1. call tree (flow chart)

mainrsmf_mrg	the main program
call rmpinit	initializing the mpi by each pe
call mpdimset	preset all starting point and length for all pe for global spectral model
call rmpdimset	preset all starting point and length for all pe for regional spectral model
call cnttime_init	initialize cnttime paras
call rgetcon_mrg	get constatn input from namelist, check the first file for base field
call rsmini_mpi	prepare all the constant arraies for regional computation before regional forecast and read the input data set
call cread	read regional sigma surface file
call rsmsmf	do regional model forecast
call rmpkencollect	mpi_reduce
call rsmsav	do regional sigma, flux, and surface files output
call cnttime_final	
call rmpfine	finalizing the mpi by each pe

rsmsmf	
call rsmltb	do the global to regional grid for base field of regional and compute the tendency of base field.
call rsmdfi	digital filter
call rfwdstep	
call rsmstep	
call rwrtsfc	output the fluxes file in grib format
call rzerout	zero variable
call rmpkencollect	mpi_reduce
call rkenwrt	
call rsetbgt	initialized budget for restart
call rsmstep	
call rmpkencollect	mpi_reduce
call rwrtout	do regional sigma, flux, and surface files output
call rzerout	zero variable
call rwrtbgt	

rsmstep

	call rbgt000	zero variable
	call cnttime_on	
	call rloopmp	program starts with spectral coefficients temp. of x-wind, y-wind, specific humidity, and ln((psfc). converts them to the gaussian grid at each row and calls rfidi, for the northern and southern rows at the same time. after return from rfidi sr. completes calculation of perturbation tendencies of temp. wind. and lnps. specific humidity with relaxation. all input/output is via commons.
	call cnttime_off	
	call rloopsp	single process
	call rbgtlpa	
	call nsicdif	nonhydrostatic version of semi-implicit time scheme
	call rsicdif	do regional semi-implicit integration.
	call rbgtsic	
	call rlatbnd	update the base field and its tendency.
	call rupdate	update prognostic variables from forcing (or tendency).
	call rbgtlpd	
	call rdeldif	horizontal diffusion of regional perturbation waves for regional spectral model.
	call rbgtdif	
	call rfilt1	do regional time filter of the first pass
	call rbgtlpb	
	call rfilt2	do regional time filter of the second pass
rloopmp		
	call dellcc	first derivative of coefficent for cos-cos wave. for regional spectral model.
	call dellsc	sin-cos
	call dellcs	cos-sin
	call dellcc	cos-cos
	call physics_init	physics init
	call radiation_init	radiation init
	call physics_prep	physics prepare
	call radiation_prep	radiation prepare

call rmpnn2n	transpose (lnwavp,nvar) to (llwavp,nvar)
call rmpnn2nk	transpose (lnwavp,levr,nvar) to (llwavp,levrp,nvar)
call ffsncsy1	fast fourier coefficient transform of cos and sin waves in x direction.
call ffscosy1	fast fourier coefficient transform of cos wave in x direction.
call rmpnl2ny	transpose (ip,kp,jf) to (if,kp,jp)
call ffsncsx1	fast fourier coefficient transform of cos and sin waves in x direction.
call ffscosx1	fast fourier coefficient transform of cos waves in x direction.
call rmpx2nx	transpose (if,k,kp) to (ip,k,kf)
call rmpnk2nx	transpose (if,kp) to (ip,kf)
call pint3	interpolate from single field of source data on a coarse grid the 3 fields (i) value (tii) (ii) x-derivative (xii) (iii) y-derivative (yii) to one row of a finer target grid
call radiation_run	
call pint1	interpolate from field of source data on a coarse grid the same field at one row of a finer target grid
call nfidi	this dynamical codes using base field temperature tendency as the coordinate 'hydrostatic' temperature, but not surface pressure in this case, coordinate surface pressure is determined internally and coordinate temperature is determined externally as the same as base field.
call rfidi	do regional dynamic computation (full tendency)
call physics_run	call rbphys
call rkenputr	
call rkenput	
call rmpnx2x	transpose (ip,k,kf) to (if,k,kp)
call rmpnx2nk	transpose (ip,kf) to (if,kp)
call ffancsx1	fast fourier grid transform of cos and sin waves in x direction. for regional spectral model.
call ffacosx1	fast fourier grid transform of cos waves in x direction. for regional spectral model.
call rmpny2nl	transpose (if,kp,jp) to (ip,kp,jf)
call ffancsy1	fast fourier grid transform of cos and sin waves in x

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                                direction. for regional spectral model.
        call ffacosy1           fast fourier grid transform of cos waves in x
                                direction. for regional spectral model.
        call rmpnk2nn           transpose (llwavp,levrp,nvar) to (lnwavp,levr,nvar)
        call rmpn2nn            transpose (llwavp,nvar) to (lnwavp,nvar)
        call cctogd             transform regional cos-cos wave coefficient to
                                regional grids. for regional spectral model.
        call sctogd             sin-cos
        call cstogd             cos-sin
        call rmpgetspd          get spdmax from all pe

radiation_run
        call omegast3
        call grrad
                call albaer     computes four components of surface albedos
                call getclds    caculate clouds
                                call cldjms
                call getozn     ozone data
                call rdlwsw
                        call cldprp     prepare cloud
                        call swr95      computes short-wave radiative heating
                        call clo89      computes cloud transmission functions
                                        for the longwave code
                        call lwr88      computes temperature-corrected co2
                                        transmission functions and also computes
                                        the pressure grid and layer optical paths.
                        call lwrad      longwave
        call rkenputr

rbphys
        call get_prs
        call dcyc2t3
        call progtm             soil temperature?
        call moninp             momentum
        call gwdps              gravity waves
        call omegast3
        call ozphys             ozone
        call get_phi
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call sascnv	
call rascnv	microphysics
call cnvc90	
call shalcv	shallow convection
call lrgscl	large scale
call gsmdrive	
call gscond	subroutine for grid-scale condensation & evaporation for the mrf model at ncep.
call precpd	subroutine for precipitation processes from suspended cloud water/ice
call progt2	progt2 is the second part of the soil model that is executed after precipitation for the time step has been calculated

rgetcon_mrg

call gncpus	gets and returns the environment variable ncpusi, designating the number of processors over which to parallelize.
call rmpbcasti	broadcast integer array to all pes
call rmpbcastr	broadcast real array to all pes
call cmpind	
call gfuncphys	
call gpln2i	initializes the constant variables and arrays of a common for subroutine pln2t.
call epsilo	computes eps, a function of wave number. eps is used in calculating legendre polys. and their derivatives. eps is also used in computing winds from divergence and vorticity.
call ggozrm	initializes the constant variables and arrays of a common for subroutine gozrmt.
call gft_lonf	
call grddf	
call grdkt	