Early fill of the Western Irish Namurian Basin: a complex relationship between turbidites and deltas

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Summary:

The Western Irish Namurian Basin developed in Early Carboniferous times as a result of extension across the Shannon Lineament which probably coincides with the Iapetus Suture. During the late Dinantian, axial areas of the NE-SW elongate trough became deep, whilst shallow-water limestones were deposited on the flanks. This bathymetry persisted into the Namurian when carbonate deposition ceased. In axial areas, a relatively thick mudstone succession spans earliest Namurian to Chokierian whilst on the northwestern marginal shelf, a thin, condensed Namurian mudstone sequence, in which pre-Chokierian sediments are apparently absent, rests unconformably on the Dinantian. From late Chokierian to early Kinderscoutian, the basin was filled by sanddominated clastic sediments. Sand deposition began in the axial area with deposition of a thick turbidite sequence, the Ross Formation, which is largely equivalent to the condensed mudstone succession on the flanks. Turbidity currents flowed mainly axially towards the north-east and deposited a sequence lacking well-defined patterns of vertical bed-thickness change. Channels and slide sheets occur towards the top of the formation. The turbidite system seems to have lacked welldefined lobes and stable distributary channels. Overlying the Ross Formation, the Gull Island Formation shows a decreasing incidence of turbidite sandstones at the expense of increasing siltstones. This formation is characterized by major slides and slumps interbedded with undisturbed strata. In the flanking areas of the basin, the formation is thinner, has only a few turbidites in the sequence above the condensed mudstones and contains only one slide sheet. Overall the formation is interpreted as the deposit of a major prograding slope, the lower part representing a ramp upon which turbidites were deposited, the upper part a highly unstable muddy slope lacking any conspicuous feeder channels through which sand might have been transferred to deeper water. Progradation of the slope appears to have been increasingly from the northwestern flank of the trough which is similar to the direction deduced for the overlying deltaic Tullig cyclothem which completes the initial basin fill. Whilst several features of the succession can be explained by envisaging the whole sequence as the product of one linked depositional system, the shifting directions of palaeocurrents and palaeoslope raise problems. The switch from axial to lateral supply casts doubt on the strict application of Walther's Law to the total sequence and seems to demand large avulsive shifts of the delta system on the shelf area to the west.