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Geometry of growth strata in a transpressive system: An example from deep water sediments of the Gosau Group at Muttekopf, Northern Calcareous Alps, Austria

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Cretaceous nappe stacking in the Northern Calcareous Alps took place in a transpressive system. Initial thrust sheet detachment and subsequent (N)NW-directed transport was accompanied by dextral shear along NW-striking high-angle faults. Deposition of deep water sediments started before and outlasted Upper Cretaceous thrust activity.

Deposition on thrust-sheet-tops was strongly controlled by internal thrust-sheet deformation during nappe transport. Upper Cretaceous thrust-sheet-top sediments of the Northern Calcareous Alps are characterized by very coarse clastic facies and syndepositional growth of WSW-trending folds resulting in the development of progressive unconformities.

In well-studied continental growth strata of the southern Pyrenees (e.g. at the classic locality of Sant Lorenc de Morunys), folds are more or less cyclindrical and the characteristics of unconformities do not change significantly in different cross sections. In contrast, three sections across successive parts of the Muttekopf outcrop are fundamentally different and show, from W to E, (1) rotational offlap, (2) combined rotational offlap-onlap-overlap and (3) rotational overlap.

A detailed study of the main unconformity in cross section (2) which displays combined rotational offlap-onlap-overlap revealed that the offlap-onlap pattern is mainly produced by changes in strike instead of changes in dip as seen in the classic exam-

ples. The geological map of the area shows that the cross sections displaying rotational offlap (1) and rotational overlap (3) are located between high-angle faults, whereas the main unconformity in cross section (2) is located above a high-angle faults crossing the basin.

We imagine a basin in which dextral shearing and folding in the bedrock of the growth strata were contemporaneously active. This would cause both tilting of fold limbs and offset across the high-angle faults. Given some surface topography of the depositional system, offset would cause additional topography. Therefore the apparent offlap-onlap-overlap pattern rather documents the activity of high-angle faults than folding.