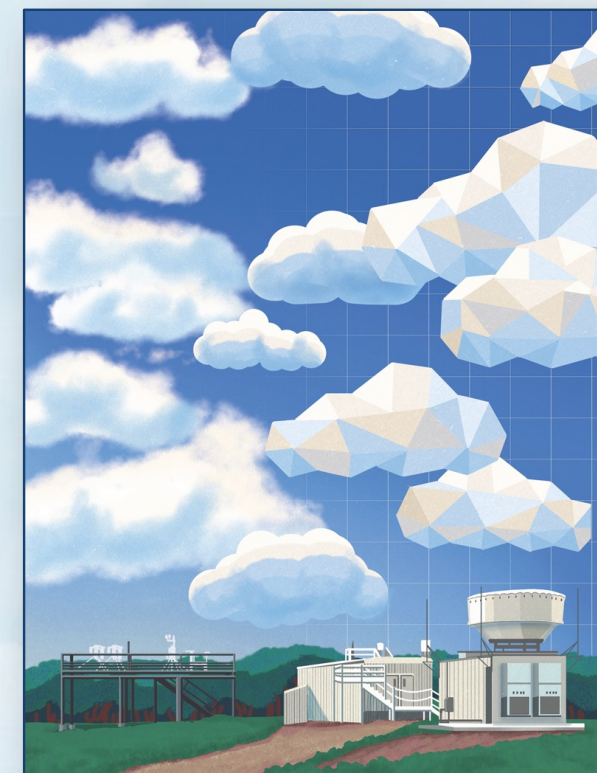


Improving Understanding of Deep Convection Life Cycle Using LASSO-CACTI

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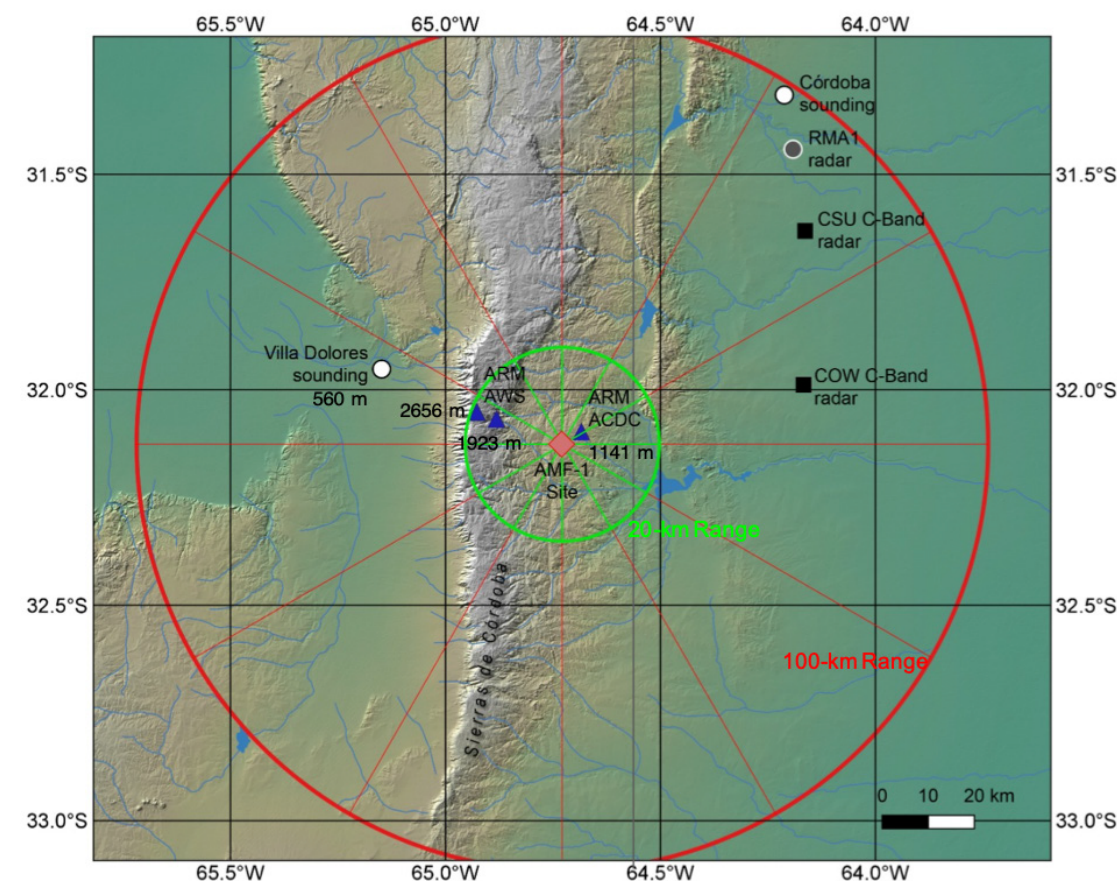


