

Las Vegas, Nevada (1/5)
Subsidence due to groundwater abstraction

SAR dates: 06-Apr-93 and 18-Apr-96
 Separation: 3 years

COMMENT

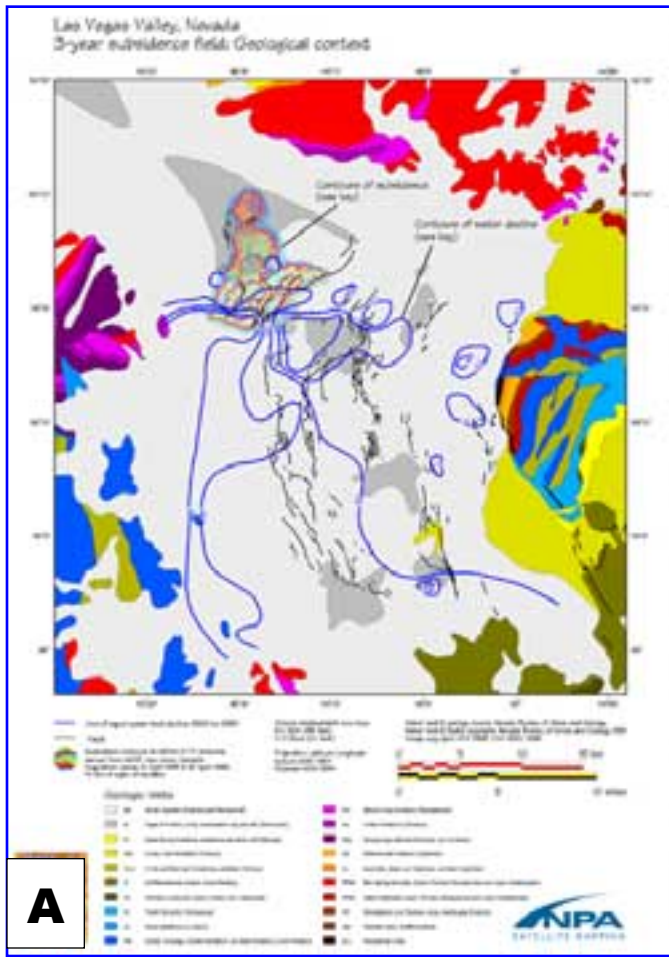
Situated in a semi-desert environment, Las Vegas is the fastest-growing settlement in the USA. The dramatic increase in the pumping of groundwater from underground aquifers has resulted in large-scale subsidence, particularly to the north-west of the town.

The four graphics relating to Las Vegas show how InSAR subsidence information can be integrated with other pertinent data to provide useful information to decision-makers on the ground. In each graphic, just the relevant part from the same interferogram has been extracted, colour-coded and then placed in context.

