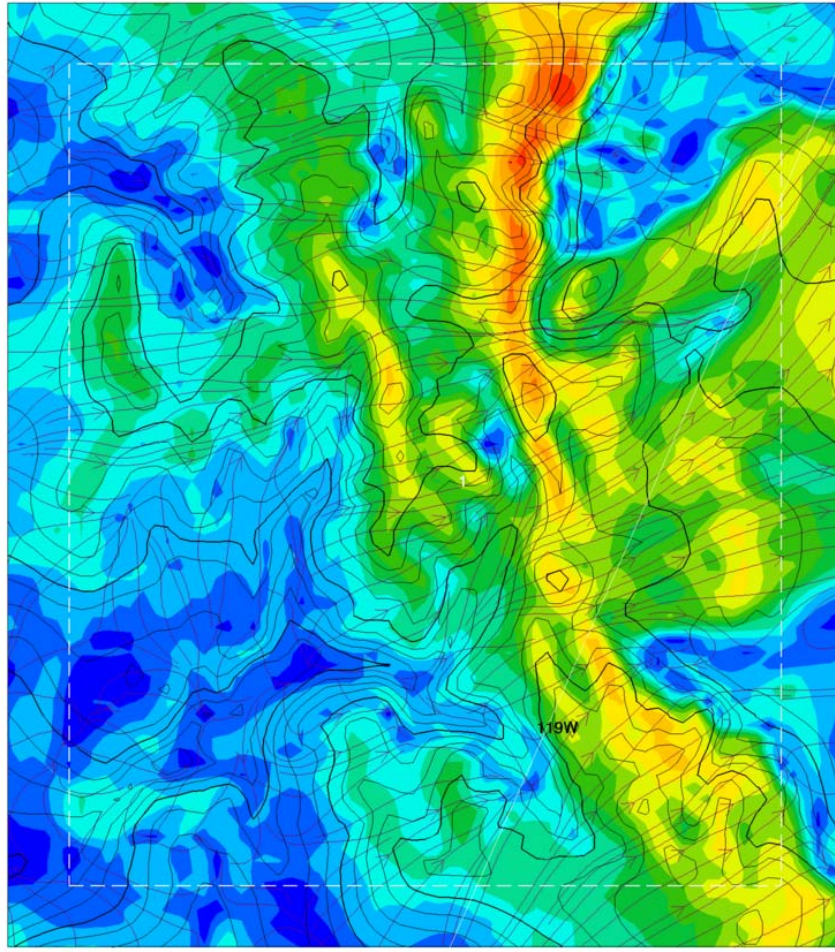
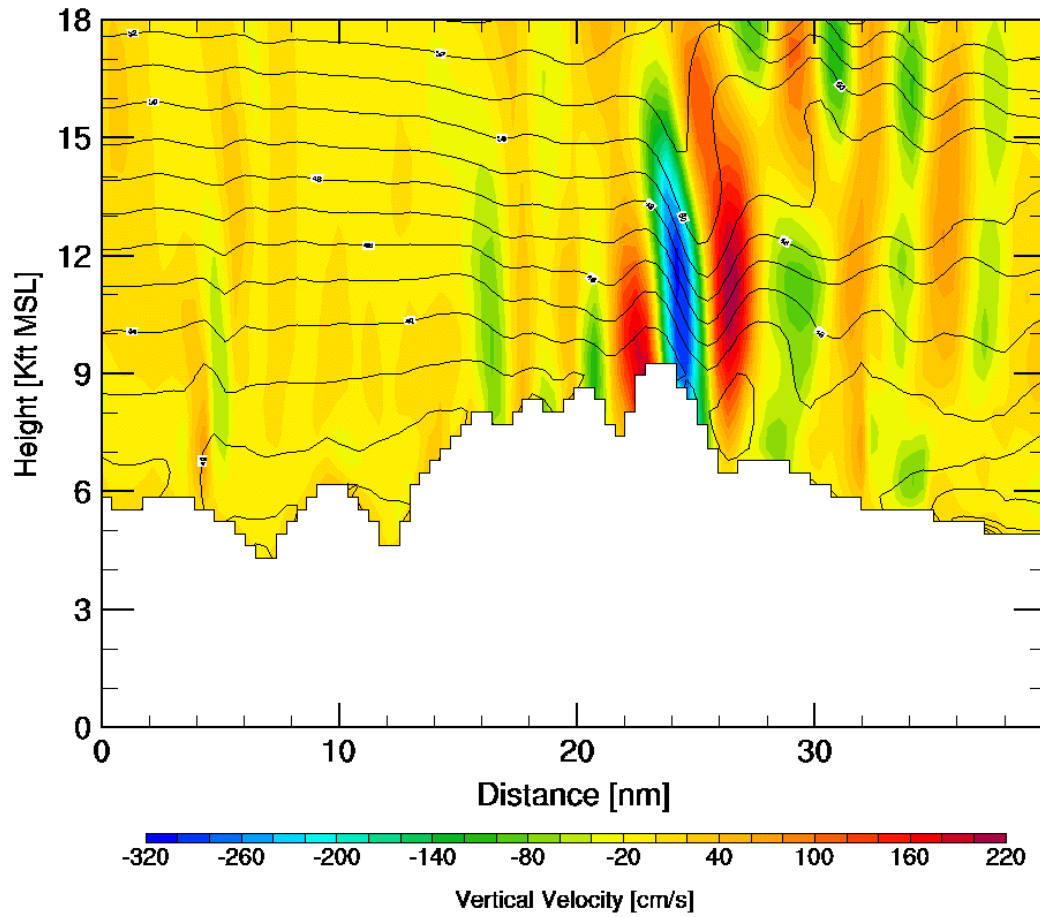


