3D INTERPRETATION OF SHARAD RADARGRAM DATA. J.H.P. Oosthoek and M.H.P. Kleuskens, Geological Survey of the Netherlands (TNO/Deltares), Princetonlaan 6, PO Box 80015, Utrecht, the Netherlands. (jelmer.oosthoek@tno.nl, marco.kleuskens@tno.nl).

Introduction: The Shallow Radar (SHARAD) on board the NASA Mars Reconnaissance Orbiter (MRO) has been active since December 2006. The instrument has been provided by Agenzia Spaziale Italiana (ASI). The acquired data released every six months to the scientific community (via the Planetary Data System) includes 'Reduced Data Records' (RDR) data. RDR data is a binary format which contain radargram data that can be interpreted by geoscientists. The horizontal resolution is 300-1000m along track and 1500-8000m across track [1]. The vertical resolution is about 15m in free space.

The radar penetrates the subsurface of Mars up to 2 kms deep. Especially the ice caps in the polar regions show reflections in the radargram data.

Up to now, the radar data is only interpreted as 2D profiles [2]. The Geological Survey of the Netherlands has decades of experience in interpreting 2D and 3D seismic data of the Dutch subsurface, especially for the 3D interpretation of reservoir characteristics of the deeper subsurface. In this abstract we present the methodology which can be used for the 3D interpretation of SHARAD data using state-of-the art seismic software used in the oil and gas industry.

Region of interest: The Titania Lobe [3] of the North Polar ice cap (see figure 2) is selected based on the abundancy of radar data and the complexity of the ice lobe. Based on the coordinates connected to the SHARAD data files, only this selection of data is converted into seismic data and loaded into Petrel.

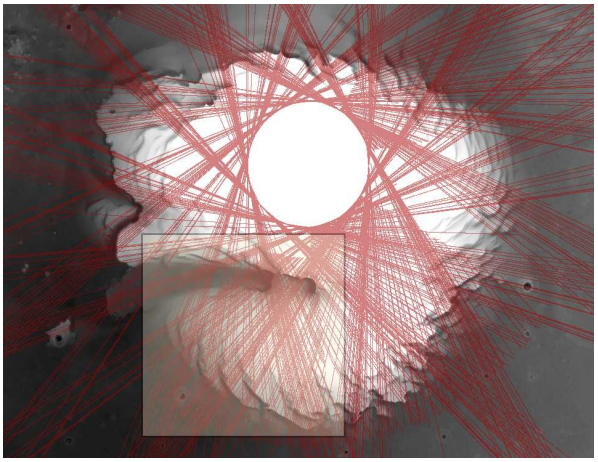

Figure 1. The North Polar region and the selected region of interest.

Methodology: We use the reservoir engineering software package Petrel of Schlumberger to interpret the radar data in 3D. Since Petrel has a powerful seismic interpretation tool, we converted the radar data to the commonly used seismic seg-y format.

Vertical offsets between different radar traces are compensated by referencing the data to the Mars Orbiter Laser Altimeter (MOLA) data of the region. In this way, we can visualize all radar traces in 3D and interpret the combined 3D dataset altogether, which is shown in figure 2. We can distinguish between different layers and estimate the volumes (see figure 3), which could help to better understand the formation process of the ice cap in the past.

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References: [1] R. Seu et al. (2007) *JGR*, 112, E05S05. [2] R.J. Phillips et al. (2008) *Science*, 320, 1182. [3] J.W. Holt et al. (2007) *Int. Conf. on Mars*, #3372.

