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A Geochronological and Structural Analysis of the Nallamalai Fold Belt, S.E. India

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Contents

ABSTRACT.....	4
1.0 INTRODUCTION.....	5
2.0 GEOLOGICAL SETTING	6
2.1 Regional Setting.....	6
2.1.1 DHARWAR CRATON.....	7
2.1.3 EASTERN GHATS BELT.....	7
2.1.2 CUDDAPAH BASIN	9
2.2 Study Area	10
2.2.1 THE NALLAMALAI FOLD BELT	10
3.0 FIELD WORK AND STRUCTURAL INTERPRETATION	12
3.1 Field work and image interpretation.....	12
3.2 Cross sections	12
4.0 ANALYTICAL METHODS	15
4.1 U-Pb Detrital Zircon Geochronology	15
4.1.1 SAMPLE PREPARATION.....	15
4.1.2 LA-ICPMS OPERATING PROCEDURES AND DATA REDUCTION.....	15
4.2 Hf Isotope Analysis	16
4.3 LA-ICPMS Trace Element Zircon Analysis	18
4.3.1 REE CHEMISTRY.....	18
4.3.2 TI-IN-ZIRCON THERMOMETRY.....	19
5.0 ANALYTICAL RESULTS.....	20
5.1 U-Pb Detrital Zircon Geochronology	20
5.1.1 SAMPLE EA01.....	20
5.1.2 SAMPLE EA04.....	21
5.1.3 SAMPLE EA05.....	21
5.1.4 SAMPLE EA06.....	22
5.1.5 SAMPLE EA07.....	22
5.1.6 SAMPLE EA08.....	23
5.1.7 SAMPLE CU10-09.....	23
5.2 Hf Isotope Analysis	23
5.3 Trace Element Zircon Analysis.....	25
5.3.1 SAMPLE EA01.....	25
5.3.2 SAMPLE EA08.....	26

6.0	DISCUSSION.....	27
6.1	Age constraints of the Nallamalai Group	27
6.2	Provenance of the Nallamalai Group sediments.....	28
6.3	Structural evolution of the NFB.....	31
6.4	Basin evolution	33
7.0	CONCLUSIONS.....	35
8.0	ACKNOWLEDGEMENTS	36
9.0	REFERENCES	37
10.0	TABLE CAPTIONS.....	41
11.0	FIGURE CAPTIONS.....	41
12.0	TABLES.....	45
13.0	FIGURES.....	51

ABSTRACT

The Proterozoic sedimentary rocks of the Cuddapah Basin, South India, were deposited in diverse tectonic settings ranging from a rift basin to a foreland basin, and occur as several unconformity-bound sequences known as the Cuddapah Supergroup. The eastern half of this basin contains the heavily deformed quartzites and shales of the Nallamalai Fold Belt. A maximum depositional age of 1661 ± 20 Ma for the Nallamalai Group, along with recent age constraints of 1207 ± 22 Ma on the underlying Kurnool Group, defines the contact between the two as an east dipping thrust fault. Reconnaissance mapping coupled with broad scale ground truthing revealed a series of east dipping faults. These have been interpreted as attaching to a shallow décollement zone thought to propagate off the much larger, crustal scale thrust fault which forms the contact between the Nellore Schist Belt and the Nallamalai Fold Belt. Dominant detrital zircon age peaks were found to occur at ~ 1850 Ma and ~ 2500 Ma supporting the theory that the Nallamalai Group sediments were deposited as a foreland basin to the Eastern Ghats Belt. This is due to the ~ 1850 Ma detrital zircon population of the Nallamalai Group correlating geochemically with ~ 1850 Ma zircon population within the southern Eastern Ghats Belt. The age constraints placed on the north-south trending folds of the Nallamalai Fold Belt along with age constraints placed on the thrusting of Nallamalai rocks suggest original deformation occurred during the $\sim 1640 - 1590$ Ma collision between the southern Eastern Ghats Belt and the Dharwar Craton before further deformation at ~ 550 Ma which caused major detachment faulting within the Nallamalai Fold Belt during the amalgamation of Gondwana.

Key Words: Nallamalai Fold Belt, Cuddapah Basin, India, U-Pb Geochronology, Hf isotopes, Foreland basin, Gondwana, Supercontinents,