Surface Wind (10m AGL)
Valid 0830 PST (1630Z) MON 3 Sep 2007 [10.5hrFcst@1617z]
DrJack BLIPMAP from RASP 0.8km ETA-initiated WRF-ARW model



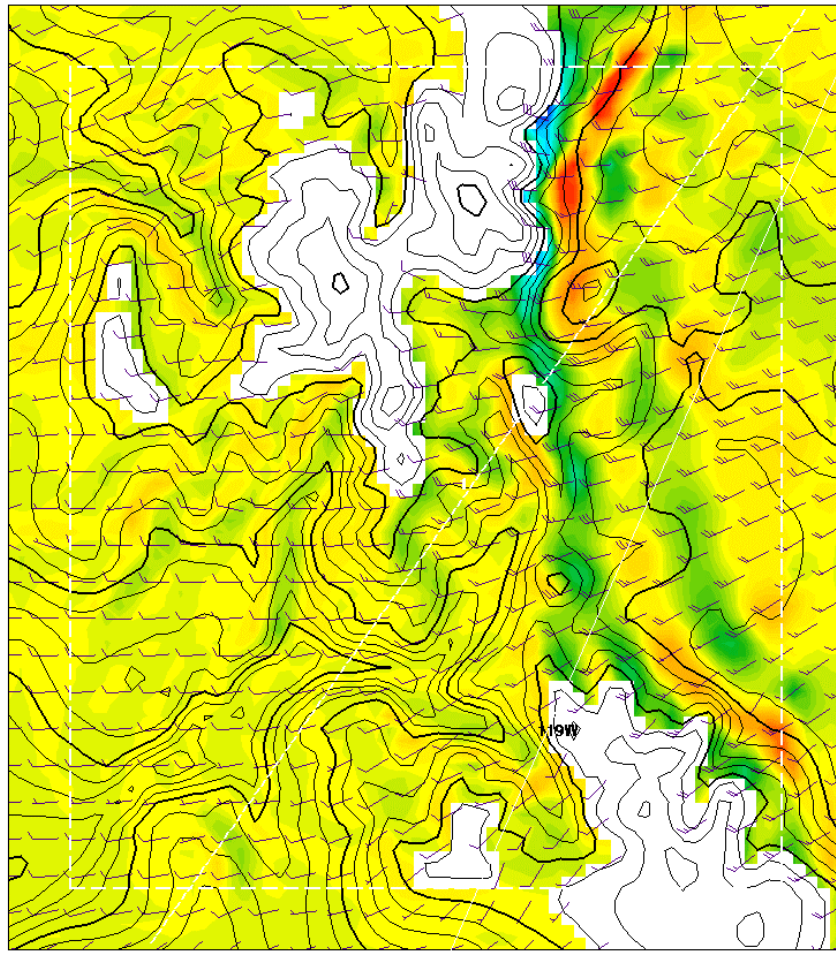
Angled Section: Vertical Velocity & Pot.Temp. (c)
2007-09-03 16:30
slice X,Y= 37,37@35°



