENERAL Proposal Submission DEM	TanDEM-X data products (DEM, intermediate DEM, CoSSC) according to the COFUR price list	unlimited

Data Support for International Initiatives e.g.:

CEOS

- ❑ Free data access for R&D via Supersites Server
- ❑ Data acquisitions for Geohazard Supersites and Disaster Pilot Projects

GFOI — Global Forest Observations Initiative
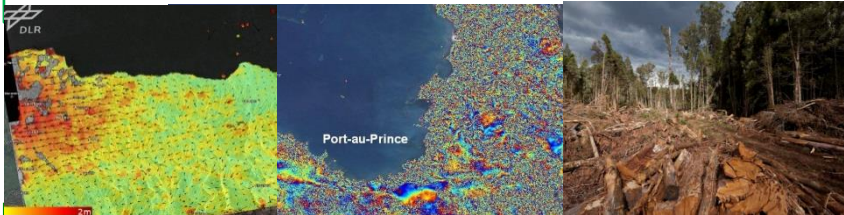
- ❑ Free Data for R&D
- ❑ TSX Background Mission

Int. Charter Space & Major Disasters

- ❑ Free TSX data for emergency response
- ❑ New acquisitons and archive images as quickly as possible
- ❑ Data access restricted to Charter Project Manager / Value Adders

TSX data contributions to Disaster Risk Reduction

- **CEOS/GEO Geohazard Supersites are supported with TSX data:**
  - Hawaii: since end of 2012
  - Iceland: since end of 2013
  - Marmara Region (Turkey): since end of 2014
  - Ecuador volcano supersite since end of 2014
  - Etna & Vesuv since end of 2014
  - Neuzealand since end of 2014
  - Greece 2016
  - San Andreas Fault (US) 2017
  - In addition: support to „Event Supersites" (only temporary existence)

- The objective of the Geohazard Supersites is to support international research consortia in their work for a better understanding of geohazards (seismic and volcanic hazards) by providing a pool of data (satellite-based and in-situ)

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TSX data contributions to Disaster Risk Reduction

- **CEOS Disaster Risk Pilots:**
    - Volcano Pilot: contribution of ca. 400 images for volcanoes in Latin America (in the time period of 2014-17)
    - Seismic Pilot: 65 images after earthquake in Greece
    - Landslide Pilot to be started soon

- The objective of the „Disaster Risk Pilots" is to demonstrate the possible use of EO data in support of Disaster Risk Management, building on a combination of satellites of CEOS member agencies.
    - data contributions under the seismic pilot support the objective to *develop and demonstrate advanced science products for rapid earthquake response*
    - Volcano pilot scientist have already demonstrated that interferograms based on radar satellite data can significantly help local volcano observatories in Latin-American countries to better understand ongoing volcanic processes and threats.

Data access for CEOS Supersites & Disaster Risk Pilots

- Unified proposal process for involved CEOS agencies
- TerraSAR-X data provided via a special server, allowing access of all members of international science teams
- Simple registration process
- special licence for GEO/CEOS science users (derived from the general scientific licence for TSX/TDX)

- Not included yet: TanDEM-X global DEM products

Doc.: TX-PGS-PL-4135
Issue: 1.0
Date: 30.09.2014

User License for the Utilisation of TerraSAR-X / TanDEM-X Data and Products for Scientific Use

