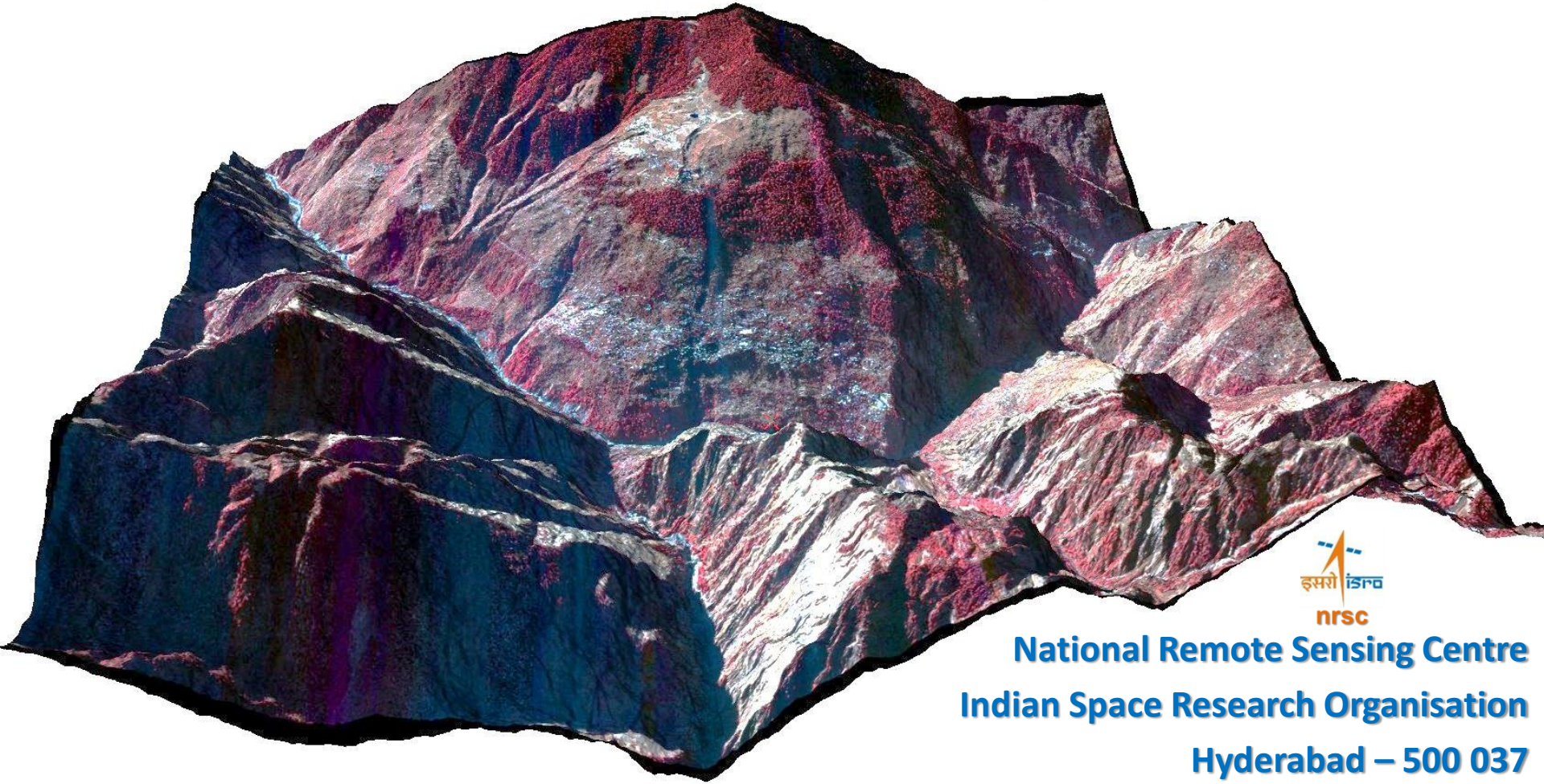
Joshimath subsidence: Satellite-based preliminary results