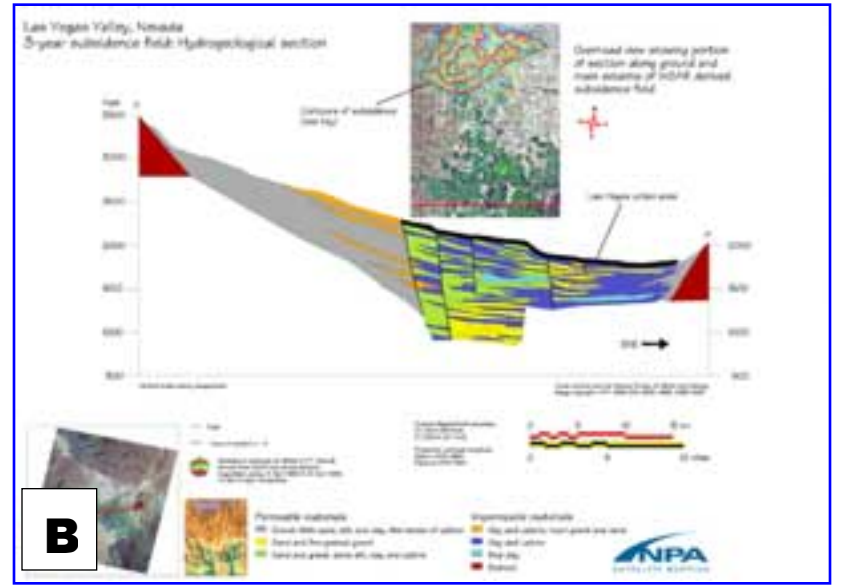
Images

- [A: Subsidence and geological context](#)
- [B: Subsidence and hydrogeological cross-section](#)
- [C: Subsidence and relationship to water decline](#)
- [D: Subsidence and risk](#)

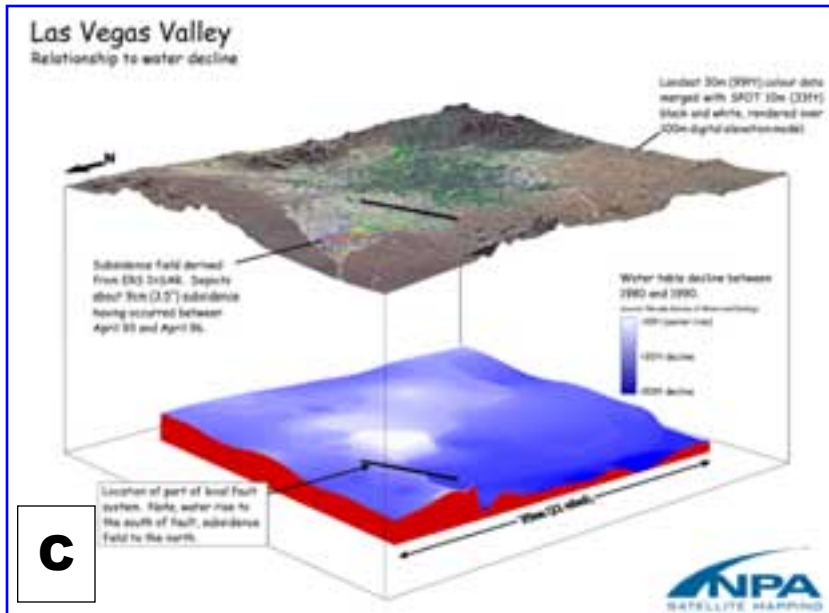
Click on individual graphics to see a higher resolution version.



