TASK 1

Results and Implications:

What needs to be done and how?

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TASK1 proposed during COROT W7, Granada

7 specific, fully identified stellar cases (targets)

- representative range in stellar masses, composition, ages
- physics specified/ numerics to be investigated

case	$M/M_\odot$	Y_0	Z_0	X_C	T_C (K)	$M_{He\ core}$	α_{OV}	state
1.1	0.9	0.28	0.02	0.35	-	-	-	MS
1.2	1.2	0.28	0.02	0.69	-	-	-	ZAMS
1.3	1.2	0.26	0.01	-	-	$0.1M_\odot$	-	postMS
1.4	2.0	0.28	0.02	-	-	-	-	preMS
1.5	2.0	0.26	0.02	0.01	$1.9\ 10^7$	-	0.15	TAMS
1.6	3.0	0.28	0.01	0.69		-	-	ZAMS
1.7	5.0	0.28	0.02	0.35		-	-	MS

$M_{He\ core}$ ⇨ mass of the central region where X<0.01

TASK1 : « standard » set of physics

Equation of state: OPAL tables (Rogers et al. 96, 01)

Opacities : OPAL tables (Iglesias & Rogers 96) + AF tables at low temperatures (Alexander & Ferguson, 94)

Nuclear reaction rates: NACRE (Angulo et al. 99)

Convection: MLT (Böhm-Vitense 58, Henyey 65) with α_{MLT}=1.6

Overshoot: fully mixed and $\nabla=\nabla_{ad}$ with α_{OV}= 0 or 0.15

No diffusion/settling

Mixture: solar mixture of Grevesse & Noels (93)

Atmosphere: Eddington's grey atmosphere

Models from 6 stellar evolution codes have been compared

ASTEC: J. Christensen-Dalsgaard (Denmark)

CESAM: P. Morel, Y. Lebreton (France)

CLES: J. Montalban, R. Scuflaire (Belgium)

FRANEC: M. Marconi, S. Degl'Innocenti (Italy)

STAROX: I. Roxburgh (U.K.)

TGEC: M. Castro (Toulouse)

PHYSICS

Equation of state:

TABLES from OPAL 96,01

ASTEC, CESAM, FRANEC ⇨ OPAL interpolation scheme

CLES ⇨ interpolation method ensures continuity of 1st derivatives at cell boundaries in the 4D space (variables logρ, logT, X, Z)

STAROX ⇨ interpolation : 4 point cubics with continuous 1st derivatives

TGEC : ?

Opacities :

OPAL95 + AF94 (Alexander & Ferguson) at low temperature

heavy elements mixture taken to initial value

ASTEC: Houdek interpolation scheme : bi-rational splines

CESAM: Houdek scheme or 4 point Lagrange polynomial interpolation, tables merged at $T=10^4$ K, conductive opacity included (Itoh)

CLES: interpolation : same method as for the equation of state, smooth merging of tables in the domain 3.9<logT<4.15 , no conductive opacity

STAROX: tables (log T, log(ρ/T^3),X,Z); interpolation : 4 point cubics with continuous 1st derivatives

FRANEC: spline interpolation in Z, cubic in T, ρ, linear in X, tables merged at log T<4.2, conductive opacity included (2 formulations possible)

TGEC: ?

Is the fitting between the two sets of tables worth to be investigated ?

Nuclear reaction rates: pp chain + CNO cycle

NACRE : approximate analytical form (Angulo et al. 99)

- CESAM, STAROX : follow all elements but ^{7}Li, ^{2}H, ^{7}Be
- CLES, FRANEC : follow all elements including ^{7}Li and ^{2}H, except ^{7}Be
- TGEC ?

rates by Bahcall & Pinsonneault (95)

- ASTEC : ^{3}He and CN part of CNO cycle at equilibrium

  NACRE has been recently implemented

Screening:

- ASTEC, CESAM: weak screening Salpeter 54
- FRANEC, STAROX: weak: Salpeter 54, weak-intermediate and intermediate-strong: Grabroske et al., de Witt et al 73
- TGEC?

Convection: MLT : Böhm-Vitense (58)

CESAM, ASTEC (probably) ⇨ Henyey et al.' formalism (65)

α_{MLT}=1.6, ξ=1/162, Φ=9/4

CLES, FRANEC ⇨ Cox & Giuli (1968) formalism

STAROX ⇨ modified MLT (Roxburgh 04)

TGEC?

MIXING-LENGTH

CLES: $l=\alpha_{MLT}\min(H_p,h)$ where h is the thickness of the convection zone

CESAM: $l=\alpha_{MLT}\min(H_p,h)$ modified to vanishes at convection zone boundaries

MIXING

STAROX : modelled as a diffusion process, chemical profile smoothed for a shrinking core

no turbulent pressure: CESAM, CLES, ASTEC, STAROX

Overshooting

fully mixed with α_{OV}= 0.0 or 0.15 H_p

CESAM ($\nabla=\nabla_{ad}$ in the overshoot layer)

CLES ($\nabla\neq\nabla_{ad}$ in the overshoot layer)

STAROX, ASTEC, TGEC ?

fully mixed with α_{OV}= $\Delta M_{ov}/H_{pm}$ where H_{pm}=-dM/dlnP

FRANEC

Atmosphere :

Eddington's grey atmosphere

ASTEC: outer boundary at $\tau=10^{-2}$, connection with envelope at $T=T_{eff}(\tau=2/3)$

CESAM_V0: outer boundary at $\tau=10^{-4}$, connection with envelope at $\tau=10$

CLES : internal model truncated at τ=1, 10 or 100

STAROX: outer boundary at $\tau= 10^{-2}$ or 10^{-3}

Krishna Swamy's (1966) scaled solar T(tau) law

FRANEC : atmosphere down to $\tau=2/3$

Hopf's atmosphere

CESAM_V1: outer boundary at $\tau=10^{-4}$, connection with envelope at $\tau=10$

TGEC?

Reference values

$M_\odot$=1.98919 10^{33} erg.s^{-1}

$GM_\odot$ =1.32712438 10^{26} $cm^{-3}.s^{-1}$

$R_\odot$ =6.9599 10^{10} cm

$L_\odot$ =3.846 10^{33} erg.s^{-1}

FRANEC : $M_\odot$=1.989 10^{33} erg.s^{-1} ; G =6.668 10^{-8} dyn $cm^2.g^{-2}$

Mixture

solar mixture of Grevesse & Noels (93)

Isotopic ratios to be checked

models starting point (except for case 1.4: PMS)

ASTEC, CESAM(PM): ZAMS

CLES, CESAM(YL), STAROX : PMS

FRANEC, TGEC?

number of shells

ASTEC: 601 shells between center and photosphere

CESAM: 1030 to 1300 shells in the interior + 100 shells in the atmosphere

CLES: 700 to 1400 shells in the interior

STAROX: 2000 shells

FRANEC: 800-900 + 300-400 sub-atmosphere

number of steps from ZAMS to TAMS

ASTEC: 30-40(200) time steps in models without (with) convective core

CESAM: about 400 time steps from PMS to TAMS in $2M_\odot$ models

CLES: about 100 time steps (1.4 $M_\odot$ model)

GLOBAL PARAMETERS COMPARISON

CASE 1.1

0.9 $M_\odot$

X_c=0.35

Z=0.02

MS

	Age	$\frac{R}{R_\odot}$	$\frac{L}{L_\odot}$	$T_{\rm eff}$	$\frac{T_c}{10^7}$	ρ_c	X_c	$\frac{M_{\rm cor}}{M}$	$\frac{R_{\rm env}}{R}$
Case 1.1:									
ASTEC	6 745	0.8927	0.6237	5 434	1.443	150.5	0.3500	-	0.6954
$\rm CESAM_0$	6 782	0.8916	0.6262	5 443	1.448	150.9	0.3501	-	0.6958
$\rm CESAM_1$	6 886	0.8933	0.6237	5 432	1.444	150.0	0.3500	-	0.6957
CLES	6 816	0.8954	0.6245	5 428	1.447	151.2	0.3496	-	0.6972
FRANEC	6 823	0.9038	0.6269	5 408	1.452	152.3	0.3500	-	0.7002
STAROX	6 674	0.8926	0.6259	5 439	1.446	151.8	0.3500	-	0.6964
TGEC	6 539	0.8942	0.6504	5 489	1.458	153.9	0.3499	-	0.7015

