Contribution of Warkworth 12m VLBI radio telescope to New Zealand geodesy

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The Institute for Radio Astronomy and Space Research (IRASR) of Auckland University of Technology (AUT) launched the New Zealand's first and only research capable radio telescope (WARK12M) near Warkworth which is located 60 km north from Auckland 8 October 2008. We intend to use the WARK12M for both purposes of radio astronomy and geodesy. The WARK12M belongs to Australia and New Zealand SKA project and is providing valuable results in cooperation with Australian station. On the other hand, in the geodetic field the WARK12M became a network station of the International VLBI Service for Geodesy and Astrometry (IVS) and is participating in IVS regular sessions from the beginning of this year. The WARK12M mainly participated in IVS-R1 and IVS-R4 sessions as much as possible and is contributing to provide twice weekly Earth Orientation Parameter (EOP) results. In addition, we are coordinating the experiment together with Japanese VLBI station to provide ultra-rapid EOP result. We also intend to contribute to the geodetic and geophysical study in New Zealand. The WARK12M is collocated with a GNSS station (WARK) which belongs to PositioNZ network maintained by Land Information New Zealand (LINZ). The inter-technique (VLBI and GNSS) solution is capable of increasing reliability of the national geodetic infrastructure. Here we will introduce WARK12M and explain the great synergetic relationship between VLBI and GNSS that we aim in New Zealand and will show the first synergetic result at Warkworth. To determine the initial coordinate of our VLBI reference point, we conducted GPS survey in collaboration with the New Zealand Crown Research Institute GNS Science and LINZ. In addition, we intend to show the recent results and discuss about noise sources such as the Ocean Tide Loading or Atmospheric Loading to influence geodetic observation at Warkworth.

Eruption dynamics of the Raventhorpe volcanic complex, South Auckland Volcanic Field

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The 0.73 Ma Raventhorpe tuff ring is the largest in a closely spaced and overlapping six tuff ring/scoria cone complex in the central part of the South Auckland volcanic field (SAVF). The stratigraphically upper part of the tuff ring is exposed in an 11 m succession in which five facies (F1-5) have been identified. The lowermost part of the succession and the upper sequence above 6 m comprises planar bedded, alternating (5-300 mm), well sorted, fine to coarse, coarse ash beds (F1). Above this is a cross-bedded, moderately to well sorted, coarse ash to fine lapilli sequence (F2). A massive, moderately to well sorted, medium lapilli to block and bomb bed (F3) occurs from 1.1-1.5 m. From 1.5 to 6 m massive or crudely bedded, moderately to poorly sorted, coarse ash to medium lapilli (F4) alternates with horizontally bedded, moderately sorted, fine to coarse lapilli (F5). The succession represents a transition from ballistic fall and surge processes to surge dominated processes. The lower ballistic unit could exemplify an increase in magma ascent rates before the eruption moved into its final stages, demonstrated by the general fining in grainsize.

The magma-groundwater interaction is an important dynamic in the evolution of Raventhorpe. The underlying Pliocene sand with shell horizons of the Kaawa Formation is >150 m thick in this area, shallowing slightly westward and thickening further south towards the St. Stevens Fault. This aquifer is thought to be a major control on phreatomagmatic volcanism of the central area of the SAVF. Evidence of the aquifer's importance comes from abundant xenocrysts of quartz, hornblende and plagioclase, most likely derived from the Kaawa Formation.