Surface movement and shallow processes

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The aim of this project is to (i) identify the processes which contribute to the baseline of net surface movement in the Surat Cumulative Management Area (CMA) and (ii) develop an integrated, evidence-based workflow to quantify the magnitude of these processes.

The work program to date has focused on data analysis and modelling in a number of locations of interest:

- Basin-scale interrogation of InSAR maps of net surface movement, acquired from satellite.
- Geospatial correlation of movement with natural events and phenomena (e.g. rainfall, clay content and type).
- Computational modelling of poroelastic processes.

Figure 1: *Net surface movement and rainfall near Taroom, showing a background trend of downward movement and accelerated movement during the wet season.*

Poroelastic finite element models have been developed to quantify the relative contributions of depressurisation and gas desorption (i.e. matrix shrinkage) on the compaction of coal seams, and resultant movement.

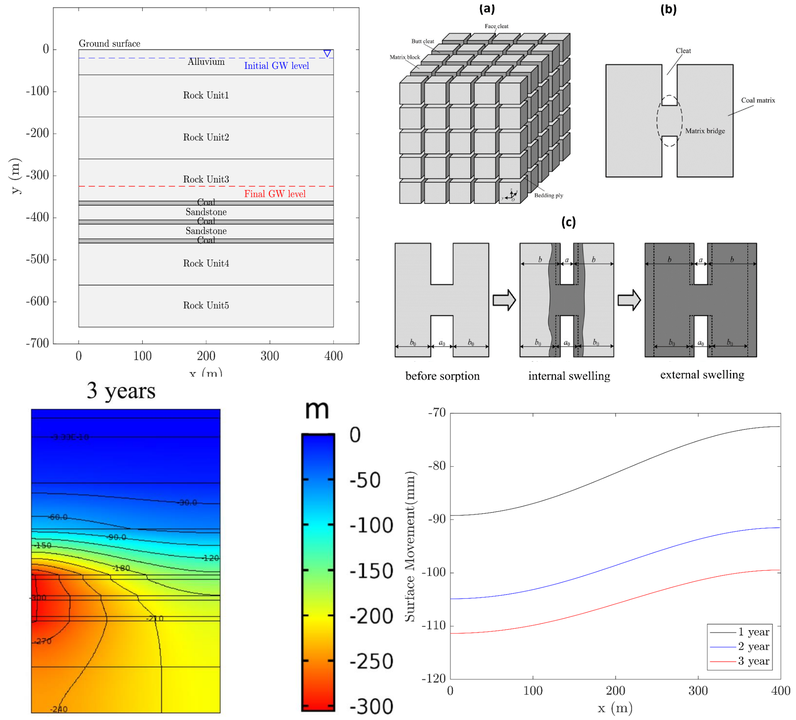

Figure 2: *(clockwise top left) The simplified stratigraphy used in modelling; mechanisms of internal and external coal swelling, depressurisation; and surface movement.*

The ratio of internal to external swelling (a coal property) was found to significantly affect compaction. However, the resultant surface movement was of the same order as that observed in non-production areas. The methodology will now be expanded to three dimensional analysis.

The generation and interrogation of basin-scale surface movement maps from InSAR data will highlight any localised and regional movement trends in the Surat CMA. These trends can be compared against other in-situ and remote sensing-derived datasets to identify, and ultimately predict, the impacts of long-term natural processes on surface movement within the Surat CMA and broader area.

Through an improved understanding of natural processes (e.g. long-term drying and shrinkage of clay-rich units) and their associated contribution to surface movement, it will be possible to quantify any impact of anthropogenic activities.

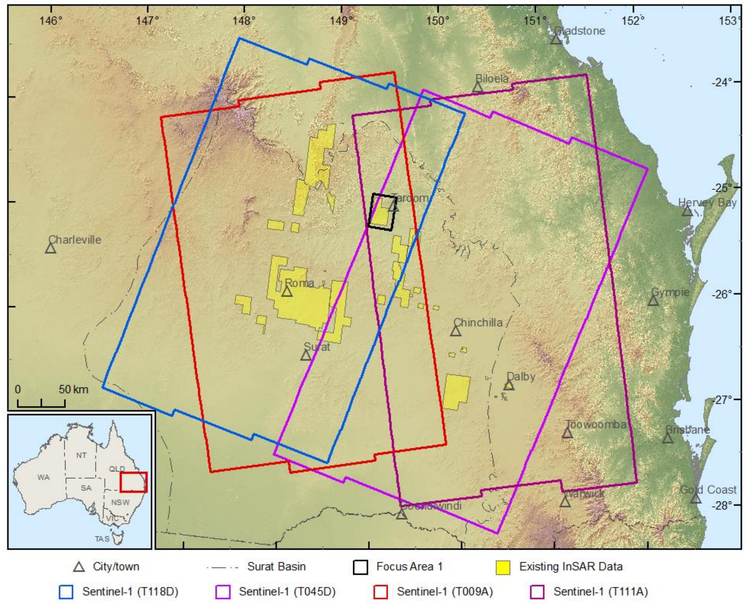

Figure 3: *Coverage of satellite data used for generating InSAR surface movement maps.*

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