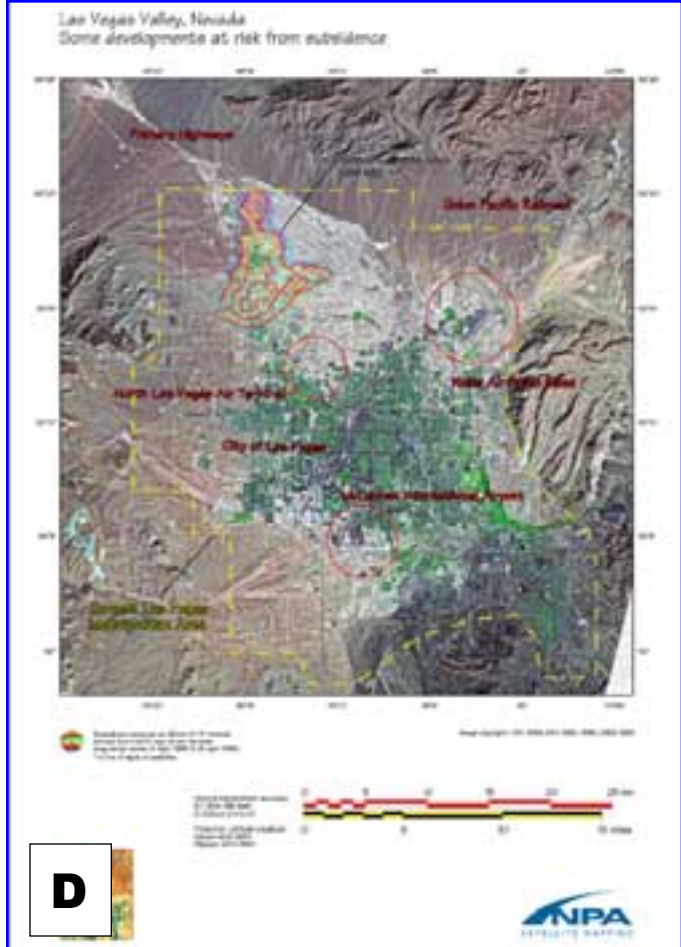
A



B



C



D

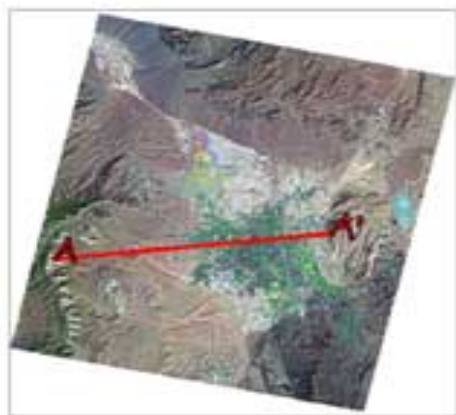
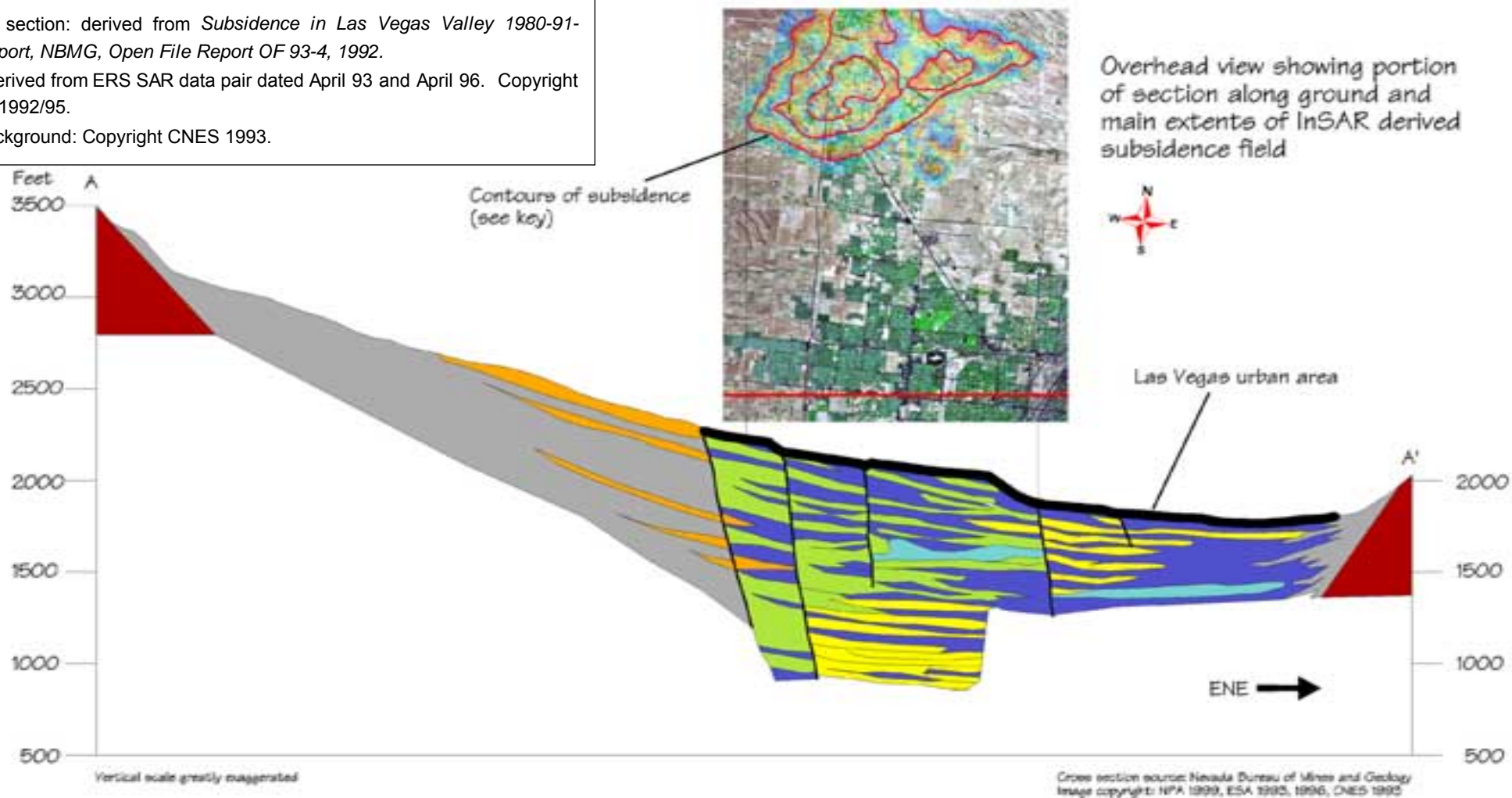
Low resolution version
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Las Vegas, Nevada (3/5)