National Remote Sensing Centre

Indian Space Research Organisation

Hyderabad – 500 037

About the Event

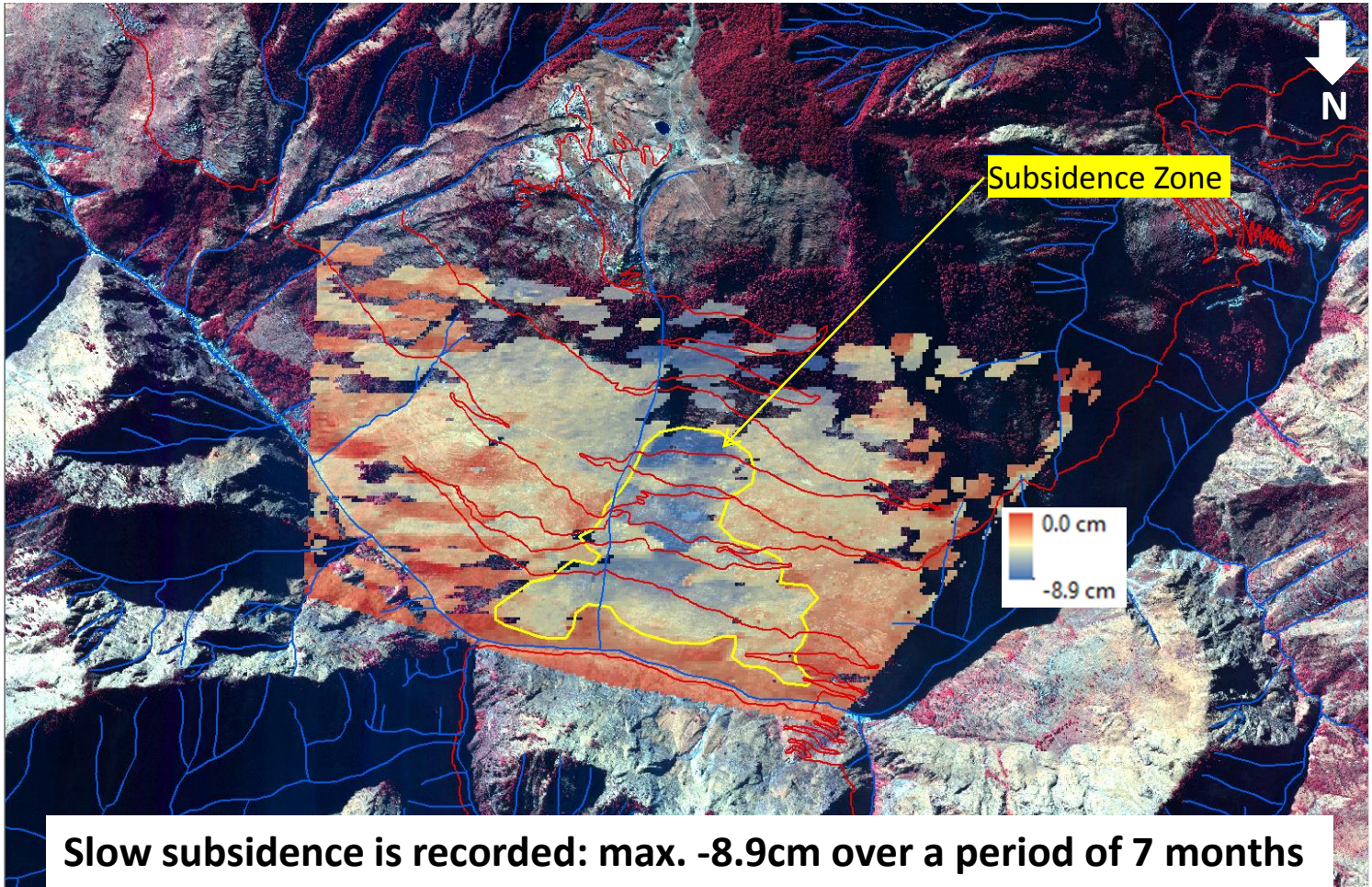
- Over the last few days, several media reports have highlighted about the subsidence issues that are occurring at Joshimath.

- Due to landslide-related creep, cracks have appeared in around >700 houses. Roads along with the hotels and hospitals present there have developed cracks.