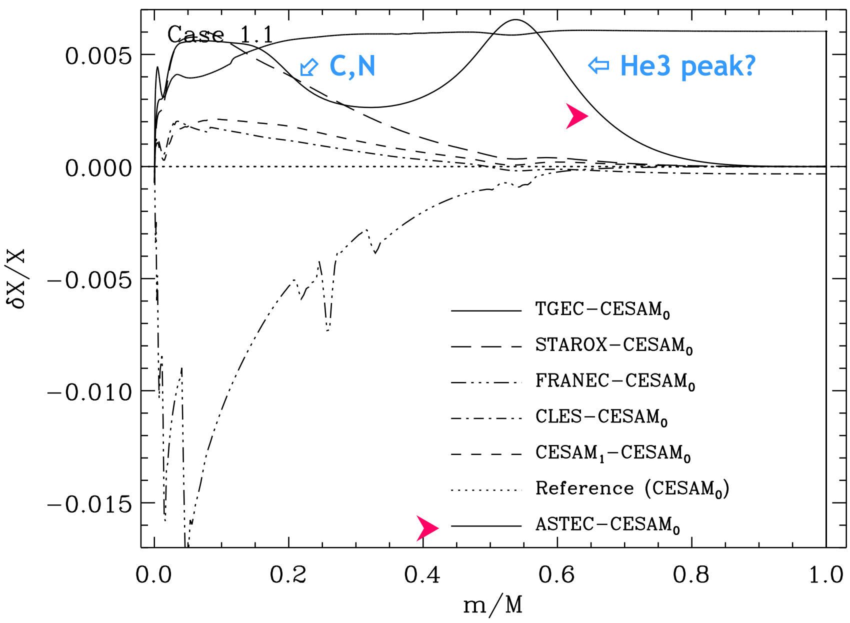
	age	$R/R_\odot$	$L/L_\odot$	T_{eff}	$T_c/10^7$	ρ_c	R_{env}/R
min max	6539 6886	0.8916 0.9114	0.6237 0.6522	5408 5489	1.443 1.461	150.0 153.9	0.6954 0.7027
$\Delta_{max-min}$	347	0.0198	0.0285	81	0.018	3.9	0.0073
$\Delta_{max-min}$/max	5.0%	2.2%	4.4%	1.5%	1.2%	2.5%	1.0%
$\rm CESAM_0$ vs CLES	0.5%	0.4%	0.3%	0.3%	0.1%	0.2%	0.2%

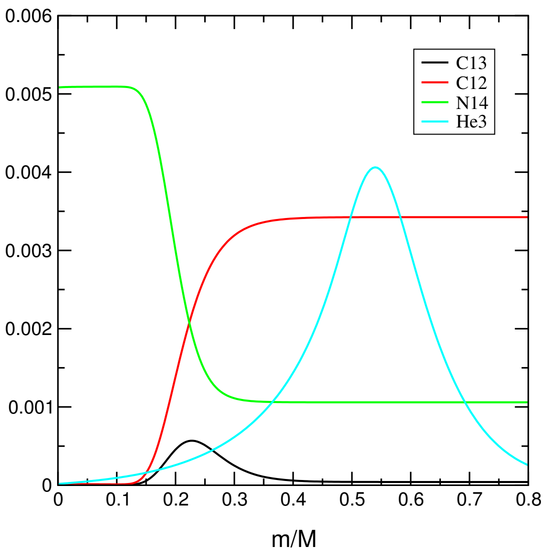
HYDROGEN PROFILE

CASE 1.1 : MS

0.9 $M_\odot$

X_c=0.35 ; Z=0.02





0.5% ASTEC,STARROX (centre), TGEC

1.5% FRANEC (centre),

0.2% CLES, CESAM

SOUND SPEED COMPARISON : MS MODELS

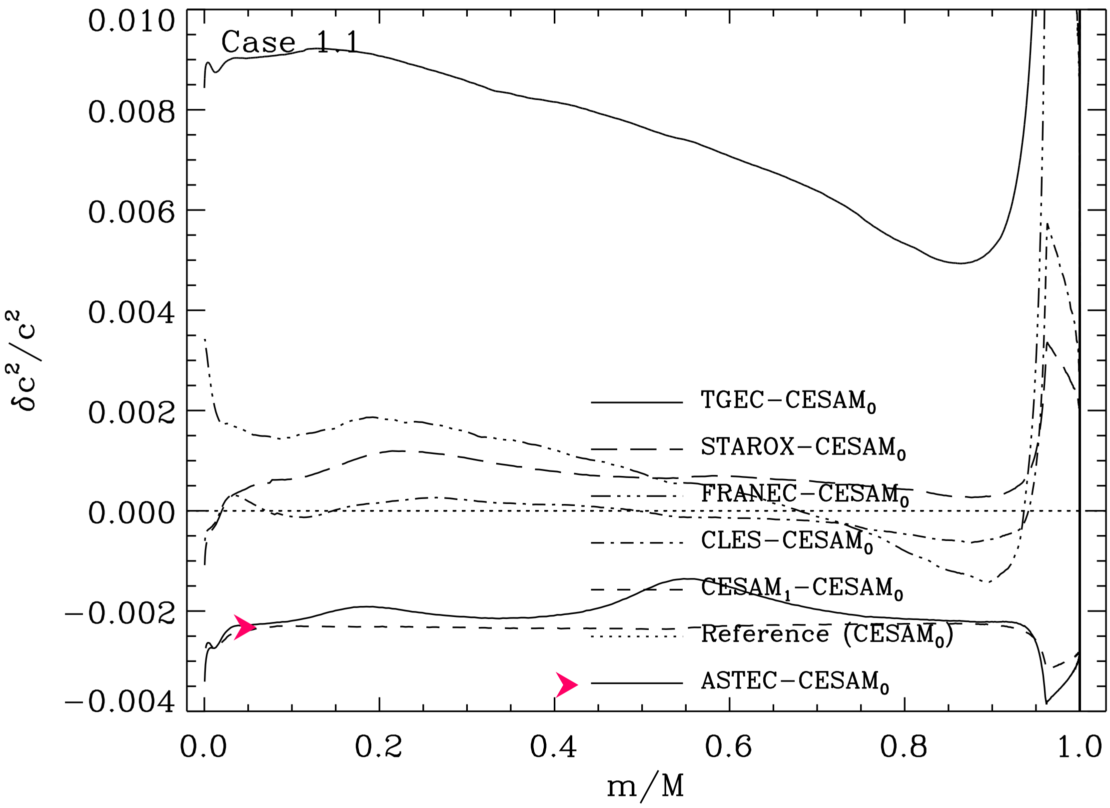
CASE 1.1

0.9 $M_\odot$

X_c=0.35

Z=0.02

MS



0.9% TGEC, 0.4% FRANEC, 0.2% ASTEC, STAROX, CLES, CESAM

But outer regions !