More detailed LASSO-CACTI talk at the Deep Convection Lifecycle Breakout on Wed.

What is LASSO & LASSO-CACTI?

- ▶ LASSO = LES ARM Symbiotic Simulation and Observation
- ▶ LASSO seeks to add value to ARM observations by using high-resolution modeling to bridge scale gaps and add context to observations
- ▶ LASSO will use large-eddy simulation (LES) to simulate ~10 CACTI cases with results released in 2022

Map of CACTI Deployment in Argentina

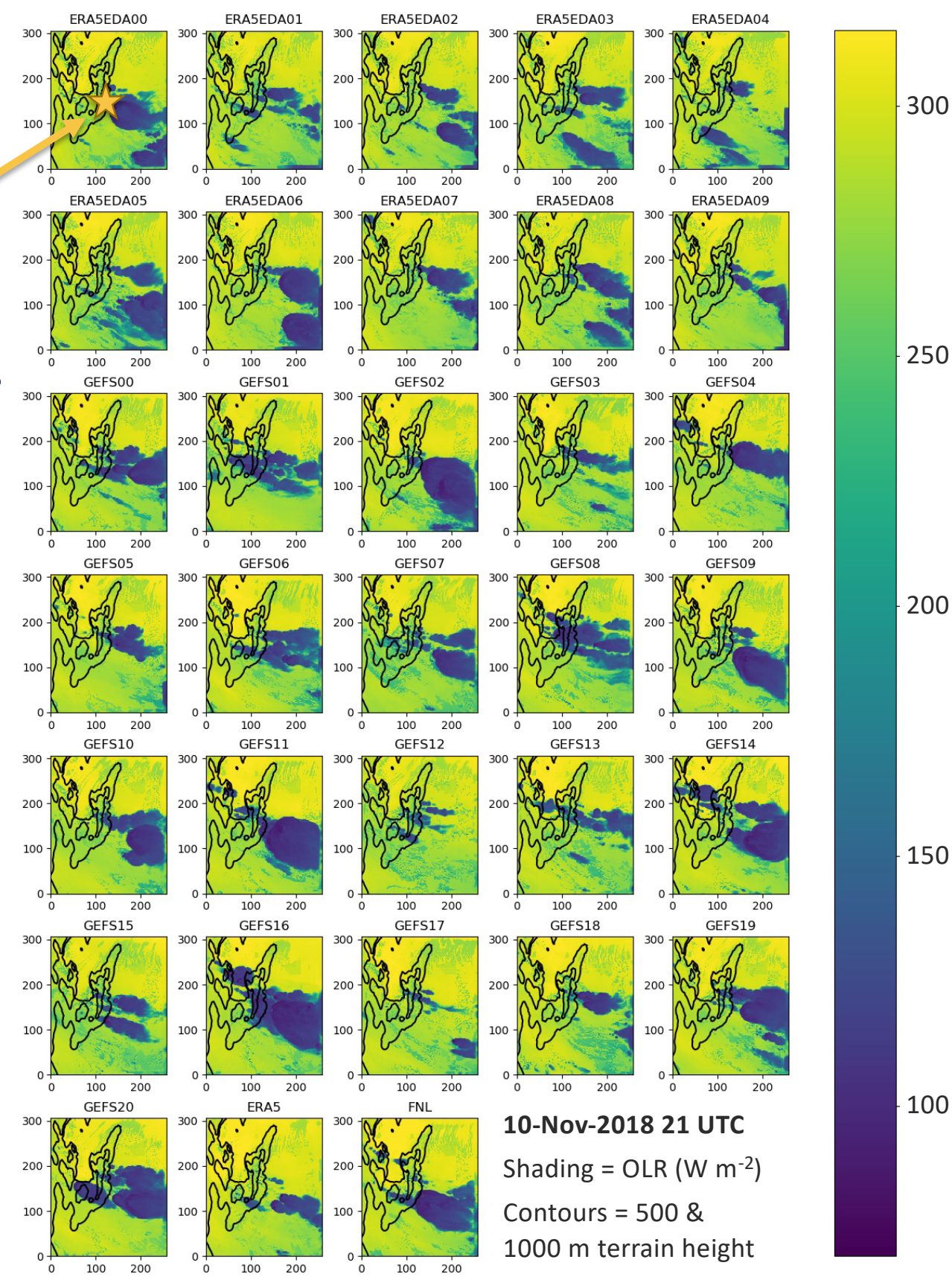


Mesoscale ensembles for case selection and LES boundary condition choices

- ▶ Ran mesoscale ensembles for 20 candidate case dates—example for 10-Nov-2018 at right
 - 33 ensemble members based on ERA5, ERA5 Ensemble, FNL, and GFS Ensemble
 - Nested down to 2.5 km grid spacing
 - Best performing ensemble members identified based on cloud comparison to GOES-16 IR data
- ▶ Will use the chosen mesoscale runs as boundary conditions for the LES
- ▶ Will make available the full mesoscale ensembles along with the fewer number of LES runs