- Sentinel-1 SAR imagery (Descending pass) was processed using the DInSAR technique to identify the possible location and extent of land subsidence in long and short time intervals as follows:
  - Master: 7th April, 2022; Slave: 9th November, 2022 : For identification of slow subsidence
  - Master: 27th December, 2022; Slave: 8th January, 2023 : For identification of rapid subsidence *(as reported on 2nd January, 2023)*

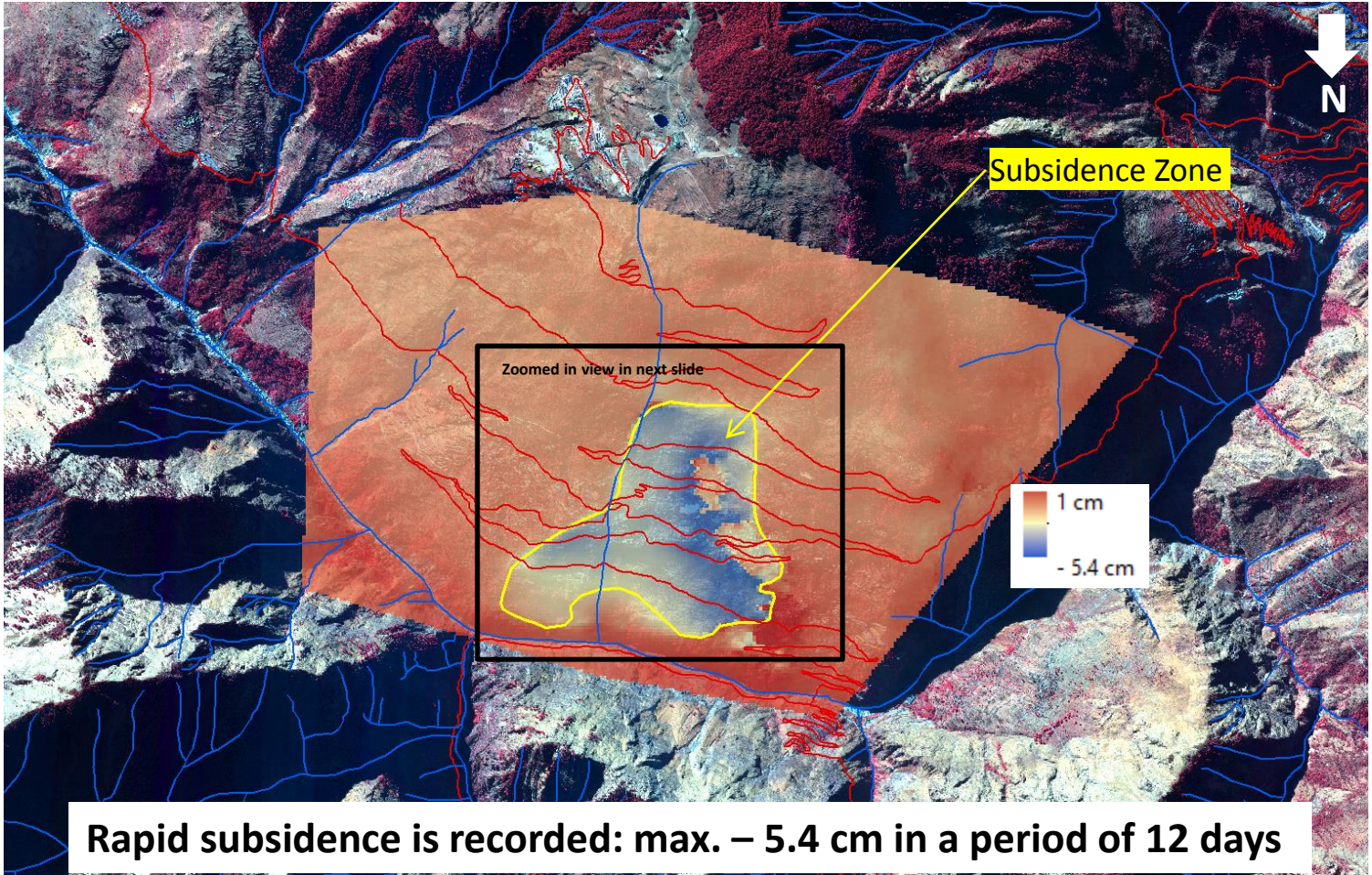
- The identified subsidence zone was correlated with new Cartosat-2S satellite data acquired by ISRO on 07 and 10 Jan 2023.

