Geophysical **Investigations of Australian 1 mpact Crater s**

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Gravity surveys have been conducted over several potential impact structures within Australia. **Several** of these features are shown 10 be of impact origin **through** coordinated geolog ic and **geophysical** investigations; other features do not **appear** to be of impact **origin**.

The **Mt.** Toondina, South Australia **structure** (27° 57' W; 135" 22' E) has a well-defined gravity signature, typic al of complex **impact** structures. Bedrock is exposed in the **central uplift and** consists of **steepy** dipping contorted units of the Mt Toondina Fm **The gravity field** is characterized by a residual **high** over the center with an amplitude of +1.0 regal surrounded by **an** annular low with -0.5 regal **amplitude** (total anomaly **1.5** regal). The anomaly is modeled **as a** relatively high-density **plug** of material brought up from **depth** (Mt. **Toondina** Fro); the **annular** low results from structural down-warping of the low-density Bulldog Shale **and infilling** of the crater depression by low-density material. **The** diameter of the structure, based on geophysical data, is ~4 km and central **peak** structural relief >300 m.

The Connolly Basin structure (2.3° 33'S, 124° 45' E) in the. Gibson Desert of South Australia, **has** a **diameter** of ~9 km based on the dimensions of a 25-30 m high nm. A subdued topographic **high** (S m) occurs in the center in which exhibits steeply dipping **beds of** sheared and crushed sandstone. **The** center of the structure is defined by a 1.6-2.0 regal high surrounded by a **narrow** annular low **and** a sc cond **gravity** high of amplitude of 0.3 -0,5 mgal covering much of the. **crater floor. The** gravity **signature** can **be** modeled as a high-density **plug** ($\Delta\rho$=+0.07 mgal) brought to the **surface** from a depth of 1 km. Surrounding **this** plug is a thin relatively **high-density** layer composed of a lens of **sand** sled from the central uplift into the crater interior.

The feature at Clifton Hills (27° 11 'S, 138<' 58' E) is a circular depression -6 x 5 **km in** diameter. **This** feature is a circular depression in an otherwise **level** area with the **suggestion** of a raised rim. A **single** cast - **west gravity** line was run across **the** feature The gravity field exhibits is a significant eastward **gradient**, but there is no **residual** anomaly associated with the feature. The. absence of **any** gravity anomaly **leads to** the conclusion that the **feature** is simply erosional in nature. A **crater** having a diameter of 5 - 6 km would be **expected** to exhibit a negative gravity anomaly due to low-density younger low. density material and / or the shocked and fractured country rock.

1. 1996 Western Pacific Geophysics Meeting

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