Vertical Velocity & Wind [kt] at 700mb

2007-09-03_16:30

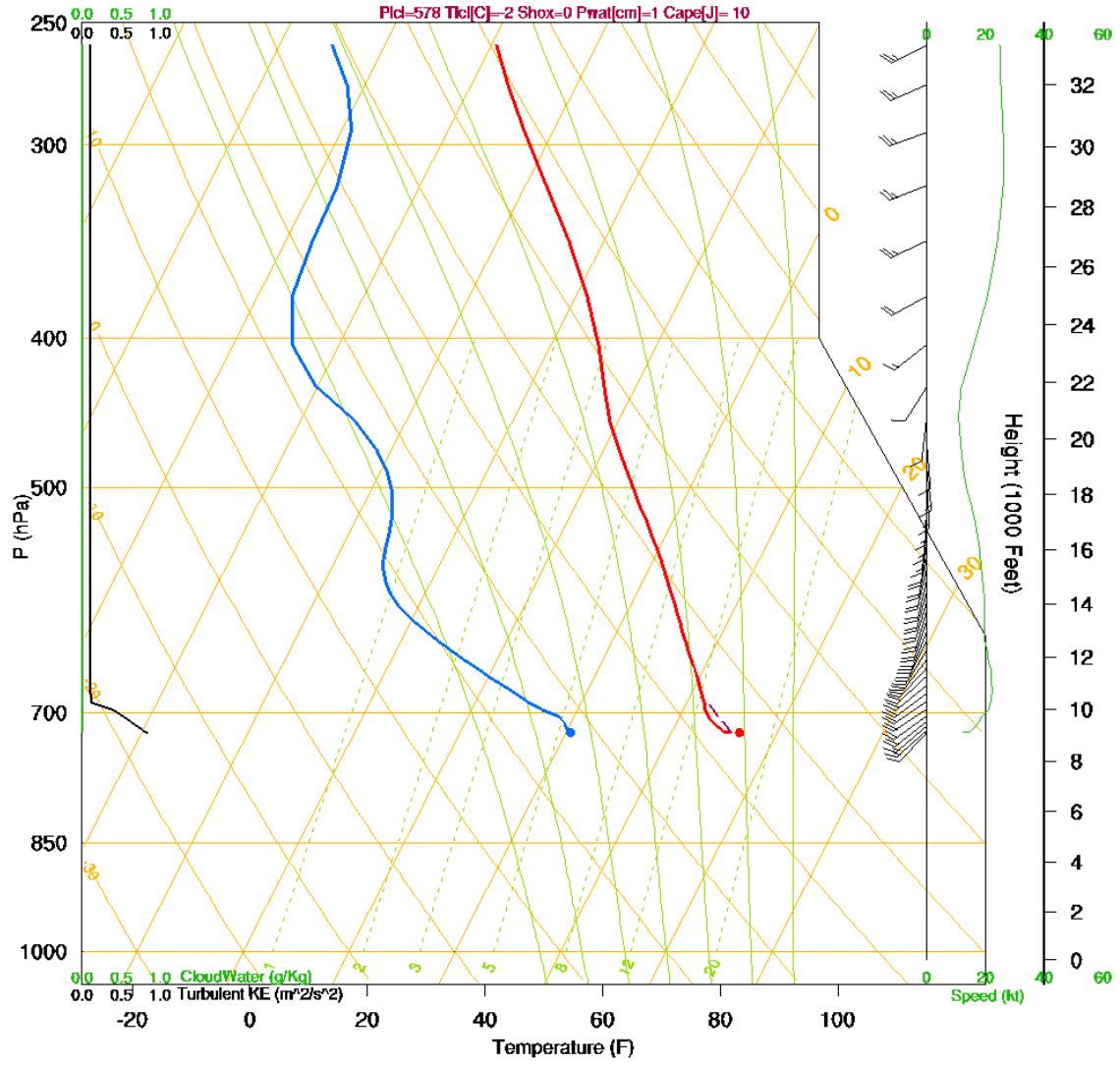
slice X,Y= 37,37@35°



Terrain contours: 500 ft



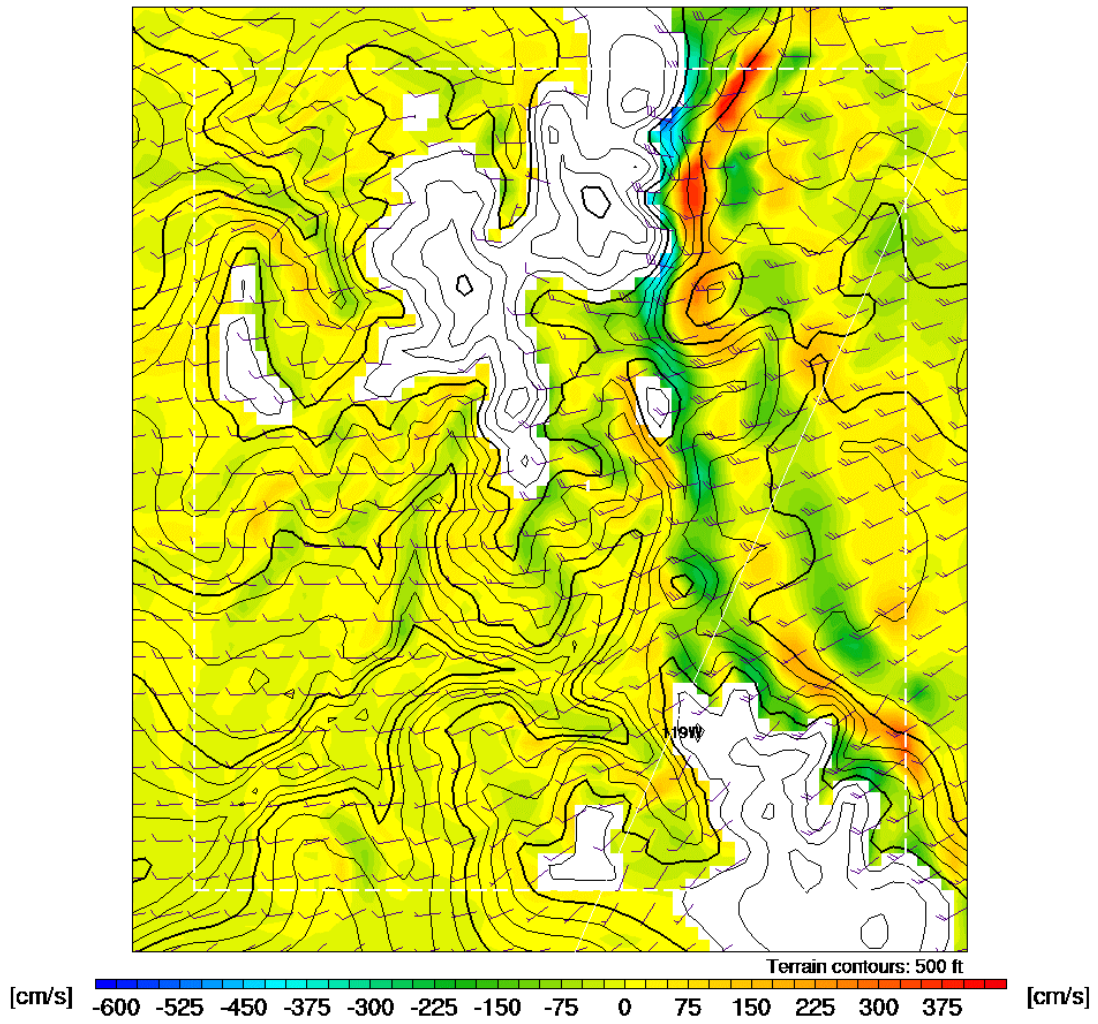
#1: Fossett 37.667°, -119.133° (38,39) 2007-09-03_16:30