Hydrogeological cross-section

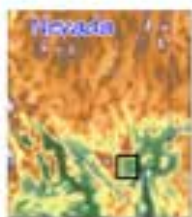
Data layer sources

1. Hydrogeological section: derived from *Subsidence in Las Vegas Valley 1980-91-Final Project Report, NBMG, Open File Report OF 93-4, 1992.*
2. InSAR extract: derived from ERS SAR data pair dated April 93 and April 96. Copyright NPA 2000, ESA 1992/95.
3. SPOT image background: Copyright CNES 1993.



— Fault
— Trace of section A - A'

Subsidence contours at 25mm (1") interval, derived from InSAR map shown beneath. Acquisition dates: 6 April 1995 & 16 April 1996. *In line of sight of satellite.



Permeable materials

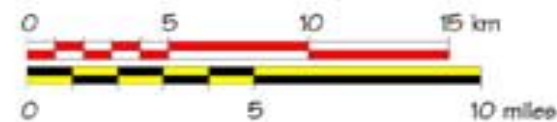
- Gravel, little sand, silt, and clay, thin lenses of caliche
- Sand and fine-grained gravel
- Sand and gravel, some silt, clay and caliche

Impermeable materials

- Clay and caliche, much gravel and sand
- Clay and caliche
- Blue clay
- Bedrock