GLOBAL PARAMETERS COMPARISON

CASE 1.2

1.2 $M_\odot$

X_c=0.69

Z=0.02

ZAMS

	Age	$R/R_\odot$	$L/L_\odot$	$T_{\rm eff}$	$T_c/10^7$	ρ_c	X_c	$M_{\rm cor}/M$	$R_{\rm env}/R$
Case 1.2:									
ASTEC	074.4	1.151	1.789	6 227	1.578	86.69	0.6900	0.0106	0.8288
CESAM$_0$	096.7	1.146	1.776	6 231	1.577	86.65	0.6900	0.0087	0.8265
CESAM$_1$	080.8	1.147	1.775	6 226	1.575	86.46	0.6900	0.0087	0.8282
CLES	098.5	1.146	1.778	6 232	1.577	86.68	0.6900	0.0094	0.8292
FRANEC	097.3	1.170	1.777	6 166	1.575	86.91	0.6900	0.0087	0.8438
STAROX	101.5	1.148	1.778	6 225	1.576	86.84	0.6900	0.0076	0.8292
TGEC	106.0	1.148	1.849	6 290	1.589	88.31	0.6900	0.0095	0.8423

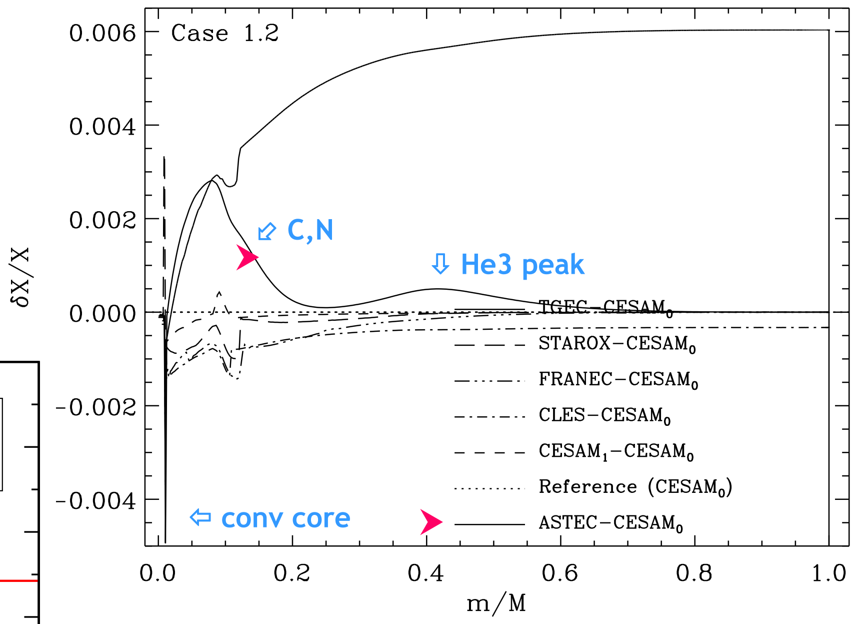
	age	$R/R_\odot$	$L/L_\odot$	T_{eff}	$T_c/10^7$	ρ_c	M_{core}/M	R_{env}/R
min max	74.4 106.0	1.146 1.183	1.775 1.859	6166 6290	1.575 1.590	86.46 88.31	0.0076 0.0106	0.8265 0.8497
$\Delta_{max-min}$	31.6	0.037	0.084	124	0.015	1.85	0.0019	0.0232
$\Delta_{max-min}$/max	3.0%	3.1%	4.5%	2.0%	0.9%	2.1%	17.9%	2.7%
CESAM$_0$ vs CLES	1.8%	0.0%	0.1%	0.02%	0.0%	0.3%	0.2%	0.3%

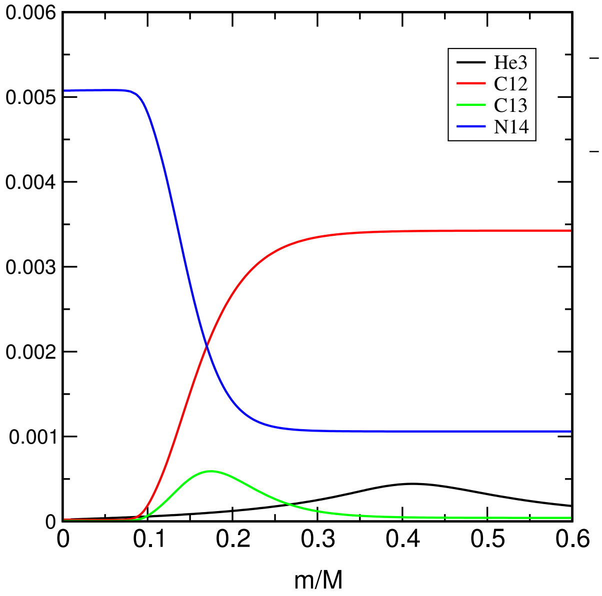
HYDROGEN PROFILE

CASE 1.2 : ZAMS

1.2 $M_\odot$

X_c=0.69 ; Z=0.02





0.6% TGEC

0.3% : ASTEC

<0.15% FRANEC, CLES, STARROX, CESAM

SOUND SPEED COMPARISON : MS MODELS

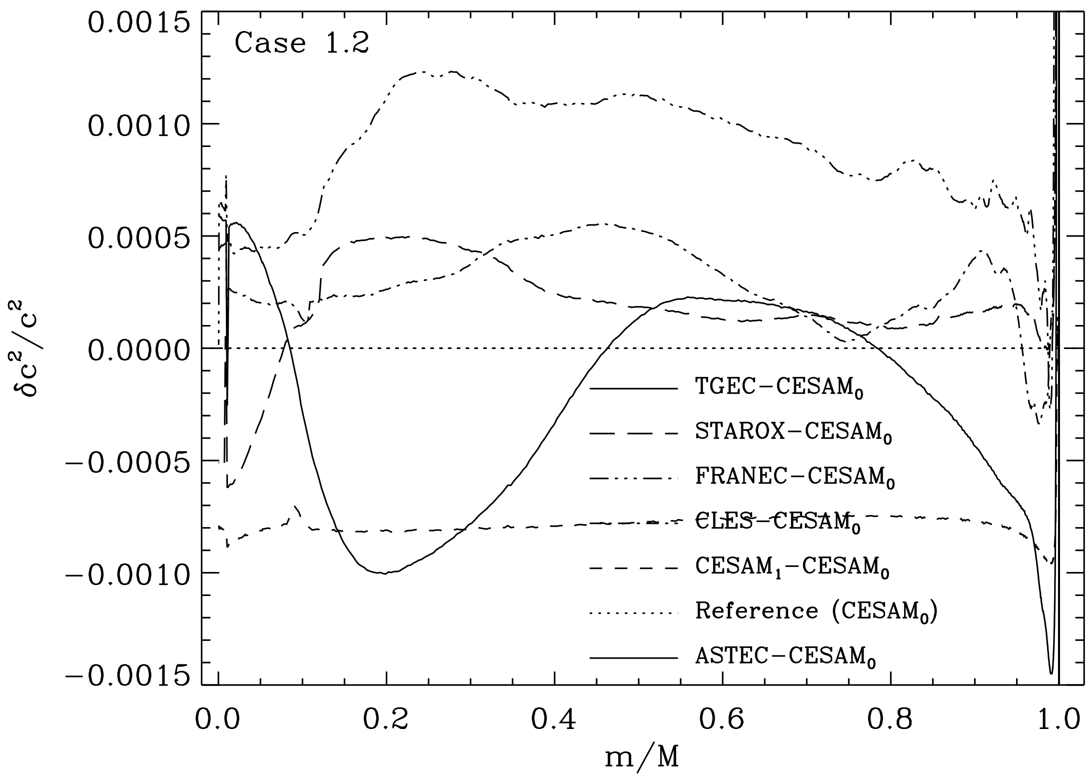
CASE 1.2

1.2 $M_\odot$

X_c=0.69

Z=0.02

ZAMS



Less than 0.0015 but outer regions !