Vertical Velocity & Wind [kt] at 700mb

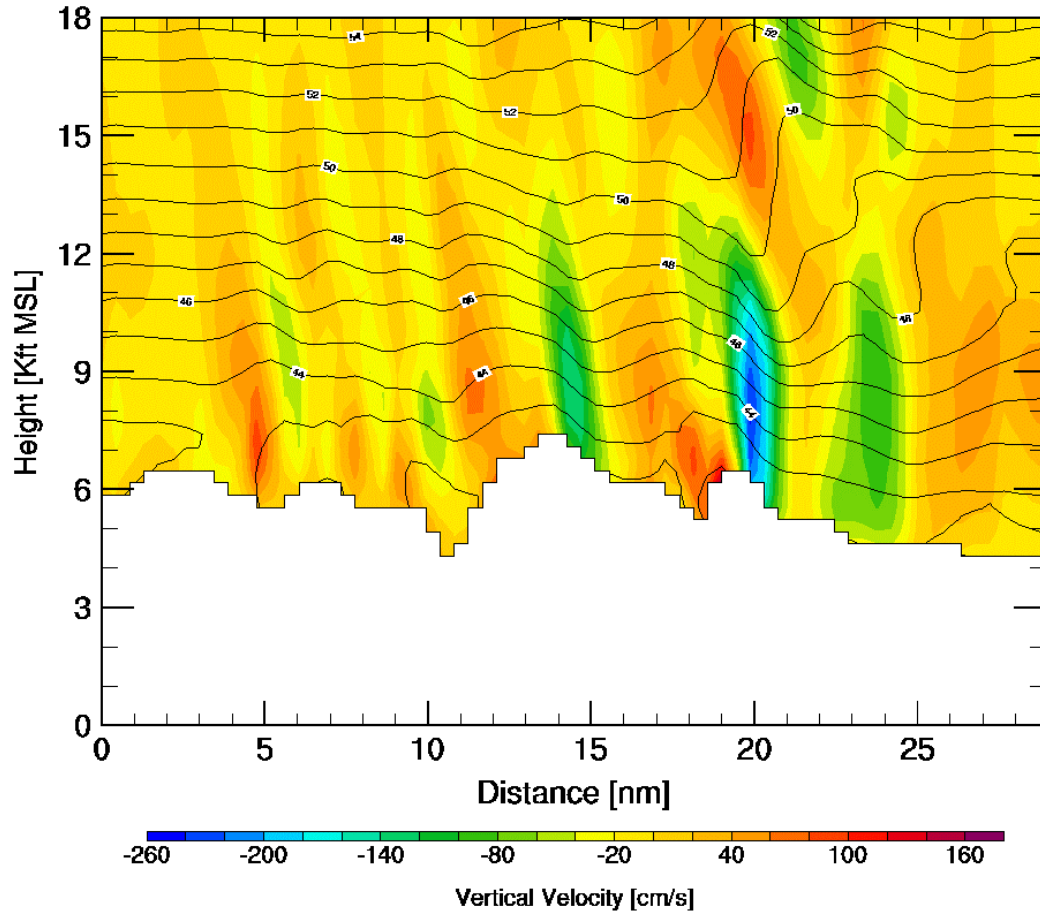
2007-09-03_16:30

DrJack BLIPMAP from RASP 0.8km ETA-initiated WRF-ARW model



X-parallel Section: Vertical Velocity & Pot.Temp (c)