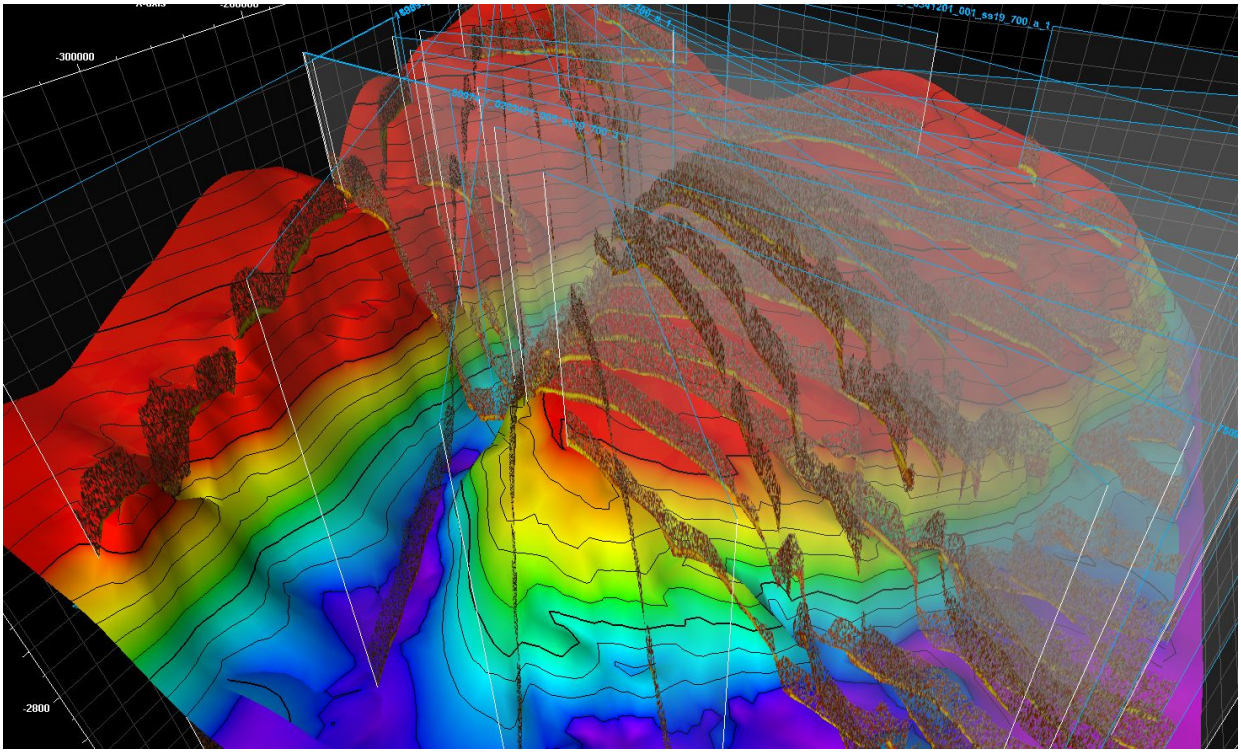

Figure 2. A composition in 3D of the radar lines and he 3D interpreted surface.

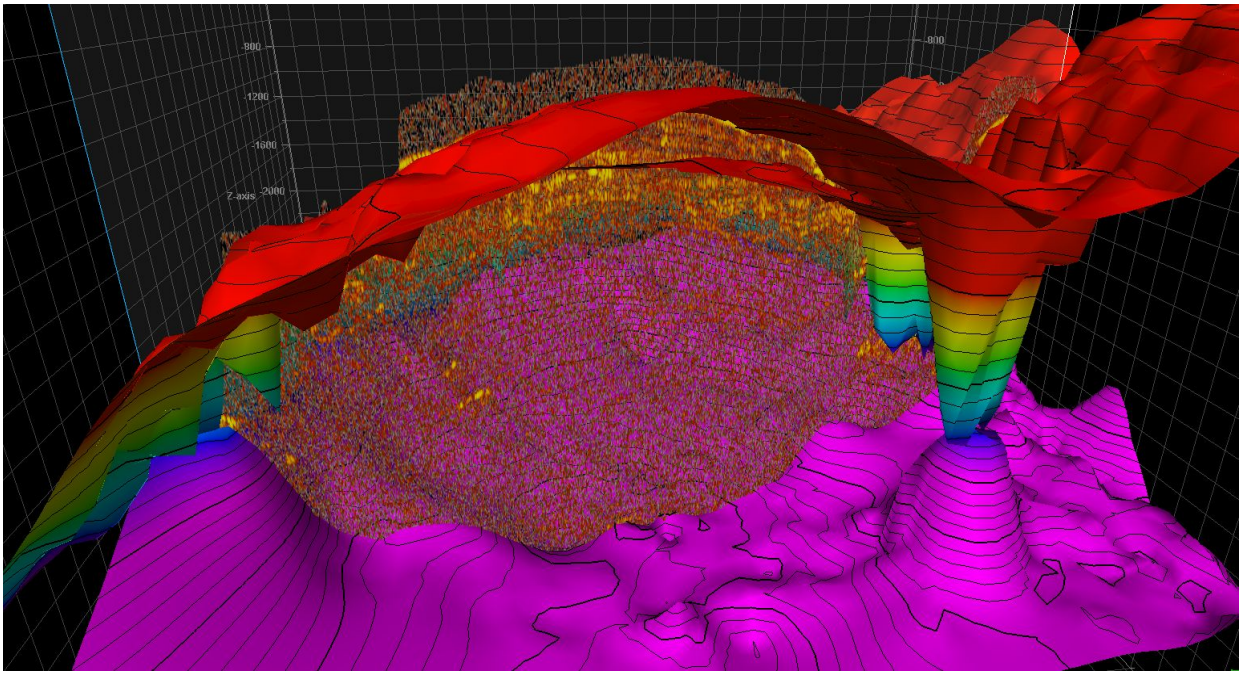

Figure 3. Example of the interpretation methodology. The surface, base and an intermediate layer of the ice cap were interpreted.