between
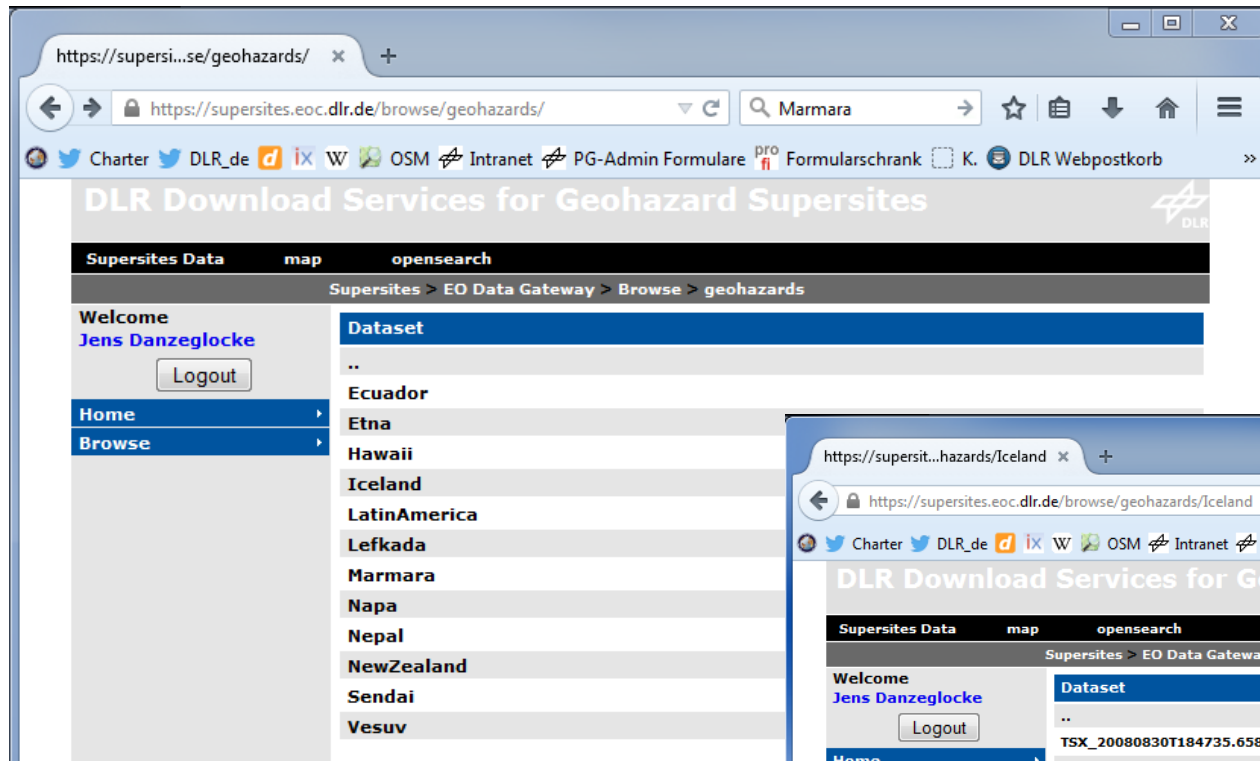
DLR

and
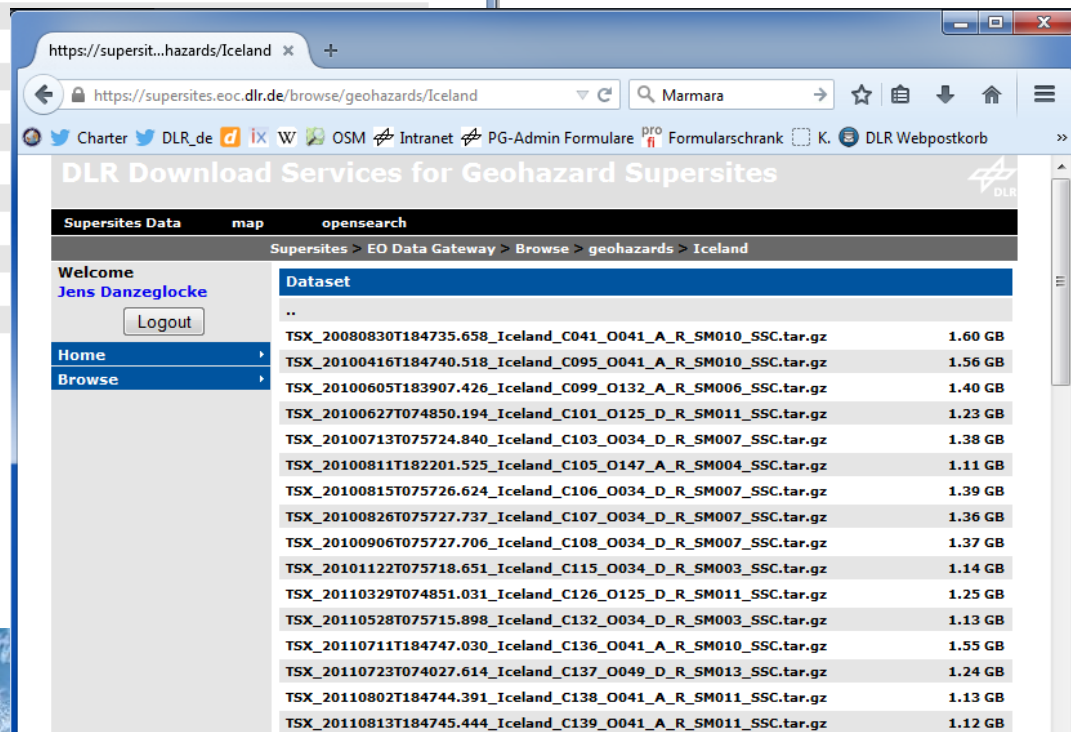
Registered Users at the DLR Download Service for the Geohazard Supersites

DLR Supersites Server

GFOI – Data acquisitions

TerraSAR-X archive data
- Acquisitions (mostly StripMap) since 2008 over selected sites
- Data collection from 1Q 2008 to 1Q 2015: http://gfoi.org/RD.
- Archive data < Q1 2015 via DLR EOWEB