Subsidence between April and November, 2022



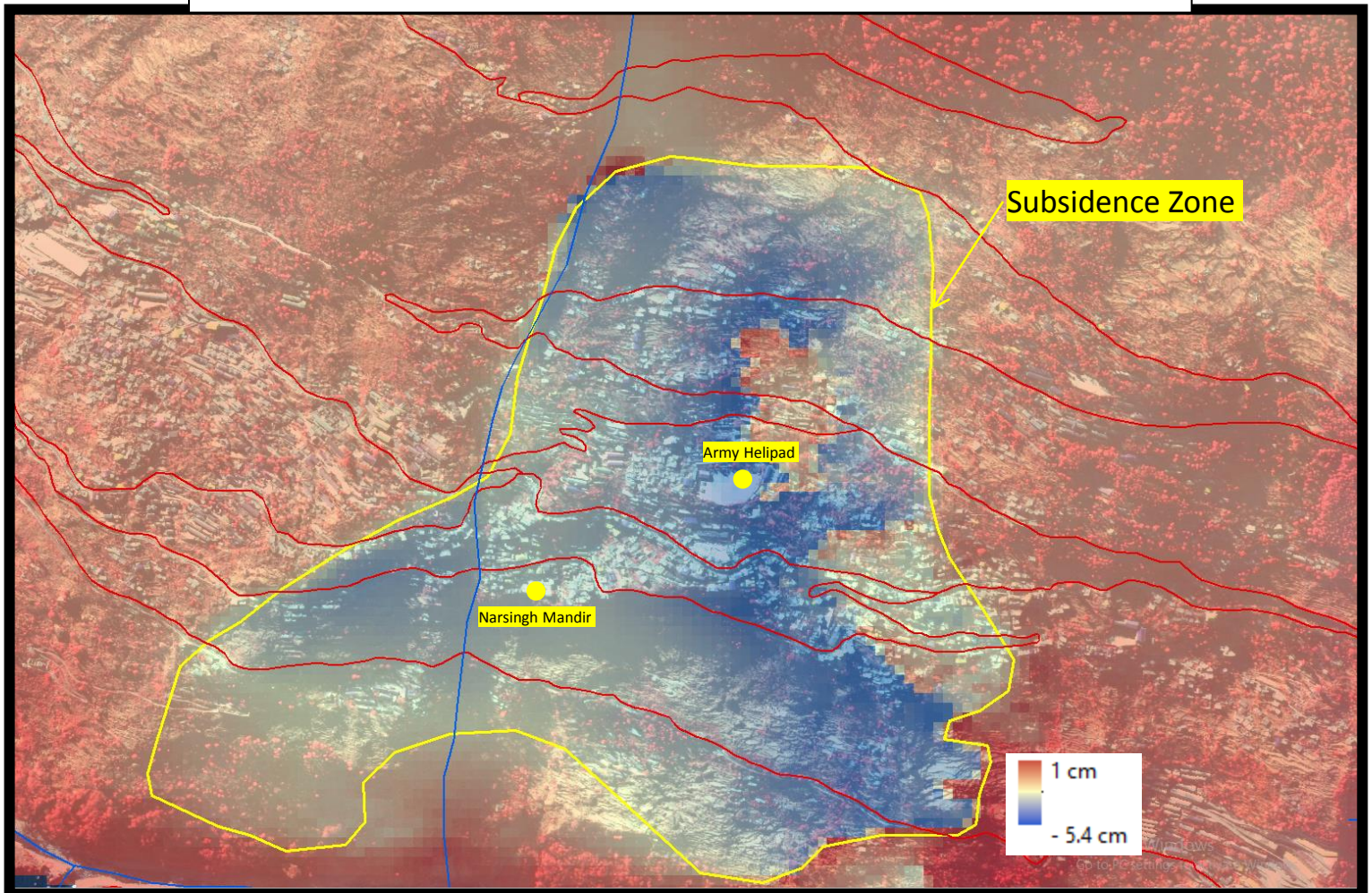
Slow subsidence is recorded: max. -8.9cm over a period of 7 months