GLOBAL PARAMETERS COMPARISON

CASE 1.6

3 $M_\odot$

X_c=0.69

Z=0.01

ZAMS

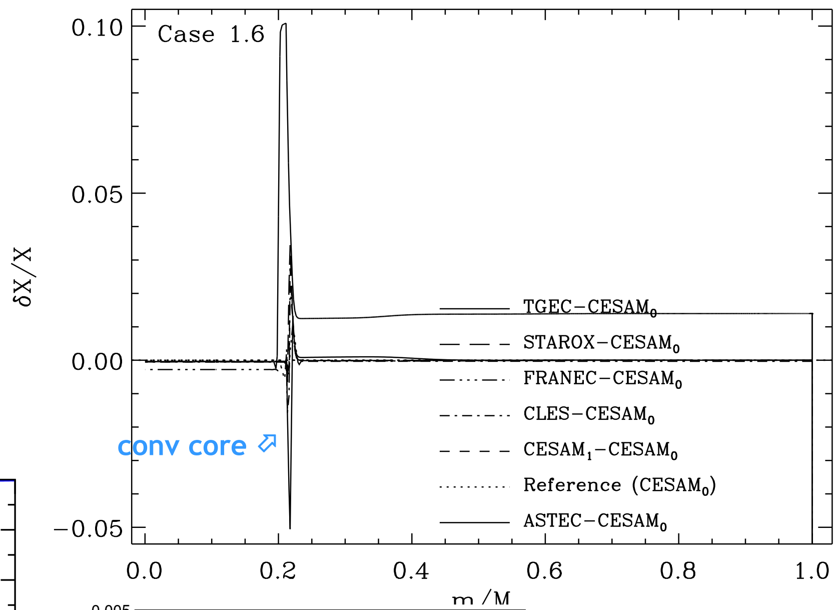
	Age	$\frac{R}{R_\odot}$	$\frac{L}{L_\odot}$	$T_{\rm eff}$	$\frac{T_c}{10^7}$	ρ_c	X_c	$\frac{M_{\rm cor}}{M}$	$\frac{R_{\rm env}}{R}$
Case 1.6:									
ASTEC	13.71	1.864	101.5	13 432	2.479	42.68	0.6900	0.2129	0.9990
$\rm CESAM_0$	14.47	1.854	101.4	13 466	2.486	43.04	0.6901	0.2114	0.9945
$\rm CESAM_1$	14.04	1.854	101.4	13 470	2.486	43.05	0.6900	0.2114	0.9945
CLES	14.76	1.852	101.6	13 479	2.487	43.08	0.6900	0.2104	0.9938
FRANEC	14.95	1.853	101.4	13 469	2.481	42.94	0.6894	0.2151	0.9939
STAROX	14.46	1.855	101.6	13 468	2.487	43.17	0.6900	0.2118	0.9939
TGEC	21.00	1.981	78.5	12 223	2.401	40.50	0.6900	0.1976	0.9989

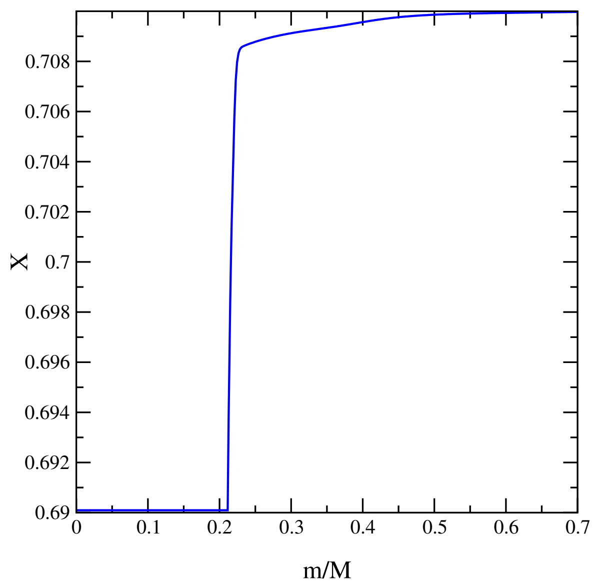
	age	$R/R_\odot$	$L/L_\odot$	T_{eff}	$T_c/10^7$	ρ_c	M_{core}/M	R_{env}/R
min max	13.71 14.95 21.00	1.852 1.864 1.981	101.4 104.5 78.5	13432 13517 12223	2.479 2.488 2.401	42.48 43.17 40.50	21.04 21.51 19.76	0.9938 0.9990 0.9989
$\Delta_{max-min}$	1.24 7.29	0.012 0.129	3.1 26	85 1209	0.009 0.087	0.60 2.67	0.47 1.75	0.0052 0.0051
$\Delta_{max-min}$/max	8.3% 35%	0.6% 6.5%	3.0% 24.9%	0.6% 8.9%	0.4% 3.5%	1.6% 6.2%	2.2% 8.1%	0.5% 0.5%
$\rm CESAM_0$ vs CLES	2.0%	0.1%	0.2%	0.1%	0.04%	0.1%	0.4%	0.07%