TerraSAR-X background mission
- Background mission since June 2015 to cover the R&D sites systematically
- Prio 1 sites every 22 days, ascending and descending orbit.
- Prio 2 sites monthly
- Status of acquisitions via DLR EOWEB

TanDEM-X archive data
- Acquisitions over selected sites since 2011
- KML of super sites available on GFOI website: http://gfoi.org/RD
- Data from the TanDEM-X science phase AO (Oct.2014 – Dec. 2015) include bistatic and/or polarimetric acquisitions over GFOI sites

GEOGLAM & Polar Space Task Group

ASIA RICE

- 42 TSX data sets provided
- Time series of different data sets to monitor rice area, development state and other parameters

JECAM sites

- Data available for sites in Argentina, Belgium, Tunisia
- Further sites to be included upon request
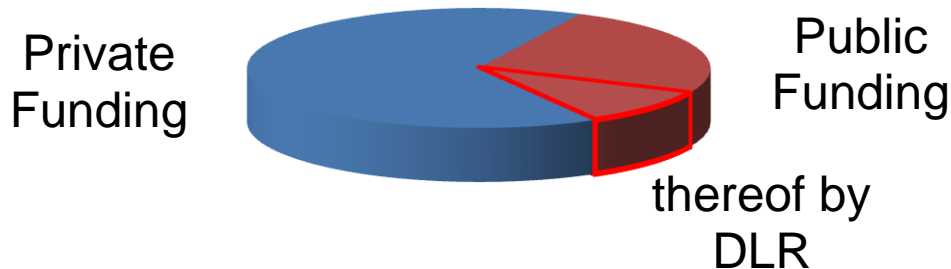- Data access through TerraSAR-X/TanDEM-X science service systems

Polar Space Task Group

- Data collection of TerraSAR-X
- TanDEM-X DEM coverage: data acquisition complete
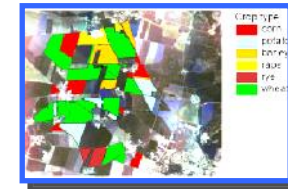- Access through general AO processes
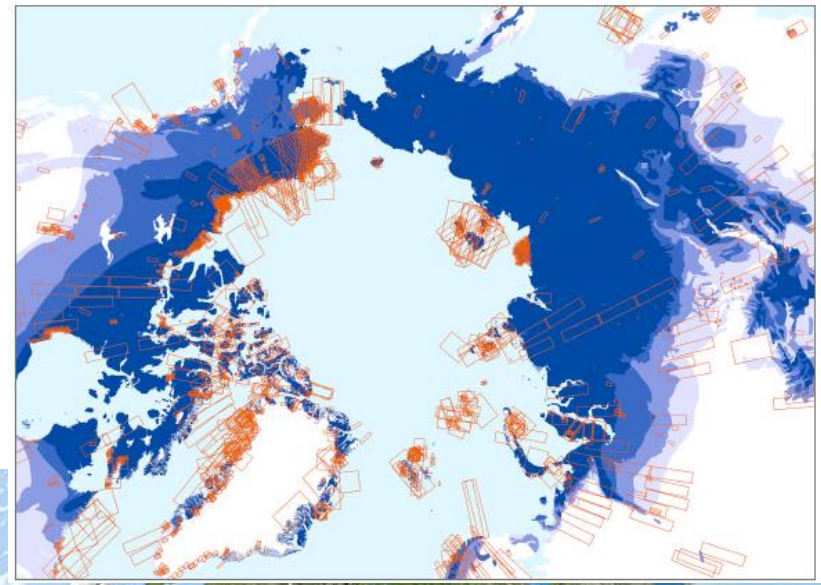
RapidEye

- Commercial initiative with financial support from DLR
- Five identical small satellites in one orbital plane
- CCD Camera, build by JenaOptronik
  - 5 spectral bands & spatial resol.: 6.5 m
  - Strip width: 78 km
  - Launch: August 29th, 2008
- Mission target: regular monitoring of large areas, daily repetition
- Balance for public contribution
  - New jobs
  - Data for Scientists

Private Funding

Public Funding

thereof by DLR

Crop Maps

Forestry

JENOPTIK GERMANY

JENA-OPTRONIK
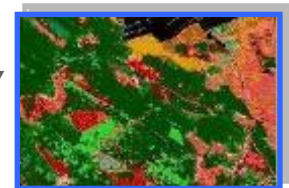
RESA – RapidEye Science Archive

- General AO for scientific use
- German PI is mandatory
- Registration and proposal submission
- Evaluation wrt to scientific objective and feasibility
- Amount of data restricted