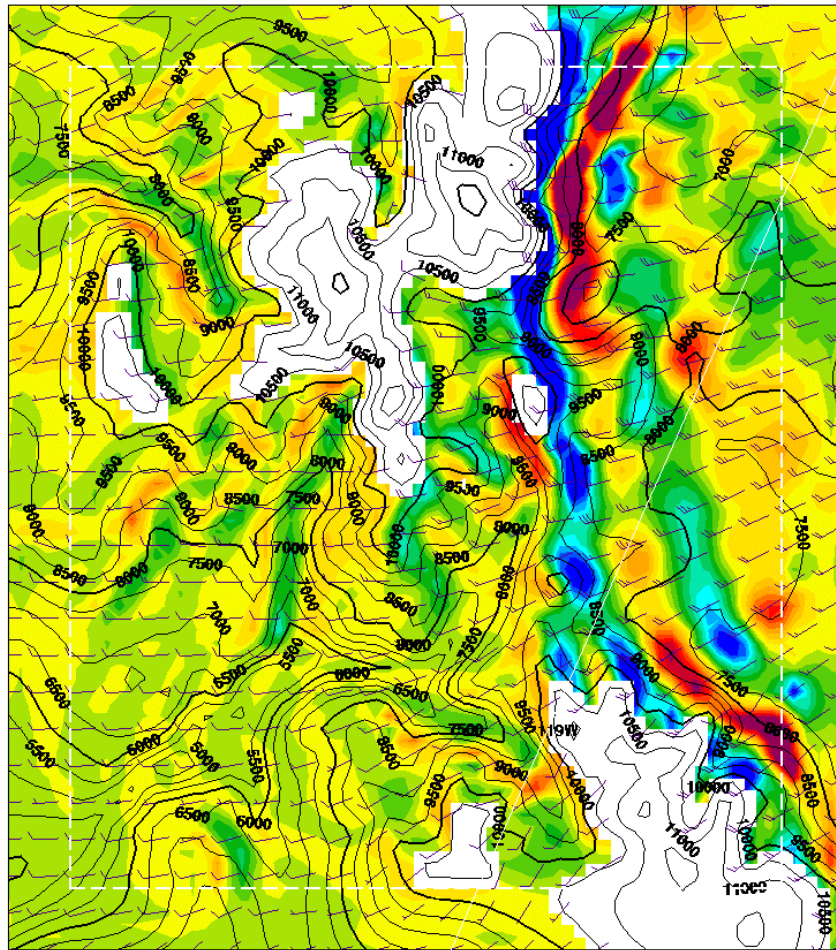
2007-09-03 16:30
slice X,Y= 37,37@90°



Vertical Velocity & Wind [kt] at 700mb

2007-09-03_16:30

DrJack BLIPMAP from RASP 0.8km ETA-initiated WRF-ARW model



FIXED
[cm/s]
COLOR

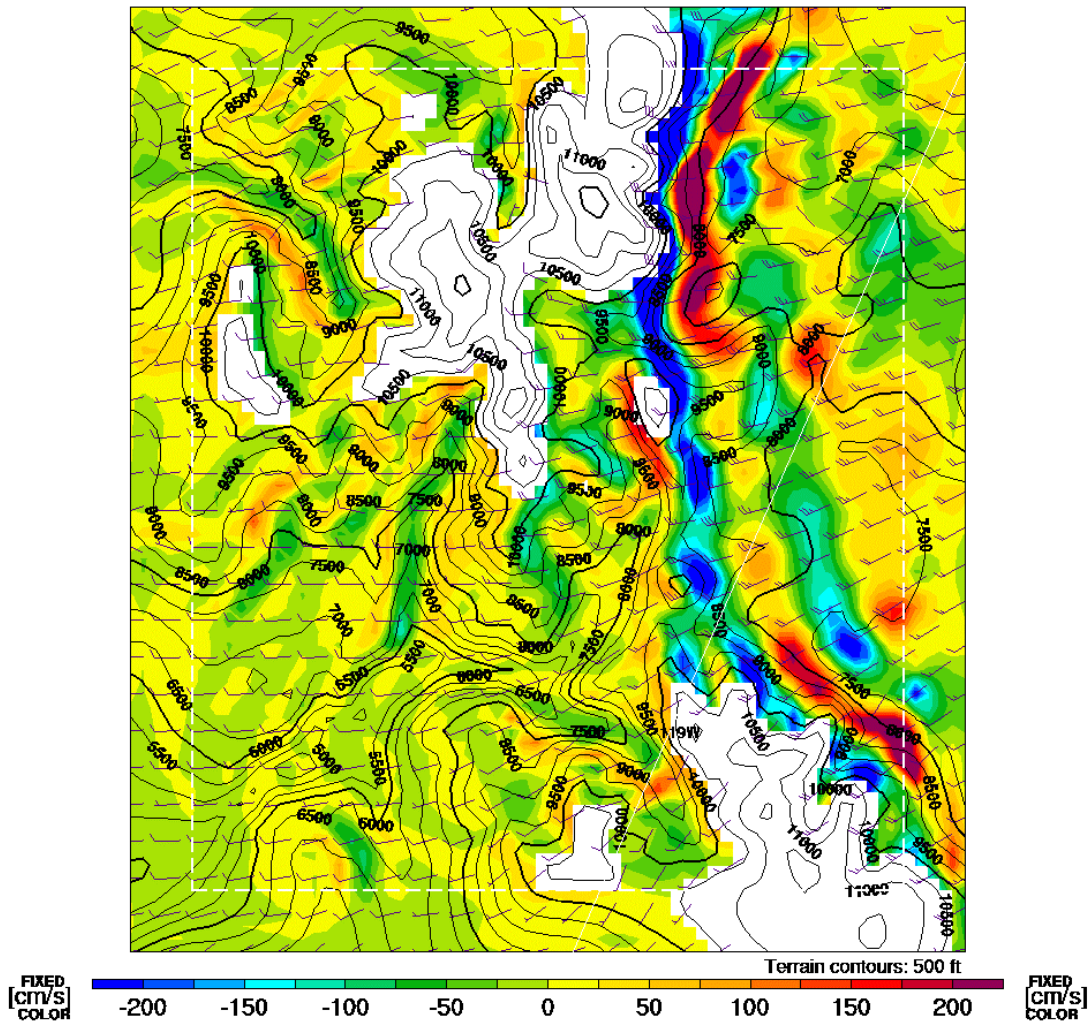
-200 -150 -100 -50 0 50 100 150 200

FIXED
[cm/s]
COLOR

Vertical Velocity & Wind [kt] at 700mb

2007-09-03_16:30

DrJack BLIPMAP from RASP 0.8km ETA-initiated WRF-ARW model



From: Dr. John W. Glendening [REDACTED]
Sent: Friday, October 31, 2008 5:38 PM
To: Salottolo Greg
Subject: Re: Fossett Accident on 9/3/07

Greg

I agree it would be good to speak in person - my home phone is [REDACTED] and I am retired so am often there during the day. For example I do plan to be home this PM if you have time to talk then. My main concern is establishing what I can/cannot provide to ensure

beforehand that my time spent will produce something that you think could be significant usefulness and value to you - I've seen too many cases where there have been misunderstandings in such cases, due to lack of communication, resulting in products being produced which were not useful to the end user.

But let me first give you some thoughts that occurred after sending my last email. It would seem to me that an important parameter for this case would be TKE. I normally use the "YSU" BL module in WRF-ARW since it is designed for thermally driven conditions, which soaring pilots are primarily interested in. However it does not produce a TKE forecast, so for this case I think it better to use the MYJ BL module since it does produce a TKE forecast and is better for shear-driven cases. I would then propose to produce a cross-section perpendicular to the mts with TKE values (and either w or theta) and plan-view TKE/w forecasts along constant-pressure surfaces. Actually it will take a bit of work to plot TKE since that is not a parameter I have plotted to date, but it should be straight-forward (though I can see my original time-required estimate is likely to be way low!).

To give you some background, before I retired I was a research meteorologist at NPGS and NRL-MRY with BL expertise, primarily using LES models. Since retiring I have been providing forecasts to soaring pilots by post-processing RUC/NAM output files to provide parameters of special interest to them, e.g. thermal updraft strength. But there were obvious limitations to that approach, particularly the relatively low resolution in regions of complex terrain, so then began using WRF-ARW model runs to provide similar parameters on grids down to 1.3km resolution (and as a pro bono effort to help the soaring community in general, I freely provide my program to others seeking to produce such parameters for their local soaring region - www.drjack.info/RASP). I should note that my display capabilities are limited, however, since I have only tried to use WRF-ARW in that "operational" environment, not for "research" - so my post-processing display facilities are limited to plan views, cross-sections, and soundings, i.e. I have not used any 3D visualization software, as one would do in a research environment.