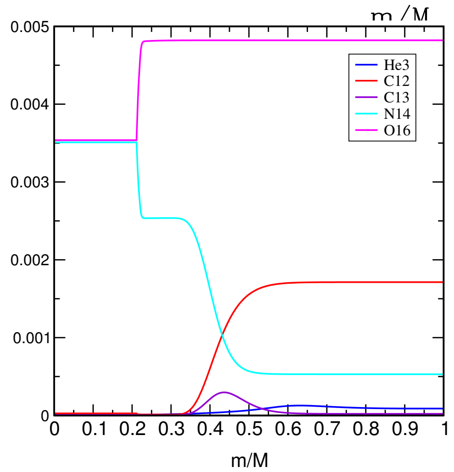
HYDROGEN PROFILE

CASE 1.6: ZAMS

3 $M_\odot$; X_c=0.69 ; Z=0.01







SOUND SPEED COMPARISON : MS MODELS

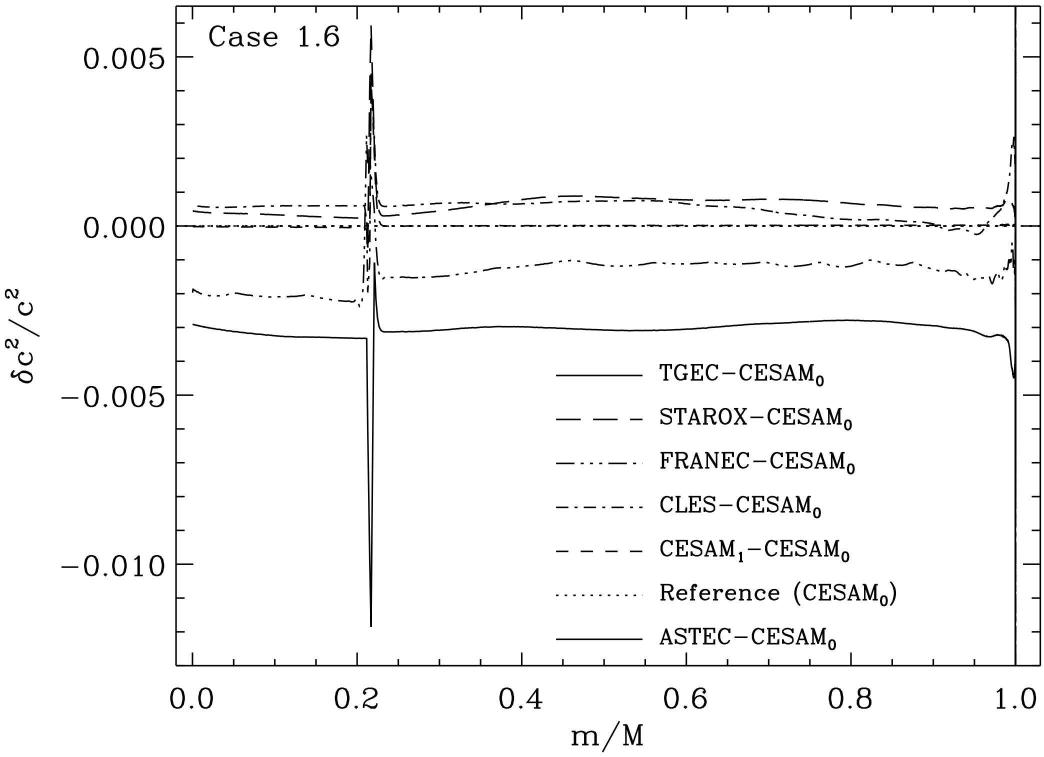
CASE 1.6

3 $M_\odot$

X_c=0.69

Z=0.01

ZAMS



GLOBAL PARAMETERS COMPARISON

CASE 1.7

5 $M_\odot$

X_c=0.35

Z=0.02

MS

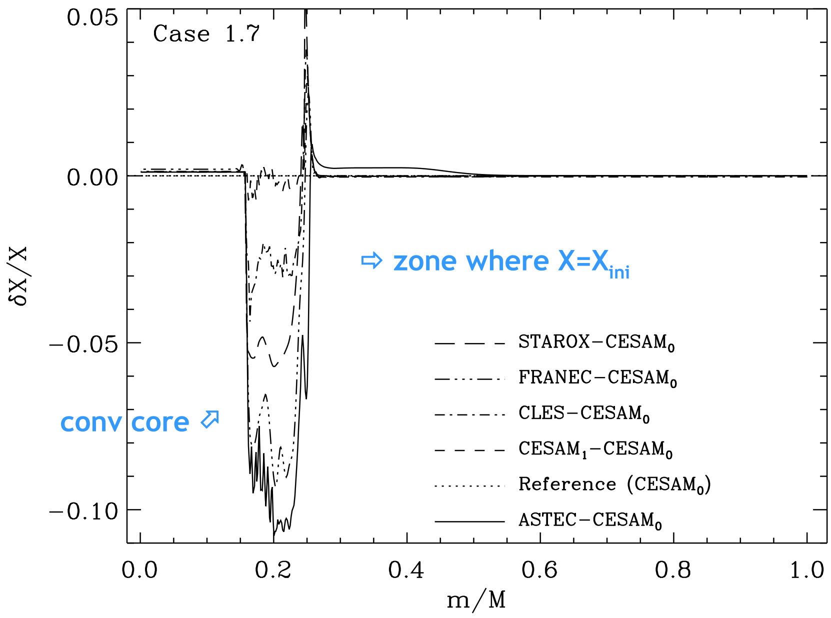
	Age	$\frac{R}{R_\odot}$	$\frac{L}{L_\odot}$	$T_{\rm eff}$	$\frac{T_c}{10^7}$	ρ_c	X_c	$\frac{M_{\rm cor}}{M}$	$\frac{R_{\rm env}}{R}$
Case 1.7:									
ASTEC	56.88	3.905	748.2	15 291	2.829	19.49	0.3500	0.1600	0.9996
$CESAM_0$	55.94	3.854	739.6	15 348	2.836	19.76	0.3498	0.1567	0.9943
$CESAM_1$	55.58	3.852	739.4	15 350	2.836	19.77	0.3500	0.1568	0.9943
CLES	56.39	3.865	741.8	15 337	2.837	19.77	0.3500	0.1564	0.9932
FRANEC	54.98	3.867	745.1	15 350	2.833	19.68	0.3502	0.1621	0.9929
STAROX	55.60	3.871	744.9	15 342	2.838	19.76	0.3500	0.1597	0.9929

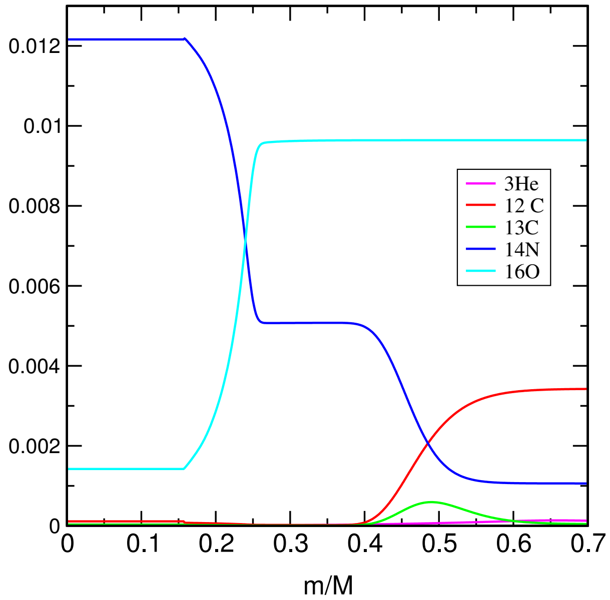
	age	$R/R_\odot$	$L/L_\odot$	T_{eff}	$T_c/10^7$	ρ_c	M_{core}/M	R_{env}/R
min max	54.73 56.88	3.852 3.905	739.4 772.3	15291 15395	2.829 2.844	19.49 19.77	0.1564 0.1638	0.9928 0.9996
$\Delta_{max-min}$	2.15	0.053	32.9	104	0.015	0.27	0.0074	0.0068
$\Delta_{max-min}$/max	3.8%	1.4%	4.3%	0.7%	0.5%	1.4%	4.5%	0.7%
$CESAM_0$ vs CLES	0.8%	0.3%	0.3%	0.1%	0.04%	0.05%	0.2%	0.1%

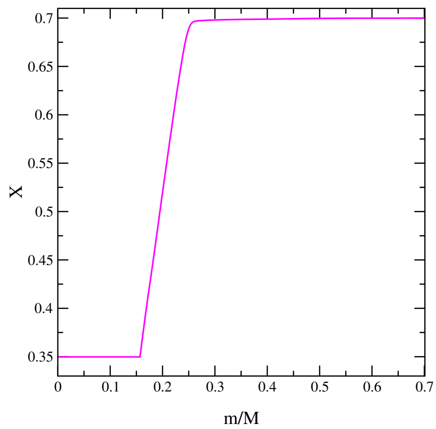
HYDROGEN PROFILE

CASE 1.7: MS

5 $M_\odot$; X_c=0.35 ; Z=0.02







SOUND SPEED COMPARISON : MS MODELS

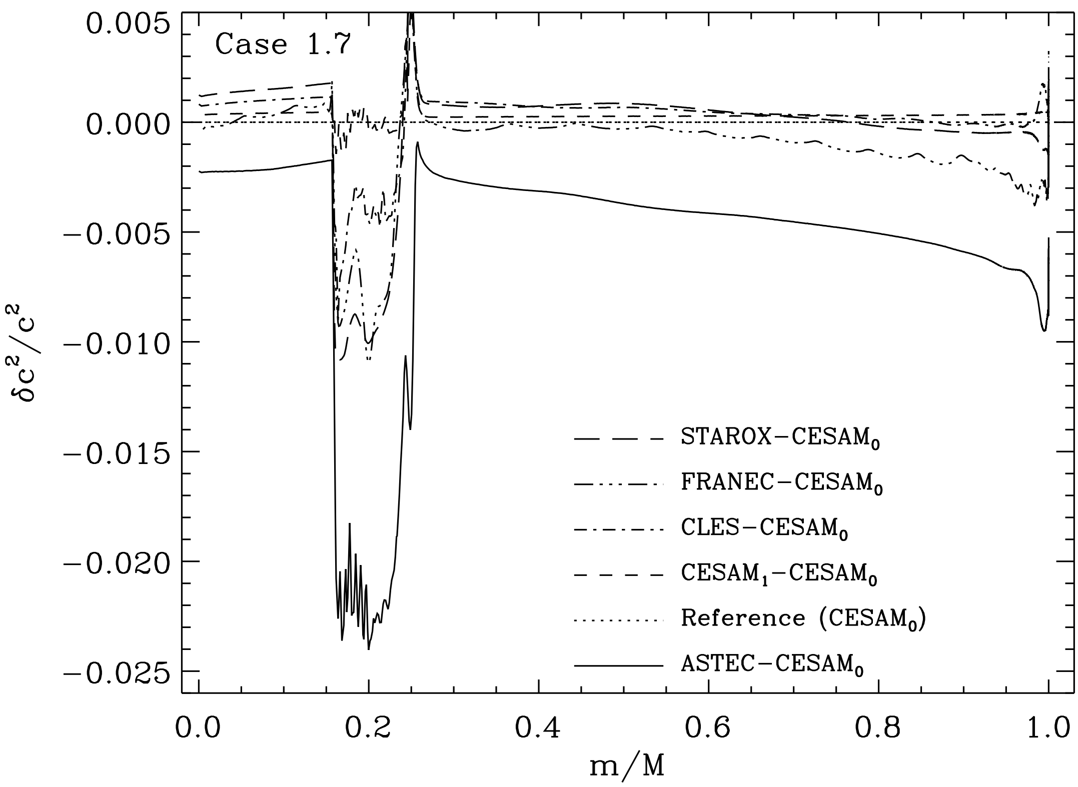
CASE 1.7

5 $M_\odot$

X_c=0.35

Z=0.02

MS



GLOBAL PARAMETERS COMPARISON

CASE 1.4

2 $M_\odot$

T_c=1.9 10^7

Z=0.02

preMS

	Age	$\frac{R}{R_\odot}$	$\frac{L}{L_\odot}$	$T_{\rm eff}$	$\frac{T_c}{10^7}$	ρ_c	X_c	$\frac{M_{\rm HeC}}{M_\odot}$	$\frac{M_{\rm cor}}{M}$	$\frac{R_{\rm env}}{R}$
Case 1.4:										
$CESAM_0$	7.043	1.866	15.80	8 431	1.900	49.22	0.6994	-	0.1075	0.9988
$CESAM_1$	6.643	1.871	15.97	8 444	1.900	49.01	0.6994	-	0.1148	0.9918
CLES	7.716	1.875	16.23	8 469	1.900	50.17	0.6993	-	0.0927	0.9915
FRANEC	8.0168	1.869	16.04	8 457	1.897	50.03	0.6993	-	0.0977	0.9986
STAROX	8.292	1.862	15.64	8419	1.900	49.19	0.6994	-	0.1077	0.9917
TGEC	7.200	1.839	15.27	8 427	1.891	46.86	0.7009	-	0.1328	0.9989