AMF

OLR: Ensemble of $\Delta x=2.5$ km Runs Based on Boundary Dataset



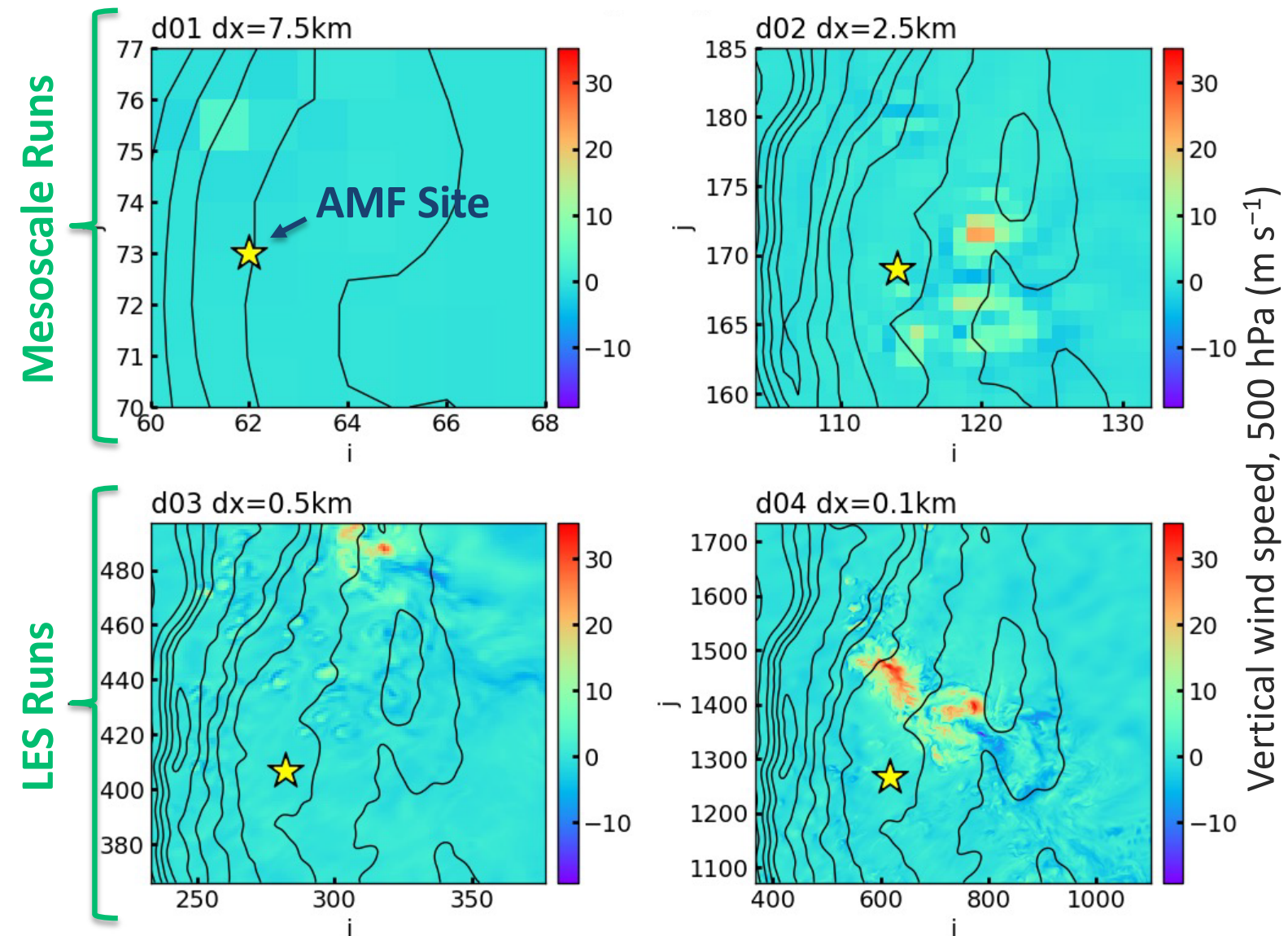
Large-eddy simulations for CACTI

- ▶ Using a 4-nest WRF configuration
 $\Delta x = 7.5 \text{ km} + 2.5 \text{ km}$, Ndown to 500 m + 100 m
- ▶ Panels at right demonstrate increased detail available in up/down-drafts gained at $dx = 100 \text{ m}$