Jack

On Friday October 31 2008 11:54, you wrote:

> Dr. Glendening:

>

> My name is Greg Salottolo and I am the NTSB meteorologist working on
> the Fossett case. I have the NAM12 and RUC20 data for this case.
> Also, Bob Sharman of NCAR has provided a turbulence analysis from the
> RUC13 data. Review of the NAM12 data suggests the possibility of
> waves in the accident area --- cross section plot of potential
> temperature. However, model vertical velocities are weak on the order
> of 20 feet per minute. As you note to try to define the environment
> will require higher resolution simulations. In this regard I believe
> running the WRF-ARW model at about a 1 kilometer or less resolution
> will be of use in this investigation. The parameters of interest
> would include vertical velocities, wind, pressure, and temperature

> profiles, and potential temperature cross sections.
>
> If you could provide a phone contact I would like to discuss this in
> more detail with you.
>
> Hope to hear from you soon.
>
> Regards ..
>
> Greg ..
>
> Gregory D. Salottolo
> National Resource Specialist, Meteorology
> National Transportation Safety Board
> Office of Aviation Safety
> Washington D.C. 20594
> Work Cell Phone: [REDACTED]
> email: [REDACTED]
>
>
>
> -----Original Message-----
> From: Struhsaker Georgia
> Sent: Thursday, October 30, 2008 12:53 AM
> To: Salottolo Greg
> Subject: FW: Fossett Accident on 9/3/07
>
>
> Greg, Here is the response from Dr. Glendening. Let me know what
> you think and please feel free to communicate with him directly.
>
> Georgia R. Struhsaker
> Senior Air Safety Investigator
> NTSB
> [REDACTED] Office
> (253) 275-2880 Fax
> [REDACTED] Cell
>
>
> _____
>
> From: Dr. John W. Glendening [REDACTED]
> Sent: Wed 10/29/2008 5:27 PM
> To: Struhsaker Georgia
> Cc: TomnKeyLargo [REDACTED]
> Subject: Re: Fossett Accident on 9/3/07
>
>
>
>
> I do not archive the graphic maps themselves but do archive the data
> values used to produce them, from which the graphics can be
> re-generated if necessary (on an individual basis). I have retrieved
> that data for 3 Sept 2008 and am attaching plots of Boundary Layer
> shear for 18z, 21z, and 0z generated from that data. If there were a
> need for other parameters that I produce (see
> <http://www.drjack.info/BLIP/INFO/parameters.html>) those could be