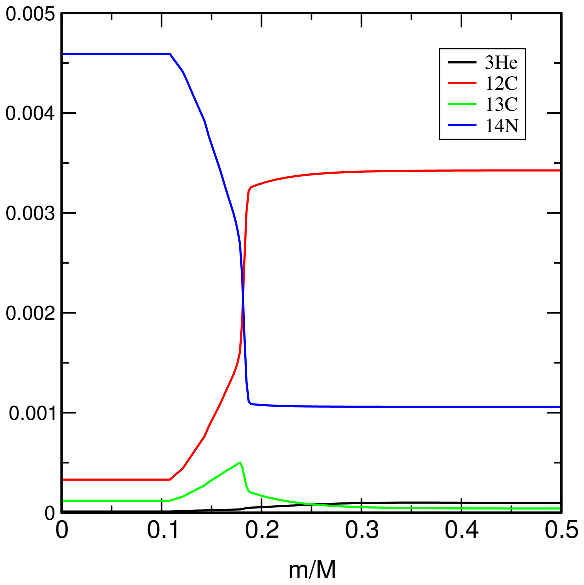
	age	$R/R_\odot$	$L/L_\odot$	T_{eff}	X_c	ρ_c	M_{core}/M	R_{env}/R
min max	6.643 8.292	1.862 1.879	15.27 16.50	8419 8484	0.6993 0.7009	46.86 50.17	0.0927 0.1328	0.9915 0.9989
$\Delta_{max-min}$	1.639	0.017	1.23	65	0.0016	3.31	0.0401	0.0074
$\Delta_{max-min}$/max	19.9%	0.9%	7.5%	0.8%	0.2%	6.6%	30.2%	0.7%
$CESAM_0$ vs CLES	8.7%	0.5%	2.6%	0.4%	0.0%	1.9%	13.8%	0.7%

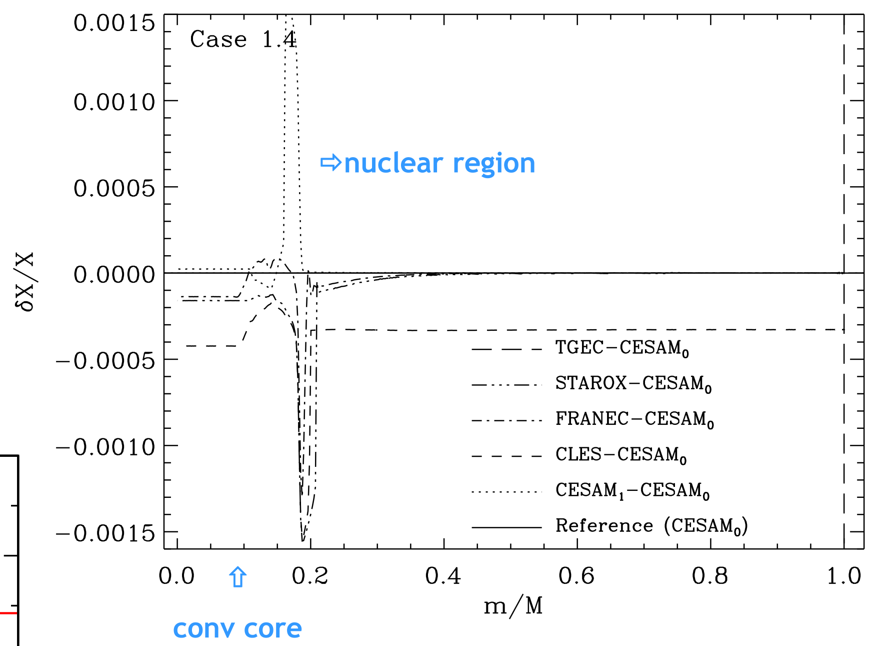
HYDROGEN PROFILE

CASE 1.4: preMS

2 $M_\odot$; T_c=1.9 10^7 K

Z=0.02





SOUND SPEED COMPARISON : preMS MODEL

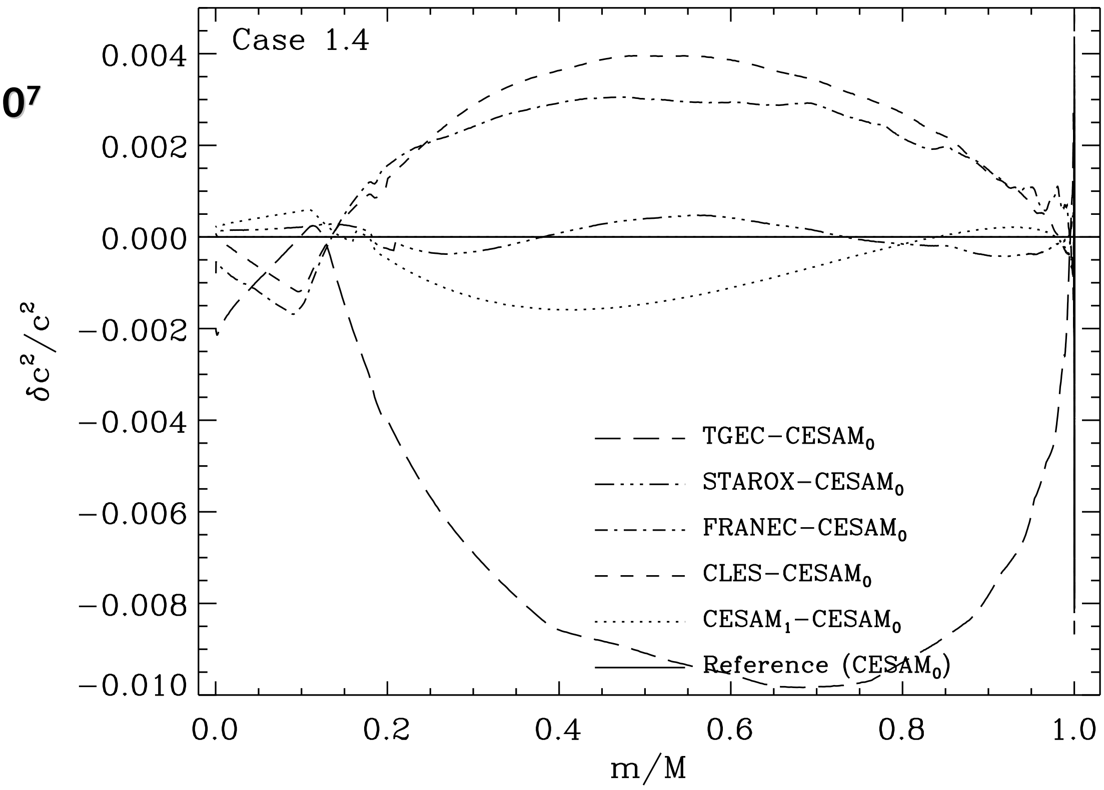
CASE 1.4

2 $M_\odot$

T_c=1.9 10^7

Z=0.02

preMS



GLOBAL PARAMETERS COMPARISON

CASE 1.3

1.2 $M_\odot$

$M_{He\ core}$

Z=0.01

postMS

	Age	$\frac{R}{R_\odot}$	$\frac{L}{L_\odot}$	T_{eff}	$\frac{T_c}{10^7}$	ρ_c	X_c	$\frac{M_{HeC}}{M_\odot}$	$\frac{M_{cor}}{M}$	$\frac{R_{env}}{R}$
Case 1.3:										
ASTEC	4 314	2.164	5.513	6 019	2.183	3 276	-	0.1000	-	0.7794
CESAM$_1$	4 552	2.164	5.582	6 037	2.187	3 206	-	0.1000	-	0.7824
CLES	4 401	2.170	5.617	6 038	2.205	3 210	-	0.1000	-	0.7843
FRANEC	4 257	2.245	5.623	5 937	2.197	3 110	-	0.0997	-	0.8013

	age	R/R$_\odot$	L/L$_\odot$	T_{eff}	$T_c/10^7$	ρ_c	R_{env}/R
min max	4207 4552	2.164 2.275	5.513 5.808	5937 6038	2.183 2.205	3110 3276	0.7794 0.8013
$\Delta_{max-min}$	345	0.111	0.295	101	0.022	166	0.0219
$\Delta_{max-min}$/max	7.5%	5%	5%	1.7%	1%	5.1%	2.7%

