surface crenulation cleavage. They are nearly coaxial with F_1, commonly trending 10–15° counterclockwise from local F_1 trends. F_2 folded F_1 to recumbent and, locally, downward-facing attitudes. F_3 folds are broad to locally close, commonly kink-like, with vertical axial surfaces commonly trending SSE. F_3 fold hinges range from horizontal to vertical depending on the pre-existing attitude of the surfaces they fold. An axial-surface crenulation cleavage, S_3, occurs in two directions making an angle 55 ± 5° either side of the local F_1 trends. The conjugate F_3 folds have sinistral and dextral symmetry consistent with shortening along the F_1 axial trend.

These structures can be related to the five regional deformations recognized on the New South Wales south coast. Deformation 1 (pre-Late Silurian) formed the bedding-parallel foliation, possibly by large-scale horizontal transport or by imbricate stacking in an accretionary prism, or possibly as an early phase of cleavage formation during F_1 folding. Deformation 2 (Siluro-Devonian) formed the upright F_1 folds. Deformation 3 (Medial Devonian) produced major NE-trending dextral transcurrent faults, but no mesoscopic folds at Bermagui. Deformation 4 (Early Carboniferous) formed the F_2 folds at Bermagui in domains hundreds of metres wide. Deformation 5 (mid-Carboniferous) formed first the outcrop-scale F_3 folds, cleavages and kink folds, and later rotated all the pre-existing structures (including F_3) into the present megakink domains.

Structural map of the Bermagui region. C. McA. Powell, P. J. Conaghan, J. Cole and D. Sims, School of Earth Sciences, Macquarie University, North Ryde, New South Wales, Australia, 2113.

Mapping at 1:25,000, with more detail in areas of critical exposure, has enabled definition of the structural and stratigraphic framework of the Bermagui region and its hinterland. Three Palaeozoic sedimentary successions are present: (1) a coastal zone of turbiditic sublitharenite and slate, (2) an inland zone of indurated quartzarenite, pelite and chert and (3) a thin succession of quartzarenite to sublitharenite, with associated red siltstones and shales and minor conglomerates and gritstones. Late Ordovician graptolites have been found in succession (2) and, although no fossils have been found in succession (1), regional stratigraphic relationships indicate that the coastal turbidites conformably overly the inland succession, and thus are of Late Ordovician or earliest Silurian age. Succession (3) contains Late Devonian fossils, and overlies the other two successions with great angular unconformity.

The coastal turbidite succession has been deformed by three phases of mesoscopic folds, and is characterized by a distinctive differentiated crenulation cleavage that becomes more closely spaced and highly differentiated inland. The contact between successions (1) and (2) is the right-lateral transcurrent Tantawangalo Fault, on which 16 km of Middle Devonian offset can be demonstrated. The Upper Devonian red-bed succession, (3), is known elsewhere to overlie paraconformably the late Middle or early Late Devonian Boyd Volcanic Complex, which is represented in the Bermagui region by silicic and mafic dykes, and the *A*-type Mumbulla Granite.

Structural and stratigraphic relationships in the region permit the following geological history to be determined.

Ma		
~90	Cretaceous	intrusion of alkaline Dromedary Complex
<290	post Carboniferous	basement to platform covers
~330	mid-Carboniferous	N–S compression producing megakinks and related structures (F_3)
~350	Early Carboniferous	second phase of regional meridional folding (F_2); upright folds refold F_1 folds
~370 to 360	Late Devonian	deposition of the red-bed Merrimbula Group
~370	Late Middle to early Late Devonian	formation of the Boyd Volcanic Complex in a continental rift; intrusion of *A*-type Mumbulla Granite
~375	Middle Devonian	wrench faulting caused by E–W compression
~390 ± 10	Early Devonian	intrusion of the *I*-type Bega Batholith
~410	Siluro-Devonian	first major meridional folding (F_1); upright folds
≤450	Late Ordovician	deposition of successions (1) and (2), possibly with imbricate stacking in an accretionary prism

Experimental deformation of quartz mylonites. S. Ralser and B. E. Hobbs, Department of Earth Sciences, Monash University, Clayton, Victoria, Australia, 3168.

Quartz mylonites with the foliation and lineation initially at 45° to the loading direction, σ_1, have been shortened 40–50% with water in thick nickel jackets at 1500 MPa confining pressures, temperatures in the range 700–800°C and at strain-rates of 10^{-5} s^{-1} and 10^{-6} s^{-1}.

At 700°C, 10^{-6} s^{-1} strain-rate and 50% strain there is a marked change in both microstructure and crystallographic preferred orientation. Two foliations develop, the first perpendicular to σ_1, is delineated by elongate grains and is crenulated by a second foliation subparallel to the initial mylonitic foliation.

Towards the more highly strained central zone, grains become elongate and ribbonlike, with increasing misorientation of subgrains, especially in the tails of grains. Minor recrystallization and comparatively undeformed equant augen occur in this zone.

No remnant of the original asymmetric *c*-axis girdle can be seen in the strained areas. Two maxima occur in the new fabric, one generally normal to σ_1; the other, dependent on measurement location, is variable but is commonly near the σ_1 axis. The latter maximum is commonly delineated by the elongate grains. Widespread occurrence of sub-basal lamellae suggests that basal slip is important in this specimen; this is consistent with the low temperature of plastic deformation.

In contrast, at 800°C, 10^{-5} s^{-1} and 40% strain no pronounced elongation of grains occurs and deformation is concentrated in a zone subparallel to the original foliation. Conjugate with this and symmetrical about the σ_1 axis, strong kinking occurs, subgrains become misoriented and minor recrystallization occurs. The initial fabric pattern is not markedly changed.

The development of high-grade tectonothermal fabrics and mylonites associated with complex ductile deformations in metamorphic basement and cover rocks from the Harts Range, Central Australia. L. R. Rankin and P. R. James, Department of Geology and Mineralogy, The University of Adelaide, Adelaide, South Australia, Australia, 5000.

The Proterozoic Arunta Complex within the Oonagalabi Tongue area in the Harts Range includes the Irindina supracrustal assemblage and Harts Range metaigneous complex as a cover sequence, and its basement, the Oonagalabi gneiss complex.

An early fabric formed before several phases of coaxial isoclinal folding shows variation in deformational intensity, with the formation of high-grade interlayered gneisses, amphibolites and layer-parallel mylonites in the basement. The cover sequence has undergone variable high-grade fabric development prior to at least two generations of folding.

Thrusting along the basement/cover contact has resulted in the formation of a second generation of mylonite in the basement. A megacrystic granitoid was locally intruded along this thrust, and into the overlying Irindina supracrustals and an intense *LS* protomylonitic fabric was developed within the granitoid by movements along its upper and lower surfaces.

Microfabric analysis within the basement indicates the development of a fabric varying from a granoblastic inequigranular tectonite to an anastomosing mylonite at upper amphibolite to granulite facies during early ductile deformation, with modification and attenuation of the fabric during subsequent coaxial folding. The cover sequence contains a pervasive granoblastic elongate fabric with only the granitic gneiss showing the development of an anastomosing mylonitic fabric.

The analysis of magnetic susceptibility anisotropy shows a bimodal distribution of both orientations and susceptibility ellipsoid shapes for the basement lithologies. Specimens with granoblastic fabrics show low-intensity triaxial ellipsoids and a lack of correlation to tectonic directions due to post-peak deformation randomization of crystallographic orientations. Mylonitic specimens have retained intense crystallographic preferred orientations, represented by higher-intensity triaxial ellipsoids, close correlation of magnetic and tectonic directions and oblate to plane-strain fabrics.