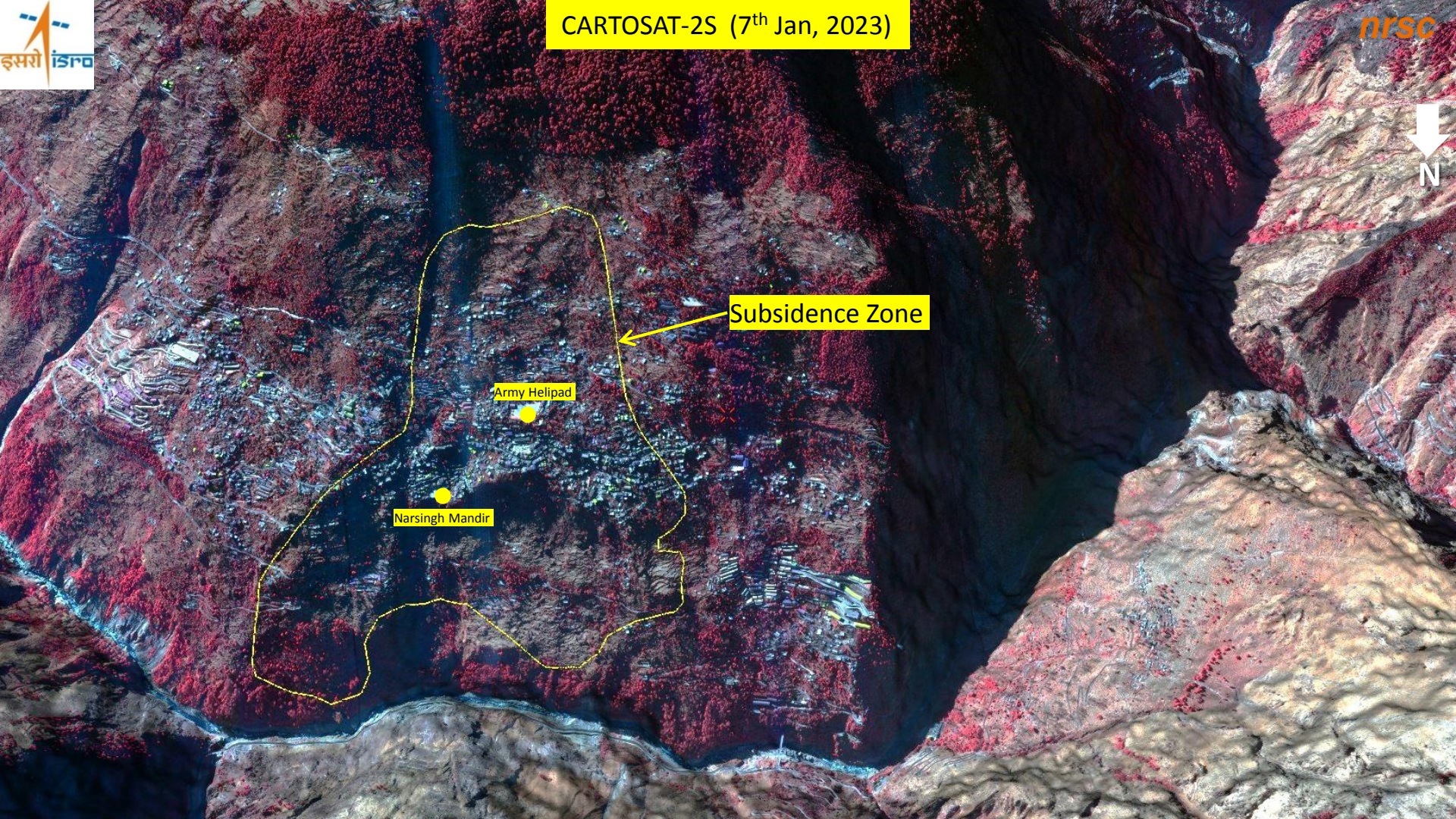
Subsidence between 27 Dec 2022 and 8 Jan 2023



Rapid subsidence is recorded: max. – 5.4 cm in a period of 12 days

Zoomed in View of the Subsidence Zone




CARTOSAT-2S (7th Jan, 2023)
nrsc
N
Subsidence Zone
Army Helipad
Narsingh Mandir

Observations

→ Slow subsidence up to **~ -9 cm** within the Joshimath town is recorded over a period of **7 months**, between April and November 2022.

→ Between 27th December 2022 and 8th January 2023 (possibly on 2nd January 2022 as per eyewitness reports) **a rapid subsidence event was triggered.**

→ The region subsided around ~ **-5 cm** within a span of a few days and the areal extent of subsidence has also increased. But it is confined to the central part of Joshimath town.

→ A subsidence zone resembling a generic landslide shape was identified (tapered top and fanning out at base). Crown of the subsidence is located near Joshimath-Auli road at a height of 2180 m.

→ *Analysis of temporal InSAR is ongoing to identify landslide kinematics and results will be further updated.*