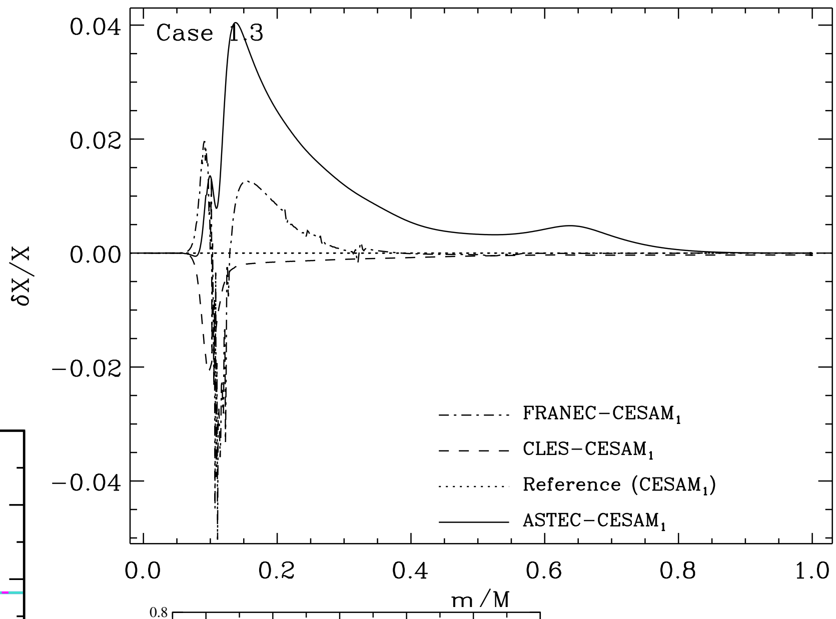
HYDROGEN PROFILE

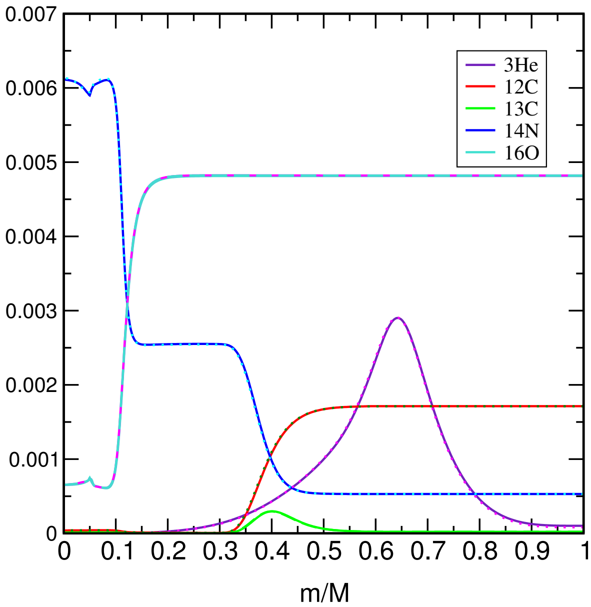
CASE 1.3 : post-MS

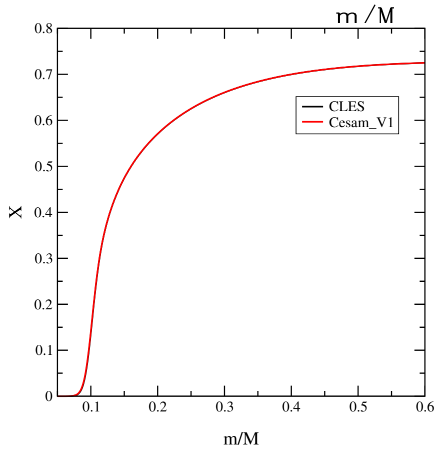
1.2 $M_\odot$

$M_{He\ core}$=0.10$M_\odot$

Z=0.01







SOUND SPEED COMPARISON : TAMS MODEL

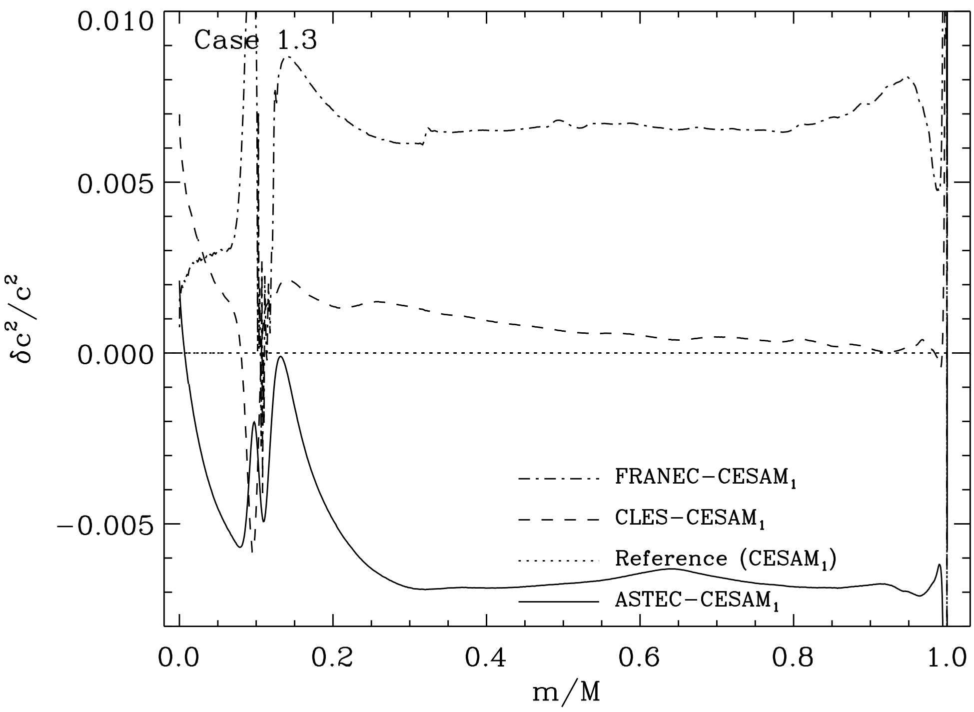
CASE 1.3

1.2 $M_\odot$

$M_{He\ core}$

Z=0.01

postMS



GLOBAL PARAMETERS COMPARISON

CASE 1.5

2 $M_\odot$

X_c=0.01

Z=0.02

α_{OV}=0.15

TAMS

	Age	$R/R_\odot$	$L/L_\odot$	T_{eff}	$T_c/10^7$	ρ_c	X_c	$M_{HeC}/M_\odot$	M_{cor}/M	R_{env}/R
Case 1.5:										
ASTEC	1 174	3.542	22.62	6 695	2.784	130.5	0.0100	-	0.0778	0.9872
$CESAM_0$	1 185	3.543	22.91	6 715	2.794	131.8	0.0100	-	0.0770	0.9870
$CESAM_1$	1 173	3.537	22.87	6 718	2.795	131.8	0.0100	-	0.0770	0.9871
CLES	1 209	3.634	23.38	6 665	2.800	131.7	0.0100	-	0.0628	0.9862
STAROX	1 197	3.652	23.32	6 644	2.801	131.8	0.0101	-	0.0635	0.9854
TGEC	1 202	3.415	22.64	6 823	2.778	129.9	0.0133	-	0.0600	0.9894