> similarly generated.
>
> However, I hasten to add that this data was produced by RUC model
> forecasts using a grid of 13 km spacing. As you know, in that region
> the terrain varies on a scale much smaller scale than 13 km so these
> results can only be considered suggestive.
>
> FYI I have occasionally produced forecasts for that region from a
> WRF-ARW model with a resolution down to 1.3 km horizontally (with
> similarly high resolution in the vertical). While I do not have
> results available for 3 Sept, they would not be too difficult to
> produce (starting from a NAM model initialization for that day) since
> I already have the requisite grids in place. However, before
> undertaking such a task (which would take about a half-day of my
> time) I would want to hear from you (i.e. your meteorologist!) how
> such data would be used, i.e. what parameters would be looked at,
> etc., to ensure that this effort would actually be useful,
>
> Steve Fossett was a subscriber to my on-line soaring forecasts and
> used them for several of his cross-country soaring record attempts.
> He had once emailed me suggesting we meet at a soaring convention -
> but since I was not planning to attend, I replied that "I'm sure we
> will run into each other someday". Since that cannot now occur, I am
> willing to spend some personal time aiding your inquiry if it will be
> useful.
>
> Jack Glendening
>
> PS: I also received an email from Tom Kelley so I am CC'ing him
> on this message.
>
> On Wednesday October 29 2008 16:55, you wrote:
> > Hello Dr. Glendening,
> >
> > I am the lead investigator on the National Transportation Safety
> > Board's investigation into the crash of Steve Fossett. I was
> > recently contacted by Mr. Tom Kelly, who told me he is an
> > experienced glider pilot. Mr. Kelly also told me that he had
> > checked your website on the day of the accident (09/03/07) and that
> > your vertical wind shear plots were showing two areas of extreme
> > (red) shear, one area near Elko, Nevada, and another area near
> > Mammoth Lakes, California. The wreckage of the airplane was found
> > on 10/01/08 about 8 miles west-northwest of Mammoth Lakes.
> >
> > My question to you is, do you archive your data? If so, the NTSB
> > would like to obtain a copy of the vertical wind shear plot Mr.
> > Kelly described. Also, if you have a data archive, I have an NTSB
> > meteorologist working with me, and I would like to put him in touch
> > with you as he may have other questions for you.
> >
> > Regards,
> >
> > Georgia R. Struhsaker
> > Senior Air Safety Investigator
> > NTSB
> > (██████████) Office
> > (253) 275-2880 Fax

> > ([REDACTED] Cell
>
>
> --
> Dr. John W. (Jack) Glendening Meteorologist
> ___ Empowering soaring pilots since 1999 ___

--
Dr. John W. (Jack) Glendening Meteorologist
___ Empowering soaring pilots since 1999 ___

From: Dr. John W. Glendening [REDACTED]
Sent: Saturday, November 01, 2008 9:17 PM
To: Salottolo Greg
Subject: Re: Fossett Accident on 9/3/07

Greg

Rains Saturday forced me to cancel my planned hike, so I took the opportunity to look more closely at what I had previously done and will pass this on to you as background for our phone call.

I looked at my previous "SIERRA" grid runs and found they actually only used 2 nests, i.e. down to 4km resolution, which means I will need to add another nest to get to 1.33 km resolution. That is not difficult, and would in any case need to be done to hone in on the area of interest, but I decided to wait until talking with you before making any decisions on that. (I had been remembering a run just north of that, which did use 3 nests). BTW, by happenstance the center of the SIERRA grids is nearly ideal, with a center lat/lon at 37.65,-119.0.

Since I already had those grids in place and had some unexpected free time, I decided to go ahead and do a preliminary run to 4 km to see what it looked like. I've produced some plots which will give you an opportunity to see the sort of plots I can produce and something for us to talk about. Attached are plots for Sept 3, 2007 at 21z (I don't know what time frame you are actually looking at) for:

(1) a forecast sounding at the grid point closest to 37.659,-119.126,
(2,3) cross-sections of both w and TKE, and
(4,5) 700mb plan views of both w and TKE (in these, note that the location of the cross-section slice is indicated by a dashed line and the location of the sounding is indicated by a hard-to-see "1", which is also along the cross-section line).

Note that in the cross-sections, the reason for TKE appearing is in most cases because the pressure level enters the BL, not because TKE is being produced above the BL. Also note that the forecasts near the boundary, i.e. outside the dashed frame in the plan view, should be disregarded as they are subject to boundary interaction inaccuracies.

One thing I will need to learn from you is the area and time range of interest for the 1.33 km run.

Jack

--

Dr. John W. (Jack) Glendening Meteorologist
___ Empowering soaring pilots since 1999 ___
From: Dr. John W. Glendening [REDACTED]
Sent: Sunday, November 02, 2008 2:08 AM
To: Salottolo Greg
Subject: Re: Fossett Accident on 9/3/07

And an example of a surface wind plot.