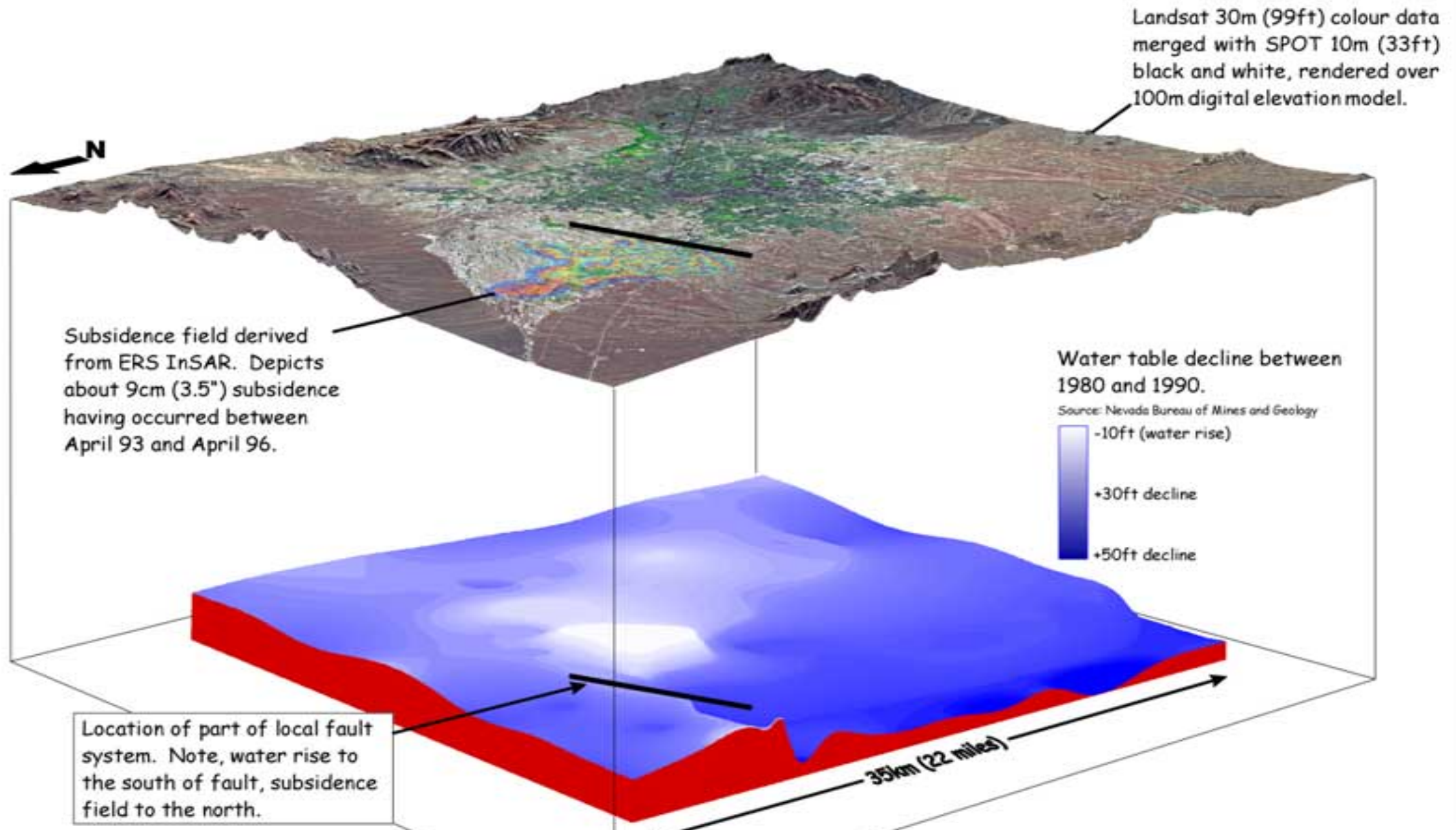
Ground placement accuracy:
XY: 50m (166 feet)
Z: 0.25cm (0.1 inch)