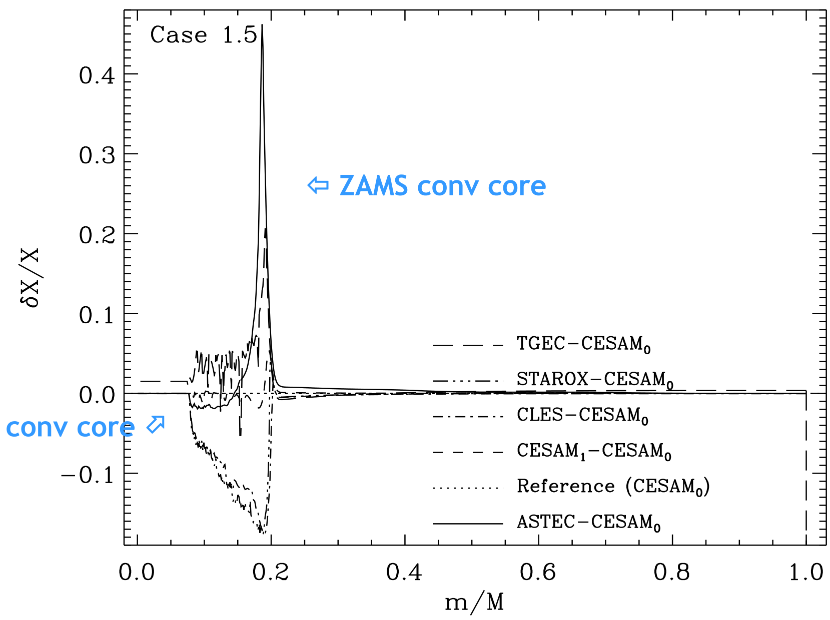
	age	$R/R_\odot$	$L/L_\odot$	T_{eff}	$T_c/10^7$	ρ_c	M_{core}/M	R_{env}/R
min max	1173 1209	3.537 3.652	22.62 23.38	6644 6823	2.784 2.801	129.9 131.8	0.0770 0.0600	0.9854 0.9894
$\Delta_{max-min}$	36	0.115	0.76	179	0.017	1.9	0.0170	0.0040
$\Delta_{max-min}$/max	3%	3.1%	3.3%	2.6%	0.6%	1.4%	22.1%	0.4%
$CESAM_0$ vs CLES	2%	2.5%	2%	0.7%	0.2%	0.1%	18.4%	0.08%

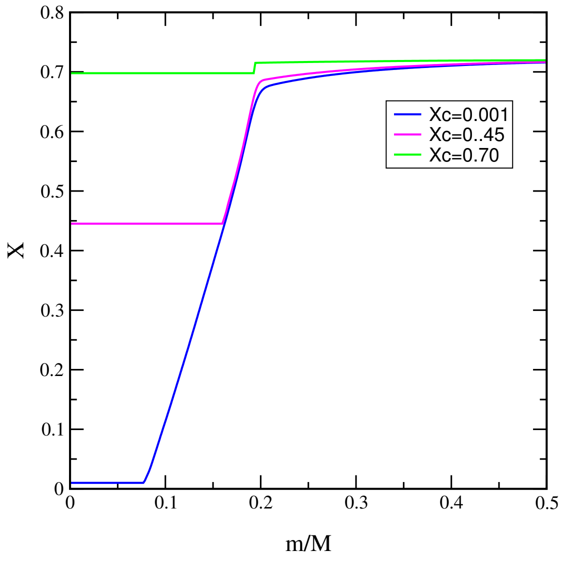
HYDROGEN PROFILE

CASE 1.5: TAMS

2 $M_\odot$; X_c=0.01 ; Z=0.02

α_{OV}=0.15





SOUND SPEED COMPARISON : postMS model

CASE 1.5

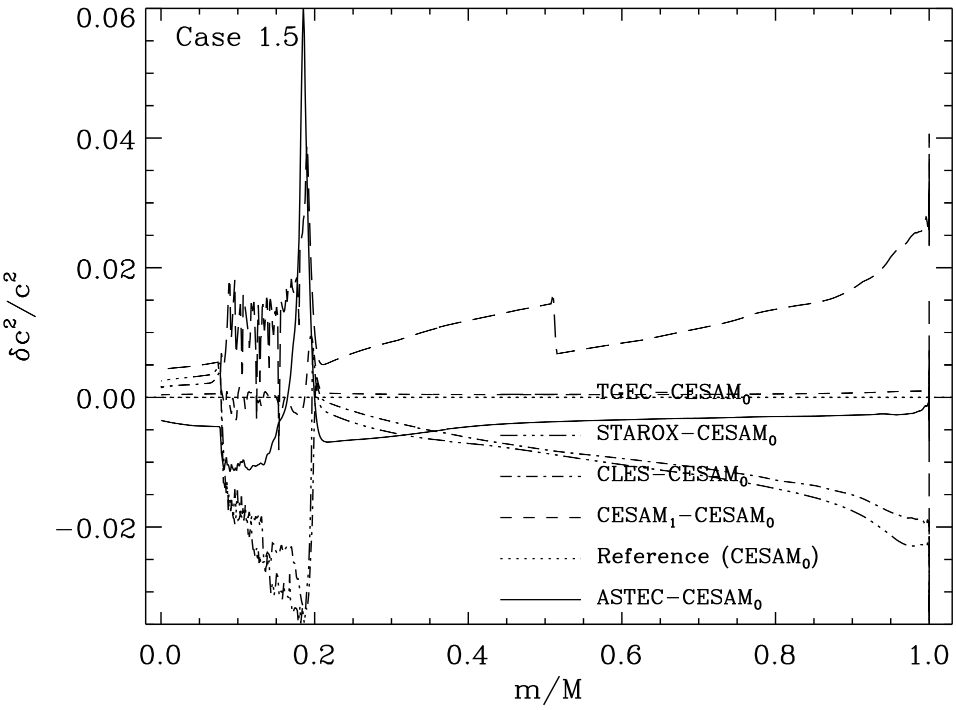
2 $M_\odot$

X_c=0.01

Z=0.02

α_{OV}=0.15

TAMS



CONCLUSIONS

GLOBAL PARAMETERS

models are consistent to first order :

- differences in global parameters range from 1 to 5%
- but age ⇨ up to 10-20%, M_{core} ⇨ up to 20-30%
- but PMS ⇨ 7-8% on L, ρ_c

part of the differences result from

- specifications for the targets not precisely followed
- reference physics not fully implemented in some codes

must be checked and quantified ! STEP 0 !

- CLES/CESAM$_0$: very close physical inputs ⇨ differences <0.5%
- but PMS, overshooting increase differences

CONCLUSIONS

INTERIOR

main differences appear at the edge of the convective regions

- narrow regions appear where differences are high
- evolved models carry the signature of convective core displacements

zones of nuclear energy production also identified

large differences at the surface

TASK1 : WHAT SHOULD BE DONE?

1ST STEP :

- eliminate remaining evident differences in the physics : check isotopic ratios, screening, formulation of convection, overshooting, conductive opacities
- try to estimate the weight of numerics:

  easy? number of shells, of time steps, interpolation methods for opacities, EOS, nuclear rates, fitting temperature for opacity tables, interface with atmosphere (fitting level, boundary conditions)…

  more difficult! treatment of convective limits and their evolution in time, overshooting, associated mixing… can we explore the methods and agree on a preferred one?

- simplify the physics for specific difficult cases: compare case1.5 with/without overshooting…

…/…

TASK1 : WHAT SHOULD BE DONE?

1ST STEP :

- compare the whole sequences of evolution
  - evolutionary track in HR diagram
  - model originating from PMS vs. ZAMS model
  - interior of models at particular evolution stages (constant X_c on the MS)
  - evolution of : size of the convective core, convective envelope depth
- decide now what quantities to be compared next
- decide of the acceptable degree of agreement necessary for COROT

global parameters/internal differences

TASK1 : WHAT SHOULD BE DONE?

2ND STEP :

- sophisticate the physics : include diffusion/settling, overshooting

NOW :

Decide what quantities to be compared

NEXT COROT WEEK

Presentation of the results of the comparisons (end of Step 1)

Go further on step 2: decide what more sophisticated physics to be considered