--

Dr. John W. (Jack) Glendening Meteorologist
___ Empowering soaring pilots since 1999 ___
From: Dr. John W. Glendening [REDACTED]
Sent: Sunday, November 02, 2008 5:40 PM
To: Salottolo Greg
Subject: Re: Fossett Accident on 9/3/07

OK, I had planned to be home Monday. Jack

On Sunday November 2 2008 05:28, you wrote:

> Good Morning:
>
> Plots of these parameters will be useful. The time we are looking at
> is about 1630Z.
>
> I will give you a call some time late morning (your time) tomorrow if
> OK.
>
> Thanks for the work you have done so far.
>
> Greg ...
>
>
> -----Original Message-----
> From: Dr. John W. Glendening [REDACTED]
> Sent: Sun 11/2/2008 2:07 AM
> To: Salottolo Greg
> Subject: Re: Fossett Accident on 9/3/07
>
> And an example of a surface wind plot.

--

Dr. John W. (Jack) Glendening Meteorologist
___ Empowering soaring pilots since 1999 ___
From: Dr. John W. Glendening [REDACTED]
Sent: Monday, November 03, 2008 1:42 PM
To: Salottolo Greg
Subject: Simplified model ruins

Greg

I'm glad we were able to introduce ourselves to each other.

FYI I did find a link to the NCAR/COMET "simplified modelling" system

intended to be run by those lacking much previous modelling experience
- see <http://strc.comet.ucar.edu/wrf/index.htm>
However, it appears that their plotting can only provide constant
pressure level plots, not cross-sections or soundings - but perhaps
that will come, or possibly some other user has extended the plotting
to produce such.

Jack

--

Dr. John W. (Jack) Glendening Meteorologist
___ Empowering soaring pilots since 1999 ___

From: Dr. John W. Glendening [REDACTED]
Sent: Thursday, November 06, 2008 3:20 PM
To: Salottolo Greg
Subject: Re: Simplified model ruins

Greg

Attached are three plots from a 0.8km resolution grid run of WRF-ARW:
a 700mb plan view, a cross-section, and a sounding. I tried calling
but you were not - I hope to discuss this sometime.

FYI I noticed that a 0.5km resolution grid gives a significantly
higher height to the ridge immediately to the NNW of the sounding
location, so I wondered how great and increase in vertical velocities
would be produced by such a run and initiated same - but that is taking
much longer than I had anticipated,

Notes/Caveats:

() Sounding and "1" plotted on plan view are for grid point closest to
-119.126,37.659.

() grid is oriented parallel to mountains, hence North is not "up".
See white longitude line for north direction.

() slice is through location "1" parallel to x axis

() model is initialized from relatively smooth field, lacking many
smaller-sized eddies, hence actual conditions will have many more
small scale eddies than forecasts.

() Actual terrain in that region has smaller-scale variations than
included in forecast terrain grid, hence stronger updrafts/downdrafts
than modelled.

() The terrain data from which the terrain grid is created has a
resolution of 30", which at that latitude means a mean square
resolution of 0.7 km, so is a fundamental limitation to the
resolution.

Jack

--

Dr. John W. (Jack) Glendenning Meteorologist
___ Empowering soaring pilots since 1999 ___
From: Dr. John W. Glendenning [REDACTED]
Sent: Thursday, November 06, 2008 4:53 PM
To: Salottolo Greg
Subject: Re: Simplified model ruins

Greg

Attached are cross-sections taken approx. parallel to wind direction (white dashed line in plan view). Again, I expect these vertical velocities to be greatly underpredicted due to the lack of sufficient terrain resolution, even at 0.8km.

Jack

--

Dr. John W. (Jack) Glendenning Meteorologist
___ Empowering soaring pilots since 1999 ___
From: Dr. John W. Glendenning [REDACTED]
Sent: Thursday, November 06, 2008 4:59 PM
To: Salottolo Greg
Subject: Re: Simplified model ruins

Oops, I forgot to mention that for all the cross-sections, I just discovered that the vertical scale is incorrect - it actually represents the height above the minimum elevation over the domain. For this domain that is around 4000 ft, so that value should be added to the plotted height to get the actual height. I had never noticed that before because I've always plotted domains which had at least one grid point close to sea level - I need to come up with a fix for that but have not yet done so.

Jack

--

Dr. John W. (Jack) Glendenning Meteorologist
___ Empowering soaring pilots since 1999 ___
From: Dr. John W. Glendenning [REDACTED]
Sent: Thursday, November 06, 2008 10:16 PM
To: Salottolo Greg
Subject: Re: Simplified model ruins

Forgot the sfc wind. Jack

--

Dr. John W. (Jack) Glendenning Meteorologist
___ Empowering soaring pilots since 1999 ___

From: Dr. John W. Glendening [REDACTED]
Sent: Friday, November 07, 2008 1:54 PM
To: Salottolo Greg
Subject: Re: Simplified model ruins

Greg

To allow vertical velocity magnitudes near the "fossett" region be better distinguishable, I've created an attached 700mb plot in which I've truncated the color plotting at +/- 200 cm/sec - it shows downdrafts up to 150 cm/sec near the terrain in that region.

Jack

--

Dr. John W. (Jack) Glendening Meteorologist
___ Empowering soaring pilots since 1999 ___