BASIC PRODUCT 1B	ORTHO PRODUCT 3A
+ radiometric corrected + sensor Corrected + 6.5 m pixel size + 5 spectral Bands	+ radiometric corrected + sensor corrected + geometric corrected + 5 m pixel size + 5 spectral bands + 25 x 25 km tile size

| STARTSEITE | NUTZUNGSINFORMATIONEN | PROJEKTE & WORKSHOP | LINKS | FAQ | SITE MAP |

RESA - RapidEye Science Archive

| EyeFind RESA | Registrieren |

- Startseite
- RapidEye Satellitenkonstellation
- Nutzungsinformationen
- Wissenschaftliche Nutzung
- Bestellbedingungen
- Projektantrag & Verfahren

DAS RAPIDEYE SCIENCE ARCHIVE

Das RapidEye Science Archive (RESA) unterstützt Wissenschaftler/innen deutscher Universitäten und Forschungseinrichtungen durch die Bereitstellung kostenloser Satellitenbilder der RapidEye-Konstellation.

Die RapidEye-Satelliten und der RapidEye-Katalog werden von der BlackBridge AG (http://blackbridge.com/rapideye/) betrieben. Die RapidEye-Flotte umfasst fünf baugleiche Satelliten, die die Erde in einer Höhe von 630 km umkreisen. Das System bietet folgende Vorteile:

Thank you

Links to data access for science:
- http://sss.terrasar-x.dlr.de/
- https://tandemx-science.dlr.de/
- https://resa.planet.com/
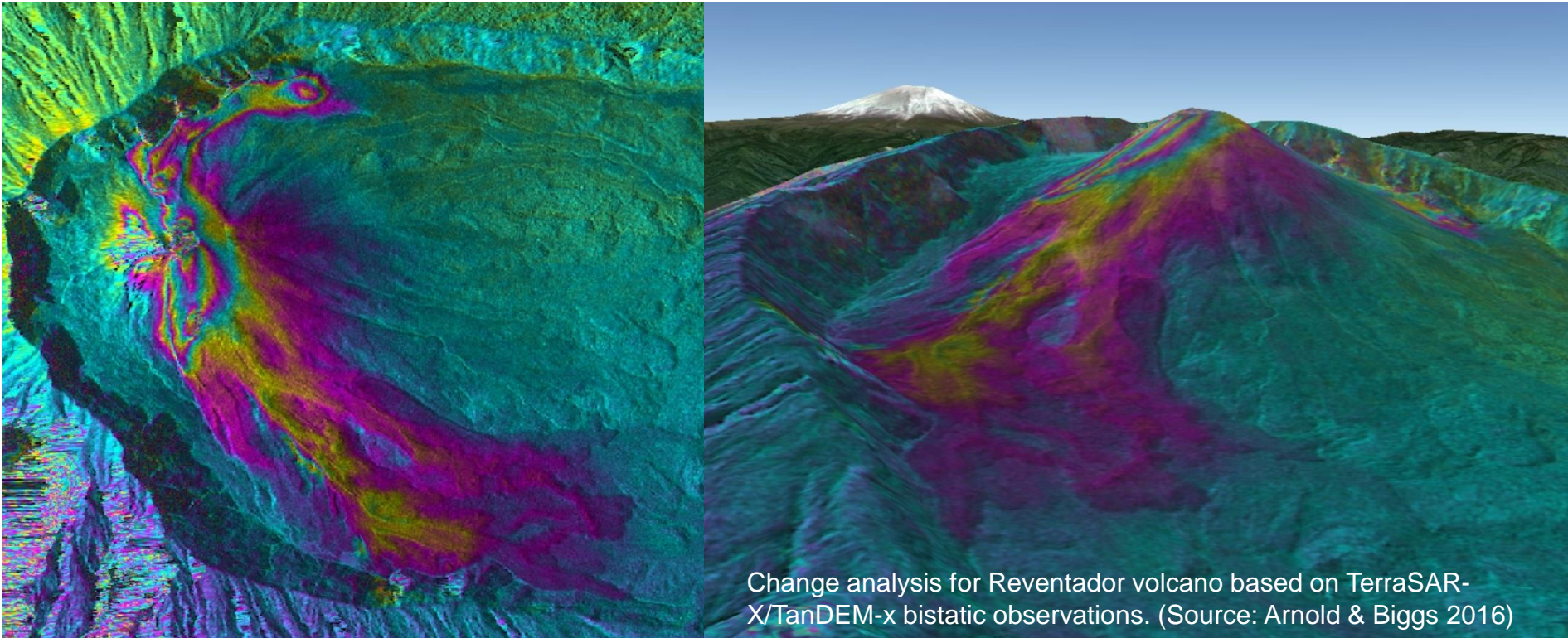
Change analysis for Reventador volcano based on TerraSAR-X/TanDEM-x bistatic observations. (Source: Arnold & Biggs 2016)