Projection: Latitude Longitude
Datum: WGS 1984
Ellipsoid: WGS 1984



Las Vegas Valley

Relationship to water decline



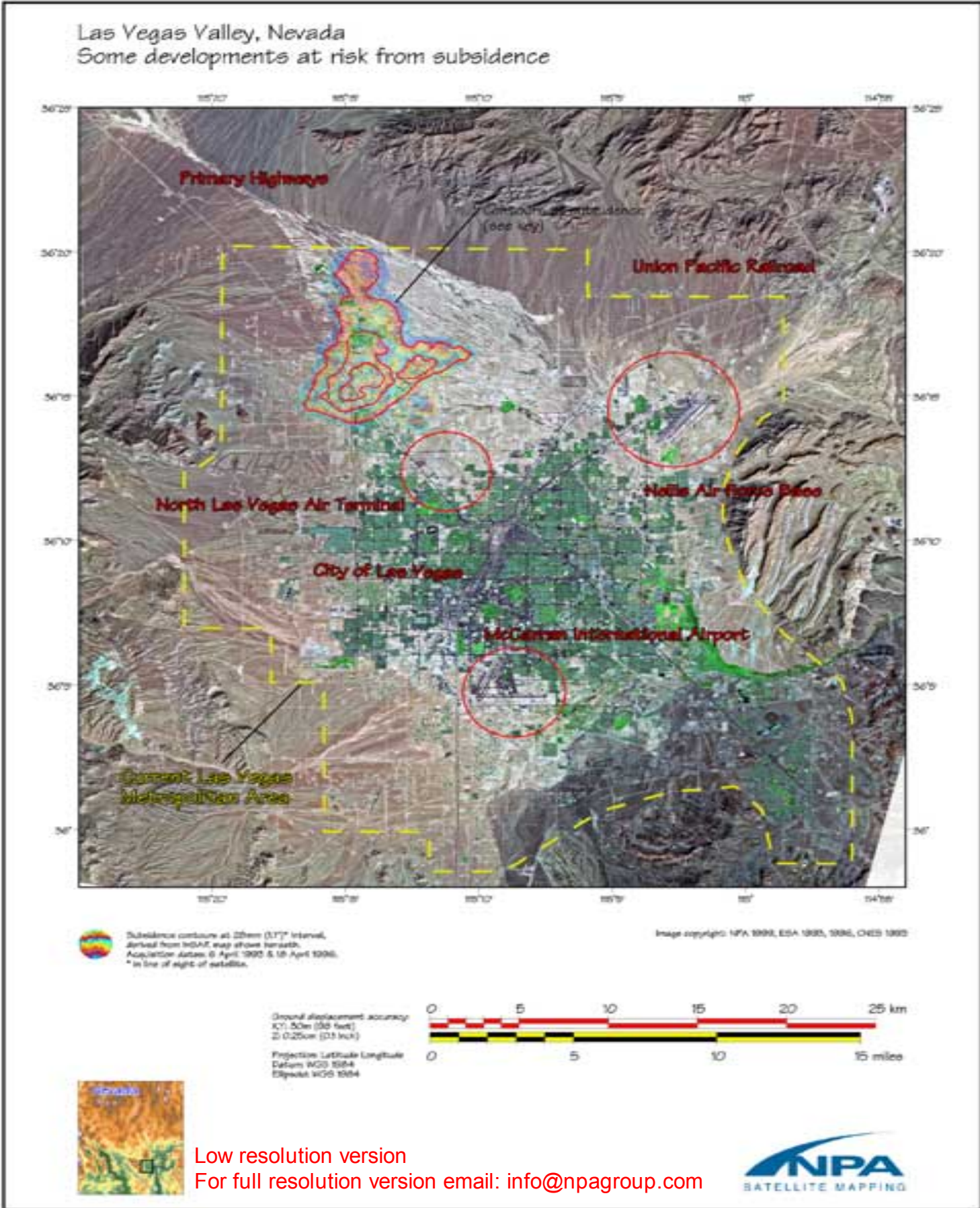
Data layer sources

1. InSAR extract: derived from ERS SAR data pair dated April 93 and April 96. Copyright NPA 2000, ESA 1993/96.
2. Water decline surface (1980-1990): derived from contours of water level decline in *Subsidence in Las Vegas Valley 1980-91- Final Project Report, NBMG, Open File Report OF 93-4, 1992*. Copyright Nevada Bureau of Mines and Geology, 1991.

Low resolution version
For full resolution version email: info@npagroup.com

COMMENT

The risk map opposite for Las Vegas combines ground cover information, in the form of the Landsat TM imagery, and the main coverage and extents of the subsidence field detected by InSAR. This, together with examples of highlighted susceptible developments, installations and structures which, by their nature and proximity to the subsidence field may be at particular risk, is an illustration of the kind of informative and valuable results that may be drawn from the powerful technique of ERS InSAR when combined with auxiliary data.



Data layer sources

1. InSAR extract: derived from ERS SAR data pair dated April 93 and April 96. Copyright NPA 2000, ESA 1993/96.
2. SPOT image background: Copyright CNES 1993.