 - Topographic ridge & slope captured more accurately in terrain dataset at high resolution
 - Note ringing of downdrafts more prominently seen at $dx = 500 \text{ m}$ (d03)
 - Getting more natural, turbulent looking drafts at $dx = 100 \text{ m}$ (d04)

Resolution Comparison for WRF Domains

Vertical Velocity at 500 hPa

25-Jan-2019 20 UTC



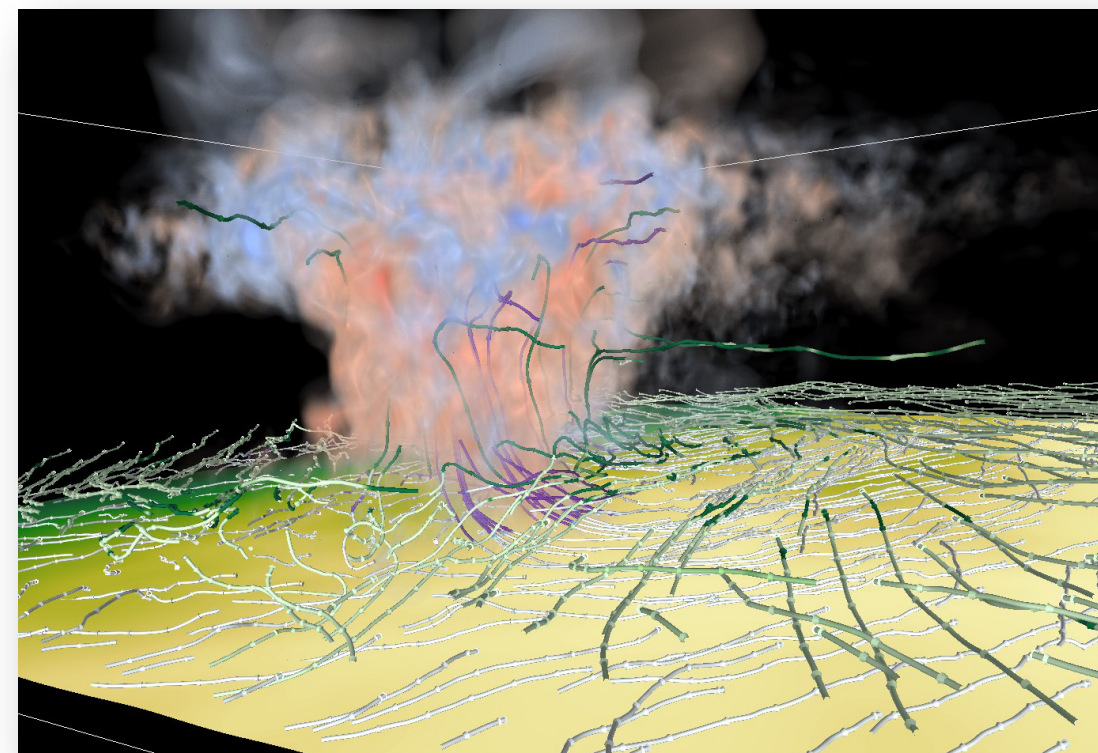
Contours = Terrain height, 300 m interval

What outputs should be provided?

- ▶ Beyond typical WRF output, what variables do you want to see from the LES?
 - Basic microphysical process rates
 - Variables necessary for running CR-SIM
 - Converted WRF nuances, e.g., destaggered winds, P+PB

- ▶ How frequently should output be provided for each scale?
 - $\Delta x = 7.5$ km and 2.5 km domains \rightarrow 15 min.
 - $\Delta x = 500$ m \rightarrow 15 min.
 - $\Delta x = 100$ m \rightarrow 5 or 15 min. for full run
1 min. for several hours around initiation
10 sec. for short period (how long?)

WRF, $\Delta x = 100$ m Vertical Velocity of Cloud Core Region and Streamlines, 25-Jan-2021 20 UTC



View: from SE of AMF Site

Shading: Red=W Up; Blue=W Down

Streamlines: Seeds at 2 km AMSL (white-to-purple) and 5 km AMSL (light to dark green); darker colors indicate w/n cloud

Join us for a LASSO-CACTI session this summer!

Join the community: new online forum for LASSO!



► Check out the new online forum for LASSO:
<https://discourse.adc.arm.gov/>

- Use it for user support, discussing scenario development, and related topics around LASSO and ARM

► Join us for an online session to discuss finalizing LASSO-CACTI details

- Date and time to be determined; will likely happen this summer
- Will advertise via the LASSO email list and the ARM newsletter

The screenshot shows the ARM Forum website at discourse.adc.arm.gov. The page features a dark blue header with the ARM logo and navigation links for 'arm.gov', 'Sign Up', and 'Log In'. A welcome message reads 'Welcome to the ARM Forum!' with a subtitle 'The world's premier ground-based observations facility advancing atmospheric and climate research'. Below the header, there are navigation tabs for 'all categories', 'Categories', 'Latest', and 'Top'. The main content area is a table of forum topics:

Category	Topics	Latest
Getting Started New to the ARM Forum? Learn more here about the Department of Energy (DOE) Atmospheric Radiation Measurement (ARM) Facility, browse FAQs, learn where to go to get more information, and review rules that will help make the forum a helpful resource.	3	Welcome to the ARM Forum! 1 Mar 30
LASSO This category is devoted to the Large-Eddy Simulation (LES) ARM Symbiotic Simulation and Observation (LASSO) activity. LASSO enhances ARM observations by using LES modeling to provide context and a self-consistent representation of the atmosphere surrounding a particular ARM site. ■ General LASSO Discussion ■ LASSO Shallow-Cumulus Scenario ■ LASSO-CACTI Scenario	2	LASSO-COGS data now available 0 12d ■ LASSO Shallow-Cumulus Scenario Getting help about ARM 0 14d ■ Getting Started Forum Guidelines and Etiquette 1 20d ■ Getting Started Register for the LASSO Tutorial on 20-May-2021 0 25d ■ General LASSO Discussion ARM Commenting Guidelines 1 26d ■ Getting Started
Uncategorized Topics that don't need a category, or don't fit into any other existing category.	1	
Site Feedback ARM welcomes feedback on this forum and how we can	0	